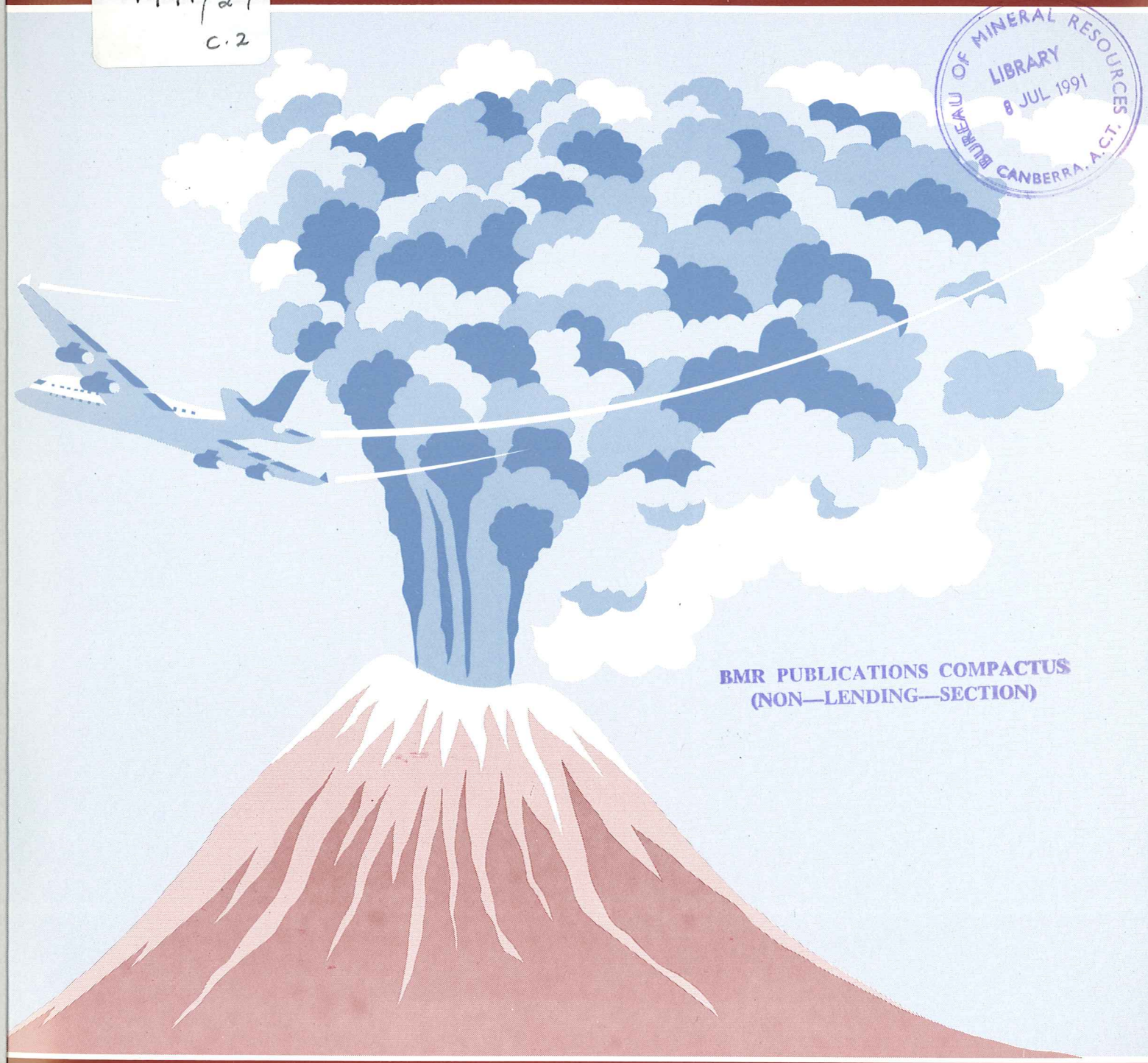
IMPACT OF VOLCANIC ERUPTIONS ON THE MIDDLE ATMOSPHERE
AN ANNOTATED BIBLIOGRAPHY

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS



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IMPACT OF VOLCANIC ERUPTIONS ON THE MIDDLE ATMOSPHERE: AN ANNOTATED BIBLIOGRAPHY

R.W. Johnson

Introduction

The authors of the works listed in this bibliography deal with the ways in which volcanic eruptions impact on the earth's atmosphere at heights between a few kilometres and about 50 kilometres - that is, in the upper parts of the troposphere and the lower parts of the stratosphere. These are the heights at which volcanic materials have the greatest effect on climatic change and where aircraft are most likely to encounter, and be threatened by, volcanic ash and aerosols.

Background and development

The bibliography was designed originally in 1985 for the personal use of the author in his role as a contributing member to the Australian Working Group of the Volcanological/Airspace Liaison Committee Australia/Indonesia (VULCAN-AUS). VULCAN was established by aviation authorities in Australia and Indonesia to help mitigate the effects of Indonesian volcanic-ash clouds on aircraft operating in the Australia-Indonesia region. The bibliography grew substantially after 1986 as more of the literature was searched and as wider aspects of the impact of eruptions on the middle atmosphere were encountered. This wider search coincided with growing international interest in atmospheric warming resulting from forecasted 'greenhouse' effects and, more particularly, in the effect of high-rising eruption clouds and aerosols on forcing climate change.

The literature on this subject is expanding rapidly and no claims are made that this edition of the annotated bibliography is either all-embrasive or comprehensive. However, the bibliography should be of use to those (1) wishing to begin accessing the literature on this subject, (2) requiring a basic check-list for their own literature research, or (3) needing general information

on the contents of certain papers without themselves wanting to spend time locating and reading the entire work of interest. The references contained in the bibliography represent a subset of the computer-based database called VLBIB (Volcano Bibliography) at the Bureau of Mineral Resources, Canberra. Each reference is assigned up to 14 keywords that allow computer searches to be made of relevant references, thus permitting shorter, more specific versions of the bibliography to be obtained on request, if necessary.

Content

The bibliography covers three main discipline areas - namely, Aircraft/Aviation, Volcanology, and Remote Sensing. This is reflected in the three main groups of subject keywords. Multidisciplinary links between the remote-sensing and both of the aviation and volcanological communities are well established, but only recently have the ties been strengthened between aviation and volcanology groups. This bibliography may be regarded as a further attempt to link volcanologists and those in aviation who, increasingly, are recognising the importance of volcanology in assisting efforts to mitigate the threat to aircraft caused by volcanic eruptions. Volcanologists, in turn, recognise the considerable value of aircraft pilots as 'front line' observers of volcanic activity.

Keywords

The keywords used in the bibliography fall into six groups. Further explanations are given below for all of the keywords. Note that the group names are not themselves keywords, except for Remote sensing.

VOLCANOLOGY:

Aerosols refers to fine, stratospheric matter of both solid particulate and liquid (mainly sulphuric acid) materials. There is a very large scientific literature on aerosols, but the entries in this bibliography deal almost entirely with aerosols of volcanic origin only.

Ash characteristics refers to the physical characteristics of volcanic-ash particles in the middle atmosphere and, particularly, to ash sampled using research aircraft. Extensive references exist in the volcanological literature on the characteristics of ash sampled on the ground by geologists, but these generally are excluded from this bibliography. The emphasis is on fine-grained ash that has residence times in the atmosphere of the order of days to months rather than minutes to hours.

Atmosphere loading refers to those bibliographic entries that deal with estimates of the mass injection of volcanic materials into the middle atmosphere - for example, the total amount of sulphur dioxide released to the atmosphere during a single eruption. The references may contain mass estimates based on satellite imagery and on volcanic-discharge rates and magma volumes made by volcanologists.

Eruption frequencies: 'How often are volcanoes active?' is a common question. This keyword refers to references that deal with the frequency and periodicity of volcanic eruptions.

Cloud dynamics: The ways in which eruption clouds develop and drift away from source volcanoes are grouped under this keyword heading. The references include theoretical assessments of the physics of eruption-column development as well as cloud-migration characteristics deduced from satellite imagery.

Gas/vapour plumes: The chemical composition and abundances of gases and vapours in eruption clouds are dealt with under this keyword. The heading refers to the gases of clouds produced during explosive eruptive activity as well as the plumes from volcanoes in repose.

Volcano lists refers to basic catalogues of information on volcanoes world-wide - name, location, volcano type, eruptive history, and so on - but also of volcanoes that are known to have had a particular effect on the middle atmosphere.

Volcano distribution refers to bibliographic entries that deal with the locations of volcanoes world-wide or on a regional scale.

Volcanic prediction: There is an extensive volcanological literature on the prediction of volcanic eruptions. Only a selection of general articles on the principles of volcanic prediction are included in the bibliography, although the keyword also refers to articles on prediction capabilities at a few volcanoes that have had significant atmospheric impact.

AIRCRAFT/AVIATION:

Airport effects refers to examples where volcanic ash has fallen on airports, disrupting aircraft landings and take-offs.

Ash encounters. This keyword covers incidents of aircraft encountering ash clouds during flights well away from airports, particularly airliners on international flights over volcanically active areas.

Damage reports appear in the bibliography and deal with the effects of injestion of ash into engines, damage to aircraft exteriors, and the corrosive effects of long-lived aerosols.

Defensive inflight measures. Advice is given to pilots on how to cope with volcanic ash-cloud encounters in reports identified by this keyword. Most of the reports are from aviation authorities.

Early-warning measures have been devised in some countries to prevent aircraft from flying into ash clouds. The reports deal mainly with new procedures devised by ICAO and national aviation authorities, commonly in association with volcanolgical observatories, meteorological bureaux, and organisations dealing with satellite imagery.

Electrical effects is a keyword referring to the electrification characteristics of volcanic-eruption clouds (for example, lightning) as well as the electrical effects observed on aircraft external parts, such as cockpit windscreens and leading wing edges ('St Elmos fire').

FAA is the acronym for the Federal Aviation Administration in the United States.

ICAO is the acronym for the Montreal-based International Civil Aviation Organisation.

Routes and schedules refers to those entries that deal with aircraft routes and timetables and with the rerouting of aircraft around volcanoes and volcanic clouds.

Working groups: Several working groups and committees have been established to investigate the effect of volcanic ash clouds on aviation - for example, VULCAN-AUS and the ICAO Ash Warning Study

Group. The keyword refers mainly to the minutes of meetings and to reports produced by these groups.

REMOTE SENSING:

Images taken from satellites and aircraft provide fundamental information on eruption clouds that are of value in studying the global effects of volcanic activity and the likely impact of individual eruption clouds on aviation. The keywords under this Remote Sensing heading are mainly the names of particular meteorological and research satellites, or satellite series, that are able to provide regional imagery of particular importance in the identification and tracking of eruption clouds (LANDSAT and SPOT are excluded from the list as their 'footprints'are restricted and as the satellites have not been used for the tracking of eruption clouds over long distances).

Earth Observation System: EOS is a planned space platform that will have wide-ranging application to the monitoring of volcanic eruptions from space.

GMS satellite: The Japanese Geostationary Meteorological Satellite provides images in the visible and infra-red of the Pacific region. GMS is used extensively for meteorological purposes in the Australian region. Volcanic eruption clouds have been identified with its imagery, including many in the Indonesian region - particularly, Galunggung in 1982, Colo in 1983, and Soputan in 1985.

GOES/SMS satellites: the United States has two Geostationary Operational Environmental Satellites (GOES) covering areas that include the western and eastern parts of the USA. SMS refers to Stationary Meteorological Satellite and was the early name of the satellite series. GOES was used extensively in the tracking

of eruption clouds from Mount St. Helens in 1980 and from El Chichon (Mexico) in 1982.

Infrasonics: Explosive volcanic eruptions produce sound waves that can be detected world-wide using sensitive geophones. Infrasonics arrays are not used widely, but there is a potential for their use world-wide in the development of an early-warning system for aviation.

INSAT satellite refers to the Indian geostationary meteorological satellite that complements the GMS and GOES imagery in the Pacific region. It has not been used significantly for volcanic-ash cloud identification.

Lidar: Light Detection and Ranging systems (or 'light radar') are used at both ground-based stations and on research aircraft to monitor atmospheric aerosol loadings.

METEOSAT is the name of the European meteorological satellite that complements GMS, GOES, and INSAT. METEOSAT has been used to monitor eruptions clouds from Etna volcano, for example.

Military satellites are capable of obtaining valuable images of volcanic eruption clouds, but the images generally are not widely available (see, however, Moore & Rice, 1984, who used military-satellite images of Mount St. Helens eruption clouds).

NIMBUS/TOMS satellites carry the Total Ozone Mapping Spectrometer which is capable of discriminating volcanic clouds (carrying sulphur dioxide) from normal weather clouds.

Radar: Ground-based meteorological radar systems close to volcanoes are useful in tracking eruption clouds. The keyword is used also for references in which airborne radar equipment on board

commercial aircraft is described as being ineffective in detecting volcanic clouds.

Remote sensing is a general keyword covering all aspects of remote sensing: satellite imagery, airborne observations, and ground-based systems such as radar and lidar.

SAMII/SAGE sensors on board the Nimbus 7 and Application Explorer Mission-B (AEM-B) satellites have been used to map the extent and characteristics of aerosols on a global scale.

Spectral characteristics is a general keyword that covers the characteristics of volcanic ash clouds determined using different parts of the electromagnetic spectrum, especially employing multi-spectral scanners and other radiometers.

Manned spacecraft refers to photographs of volcanic plumes and active volcanoes taken by astronauts from space.

TIROS satellites: The acronym stands for Television Infra-Red Operational Satellite and refers to the polar-orbiting series of satellites of the National Oceanic and Atmospheric Administration in the United States. The satellite series is known commonly as 'NOAA satellites'. They carry the Advanced Very High Resolution Radiometer (AVHRR) that can be used to discriminate volcanic clouds from normal weather clouds.

COUNTRIES AND REGIONS:

The countries listed by individual keywords include particularly all those volcanically active countries of the western and south-western Pacific and southeast Asian region - from Indonesia in the west through the Philippines and Papua New Guinea, to the

Solomon Islands, Vanuatu, and Tonga-Kermadec, to New Zealand in the southeast.

Antarctica has active volcanoes, but the keyword refers mainly to the record of volcanic activity preserved in ice cores (tephra layers and acidity profiles, or to investigations of the aerosol content of the Antarctica atmosphere.

Australia is used for entries that deal with ash clouds and aerosols in Australian air space and for authors of the contributions concerned who are Australian.

Europe covers all European volcanoes (mainly Etna) and airspace.

United States covers the active volcanoes of the conterminous western United States and Alaska and the Aleutian Islands. The keyword is used also for investigations of the volcanic content of the middle atmosphere by US atmospheric scientists, but not for other US-authored contributions.

VOLCANOES:

Twenty-six volcanoes are identified by individual keywords, as shown in the following list. These are the volcanoes whose eruptions are referred to most commonly in the literature and which have had the most significant impact on the middle atmosphere. All but one of the volcanoes is in the Pacific region, mostly in the Circum-Pacific 'Ring of Fire'.

Agung: Agung volcano on the island of Bali in Indonesia produced a major eruption in 1963 that had a significant impact on the middle atmosphere.

Alaid is an island volcano in the USSR Kurile Islands. Images of its eruption plumes have been obtained from space.

Augustine volcano in Alaska is close to the city and international airport of Fairbanks where aircraft movements were affected by Augustine eruptions in 1976 and 1986.

Colo volcano is on the island of Una Una in Suluwesi, Indonesia. An eruption in 1983 resulted in an aircraft/ash-cloud incident.

El Chichon, Mexico, produced major volcanic activity in 1982. This resulted in a massive injection of volcanic materials into the atmosphere.

Fuego is a Guatemalan volcano that had an eruption in 1974, producing long-lived aerosols that were distributed globally in the stratosphere.

Galunggung is in western Java, Indonesia. Its activity in 1982 produced high-rising eruption columns that interfered with aircraft, resulting in multiple engine failures on two 747 airliners.

Katmai volcano, Alaska, had a major eruption in 1914. Its atmospheric impact was studied by atmospheric scientists and meteorologists, particularly in the United States.

Krakatau in the straits between Sumatra and Java, Indonesia, produced a catastrophic eruption in 1883 that had globally widespread atmospheric effects.

Laki is a high-latitude volcano in Iceland. Its 1783 activity was of the fissure type, resulting in the emplacement of voluminous lava flows. However, the eruption also led to major atmospheric and climatic effects that were reported in Europe.

Lamington is a volcano in Papua New Guinea whose explosive activity in 1951 caused aircraft diversions.

Manam is one Papua New Guinea's two most active volcanoes. The atmospheric impact of its activity is referred to only occasionally in the literature.

Mount St. Helens is in Washington state, western United States. The atmospheric effects of its 18 May 1980 eruption were studied extensively. Aircraft movements were affected also by the volcanic activity.

Mystery volcano refers to the source of globally distributed aerosols that were discovered by atmospheric scientists, mainly using lidar, in early 1982. The source remained uncertain for some time before the African volcano Nyamuragira was identified as having produced a stratospheric injection in late 1981.

Nevado del Ruiz in Columbia is infamous for the volcanic activity in 1985 that resulted in the deaths of about 20,000 people from mudflows. Its explosive activity also interfered with aircraft movements around the volcano.

Nyamuragira is the African volcano that produced an stratospheric injection of aerosols in late 1981. It is referred to as the 'Mystery volcano' in the literature (see above) because it was not identified immediately as the source volcano of the aerosols.

Pagan is an island volcano in the Northern Marianas. Its eruption clouds have been distinguished on satellite imagery.

Rabaul is an active caldera volcano in Papua New Guinea. The latest event of caldera formation took place about 1400 years ago. This probably had a major climatic impact as some authors

correlate recorded famines in China and dry fogs in Europe with the Rabaul event.

Redoubt volcano, Alaska, produced an eruption in December 1989 that resulted in the multiple-engine failure of a KLM 747 airliner.

Sakurajima, Japan's most active volcano, is 25 km from Kagoshima international airport on the island of Kyushu. The volcano poses a threat to aviation in the area.

Sierra Negra is an active volcano in the Galapagos Islands, eastern Pacific. It has produced stratospheric injections of aerosols that that have been detected by satellites and lidar.

Soufriere is the name of two Caribbean volcanoes in the Lesser Antilles - one on St Vincent, the other on Guadeloupe. Eruptions from the St Vincent Soufriere in 1979 produced stratospheric aerosol injections that were studied intensively.

Soputan is an active volcano on Sulawesi in Indonesia. A Qantas 747 aircraft ran into Soputan ash in 1985.

Tambora volcano in Indonesia produced a major eruption in 1815 that ranks as the greatest in historical time. This eruption had an important effect on climate, leading to what is referred to widely as the 'Year without a Summer' in Europe because of the dry fogs of volcanic origin that cut down solar radiation.

Tarawera, a New Zealand volcano, had an important explosive eruption in 1886 that is commonly referred to in the literature on the climatic effects of volcanic eruptions.

Ulawun is a frequently active volcano on New Britain island in Papua New Guinea. A short-lived eruption in 1981 produced a stratospheric injection that was detected by satellite monitoring.

MISCELLANEOUS:

Climate change refers to those references that deal with the influence of volcanic eruptions in forcing climatic changes in both the short and long term.

Glacier records. Drill cores in glaciers reveal a history of volcanism by the presence of acidic layers caused by aerosols settling and of ash layers from commonly nearby volcanic centres.

Meteorology. Some references in the bibliography are from meteorological journals where reports of weather conditions include references to volcanic eruptions.

Acknowledgments

Assistance with the location and photocopying of many articles was provided by Bev Allen, Deanne Dorn, and Anna McCall of the BMR Library. Their valuable help is gratefully acknowledged. Thanks are extended also to the many authors who provided me with copies of their work in this field. Del Stafford and Pam Kirkpatrick undertook most of the entry of the bibliographic data. Their assistance too is greatly appreciated. Jan Knutson and David Palfreyman kindly reviewed the accompanying text to the bibliography.

BIBLIOGRAPHY

ABBOT, C.G.,, FOWLE, F.E.
1913
Volcanoes and climate.
JOURNAL/PUBLISHER Smithsonian Miscellaneous Collections
VOLUME/PAGE NO. 60 (29), 1-24
SUBJECT KEYWORDS * Climate change * Indonesia * Japan * Katmai * Krakatau * Meteorology * Philippines * United States *

Measurements of solar radiation during 1912 were made in Algeria and California, and reductions in radiation are attributed to the Katmai eruption, Alaska. The authors also review the atmospheric effects of previous historical eruptions. They conclude that the 1912 Katmai eruption affected terrestrial temperatures.

REFERENCE NO. A00400

ACKERMAN, M., LIPPENS, C.
1982
Forward scattering and backscattering of solar radiation by the stratospheric limb after Mount St. Helens eruption.
JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication
VOLUME/PAGE NO. 2240, 299-303
SUBJECT KEYWORDS * Aerosols * Mount St. Helens * Remote sensing * United States *

Stratospheric limb-radiance profiles versus altitude of closest approach of line of sight to the Earth's surface were measured before and after the Mount St. Helens eruption by photography from a Sun-oriented balloon gondola over France above 35 km altitude. Details of aerosol height, scattering characteristics, and colour are given in a short report.

REFERENCE NO. A00387

Note: Spaces such as this have been inserted in the bibliography where a slightly longer entry than usual would otherwise be split between two pages. Complete entries are printed on single pages in order to facilitate easy photocopying of individual entries.

ADAMSON, H.P., GRAY, R.G., ROGERS, D.R.

1986

A review of airborne infrared advanced warning research on air turbulence.

JOURNAL/PUBLISHER Turbulence Prediction Systems, Boulder, Colorado, unpublished report

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Defensive inflight measures * Early-warning measures * Meteorology * Remote sensing * Spectral characteristics * United States *

The infrared radiometer can detect both clear-air turbulence and low-level wind shear with a significant advance warning so the aircrew of aircraft can take appropriate courses of action. The technique may be applicable to detection of volcanic ash clouds, although this is not discussed in this review by company personnel.

REFERENCE NO. A00392

ADRIANI, A., CONGEDUTI, F., FIOCCO, G., GOBBI, G.P.

1983

One-year lidar observations of the stratospheric aerosol at Frascati, March 1982 - March 1983.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 1005-1008

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * El Chichon * Lidar * Mystery volcano * Remote sensing *

Aerosol formed as a result of the 1982 El Chichon eruption (and other 1982 eruptions) was detected and measured from a lidar station in Italy (lat.42N, long.13E). The aerosol initially appeared stratified in thin layers, but later became more homogeneous.

REFERENCE NO. A00062

AERONAUTICAL SERVICES HANDBOOK

1989

Volcanic ash cloud advices.

JOURNAL/PUBLISHER Aeronautical Services Handbook (Australia), Annex

VOLUME/PAGE NO. 4

SUBJECT KEYWORDS * Australia * Early-warning measures * Meteorology * New Zealand * Remote sensing *

The formal procedures applying to 'any volcanic eruption to the near north of Australia' are presented. A 'Volcanic Ash Cloud Advice' is to be issued by the National Meteorological Centre when eruption information is provided by another country, through AIREPs, or clouds are seen on satellite images. Advices are sent to aviation authorities.

REFERENCE NO. A00485

AIR PROGRESS

1980
Volcanic ash a hazard to planes.
JOURNAL/PUBLISHER Air Progress
VOLUME/PAGE NO. 42, September, 12
SUBJECT KEYWORDS * Ash encounters * Damage reports * Mount St. Helens * United States *

A brief article is provided on the effects of the 1980 Mount St. Helens eruptions on general aviation. Ash, acids, and salts are identified as the cause of airframe and engine abrasion and attack. 'Flying in any visible ash is definitely not recommended.' A photograph is provided of damage to a Skylane single-propeller aircraft.

REFERENCE NO. A00299

AIR RESERVIST

1980
After the eruptions.
JOURNAL/PUBLISHER Air Reservist
VOLUME/PAGE NO. 32 (8), 4
SUBJECT KEYWORDS * Mount St. Helens * United States *

Air National Guard, Air Force Reserve, Military Airlift Command, and Strategic Air Command assisted in the rescue and clean-up efforts following the 1980 Mount St. Helens eruption. Some details are given in this brief account. C-130s were used as in-flight communication links for ground rescue operations.

REFERENCE NO. A00298

ALASKA VOLCANO OBSERVATORY STAFF

1990
The 1989-1990 eruption of Redoubt Volcano. The eruption and its hazards.
JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union.
VOLUME/PAGE NO. 71(7), 265-275
SUBJECT KEYWORDS * Ash encounters * Redoubt * United States * Volcanic prediction *

A comprehensive account is provided of volcanic activity from Redoubt in the six weeks following 14 December 1989. Ash from the volcano on 15 December caused a near-tragic incident when a 745 jetliner ran into the eruption cloud (see Kienle et al., 1990). The eruption was on-going at the time of publication of this article.

REFERENCE NO. A00524

ALASKAN AIR COMMAND

1955
Natural phenomenon : Mt. Spurr eruption
JOURNAL/PUBLISHER History of the Alaskan Air Command
VOLUME/PAGE NO. July-December, 73-80
SUBJECT KEYWORDS * Airport effects * Ash encounters * Damage reports * United States *

The effects of volcanic ash from the July 1955 Spurr eruption, Alaska, on USAF aircraft and Elmendorf Air Force Base, are described in some detail in this valuable report. Damage to aircraft included abrasion effects. The base was evacuated of many aircraft. A truck-mounted jet engine was used to blow clear runways at Elmendorf and Anchorage.

REFERENCE NO. A00423

ALASKAN AIR COMMAND

1976
No title
JOURNAL/PUBLISHER History of the 21st Composite Wing, Alaskan Air Command
VOLUME/PAGE NO. January-March, 1
SUBJECT KEYWORDS * Ash encounters * Augustine * Damage reports * United States *

A brief report based on an 'Anchorage Times' newspaper article is given of an encounter between two F-4E jet fighters and volcanic ash from the 24 January 1986 eruption at Augustine. The aircraft were sandblasted, reducing visibility out of the front. Leading edges of the wings and inlet ramp dusts were polished smoothand paint blasted away. BMR.

REFERENCE NO. A00424

ALLARD, P.

1983
Facing hazards from thereawakening of dormant explosive volcanoes : the examples of Mt. St. Helens, El Chichon, and Galunggung in 1980-1982.
JOURNAL/PUBLISHER Forecasting Volcanic Events (Editors, H. Tazieff and J.C. Sabroux). Developments in Volcanology 1. Elsevier, Amsterdam
VOLUME/PAGE NO. 561-584
SUBJECT KEYWORDS * El Chichon * Eruption frequencies * Galunggung * Indonesia * Mount St. Helens * United States * Volcanic prediction *

The 1980-2 eruptions at three volcanoes, including Galunggung, Indonesia, are compared and contrasted in relation to precursory activity, monitoring, eruption patterns, and the impact of the eruptions. The Galunggung eruption narrative is short and based largely on SEAN Bulletin reports. Aircraft hazard is mentioned briefly.

REFERENCE NO. A00243

ANDERSON, I.

1991
How pilots avoid volcanic clouds.
JOURNAL/PUBLISHER New Scientist
VOLUME/PAGE NO. 13 April 1991, 18
SUBJECT KEYWORDS * Australia * Early-warning measures * Japan * Remote sensing * Sakurajima * Spectral characteristics *

A science journalist presents a short article on the work being done by Australian atmospheric scientists in developing an airborne volcanic ash detection system (AVADS). The instrument is a multi-channel, infra-red radiometer that is able to remotely distinguish volcanic-ash clouds from normal weather clouds. AVADS was tested successfully in March 1991.

REFERENCE NO. A00613

ANDERSON, S.J.

1984
Skywave radar detectability of volcanic aerosols.
JOURNAL/PUBLISHER Australian Department of Defence, Electronic Research Laboratory, Salisbury. Technical Report
VOLUME/PAGE NO. ERL-0301-TR
SUBJECT KEYWORDS * Australia * Galunggung * Indonesia * Mount St. Helens * Radar * Remote sensing *

A theoretical assessment is given of the capability of the 'Jindalee' over-the-horizon radar system in detecting Indonesian eruption clouds. Detection is considered unlikely, but an assessment of microwave radar was not attempted. The Galunggung eruption, Indonesia, of 3 February 1984 (sic) was not seen on Jindalee radar.

REFERENCE NO. A00175

ANGELIS, M. de, FEHRENBACH, L., JEHANNO, C., MAURETTE, M.

1985
Micrometre-sized volcanic glasses in polar ice and snow.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 317, 52-54
SUBJECT KEYWORDS * Antarctica * Ash characteristics * El Chichon * Glacier records * Indonesia * New Zealand * Tambora *

Microprobe chemical analyses are reported for ultrathin micrometer-size glass shards extracted from both ancient Antarctic ice and snow from Greenland. However, the compositions do not conform with those expected for the eruptions identified - namely, Tambora 1815, and Taupo 186 A.D. Data for the 1982 El Chichon eruption are also given.

REFERENCE NO. A00223

ANGELL, J K

1986

Tropospheric effects of the 1963 El Chichon eruptions.

JOURNAL/PUBLISHER Norman D Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 9-17

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * El Chichon * Indonesia *

The temperature effects recorded after eruptions in 1963 and 1982 on the earth's surface and in the stratosphere are discussed in some detail. Unexpected surface-temperature increases following the El Chichon eruption are attributed to the effects of El Nino in 1982-83. Volcanic influences on temperatures may be offset by El Nino effects.

REFERENCE NO. A00507

ANGELL, J.K.

1988

Impact of El Nino on the delineation of tropospheric cooling due to volcanic eruptions.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 93 (D4), 3697-3704

SUBJECT KEYWORDS * Agung * Climate change * El Chichon * Indonesia * Katmai * Krakatau * Meteorology *

The reason why tropospheric temperatures cooled after the 1963 Agung eruption but warmed after the El Chichon activity in 1982, is the effect of a very strong El Nino. This effect can be 'substracted out' for five post-1880 eruptions and decreases of 0.3C calculated for northern hemisphere continental surfaces.

REFERENCE NO. A00584

ANGELL, J.K., KORSHOVER, J.

1964

Quasi-biennial variations in temperature, total ozone, and tropopause height.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 21, 479-492

SUBJECT KEYWORDS * Meteorology *

The authors compile and assess evidence for the existence of quasi-biennial (about 26 monthly) oscillations in stratospheric temperature, total ozone content, and tropopause height in temperate, polar, and tropical latitudes. There is little evidence for biennial temperature oscillations in the troposphere, except in polar latitudes.

REFERENCE NO. A00323

ANGELL, J.K., KORSHOVER, J.

1983

Tropospheric and stratospheric temperatures since El Chichon.

JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia

VOLUME/PAGE NO. 403-414

SUBJECT KEYWORDS * Agung * Climate change * El Chichon * Indonesia * Krakatau * Meteorology *

No evidence is found for any tropospheric cooling caused by the 1982 El Chicon eruption. However, evidence for stratospheric warming seems incontrovertible, especially at Hawaii where the cloud passed directly overhead. The authors stress the need for care in drawing conclusions because of the effects of the quasi-biennial oscillation.

REFERENCE NO. A00220

ARMIENTI, P., MACEDONIO, G., PARESCHI, M.T.

1988

A numerical model for simulation of tephra transport and deposition: applications to May 18, 1980, Mount St. Helens eruption.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 93 (B6), 6463-6476

SUBJECT KEYWORDS * Cloud dynamics * Mount St. Helens * United States *

A numerical model for the computation of tephra fall accumulation from Plinian or sub-Plinian eruptions is presented. The results for some theoretical cases are presented to illustrate the model. The validity of the model is tested by comparing observed and calculated deposits for the 18 May 1980 Mount St. Helens eruption.

REFERENCE NO. A00577

ARNOLD, F., BUHRKE, Th.

1983

New H2S04 and HS03 vapour measurements in the stratosphere - evidence for a volcanic influence.

JOURNAL/PUBLISHER Nature

VOLUME/PAGE NO. 301, 293-295

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Gas/vapour plumes *

Measurements of stratospheric H2S04 and HS03 vapour concentrations using passive chemical ionisation mass spectrometry were made in 1982 before and after the El Chichon eruptions. Increases in total concentrations of these gases over previously measured values were observed, particularly around 25 km where most material was deposited.

REFERENCE NO. A00394

ARONSON, J.R., EMSLIE, A.G.

1973
Spectral reflectance and emittance of particulate materials. 2 : Application and results.
JOURNAL/PUBLISHER Applied Optics
VOLUME/PAGE NO. 12 (11), 2573-
SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

Experimental data on the spectral emittance of particulate minerals, obtained using a Michelson interferometer are compared with the results of a new theory of the spectral reflectance (emittance) of these materials (see Emslie & Aronson, 1973). The good agreement is taken as support that the theory can be applied to different problems.

REFERENCE NO. A00399

AUSTRALIAN BUREAU OF METEOROLOGY

1989
Volcanic ash cloud advices.
JOURNAL/PUBLISHER Aeronautical Services Handbook.
VOLUME/PAGE NO. Annex 4, A4-12-3
SUBJECT KEYWORDS * Australia * Early-warning measures * Meteorology * Remote sensing *

The National Meteorological Centre, Melbourne, issues a Volcanic Ash Cloud Advice when a neighbouring country advises of an eruption, when an AIREP contains information on volcanic activity, or when an ash cloud is observed on satellite imagery. This document also contains a description of how such advices are distributed to other authorities.

REFERENCE NO. A00536

AUSTRALIAN CIVIL AVIATION AUTHORITY

1989
Aviation telexes concerning eruption clouds from Redoubt volcano, Alaska.
JOURNAL/PUBLISHER Australian Civil Aviation Authority, Search and Rescue, unpublished data
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Ash encounters * Redoubt * Routes and schedules * United States *

This is a compilation of copies of telexes dealing with the effects on aircraft movements of eruption clouds from Redoubt volcano 14-17 December 1989. A 747 aircraft ran into an ash cloud and lost power in all four engines. Pilots are advised to avoid the Redoubt-Anchorage area. Warnings are given on the adverse affects of entering ash clouds.

REFERENCE NO. A00487

AUSTRALIAN DEPARTMENT OF AVIATION

1983
Volcanic eruptions Indonesia - 1982.
JOURNAL/PUBLISHER Papers presented at 2nd Asia-Pacific Regional Air Navigation Conference (ICAO), Singapore
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Australia * Early-warning measures * GMS satellite * Galunggung * ICAO * Indonesia * Remote sensing * Soputan * TIROS satellites * Volcano lists *

The Australian delegation to an ICAO regional meeting presented three papers on the aircraft/ash-cloud problem: (1) Procedures for avoidance of volcanic ash clouds; (2) Volcanic eruptions Indonesia - 1982; (3) Volcanic ash from Indonesian eruptions. The principal author is P.C.S. Jackson of the Australian Airways Volcano Watch.

REFERENCE NO. A00543

AUSTRALIAN DEPARTMENT OF AVIATION

1984
Methods of tracking clouds of volcanic ash. Presented by Australia.
JOURNAL/PUBLISHER Paper presented at 12th Meeting of the Commonwealth Air Transport Council, London 1984
VOLUME/PAGE NO. CATC12-CP/13
SUBJECT KEYWORDS * Ash encounters * Australia * Early-warning measures * Indonesia *

A summary is provided of the procedures adopted by Australian aviation authorities in coping with the threat to aviation from Indonesian volcanic-ash clouds. It includes background information on aircraft/ash encounters and the use of satellite images in determining ash-plume development.

REFERENCE NO. A00573

AUSTRALIAN DEPARTMENT OF AVIATION

1985
Jakarta-Bandung
JOURNAL/PUBLISHER Department of Aviation, Canberra
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Australia * Early-warning measures * Indonesia * Meteorology * Remote sensing * Working groups *

A delegation from the Australian Department of Aviation visited Indonesia in July 1985 to discuss the aircraft/ash-cloud problem with Indonesian officials representing aviation, meteorology, remote-sensing, and volcanology. The visit resulted in the establishment of a joint Australian-Indonesian committee that would meet regularly.

REFERENCE NO. A00312

AUSTRALIAN DEPARTMENT OF AVIATION

1986
No title
JOURNAL/PUBLISHER Department of Aviation,Canberra
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Australia * Indonesia * Routes and schedules *

Statistics are provided in this unpublished data compilation of the number of flights in and out of Australia for the 1969-84 period. Data are given on a yearly basis and subdivided into name of airline and destination. A separate list is of the numbers of flights through Indonesian (that is, volcanic-eruption affected) airspace.

REFERENCE NO. A00333

AUSTRALIAN DEPARTMENT OF AVIATION

1988
Distribution of AIREPS and movement reports.
JOURNAL/PUBLISHER Aeronautical Information Publication Australia
VOLUME/PAGE NO. RAC/OPS-1-173, Appendix 1
SUBJECT KEYWORDS * Ash encounters * Australia * Early-warning measures *

This regulatory document is concerned with the mechanisms of distribution of reports from pilots (AIREPS). An accompanying appendix is a list of items that could be included in such reports. Volcanic activity was added to the list about 1984. The position, height, and extent of ash clouds, plus the name of the volcano, should be notified.

REFERENCE NO. A00535

AVIATION WEEK AND SPACE TECHNOLOGY

1980A
Manufacturers issue volcano advisories.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 112 (23), 41, 43-45
SUBJECT KEYWORDS * Airport effects * Ash encounters * Damage reports * Defensive inflight measures * Mount St. Helens * United States *

The following airframe and engine manufacturers issued advisories after aircraft encounters with ash from the May 1980 Mount St. Helens eruptions: Boeing, Lockheed, McDonnell Douglas, General Electric, Pratt & Whitney, and Rolls-Royce. These advisories cover a wide range of precautionary and maintenence procedures.

REFERENCE NO. A00308

AVIATION WEEK AND SPACE TECHNOLOGY

1980B
Mount St. Helens spurs new scientific studies.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 113 (7), 68, 73
SUBJECT KEYWORDS * Aerosols * Ash encounters * Damage reports * Lidar * Mount St. Helens * SAMII/SAGE sensors * United States *

A magazine-style account is given of a scientific meeting at NASA'S Ames Research Center on 11 July on the impact of the 1980 Mount St. Helens eruptions on the atmosphere. Health effects were also discussed. Satellite and airborne research work by NASA and the Universities of Oregon and Washington are highlighted. Research aircraft were damaged.

REFERENCE NO. A00310

AVIATION WEEK AND SPACE TECHNOLOGY

1980C
Most recent eruptions draw crowds.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 113 (4), 19
SUBJECT KEYWORDS * Airport effects * FAA * Mount St. Helens * Routes and schedules * United States *

Late-July 1980 eruptions at Mount St. Helens caused the FAA to establish a 'protected' area for aircraft. Details of diversionary routes for both commercial and military aircraft are given. FAA was concerned about the estimated 150-200 sight-seeing aircraft that swarmed around the volcano. Warnings were broadcast to pilots to use extreme caution.

REFERENCE NO. A00300

AVIATION WEEK AND SPACE TECHNOLOGY

1982A
Scientists track Mexican volcano dust.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 116 (23), 87-89
SUBJECT KEYWORDS * Cloud dynamics * El Chichon * GOES/SMS satellites * Remote sensing * TIROS satellites *

A series of five images is given for 1982 El Chichon eruption clouds using GOES and NOAA-7 satellite data. Three GOES images for two eruptions on 4 April are in infrared and visible enhanced in infrared. Two false-colour NOAA-7 images are for a 29 March eruption and show clouds extending both northeast and southwest.

REFERENCE NO. A00306

AVIATION WEEK AND SPACE TECHNOLOGY

1982B
Eruption imaged by NOAAspacecraft.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 117 (4), 29
SUBJECT KEYWORDS * Galunggung * Indonesia * Remote sensing * TIROS satellites *

A NOAA-7, thermal-infrared image is given of the volcanic-eruption plume from Galunggung volcano, Indonesia, that resulted in the multiple engine failure of a British Airways 747 aircraft. The ash is shown drifting southwards from Java drifting southwards froacross the Indian Ocean. Resolution of the image is 2.4 miles.

REFERENCE NO. A00305

AVIATION WEEK AND SPACE TECHNOLOGY

1986
Alaskan air traffic disrupted by ash from volcano.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 124 (14), 36
SUBJECT KEYWORDS * Airport effects * Ash encounters * Augustine * FAA * Routes and schedules * United States *

A brief report is given of the impact of the late-March 1986 eruptions at Augustine volcano, Alaska, on aviation at Anchorage International Airport. Air-carrier services were nearly at a standstill on 27-29 March because of ash fallout. Alaska Airlines reported the worst impact on operations: 40 scheduled flights out of 68 cancelled on the 28th.

REFERENCE NO. A00304

AVIATION WEEK AND SPACE TECHNOLOGY

1987
NOAA, FAA consider volcano monitoring system.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 127 (1), 30-31
SUBJECT KEYWORDS * Ash encounters * Early-warning measures * El Chichon * FAA * GOES/SMS satellites * Mount St. Helens * Remote sensing * TIROS satellites * United States *

A short article is given on the possibility of NOAA providing satellite detection and tracking data on volcanic eruption clouds for the U.S. Federal Aviation Administration. Both polar-orbiting and geostationary satellites would be used. NOAA and FAA administrators and lawyers were reviewing a joint plan.

REFERENCE NO. A00373

AXELROD, D.I.

1981
Role of volcanism in climate and evolution.
JOURNAL/PUBLISHER Geological Society of America Special Paper
VOLUME/PAGE NO. 185
SUBJECT KEYWORDS * Climate change * United States *

An American palaeobiologist reviews faunal and floral evolution and extinctions in the geological record and especially in the Tertiary. Pulses of sharply lowered temperatures caused by large stratospheric injections of volcanic material, and widespread falls of volcanic ash, are considered to be at least in part the cause of these changes.

REFERENCE NO. A00278

BAILEY, J.

1985
Volcanology - a first hand report.
JOURNAL/PUBLISHER Australian Geologist
VOLUME/PAGE NO. 56, 5
SUBJECT KEYWORDS * Ash encounters * Australia * Electrical effects * Indonesia * Soputan *

A passenger on Qantas flight QF28 from Hong Kong to Melbourne on 20 May 1985, writes in a short letter of the encounter of the 747 aircraft with drifting ash from Soputan volcano, Indonesia. Engines did not cut out, but volcanic dust entered the cabin and the aircraft vibrated. The crew appeared unaware that the cause was high-rising volcanic ash.

REFERENCE NO. A00204

BAKORNAS PBA

1982
Report and Recommendations of the National Workshop on Mt. Galunggung Volcanic Risk Management held in Bandung, Indonesia 20-25 September 1982.
JOURNAL/PUBLISHER Badan Koordinasi Nasional Penanggulangan Bencana Alam (BAKORNAS PBA), Jakarta
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Galunggung * Indonesia * Remote sensing * Volcanic prediction *

This three-volume report represents a compilation of the individual reports of five working groups that met during the Bandung workshop. Working Group A dealt with volcanology, geology, and remote sensing. The report is comprehensive, but the hazards to aircraft caused by the 1982 Galunggung eruptions are not considered.

REFERENCE NO. A00037

BALDWIN, B., POLLACK, J.B., SUMMERS, A., TOON, O.B.
1976
Stratospheric aerosols and climatic change.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 263, 551-555
SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Glacier records * Indonesia * Krakatau * New Zealand * Papua New Guinea * Soufriere * Tarawera *

Global heat-balance calculations are reported and the conclusion reached that volcanogenic stratospheric aerosols have made important contributions to some observed climatic changes, including those of the Little Ice Age and Wisconsin ice age. Aerosols generated by supersonic transports and Space Shuttles are unlikely to have significant impact.

REFERENCE NO. A00287

BANKS, N.G., TILLING, R.I., HARLOW, D.H., EWERT, J.W.
1989
Volcano monitoring and short-term forecasts.
JOURNAL/PUBLISHER Volcanic Hazards (Editor R.I. Tilling). Short Course in Geology, American Geophysical Union, Washington, D.C.
VOLUME/PAGE NO. 1, 50-80
SUBJECT KEYWORDS * Mount St. Helens * United States * Volcanic prediction *

A detailed, up-to-date account is provided of the techniques used to monitor eruption precursors and provide forecasts. The authors concentrate on the two most useful techniques - seismic monitoring and ground-deformation monitoring. Their account is based on the more wide-ranging paper by Newhall (1984).

REFERENCE NO. A00542

BARR, S.
1982
Skirt clouds associatedwith the Soufriere eruption of 17 April 1979.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 216, 1111-1112
SUBJECT KEYWORDS * Meteorology * Soufriere *

The 'skirt' clouds at Soufriere formed where thin, quasi-horizontal layers of moist air were intensely deformed by the rapidly rising eruption column. The layers were carried to higher altitudes where they condensed in a skirt-like formation. Figure 1 is a photograph of this striking phenomenon.

REFERENCE NO. A00114

BARR, S., HEFFTER, J.L.

1982

Meteorological analysisof the eruption of Soufriere in April 1979.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 216, 1109-1111

SUBJECT KEYWORDS * Cloud dynamics * Meteorology * Soufriere *

Meteorological upper-air data are used in conjunction with other monitoring results to determine the height and transport of eruption plumes. Ash was transported eastward to Africa in 3-5 days. Meridional transport as far as 15N poleward took place during the first week of travel.

REFERENCE NO. A00113

BARTH, C.A., SANDERS, R.W., THOMAS, G.E., JAKOSKY, B.M., WEST, R.A.

1983

Formation of the El Chichon aerosol cloud.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 993-996

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * El Chichon * Remote sensing * SME satellite *

Data from the Solar Mesosphere Explorer (SME) is used to determine the speed and direction of the El Chichon volcanic cloud and to determine a cloud height centred on about 27 km. The SME instruments are an infrared radiometer, a 'visible' spectrometer, and an infrared spectrometer. Colour images are published with the paper.

REFERENCE NO. A00059

BELL, A.

1983

Satellite images of volcanic ash clouds.

JOURNAL/PUBLISHER ECOS, CSIRO Australia

VOLUME/PAGE NO. 35 Autumn

SUBJECT KEYWORDS * Australia * Galunggung * Indonesia * Remote sensing * TIROS satellites *

A brief account is given of the technique developed by Australian remote-sensing specialists F. Honey and W. Carroll, to distinguish volcanic-ash clouds from Galunggung volcano, Indonesia, from normal weather clouds using radiometer data from NOAA6-7 satellites. The article is accompanied by three images taken at different times on 29-30 July 1982.

REFERENCE NO. A00572

BERRESHEIM, H., JAESCHKE, W.

1983

The contribution of volcanoes to the global atmospheric sulfur budget.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 88 (C6), 3732-3740

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Augustine * Eruption frequencies * Europe * Fuego * Gas/vapour plumes * Japan * Mount St. Helens * United States *

The emission rate of sulphur from volcanoes world-wide is calculated to be 11.8 million tonnes per year, and for the 1961-79 period to be 15.2 million. The importance of contributions during non-eruptive periods is stressed. An order-of-magnitude increase may take place during periods of increased volcanic activity.

REFERENCE NO. A00161

BIGG, E.K.

1971

Stratospheric pollution and volcanic eruptions.

JOURNAL/PUBLISHER Weather

VOLUME/PAGE NO. 26 (1), 13-18

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Australia * Indonesia *

The effects of the 1963 Agung eruption, Indonesia, on the stratosphere over Australia are illustrated by six colour photographs taken from a USAF U-2 aircraft. Scanning electron photomicrographs of stratospheric particles are also given, together with a general account of stratospheric pollution problems.

REFERENCE NO. A00340

BIZZARI, B., PAGANO, P., PERRONE, M.

1985

Meteosat-derived quantitative measurements on volcanic ash plumes for warning to aviation.

JOURNAL/PUBLISHER Second International Conference on the Aviation Weather System, Montreal

VOLUME/PAGE NO. 23-26

SUBJECT KEYWORDS * Ash encounters * Atmosphere loading * Early-warning measures * Europe * METEOSAT satellite * Remote sensing *

Methods are given for calculating a wide range of parameters for eruption clouds using mainly satellite data. The authors propose that such data could be processed on board aircraft and used to decide whether there is a risk in flying through a volcanic cloud.

REFERENCE NO. A00083

BLONG, R.J.

1981

Tephra fallout from Karkar volcano : a first approximation.

JOURNAL/PUBLISHER Cooke-Ravian Volume of Volcanological Papers (Editor, R.W. Johnson). Geological Survey of Papua New Guinea Memoir

VOLUME/PAGE NO. 10, 85-93

SUBJECT KEYWORDS * Cloud dynamics * Papua New Guinea *

A method is described for predicting the general extent of areas affected by ash fallout from a particular volcano, knowing the height of the eruption cloud, wind speeds and directions at different times of the year and at different heights above the volcano, and terminal velocities of the ash particles. Karkar volcano, PNG, is used as an example.

REFERENCE NO. A00016

BLONG, R.J.

1982

The Time of Darkness : Local Legends and Volcanic Reality in Papua New Guinea.

JOURNAL/PUBLISHER Australian National University Press, Canberra

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Ash characteristics * Cloud dynamics * Papua New Guinea *

A major volcanic eruption that took place about 300 years ago on Long Island had important effects on life in the PNG highlands region. It must have had a major atmospheric impact, as the author of this book calculates the height of the eruption cloud was at least 18 km, and as highlands people refer to the event as a 'time of darkness'.

REFERENCE NO. A00036

BLONG, R.J.,

1984

Volcanic Hazards : A Sourcebook on the Effects of Eruptions

JOURNAL/PUBLISHER Academic, Sydney

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Airport effects * Ash characteristics * Ash encounters * Cloud dynamics * Damage reports * Early-warning measures * Electrical effects * Europe * Gas/vapour plumes * Indonesia * Japan * Mount St. Helens * Remote sensing * United States *

This book is an assessment of volcanic hazards from many points of view. Chapter 6.6 contains a valuable review of the effects of volcanic ash on airports and aircraft and of air safety. Several other volcanological topics are also considered.

REFERENCE NO. A00027

BOEING

1983
Flight operations in volcanic dust.
JOURNAL/PUBLISHER Operations Manual Bulletin, Boeing Company, Seattle, Washington
VOLUME/PAGE NO. 8 April 1983
SUBJECT KEYWORDS * Ash encounters * Damage reports * Defensive inflight measures * United States *

Boeing provides background information to flight crews on the hazard caused by volcanic ash, and recommendations in the event of aircraft/ ash-cloud encounters.

REFERENCE NO. A00097

BRANTLEY, S.R. (Editor)

1990
The eruption of Redoubt Volcano, Alaska, December 14, 1989 - August 31, 1990.
JOURNAL/PUBLISHER United States Geological Survey Circular
VOLUME/PAGE NO. 1061
SUBJECT KEYWORDS * Ash encounters * Redoubt * United States * Volcanic prediction *

The numerous authors of this well-written narrative summarise the Alaska Volcano Observatory's observations during the first nine months of the 1989-90 eruptive activity of Redoubt volcano. The hazards and effects of the eruption, including those to aviation, are discussed, including the KLM 747 ash encounter that resulted in multiple-engine failure.

REFERENCE NO. A00540

BRASSEUR, G.P., GRANIER, C., WALTERS, S.

1990
Future changes in stratospheric ozone and the role of heterogeneous chemistry.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 348, 626-628
SUBJECT KEYWORDS * Aerosols * El Chichon * Gas/vapour plumes * Meteorology *

Chemical reactions on the surfaces of stratospheric particles may be an important influence on ozone depletion resulting from increased concentrations of chlorine compounds. Volcanic sulphuric acid aerosols also may provide sites for reactions leading to ozone depletion. Ozone depletion is predicted following the next major volcanic eruption.

REFERENCE NO. A00592

BRIAT, M., ROYER, A., PETIT, J.R., LORIUS, C.

1982

Late glacial input of eolian continental dust in the Dome C ice core : additional evidence from individual microparticle analysis.

JOURNAL/PUBLISHER Annals of Glaciology

VOLUME/PAGE NO. 3, 27-31

SUBJECT KEYWORDS * Antarctica * Ash characteristics * Glacier records *

399 individual microparticles in nine samples from the Dome C ice core, Antarctica, were analysed using an energy-dispersive X-ray system. Probable volcanic ash was identified in relatively few cases. Most of the particles were wind-blown dust of continental origin. Particle concentrations increased 10-20 times during the last glacial stage.

REFERENCE NO. A00238

BRIGGS, G.A.,

1969

Plume rise.

JOURNAL/PUBLISHER Office of Information Services, U.S. Atomic Energy Commission

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Cloud dynamics * Meteorology * United States *

The mechanism of plume rise and dispersion is described in qualitative terms with emphasis on possible aerodynamic, meteorological, and topographical effects. Plume-rise observations and formulae in the literature are reviewed, and a relatively simple theoretical model is developed and compared with other models.

REFERENCE NO. A00317

BRITISH AIRWAYS

1984

No title.

JOURNAL/PUBLISHER Letter, 7 May 1984, British Airways, Sydney

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Ash encounters * Damage reports * Defensive inflight measures * Electrical effects * Galunggung * Indonesia *

The Public Affairs Manager of British Airways, Australia, provides copies of three documents on the 24 June 1982 encounter of flight BA9 with drifting ash from Galunggung volcano, Indonesia. The main report includes flight and cabin-crew observations, flight recorder data, and damage reports. A telex from Rolls Royce is another document.

REFERENCE NO. A00265

BROAD, W.J.

1989

New system warns of volcano dust, but a plane still flies in to trouble.

JOURNAL/PUBLISHER New York Times.

VOLUME/PAGE NO. 19 December 1989, C1-C6

SUBJECT KEYWORDS * Ash encounters * Damage reports * Early-warning measures * FAA * Redoubt * Remote sensing * United States *

A journalist points out that aviation authorities warned pilots of the danger caused by ash from the 15 December Redoubt eruption, Alaska, but a KLM 747 ran into the ash cloud causing multiple-engine failure. A general account also is given of the aircraft/ash-cloud problem, drawing attention to a NOAA/FAA satellite warning system for aviation.

REFERENCE NO. A00527

BROOK, R.R.

1982

A study of the subtropical jetstream in the Australian region.

JOURNAL/PUBLISHER Australian Meteorological Magazine

VOLUME/PAGE NO. 30, 223-239

SUBJECT KEYWORDS * Australia * Meteorology *

The subtropical jetstream is a consistent and persistent feature of the atmospheric circulation in the Australian region. The author gives an analysis of the mean wind and temperature fields relative to the jet axis and evaluations of the meridional fluxes of heat, momentum, and kinetic energy. Data used is from the 1962-8 period.

REFERENCE NO. A00319

BRUCE, C.W., YEE, Y.P., JENNINGS, S.G.

1980

In situ measurements ofthe ratio of aerosol absorption to extinction coefficient.

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 19 (12), 1893-1894

SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

The extinction coefficient is obtained using a direct transmission measurement, and the absorption coefficient is obtained simultaneously using an aerosol spectrophone. The difference is the scattering coefficent. The approach is applied in measurements of 9.55-micron C02 laser radiation.

REFERENCE NO. A00433

BRYSON, R.A., GOODMAN, B.M.
1980
Volcanic activity and climate change.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 207, 1041-1044
SUBJECT KEYWORDS * Climate change * Eruption frequencies * Glacier records * Meteorology *

Radiocarbon dates for the deposits of volcanic eruptions over the last 10,000 years are used to suggest correlations between periods of increased volcanic activity and climate change.

REFERENCE NO. A00100

BRYSON, R.A., GOODMAN, B.M.
1982
The climatic effect of explosive volcanic data : analysis of the historical data
JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1988 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication
VOLUME/PAGE NO. 2240, 191-202
SUBJECT KEYWORDS * Aerosols * Climate change * Eruption frequencies * Mount St. Helens * United States *

An analysis of the role of volcanism in modulating direct-beam solar radiation is given. Results from a simple fallout and dispersion model explains about 77 percent of the radiation variance. Tropical and sub-polar eruption are more important than mid-latitude eruptions in their impact on stratospheric aerosol optical depth.

REFERENCE NO. A00371

BUCK, M.O.
1985
An assessment of volcanic risk on and from Mayor Island, New Zealand.
JOURNAL/PUBLISHER New Zealand Journal of Geology and Geophysics
VOLUME/PAGE NO. 28, 283-298
SUBJECT KEYWORDS * Cloud dynamics * Eruption frequencies * New Zealand *

This assessment includes a predictive evaluation of tephra dispersal from high-rising eruption clouds at Mayor Island. Dispersal modelling is by the method used by Blong (1981). Tephra falls are likely to reach North Island only in the summer months and only where a Plinian eruption column exceeded 20 km in height.

REFERENCE NO. A00325

BUDYKO, M.I.

1969

The effect of solar radiation variations on the climate of the Earth.

JOURNAL/PUBLISHER Tellus

VOLUME/PAGE NO. 21 (5), 611-619

SUBJECT KEYWORDS * Climate change * Eruption frequencies * Glacier records * Meteorology *

The author accepts the view of Humphreys (1929) and others that volcanic activity causes changes in atmospheric transparency and thereby changes in direct solar radiation and climate. He addresses the origin of glaciations on this basis, and concludes that small changes in atmospheric transparency could be sufficient for their development.

REFERENCE NO. A00224

BURDECKI, F.

1963

Optical phenomena during twilight, particularly after volcanic eruptions.

JOURNAL/PUBLISHER South Africa Weather Bureau News Letter

VOLUME/PAGE NO. 171, 96-104

SUBJECT KEYWORDS * Aerosols * Agung * Indonesia * Krakatau * Meteorology *

A South African meteorologist discusses as a result of the 1963 Agung eruption, the change in twilight colours in normal sky. Atmosphere loaded with volcanic material has more intense colours and more distinct boundaries between regions of different colours. The origin of 'sky haze' and Bishop's rings is also discussed.

REFERENCE NO. A00352

BURDECKI, F.

1964

Meteorological phenomena after volcanic eruptions.

JOURNAL/PUBLISHER Weather

VOLUME/PAGE NO. 19, 113-114

SUBJECT KEYWORDS * Aerosols * Agung * Indonesia * Krakatau * Meteorology *

An announcement is made that the South African Weather Bureau would be monitoring solar radiation following the March 1963 Agung eruption, Indonesia. A brief review is given of visual changes to the sky noted after volcanic eruptions, particularly 'Bishop's rings' recorded first after the 1883 Krakatau eruption.

REFERENCE NO. A00282

BURKE, K., FRANCIS, P.
1985
Climatic effects of volcanic eruptions.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 314, 136
SUBJECT KEYWORDS * Climate change * Eruption frequencies * Laki * Tambora *

More attention should be paid to the possible climatic effects of inevitable volcanic eruptions on climate, rather than those of hypothetical nuclear winters, argue the authors of this short article. Eruptions highlighted are Tambora 1815, Laki 1783, and the AD536 eruption of 'unknown provenance'.

REFERENCE NO. A00273

CADLE, R.D., BLIFFORD, I.H.
1971
Hekla eruption clouds.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 230 (5296), 573-574
SUBJECT KEYWORDS * Ash characteristics * Europe *

Particles collected on filters mounted on a U.S. weather service aircraft during an eruption of the Icelandic volcano Hekla on 9 May 1970, are shown to be silicate glass rather than heavy-metal-enriched particles produced by decomposition, as claimed for the 1965 eruption at another Icelandic volcano.

REFERENCE NO. A00364

CADLE, R.D., FERNALD, F.G., FRUSH, C.L.
1977
Combined use of lidar and numerical diffusion models to estimate the quantity and dispersion of volcanic eruption clouds : Vulcan Fuego, 1974, and Augustine, 1976.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 82 (12), 1783-1786
SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Augustine * Cloud dynamics * Fuego * Indonesia * Lidar *

Methods are described for estimating the quantity and dispersal of stratospheric materials from explosive eruptions. The 1976 Augustine eruption must have injected no more than one-fiftieth of the amount injected by Agung in 1963, and Fuego in 1974 produced one fifth of the Agung amount.

REFERENCE NO. A00080

CADLE, R.D., GRAMS, G.W.

1975

Stratospheric aerosol particles and their optical properties.

JOURNAL/PUBLISHER Reviews of Geophysics and Space Physics

VOLUME/PAGE NO. 13 (4), 475-501

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Fuego * Lidar * Remote sensing *

A comprehensive review is given of stratospheric aerosols - their size distributions, compositions, concentrations, sources, chemical reactions and optical properties. Perturbations caused by volcanic eruptions are mentioned. Climate models and heating of the atmosphere by the aerosol layer are also considered.

REFERENCE NO. A00366

CADLE, R.D., LAZRUS, A.L. HUEBERT, B.J., HEIDT, L.E. ROSE, W.I. Jr, WOODS, D.C. CHUAN, R.L. STOIBER,R.E., SMITH, D.B. ZEILINSKI, R.A.

1979

Atmospheric implications of studies of Central American volcanic eruption clouds.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 84 (C11), 6961-6968

SUBJECT KEYWORDS * Ash characteristics * Fuego * Gas/vapour plumes * United States *

A large team of U.S. scientists in 1978 undertook 11 sampling flights through the eruption clouds of three Guatemalan volcanoes. Water-soluble cations were measured in samples on special filters. Particle distributions were obtained using a cascade impactor. Several conclusions are reached on the behaviour of SO2 in eruption clouds.

REFERENCE NO. A00431

CADLE, R.D., LAZRUS, A.L., SHEDLOVSKY, J.P.

1969

Comparison of particles in the fume from eruptions of Kilauea, Mayon, and Arenal volcanoes.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 74 (13), 3372-3378

SUBJECT KEYWORDS * Aerosols * Gas/vapour plumes * Philippines * United States *

The authors undertook this comparative study using colorimetric chemical techniques, neutron activation, atomic absorption, X-ray diffraction, electron microprobe, and electron microscopy. Sulphuric-acid droplets were identified at each volcano, but most Mayon droplets were less acidic than those at Kilauea. Arenal particles resembled Mayon ones.

REFERENCE NO. A00415

CADLE, R.D., MROZ, E.J., HOBBS, P.V., RADKE, L.F., STITH, J.L.
1978
Particles in the eruption cloud from St. Augustine volcano.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 199, 455-458
SUBJECT KEYWORDS * Aerosols * Augustine * Gas/vapour plumes * United States *

The first two authors describe and illustrate impure sulphuric acid aerosols from the 1 February 1976 eruption plumes. Their results do not necessarily conflict with those obtained later by Hobbs et al. (1977). Hobbs, Radke, and Stith reply that the differences between the two measurement periods represent real differences in volcano behaviour.

REFERENCE NO. A00183

CADLE, R.D., WARTBURG, A.F., GRAHEK, F.E.
1971
The proportion of sulfate to sulfur dioxide in Kilauea Volcano fume.
JOURNAL/PUBLISHER Geochimica et Cosmochimica Acta
VOLUME/PAGE NO. 35 (5), 503-507
SUBJECT KEYWORDS * Aerosols * Agung * Gas/vapour plumes * Indonesia * United States *

Particles collected from the fume of Kilauea volcano, Hawaii, are largely sulphuric acid droplets containing dissolved salts. Differences in the proportion of sulphate to sulphuric acid are attributed to different degrees of oxidation of H2S, S, and SO2 at high temperatures by atmosphere. Stratospheric acid droplets are also discussed.

REFERENCE NO. A00367

CADLE, R.D., WARTHBURG, A.F., POLLOCK, W.H., GANDRUD, B.W., SHEDLOVSKY, J.P.
1973
Trace constituents emitted to the atmosphere by Hawaiian volcanoes.
JOURNAL/PUBLISHER Chemosphere
VOLUME/PAGE NO. 2 (6), 231-234
SUBJECT KEYWORDS * Gas/vapour plumes * United States *

A large number of trace constituents in fume emitted from Kilauea volcano were analysed for samples collected on polystyrene fibre filters. Many of the elements are toxic (for example, mercury), but their concentrations are too low to be considered harmful to human health. Sulphur dioxide and sulphuric acid droplets are exceptions.

REFERENCE NO. A00495

CAPONE, L.A., TOON, O.B., WHITTEN, R.C., TURCO, R.P., RIEGEL, C.A. SANTHANAM, K.

1983

A two-dimensional model simulation of the El Chichon volcanic eruption cloud.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 1053-1056

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * El Chichon * Gas/vapour plumes *

A simulation of sulphate photochemistry, transport, and aerosol microphysics of the El Chichon cloud is successful in reproducing the observed optical depth, lidar backscattering, and infrared extinction coefficients if 10 megatonnes of sulphur dioxide are injected. Simulated transport times are, however, too rapid.

REFERENCE NO. A00087

CAREY, S N

1986

The injection and dispersal of tephra and gases in the atmosphere during major explosive eruptions.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 21-23

SUBJECT KEYWORDS * Cloud dynamics * El Chichon * Mount St. Helens * United States *

A broad, brief account is provided of convective plume theory in relation to the development of major eruption columns and clouds. The development of 'umbrella' regions in clouds is discussed, as well as velocity, density, temperature, and particle content within eruption columns. Ancient fall deposits can be used to reconstruct column dynamics.

REFERENCE NO. A00508

CAREY, S., SIGURDSSON, H.

1985

The May 18, 1980 eruption of Mount St. Helens. 2. Modelling of dynamics of the plinian phase.

JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 90 (B4), 2948-2958
SUBJECT KEYWORDS * Cloud dynamics * Mount St. Helens * United States *

A detailed interpretation is given of the mechanics of the 1980 Plinian eruption using a range of dynamics formulae. Results include minimum exit velocities from a flared vent of 300 m per second. Conditions are defined close to the transition between convective column rise and column collapses which cause sporadic pyroclastic flows.

REFERENCE NO. A00422

CAREY, S., SIGURDSSON, H.

1986

The 1982 eruptions of El Chichon, Mexico (2) : observations and numerical modelling of tephra-fall distribution.

JOURNAL/PUBLISHER Bulletin of Volcanology
VOLUME/PAGE NO. 48 (2/3), 127-141
SUBJECT KEYWORDS * Cloud dynamics * El Chichon * GOES/SMS satellites * Remote sensing *

Three eruptions in 1982 at El Chichon are considered to have reached heights of 27, 32, and 29 km on the basis of maximum lithic-clast dispersion patterns. All three eruption columns penetrated the tropopause and were sheared in two directions by a reversal of wind direction at 18-20 km. Rates of magma supply from depth may have been low.

REFERENCE NO. A00320

CAREY, S., SIGURDSSON, H.

1987

Temporal variations in column height and magma discharge rate during the 79 A.D. eruption of Vesuvius.

JOURNAL/PUBLISHER Geological Society of America Bulletin
VOLUME/PAGE NO. 99, 303-314
SUBJECT KEYWORDS * Ash characteristics * Cloud dynamics * Europe *

A theoretical model of pyroclast dispersal is used to interpret the eruption characteristics of the pumice deposits of the 79 A.D. eruption. The column reached its maximum altitude of 32 km shortly after onset of the 'gray' pumice fall. Deposition of the upper, gray pumice was interrupted six times by column collapse and emplacement of surges etc.

REFERENCE NO. A00538

CAREY, S., SPARKS, R.S.J.

1986

Quantitative models of the fallout and dispersal of tephra from volcanic eruption columns.

JOURNAL/PUBLISHER Bulletin of Volcanology
VOLUME/PAGE NO. 48 (2/3), 109-125
SUBJECT KEYWORDS * Cloud dynamics * Europe * Mount St. Helens * New Zealand * Tarawera * United States *

A theoretical model of clast fallout from convective volcanic-eruption columns is developed whereby maximum clast-size dispersal (isopleth width and distance from source) is determined by column height and wind strength. The model is discussed with reference to data for the deposits of six eruptions, including two in New Zealand.

REFERENCE NO. A00316

CAREY, S.N., SIGURDSSON, H.

1982

Influence of particle aggregation on deposition of distal tephra from the May 18, 1980, eruption of Mount St. Helens volcano.

JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 87 (B8), 7061-7072
SUBJECT KEYWORDS * Ash characteristics * Mount St. Helens * United States *

A grain-size and component analysis is given of the Mount St. Helens airfall tephra, including that of a second thickness maximum at Ritzville, Washington. The second maximum is simulated by a computer model of general ash fallout from an atmospherically dispersed eruption plume, if significant particle aggregation of fine ash is invoked.

REFERENCE NO. A00354

CARLON, H.R.

1979

Christiansen effect in IR spectra of soil-derived atmospheric dusts.

JOURNAL/PUBLISHER Applied Optics
VOLUME/PAGE NO. 18 (21), 3610-3614
SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

The Christiansen effect takes place when a suspension of particles in a transparent medium is observed at a wavelength where the refractive indices of the particles and of the medium are equal, thus producing an optically homogeneous medium with optical bandpass or filter characteristics. Approximation equations are given in this paper.

REFERENCE NO. A00419

CARLON, H.R.

1980A

Contributions of particle absorption to mass extinction coefficients (0.55-14 microns) of soil-derived atmospheric dusts

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 19 (5), 690-

SUBJECT KEYWORDS * Aerosols * Remote sensing * Spectral characteristics *

Absorption coefficients of dust in the visible and infrared wavelengths and the physical mechanisms of dust aerosol generation determining that portion of extinction attributable to absorption in a given dust cloud, are discussed in this paper. Some soils, especially clays, can produce dust clouds that are almost pure absorbers at longer IR wavelengths

REFERENCE NO. A00467

CARLON, H.R.

1980B

Contributions of particle absorption to mass extinction coefficients (0.55-14um) of soil-derived atmospheric dusts : erratum

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 19 (7), 1165-1172

SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

This is the same paper as that produced by Carlon (1980A), except that two of the pages transposed in the earlier paper are published with the pages in the correct sequence.

REFERENCE NO. A00411

CARLON, H.R.

1980C

Mass extinction coefficients estimated for nonabsorbing spherical aerosol particles in the geometric scattering regime.

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 19 (12), 1891-1892

SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

The Beer-Lambert equation for aerosols is adapted and used to propose that a great many liquid and solid substances exist for which good first approximations of mass extinction coefficient can be made, if the substances are dispersed as spherical particles at wavelengths where their absorption is negligible.

REFERENCE NO. A00403

CARLON, H.R.

1980D

Christiansen effect in IR spectra of soil-derived atmospheric dusts : addenda.

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 19 (12), 1892

SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

Scattering at the Christiansen wavelength is discussed in greater detail than it was by the author in an earlier paper (Carlon,1979). Mathematical approximations for this special case are also considered.

REFERENCE NO. A00434

CARLON, H.R.

1980E

Aerosol spectrometry in the infrared.

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 19 (13), 2210-2218

SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

Aerosol spectrometry denotes a methodology for describing spectral effects of atmospheric constituents in quantitative, standardised terms. This discussion deals with liquid and solid particulate aerosols, special cases including Christiansen effects and isosbestics, and the phase-transition behaviour of liquid droplets in vapour.

REFERENCE NO. A00418

CASADEVALL, T.

1986

Eruption of Sorikmarapi volcano, Sumatera, July 5, 1986

JOURNAL/PUBLISHER File report, Volcanological Survey of Indonesia, Bandung

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Early-warning measures * Indonesia *

An exercise in reporting the outbreak of an Indonesian eruption to Australian aviation authorities is given in this short note. VSI heard about the outbreak 'through a series of lucky circumstances', but there were problems in attempts to make contact with the Qantas Jakarta Office and with individuals at Canberra and Sydney telephone numbers.

REFERENCE NO. A00169

CASADEVALL, T.J., JOHNSTON, D.A. HARRIS, D.M., ROSE, W.I.Jr MALINCONICO, L.L., STOIBER, R.E. and four others

1981

SO2 emission rates at Mount St. Helens from March 29 through December 1980.

JOURNAL/PUBLISHER The 1980 Eruptions of Mount St. Helens, Washington (Editors, P.W. Lipman and D.R. Mullineaux). United States Geological Survey Professional Paper

VOLUME/PAGE NO. 1250, 193-200

SUBJECT KEYWORDS * Atmosphere loading * Gas/vapour plumes * Mount St. Helens * United States *

Emission rates determined by ground-based and airborne correlation spectrometry were: 0-40 metric tons per day from 29 March to 14 May; 130-260 t/day from 25 May to 3 June; 1000 t/day from 6 June through to December. Most of the gas was released during non-explosive events. The magma body required to account for this emission is at least 0.3 km3.

REFERENCE NO. A00206

CASADEVALL, T.J., ROSE, W.I. Jr, FULLER, W.H. HUNT, W.H. HART, M.A., MOYERS, J.L. WOODS, D.C. CHUAN, R.L., FRIEND, J.P.

1984

Sulfur dioxide and particles in quiescent volcanic plumes from Poas, Arenal, and Colima volcanos, Costa Rica and Mexico.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 89 (D6), 9633-9641

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Atmosphere loading * Gas/vapour plumes * Lidar * Remote sensing *

SO2 emission rates were measured by COSPEC, plume structure by airborne lidar, S-gas concentrations by flame photometry, and particle characteristics by an impactor, for the plumes of three central-American volcanoes in February 1982 during non-eruption conditions. SO2 oxidation rates are small. The plumes represent degassing of shallow magma bodies.

REFERENCE NO. A00271

CASTLEMAN, A.W. Jr, MUNKELWITZ, H.R., MANOWITZ, B.

1974

Isotopic studies of the sulfur component of the stratospheric aerosol layer.

JOURNAL/PUBLISHER Tellus

VOLUME/PAGE NO. 26 (1-2), 222-234

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Indonesia * Philippines *

A report is given on the results of an extensive study of the sulphur concentration and isotopic ratio of stratospheric particles collected from 1962 to 1971. Major perturbations to the aerosol layer result from a few explosive volcanic eruptions. Isotopic values are similar in both hemispheres, suggesting input from a continual equatorial source.

REFERENCE NO. A00408

CHENG, R.J.

1982

The mechanisms of fine particle generation and electrification during Mount St. Helens volcanic eruption.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1988 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 211-217

SUBJECT KEYWORDS * Ash characteristics * Cloud dynamics * Electrical effects * Mount St. Helens * United States *

Highly electrically charged fine, solid fragments are ejected by bursting of gas bubbles from the surface of a crystallising molten magma particles. Charge polarities are determined by temperature gradients in particles of different sizes. Fine, positively charged particles rise to the top of eruption columns. Lightning may be generated

REFERENCE NO. A00377

CHESTER, D.K.

1988

Volcanoes and climate : recent volcanological perspectives.

JOURNAL/PUBLISHER Progress in Physical Geography

VOLUME/PAGE NO. 12 (1), 1-35

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Glacier records * Indonesia * Krakatau * Remote sensing * Tambora *

A general, wide-ranging account is provided of the impact of volcanic eruptions on climate. Lamb's DVI is discussed in some detail. The character of climate-influencing eruptions and their long- and short-term effects are described also, including the relationships between ice ages and periods of extensive volcanic activity.

REFERENCE NO. A00601

CHRISTIANSEN, R.L., PETERSON, D.W.

1981

Chronology of the 1980 eruptive activity.

JOURNAL/PUBLISHER The 1980 Eruptions of Mount St. Helens, Washington (Editors, P.W.Lipman and D.R. Mullineaux). United States Geological Survey Professional Paper

VOLUME/PAGE NO. 1250, 17-30

SUBJECT KEYWORDS * Atmosphere loading * Cloud dynamics * Mount St. Helens * United States *

This introductory paper to the Mount St. Helens volume is a condensed narrative of the 1980 events. It covers the initial period of seismic and steam-blast activity, the climactic eruption when the more than 20 km-high column was produced, and the period of subsequent pyroclastic activity and lava-dome formation. Sixteen photographs are included.

REFERENCE NO. A00205

CHUAN, R.L., PALAIS, J., ROSE, W.I., KYLE, P.R.

1986

Fluxes, sizes, morphology and compositions of particles in the Mt. Erebus volcanic plume, December 1983.

JOURNAL/PUBLISHER Journal of Atmospheric Chemistry

VOLUME/PAGE NO. 4, 467-477

SUBJECT KEYWORDS * Aerosols * Antarctica * Gas/vapour plumes * United States *

The flux and size distribution of particles in the plume at Erebus volcano, Antarctica, has been determined using a cascade impactor instrument. The particles consist of sulphur, silica, iron oxides, and small particles of complex liquids. The Erebus plume has only a small amount of sulphate particles. Fallout is widespread over Antarctica.

REFERENCE NO. A00623

CHUAN, R.L., WOODS, D.C., McCORMICK, M.P.

1981
Characterization of aerosols from eruptions of Mount St. Helens.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 211, 830-832
SUBJECT KEYWORDS * Aerosols * Mount St. Helens * United States *

Aerosol measurements and analyses of eruptions between 7 April and 7 August 1980 were made under different eruptive conditions. Phreatic aerosol was characterised by a monomodal size distribution of larger silicate particles, whereas phreatomagmatic clouds were multimodal and the small-size modes were mixtures of sulphuric acid and silicates.

REFERENCE NO. A00561

CLANCY, R.T.

1986
El Chichon and "mystery cloud" aerosols between 30 and 55 km : global observations from the SME visible spectrometer.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 13 (9), 937-940
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Mystery volcano * Remote sensing * SME satellite *

Data for visible limb radiance from the Solar Mesophere Explorer satellite collected in 1982-4 are used to obtain scattering ratios for aerosols in the 30-55 km altitude range. Significant aerosol scattering from the 'mystery cloud' and El Chichon aerosol layers are found above 30 km. Vertical transport of the aerosols is by eddy diffusion.

REFERENCE NO. A00322

CLARKE, A.D., CHARLSON, R.J., OGREN, J.A.

1983
Stratospheric aerosol light absorption before and after El Chichon.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 1017-1020
SUBJECT KEYWORDS * Aerosols * El Chichon * Remote sensing *

The light absorption characteristics of aerosol collected mainly on an opal glass bar suspended from a U2 aicraft, are measured directly from the bar. A slight increase in stratospheric absorption after the El Chichon eruption is suggested, but the presence of a soot component adds uncertainty to this interpretation.

REFERENCE NO. A00065

COLE, J.W., NAIRN, J.A.
1975
New Zealand.
JOURNAL/PUBLISHER Catalogue of the Active Volcanoes of the World including Solfatara Fields. International Association of Volcanology and Chemistry of the Earth's Interior, Rome
VOLUME/PAGE NO. Part 22
SUBJECT KEYWORDS * New Zealand * Tarawera * Volcano distribution * Volcano lists *

This IAVCEI catalogue contains information on New Zealand's five historically active volcanoes and other potentially active centres. All of these volcanoes are in North Island.

REFERENCE NO. A00007

CONEL, J.E.
1969
Infrared emissivities of silicates: experimental results and a cloudy atmosphere model of spectral emission from condensed particulate mediums.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 74 (6), 1614-1634
SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

Infrared emissivities of powdered silicates are demonstrated by experiment to contain newly recognised maxima and minima that are representative of both composition and particle size. Christiansen frequencies of silicate powder films are shown to be diagnostic of mineralogy and to be the frequency of emissivity for powders.

REFERENCE NO. A00187

COOK, R.K.
1962
Strange sounds in the atmosphere : Part I.
JOURNAL/PUBLISHER Sound
VOLUME/PAGE NO. 1 (2), 12-16
SUBJECT KEYWORDS * Infrasonics * Krakatau * Meteorology * Remote sensing * United States *

The principles of propagation of low-frequency sound through the atmosphere from events such as volcanic eruptions, tornados, earthquakes, and magnetic storms, are reviewed in this first part of a two-part paper (see also Cook and Young, 1962). A historical background is also presented, plus a description of the microphones used for detection.

REFERENCE NO. A00201

COOK, R.K., YOUNG, J.M.
1962
Strange sounds in the atmosphere : Part II.
JOURNAL/PUBLISHER Sound
VOLUME/PAGE NO. 1 (3), 25-33
SUBJECT KEYWORDS * Infrasonics * Meteorology * Remote sensing * United States *

This last part of a two-installment article (see Cook, 1962) is a report on a few of the many natural sounds taking place at infrasonic frequency in the atmosphere. Microbaroms, earthquakes waves, magnetic storms, and tornadoes are considered, but not volcanic eruptions.

REFERENCE NO. A00202

COOKE, R.J.S., McKEE, C.O., DENT, V.F., WALLACE, D.A.
1976
Striking sequence of volcanic eruptions in the Bismarck volcanic arc, Papua New Guinea, in 1972-75.
JOURNAL/PUBLISHER Volcanism in Australasia (Editor, R.W. Johnson). Elsevier, Amsterdam
VOLUME/PAGE NO. 149-172
SUBJECT KEYWORDS * Eruption frequencies * Papua New Guinea *

The phenomenon of several volcanoes in a small region each producing volcanic activity during the same, short time span, is well illustrated by this paper.

REFERENCE NO. A00034

COUR-PALAIS, B.G., KESSLER, D.J., ZOOK, H.A., CLANTON, U.S.
1985
STS 8 Orbiter mission window pitting and the possible association with the El Chichon eruption of March and April 1982.
JOURNAL/PUBLISHER AIAA 23rd Aerospace Sciences Meeting, Reno, Nevada. American Institute of Aeronautics and Astronautics, New York
VOLUME/PAGE NO. AIAA-85-0098
SUBJECT KEYWORDS * Aerosols * Ash encounters * Damage reports * El Chichon * United States *

Windows of the Shuttle Orbiter were pitted after its flight of August-September 1983. The pitting is attributed to impact of frozen sulphuric acid droplets produced by stratospheric injection by the El Chichon eruption of March-April 1982. The Shuttle re-entry was at night when the aerosols were frozen. The aerosols may melt during the day.

REFERENCE NO. A00339

CRITCHFIELD, H.J.

1982

Problems in the climatology of the 1980 Mount St. Helens eruptions.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication.

VOLUME/PAGE NO. 2240, 203-209

SUBJECT KEYWORDS * Climate change * Infrasonics * Meteorology * Mount St. Helens * United States *

Complex climatological relationships caused by the 1980 Mount St. Helens eruption are reviewed. Refined models of the interaction between climate and volcanic activity at all scales of space and time are needed, but all events, causes, and effects should be treated in the perspective of the entire climate system.

REFERENCE NO. A00376

CRONIN, J.F.

1971

Recent volcanism and the stratosphere.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 172, 847-849

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Eruption frequencies * Indonesia * Katmai * Krakatau * Laki * Tambora *

Two latitudinal belts of volcanoes produced ash and gases that were injected into the stratosphere between 1963 and 1970 - one equatorial, and the other just below the Arctic Circle. The latter, where the tropopause is lower, may have been the principal source of replenishment of volcanic dust and gases to the stratosphere.

REFERENCE NO. A00166

CRONN, D.R., NUTMAGUL, W.

1982
Volcanic gases in the April 1979 Soufriere eruption.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 216, 1121-1123
SUBJECT KEYWORDS * Gas/vapour plumes * Soufriere *

Six samples of gas collected from an aircraft were analysed for ten different gas species, only four of which (CO, CO2, COS, and CS2) were found to have increased mixing ratios. These increases were insufficient to contribute greatly to the global budgets of these four components.

REFERENCE NO. A00119

D'ALTORIO, A., VISCONTI, G.

1983
Lidar observations of dust layers' transience in the stratosphere following the El Chichon volcanic eruption.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (1), 27-30
SUBJECT KEYWORDS * Aerosols * Cloud dynamics * El Chichon * Europe * Lidar * Remote sensing *

Two stratospheric aerosol layers were observed using a lidar at L'Aguila Italy (lat. 42N, long. 13E) in July and August 1982. An unusually fast decrease in altitude of the layers is recorded: 0.2-0.3 km per day.

REFERENCE NO. A00108

DANIELSEN, E.F.

1981
Trajectories of the Mount St. Helens eruption plume.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 211, 819-821
SUBJECT KEYWORDS * Cloud dynamics * Mount St. Helens * United States *

The plume of the major eruption at Mount St. Helens on 18 May 1980 penetrated 10-11 km into the stratosphere to heights of 22-23 km. Trajectories computed to position a NASA U2 aircraft for sampling in the plume are described. Wind shears rapidly converted the plume to a thin, slightly inclined lamina that separated under different wind regimes.

REFERENCE NO. A00506

DANIELSEN, E.F.

1982

Mount St. Helens plume dispersion based on trajectory analysis.

JOURNAL/PUBLISHER Atmospheric Effects andPotential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 141-151

SUBJECT KEYWORDS * Cloud dynamics * Meteorology * Mount St. Helens * Remote sensing * TIROS satellites * United States *

The initially quasi-vertical 18 May 1980 plume rapidly acquired the horizontal momentum of environmental winds and underwent differential rotation caused by positive speed shear in the troposphere and negative shear in the stratosphere. The lower stratospheric part of the cloud circled the globe at an average speed of about 25 m per second.

REFERENCE NO. A00369

DANIELSEN, E.F., GELLER, M.A., LAVER, J.D., PETERSON, K.R.

1982

Transport and dispersion.

JOURNAL/PUBLISHER Mount St. Helens Eruptions of 1980 : Atmospheric Effects and Potential Climatic Impact (Editors, R.E. Newell and A. Deepak). National Aeronautics and Space Administration, Washington, D.C.

VOLUME/PAGE NO. NASA SP-458, 37-46

SUBJECT KEYWORDS * Cloud dynamics * Meteorology * Mount St. Helens * Remote sensing * TIROS satellites * United States * Working groups *

A mainly meteorological approach is taken in describing and analysing the trajectories of the 18 May eruption plume. The Mount St. Helens cloud remained discrete in the horizontal and laminar in the vertical for at least five months after the stratospheric injections. Different observational techniques are reviewed.

REFERENCE NO. A00153

DE LUISI, J.J., HERMAN, B.M.

1977

Estimation of solar radiation absorption by volcanic stratospheric aerosols from Agung using surface-based observations.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 82 (24), 3477-3480

SUBJECT KEYWORDS * Aerosols * Agung * Australia * Climate change * Indonesia * Meteorology *

The imaginary term of the complex refractive index of stratospheric aerosols from the 1963 eruption of Agung volcano in Bali, Indonesia, is estimated from theory to be less than 0.01 by comparison with measurements of the direct and diffuse solar flux made at Aspendale, Australia. Other parameters are also calculated and discussed.

REFERENCE NO. A00435

DECKER, R.W.

1978

State of the art in volcano forecasting.

JOURNAL/PUBLISHER Geophysical Predictions. Studies in Geophysics. National Academy of Sciences, Washington D.C.

VOLUME/PAGE NO. 47-57

SUBJECT KEYWORDS * Eruption frequencies * Japan * New Zealand * United States * Volcanic prediction *

This review of eruption forecasting was published originally in 1973 in Bulletin Volcanologique. It includes short descriptions of instrumental monitoring techniques (seismicity, ground deformation, temperature, gravity, magnetics, geochemistry), and of the general geological framework of volcanism and a statistical approach to repose periods.

REFERENCE NO. A00283

DECKER, R.W.

1986

Forecasting volcanic eruptions.

JOURNAL/PUBLISHER Annual Review of Earth and Planetary Sciences

VOLUME/PAGE NO. 14, 267-291

SUBJECT KEYWORDS * Colo * Eruption frequencies * Europe * Indonesia * Mount St. Helens * United States * Volcanic prediction *

A readable, up-to-date review is given of the current status of volcanic forecasting. The 1983 Colo eruption, Indonesia, is given as an example of a successful general forecast. The author concludes that there is an ultimate limit to the accuracy of forecasting volcanic eruptions. Forecasts will always be probabilistic rather than deterministic.

REFERENCE NO. A00211

DEIRMENDJIAN, D.

1971

Global Turbidity Studies.1. Volcanic Dust Effects - A Critical Survey

JOURNAL/PUBLISHER Rand Corporation, SantaMonica, California

VOLUME/PAGE NO. R-886-ARPA

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Climate change * Indonesia * Katmai * Krakatau * Lidar * Meteorology *

This report is the forerunner to two other reports on exactly the same subject by the same author (see Deirmendjian, 1972, 1973).

REFERENCE NO. A00167

DEIRMENDJIAN, D.

1972

On volcanic and other particulate turbidity anomalies.

JOURNAL/PUBLISHER Rand Corporation, Santa Monica, California

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Climate change * Indonesia * Katmai * Krakatau * Lidar * Meteorology *

This review of the impact of major volcanic eruptions on the middle atmosphere was subsequently published in Advances in Geophysics (see Deirmendjian, 1973). It is condensation of Rand Report R-886-ARPA (see Deirmendjian, 1971).

REFERENCE NO. A00094

DEIRMENDJIAN, D.

1973

On volcanic and other particulate turbidity anomalies

JOURNAL/PUBLISHER Advances in Geophysics

VOLUME/PAGE NO. 16, 267-296

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Climate change * Indonesia * Katmai * Krakatau * Lidar * Meteorology *

Optical atmospheric effects caused by the 1883 Krakatau, 1912 Katmai, and 1963 Agung eruptions are reviewed. The climatic effects of volcanic materials injected into the atmosphere are assessed, but the author considers there is little evidence of volcanically induced climatic effects.

REFERENCE NO. A00093

DEIRMENDJIAN, D.

1979

Use of light scattering phenomena in atmospheric aerosol monitoring - a survey.

JOURNAL/PUBLISHER Rand Note prepared for the National Aeronautics and Space Administration. Santa Monica, California

VOLUME/PAGE NO. N-1211-NASA

SUBJECT KEYWORDS * Aerosols * Lidar * Remote sensing *

A review is given and an assessment made of the 'passive' (spectral extinction, aureole method, etc.) and 'active' (searchlight, lidar, etc.) ground-based and space-borne remote-sensing methods for measuring atmospheric turbidity.

REFERENCE NO. A00103

DELMAS, R.J., LEGRAND, M., ARISTARAIN, A.J., ZANOLINI, F.

1985

Volcanic deposits in Antarctic snow and ice.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 90 (D7), 12901-12920

SUBJECT KEYWORDS * Aerosols * Agung * Antarctica * Eruption frequencies * Glacier records * Krakatau *

The 1883 Krakatau and 1963 Agung eruptions are two important volcanic events that are recorded as sulphuric acid layers in Antarctic ice cores. Volcanic acid signals are especially well defined in central Antarctica. Records are not severely interfered with by signals from Ant arctic volcanoes.

REFERENCE NO. A00073

DELUISI, J.

1982

Comments on stratospheric dust.

JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union

VOLUME/PAGE NO. 63 (23), 529

SUBJECT KEYWORDS * Aerosols * El Chichon * Lidar * Mystery volcano * Philippines * Remote sensing * United States *

The author reports on Mauna Loa lidar observations (made by others) of enhancements of stratospheric dust concentrations in January and April 1982. These correspond to the so-called 'mystery' and 'monster' clouds, respectively. The latter is attributed to the El Chichon eruption, but the source of the 'mystery' cloud is unclear.

REFERENCE NO. A00233

DELUISI, J.

1983

Measurements of the El Chichon dust cloud from Mauna Loa Observatory.

JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia

VOLUME/PAGE NO. 383-385

SUBJECT KEYWORDS * Aerosols * El Chichon * Lidar * United States *

The El Chichon eruption cloud was observed on 9 April over Hawaii using a ground-based lidar system. The cloud originally was extremely dense at 27 km height, but then spread vertically to between 15 and 35 km. Observations of the cloud using a range of instruments were expected to be continued.

REFERENCE NO. A00215

DELUISI, J.J., MENDONCA, B.G., HANSON, K.J.

1982

Measurements of stratospheric aerosol over Mauna Loa, Hawaii, and Boulder, Colorado.

JOURNAL/PUBLISHER Atmospheric Effects andPotential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 117-123

SUBJECT KEYWORDS * Aerosols * Fuego * Lidar * Meteorology * Mount St. Helens * Soufriere * United States *

Direct solar-radiation transmission records at Mauna Loa from 1958 reveals precisely the presence of stratospheric aerosol from volcanic activity. The stratospheric aerosol optical depth resulting from the Mount St. Helens eruption appears to be similar to that measured for the 1974 Fuego eruption. Lidar data are also presented and discussed.

REFERENCE NO. A00362

DEVINE, J.D., SIGURDSSON, H., DAVIS, A.N., SELF, S.

1984

Estimates of sulfur andchlorine yield to the atmosphere from volcanic eruptions and potential climatic effects.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 89 (B7), 6309-6325

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Climate change * El Chichon * Krakatau * Laki * Mount St. Helens * Tambora *

Minimum masses of sulphur and chlorine are estimated from microprobe analyses of tephra. Declines in surface temperature associated with five historical eruptions corellate positively with minimum mass in a cube root relationship. El Chichon sulphur is anomalous, possibly because the sulphur derives in part from anhydrite decompositon.

REFERENCE NO. A00104

DIBBLE, R.B.

1989

Infrasonic recordings of Strombolian eruptions of Erebus, Antarctica, March-December 1984, covering the jump in activity on 13 September 1984.

JOURNAL/PUBLISHER Volcanic Hazards (Editor, J.H. Latter), IAVCEI Proceedings in Volcanology, Springer-Verlag, Berlin

VOLUME/PAGE NO. 1, 536-553.

SUBJECT KEYWORDS * Antarctica * Early-warning measures * Infrasonics * Remote sensing *

Infrasonic recordings of Erebus eruptions were made 26 km from the volcano using the Windless Bight Infrasonic Array. The author stresses the usefulness of infrasonic recordings as an adjunct to seismic recording and proposes a global reporting system of infrasonic arrays as a means of warning aviation authorities of eruptions.

REFERENCE NO. A00476

DILDA, R.P.

1982

No title

JOURNAL/PUBLISHER Letter, 8 December 1982, United Technologies, Pratt and Whitney Aircraft

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Ash encounters * Damage reports * Defensive inflight measures * Galunggung * Indonesia *

This reply to the International Air Transport Association for comments regarding aircraft operations through areas of volcanic activity, contains the results of inspections of the damaged engines of the Singapore Airlines 747 aircraft that ran into ash from Galunggung volcano, Indonesia, in July 1982. See also Tracy (1983).

REFERENCE NO. A00021

DITTBERNER, G.J.

1978
Climatic change : volcanoes, man-made pollution, and carbon dioxide.
JOURNAL/PUBLISHER IEEE Transactions on Geoscience Electronics
VOLUME/PAGE NO. GE-16 (1), 50-61
SUBJECT KEYWORDS * Climate change *

The three most important factors in determining climate change (external to atmospheric processes) are identified as (1) high-level stratospheric particles injected by volcanic eruptions, (2) increase in C02 caused by industrial activity, and (3) generation of lower atmospheric particles directly caused by man. These are evaluated using a climate model.

REFERENCE NO. A00432

DONN, W.L., BALACHANDRAN, N.K.

1981
Mount St. Helens eruption of 18 May 1980 : air waves and explosive yield.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 213 (4507), 539-541
SUBJECT KEYWORDS * Infrasonics * Mount St. Helens * United States *

Strong atmospheric acoustic-gravity waves were recorded by sensitive microbarographs and seismographs at large distances from the Mount St. Helens eruption. Wave signatures were similar to those of waves from large nuclear explosions. The approximate explosive yield of the eruption was 35 megatons, calculated by independent methods.

REFERENCE NO. A00402

DUBE, M., KRUEGER, A.J.

1986
Detection of volcanic sulfur dioxide from space.
JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union
VOLUME/PAGE NO. 67 (16), 397
SUBJECT KEYWORDS * El Chichon * Galunggung * Indonesia * Mystery volcano * NIMBUS/TOMS satellites * Nevado del Ruiz * Remote sensing *

A review is given of the 1982-5 use of the satellite-borne Total Ozone Mapping Spectrometer in studying volcanic eruptions. A volcanic hazard warning system would require modified TOMS instruments on geostationary satellites to detect eruptions as they take place.

REFERENCE NO. A00126

DUTTON, E., DeLUISI, J.
1983
Spectral extinction of direct solar radiation by the El Chichon cloud during December 1982.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 1013-1016
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Meteorology * Remote sensing *

Stratospheric aerosol optical depths are calculated from solar extinction measurements made from on board an aircraft between 6S and 55N using sun photometers. Two components of the El Chichon cloud are identified, each at a different latitude, and each with a characteristic spectral signature.

REFERENCE NO. A00064

DYER, A.J.
1966
Artificial radio-activity, ozone and volcanic dust as atmospheric tracers in the Southern Hemisphere.
JOURNAL/PUBLISHER Tellus
VOLUME/PAGE NO. 18 (2), 416-419
SUBJECT KEYWORDS * Aerosols * Agung * Australia * Cloud dynamics * Indonesia *

The bulk of the volcanic 'dust' from the 1963 Agung eruption arrived over Aspendale (38S), Australia, after about six months at a height of 20 km, but the poleward transfer of fission products is shown to be complex from stratospheric sampling carried out at Mildura (35 S).

REFERENCE NO. A00079

DYER, A.J.
1974
The effect of volcanic eruptions on global turbidity, and an attempt to detect long-term trends due to man.
JOURNAL/PUBLISHER Quarterly Journal of the Royal Meteorological Society
VOLUME/PAGE NO. 100, 563-571
SUBJECT KEYWORDS * Aerosols * Agung * Australia * Climate change * Indonesia * Meteorology *

An Australian atmospheric physicist concludes that the effects of the 1963 Agung eruption, Indonesia, are seen clearly in solar radiation data from the USSR, Japan, USA, and Australia. However, there is no convincing evidence for recent, long-term, world-wide increases in atmospheric turbidity caused by Man.

REFERENCE NO. A00130

DYER, A.J., HICKS, B.B.
1965
Stratospheric transport of volcanic dust inferred from solar radiation measurements.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 208 (5006), 131-133
SUBJECT KEYWORDS * Aerosols * Agung * Antarctica * Australia * Cloud dynamics * Indonesia * Meteorology *

Differences in diffuse and direct solar radiation measurements for Aspendale, Victoria, are reported for 1959-65, and are interpreted in relation to the 17 March 1963 Agung eruption, Indonesia. Radiation data from the South Pole are also considered, and a seasonal control on the stratospheric transfer of volcanic material is identified.

REFERENCE NO. A00234

DYER, A.J., HICKS, B.B.
1968
Global spread of volcanic dust from the Bali eruption of 1963.
JOURNAL/PUBLISHER Quaterly Journal of the Royal Meteorology Society
VOLUME/PAGE NO. 94, 545-554
SUBJECT KEYWORDS * Aerosols * Agung * Australia * Cloud dynamics * Indonesia * Meteorology *

Solar radiation measurements are assessed by two Australian atmospheric physicists. The initial injection produced a 22-3 km-high layer. Most of the material stayed in the Southern Hemisphere, but seasonal effects appeared in both hemispheres (a 'winter' maximum). Attempts to relate observations to an atmospheric diffusion model are inconclusive.

REFERENCE NO. A00147

EBERSTEIN, I.J, PARKER, B., O'KEEFE, J.
1986
Airborne tephra from Soputan eruption.
JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union
VOLUME/PAGE NO. 67 (16), 398
SUBJECT KEYWORDS * Ash characteristics * Ash encounters * Indonesia * Soputan *

Ash from the Qantas 747 aircraft that entered an eruption cloud from Soputan volcano, Indonesia, on 20 May 1985, is reported to consist of glass particles, angular silicate particles, and aggregated particles of sub-micron-size material containing large amounts of sulphur and iron and having the potential for significant atmospheric interaction.

REFERENCE NO. A00127

EDDLEMAN, T.

1980
Facing the mountain's fury.
JOURNAL/PUBLISHER Air Reservist
VOLUME/PAGE NO. 32 (8), 6-8
SUBJECT KEYWORDS * Mount St. Helens * United States *

Air Force Reserve's 304th Aerospace Rescue and Recovery Squadron based at Portland International Airport, Oregon, was a major unit used for helicopter-supported rescue work at Mount St. Helens shortly after the devastating eruption of 18 May 1980. Pararescuemen's reminiscences are documented in this short magazine-style article.

REFERENCE NO. A00294

ELANSKII, N.F., ZVENIGORODSKII, S.G., SM'ISHLYAEV, S.P.

1987
The influence of volcanic eruptions on the stratospheric ozone layer.
JOURNAL/PUBLISHER Doklady Akademii Nauk SSSR
VOLUME/PAGE NO. 294 (5), 1077-1081
SUBJECT KEYWORDS * Aerosols *

This paper is in Russian. No translation is available.

REFERENCE NO. A00496

EMSLIE, A.G., ARONSON, J.R.

1973
Spectral reflectance and emittance of particulate materials. 1 : Theory.
JOURNAL/PUBLISHER Applied Optics
VOLUME/PAGE NO. 12 (11), 2563-2572
SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

The infrared spectral reflectance of a semi-infinite medium composed of irregular particles of different materials is calculated in terms of the sizes, shapes, and complex refractive indices of the particles. Part 2 of this paper deals with application of derived formulae and their results (see Aronson & Emslie, 1973).

REFERENCE NO. A00398

ENGINEERS AUSTRALIA

1982
Jet hazard tracked.
JOURNAL/PUBLISHER Engineers Australia
VOLUME/PAGE NO. 20 August, 14
SUBJECT KEYWORDS * Australia * Early-warning measures * Galunggung * Indonesia * Remote sensing * Spectral characteristics * TIROS satellites *

A short, magazine-style article is given on an Australian-developed method for identifying and tracking volcanic-ash clouds using NOAA-7 satellite imagery (AVHR radiometer). F. Honey (CSIRO) and W. Carroll (WAIT) developed a computer program that enabled discrimination between volcanic-ash and normal weather clouds.

REFERENCE NO. A00295

EOS

1990
Eruption plume from Redoubt volcano.
JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union
VOLUME/PAGE NO. 71 (1)
SUBJECT KEYWORDS * Cloud dynamics * Redoubt * Remote sensing * TIROS satellites * United States *

A NOAA-11 satellite image obtained on 16 December 1989 is presented, together with an extended figure caption. A 10.5 km high, 400 km long plume is shown extending eastwards from Redoubt volcano about 200 km southwest of Anchorage, Alaska. Ash on 16 December was over the conterminous United States, as far as Texas 5000 km away.

REFERENCE NO. A00488

EVANS, W.F.J., KERR, J.B.

1983
Estimates of the amountof sulphur dioxide injected into the stratosphere by the explosive volcanic eruptions : El Chichon, Mystery Volcano, Mt. St. Helens.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 1049-1051
SUBJECT KEYWORDS * Atmosphere loading * El Chichon * Gas/vapour plumes * Mount St. Helens * Mystery volcano *

Ground-based measurements of sulphur dioxide amounts using a Brewer spectrophotometer, supplemented by aircraft flight measurement and satellite data, are 0.6 megatons for Mount St. Helens, 5.6 megatons for Mystery Volcano, and 13.4 megatons for El Chichon several weeks after the eruption.

REFERENCE NO. A00088

FAA GENERAL AVIATION NEWS

1980
Ash Sunday. How seriously has Mt. St. Helens affected flying in the Northwest?
JOURNAL/PUBLISHER FAA General Aviation News
VOLUME/PAGE NO. September - October, 10-11
SUBJECT KEYWORDS * Ash encounters * Damage reports * FAA * Mount St. Helens * United States *

The problem of aircraft encounters with volcanic ash from Mount St. Helens in 1980 is dealt with in this short article. Five precautions recommended by FAA are: avoid the volcano, keep the aircraft clean, watch exposed seals for leakage, anticipate unusual brake and tire wear, and change engine oil and oil filters more often than usual.

REFERENCE NO. A00301

FARLOW, N.H., FERRY, G.V., LEM, H.Y.

1973
Analysis of individual particles collected from the stratosphere.
JOURNAL/PUBLISHER Space Research
VOLUME/PAGE NO. 13, 1153-1157
SUBJECT KEYWORDS * Aerosols * Ash characteristics *

Chemical analyses are given for Southern Hemisphere stratospheric samples collected by Australian atmospheric physicist E.K. Bigg. The samples are similar to volcanic emissions examined by others.

REFERENCE NO. A00131

FARLOW, N.H., FERRY, G.V., LEM, H.Y., HAYES, D.M.

1979
Latitudinal variations of stratospheric aerosols.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 84 (C2), 733-743
SUBJECT KEYWORDS * Aerosols * Fuego * United States *

Stratospheric aerosols were collected from a U2 aircraft in 1976-7 from the tropics to northern latitudes. The tropics are identified as a possible region of particle growth. The aerosol layer decreases in height towards the North Pole, possibly meaning that mature, well-mixed aerosols leave the stratosphere at higher latitudes.

REFERENCE NO. A00077

FARLOW, N.H., OBERBECK, V.R., SNETSINGER, K.G., FERRY, G.V., POLKOWSKI, G., HAYES, D.M.

1981

Size distributions and mineralogy of ash particles in the stratosphere from eruptions of Mount St. Helens.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 211, 832-834

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Cloud dynamics * Gas/vapour plumes * Mount St. Helens * United States *

Samples collected by U-2 aircraft from the stratosphere after the first three major eruptions at Mount St. Helens contained large globules of liquid acid and ash. The globules had disappeared from the lower stratosphere by late June 1980, leaving only smaller droplets. Cloud inhomogeneity is indicated by particle size and mineralogy analyses.

REFERENCE NO. A00049

FARLOW, N.H., SNETSINGER, K.G., OBERBECK, V.R., FERRY, G.V. POLKOWSKI, G., HAYES, D.M.

1982

Time variations of aerosols following Mount St. Helens eruptions.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1988 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 55-63

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Mount St. Helens * United States *

Ash and acid contents of stratospheric aerosols collected from a U2 aircraft during several months after the first three major eruptions at Mount St. Helens, were analysed for grain sizes and composition. Ash obtained 1-4 days after eruptions was coated with acid and fell rapidly from the atmosphere leaving a residue of acid droplets.

REFERENCE NO. A00344

FEDERAL AVIATION ADMINISTRATION

1980
Volcanic ash hazard!
JOURNAL/PUBLISHER General Aviation Airworthiness Alerts, Special Issue. United States Department of Transportation, Federal Aviation Administration, Oklahoma City
VOLUME/PAGE NO. AC No. 43-16
SUBJECT KEYWORDS * Damage reports * FAA * Mount St. Helens * United States *

The United States FAA provides guidelines on how to preclude possible airworthiness problems associated with aircraft exposure to volcanic ash either in the atmosphere or on the ground. The guidelines are based on experience gained during the 1980 Mount St. Helens eruption. Airframe, systems, and powerplant considerations are dealt with.

REFERENCE NO. A00297

FEGLEY, R.W., ELLIS, H.T.

1975A
Lidar observations of a stratospheric dust cloud layer in the tropics.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 2 (4), 139-141
SUBJECT KEYWORDS * Fuego * Lidar * Remote sensing * United States *

A whitish cloud veil was observed over Hawaii from October 1974. Lidar measurements were made from Mauna Loa, and the layer was established to be about 19.5 km high. These new observations support the view that the veil was caused by the 1974 Fuego eruption, Guatamala, but there are some unanswered questions.

REFERENCE NO. A00358

FEGLEY, R.W., ELLIS, H.T.

1975B
Optical effects of the 1974 stratospheric dust cloud.
JOURNAL/PUBLISHER Applied Optics
VOLUME/PAGE NO. 14 (8), 1751-1752
SUBJECT KEYWORDS * Aerosols * Agung * Fuego * Indonesia * Lidar * Remote sensing *

A sharp, well-defined 'dust' cloud was detected by the Mauna Loa Observatory, Hawaii, on 8 October 1974, and is attributed to the 1974 Fuego eruption, Guatemala. A plot of solar-radiation extinction at Mauna Loa from 1958 to 1975 has a peak in the mid 1960s corresponding to the 1963 Agung eruption, Indonesia.

REFERENCE NO. A00582

FEGLEY, R.W., ELLIS, H.T., HEFFTER, J.L.

1980

Volcanic contributions to the stratospheric sulfate layer.

JOURNAL/PUBLISHER Journal of Applied Meteorology

VOLUME/PAGE NO. 19 (6), 683-690

SUBJECT KEYWORDS * Aerosols * Lidar * Meteorology * Nyamuragira * Remote sensing *

Transport of volcanic sulphate through the tropical tropopause in January 1977 from a source believed from trajectory analyses to be Nyiragongo in central Africa, was detected using ground-based lidar in Hawaii. The eruption was only of moderate intensity, and the volcanic layer was convected by means of radiative absorption.

REFERENCE NO. A00414

FISHER, N.H.

1957

Melanesia.

JOURNAL/PUBLISHER Catalogue of the Active Volcanoes of the World including Solfatara Fields. International Volcanological Association, Naples

VOLUME/PAGE NO. Part 5

SUBJECT KEYWORDS * Lamington * Manam * Papua New Guinea * Rabaul * Solomon Islands * Ulawun * Vanuatu * Volcano distribution * Volcano lists *

The active volcanoes of Papua New Guinea, Solomon Islands, and Vanuatu are described in this IVA catalogue. Data on only pre-1957 eruptions are given. See Johnson (1976), Simkin and others (1981), and Johnson (1981) for information on more recent Melanesian eruptions.

REFERENCE NO. A00005

FISKE, R.S., SIGURDSSON, H.

1982

Soufriere Volcano, St. Vincent : observations of its 1979 eruption from the ground, aircraft, and satellites.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 216, 1105-1106

SUBJECT KEYWORDS * Remote sensing * Soufriere * United States *

An introduction is given to 11 papers, listed in this bibliography (see Soufriere), that were presented in a special issue of Science. Rapid response by earth, atmospheric, and space scientists made possible diverse observations during the explosive phase of the 1979 Soufriere eruption.

REFERENCE NO. A00110

FLANIGAN, D.F., DELONG, H.P.

1971
Spectral absorption characteristics of the major components of dust clouds.
JOURNAL/PUBLISHER Applied Optics
VOLUME/PAGE NO. 10 (1), 51-56
SUBJECT KEYWORDS * Ash characteristics * Remote sensing * Spectral characteristics *

The compositions and spectral absorption characteristics of 70 soil samples collected world-wide are examined. There are five major components that selectively absorb radiation in the 700-1300 cm-1 atmospheric window - three clay minerals, silica, and calcium carbonate.

REFERENCE NO. A00181

FLOWERS, E.C., VIEBROCK, H.J.

1965
Solar radiation : an anomalous decrease of direct solar radiation.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 148, 493-393
SUBJECT KEYWORDS * Aerosols * Agung * Antarctica * Indonesia * Meteorology *

Decreases of 5-78 percent normal-intensity solar radiation measured at the South Pole beginning in November 1963 are attributed to atmospheric 'dust' from the March eruption at Agung, Indonesia. The late arrival of volcanic material in Antarctica is considered to be due to the breakdown of the stratospheric circum-polar circulation in the spring of 1963.

REFERENCE NO. A00264

FOX, T.

1985
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organization, Montreal, Memorandum
VOLUME/PAGE NO. 5
SUBJECT KEYWORDS * Early-warning measures * ICAO * Working groups *

Some replies from Study Group members to VAW-Memos/1-4 are included with this brief memorandum. See Nancoo (1984,1985).

REFERENCE NO. A00025

FOX, T.

1986A
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organization, Montreal, Memorandum
VOLUME/PAGE NO. 6
SUBJECT KEYWORDS * Early-warning measures * ICAO * Working groups *

This memorandum contains notification of changes in membership (including Australian member change - W.A.Fairbairn replaced by G.L. Dutton). The Study Group Secretary also comments on proposals made in VAW-Memo/5 for amendments to ICAO regulatory documents.See Fox (1985).

REFERENCE NO. A00026

FOX, T.

1986B
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memorandum
VOLUME/PAGE NO. 7
SUBJECT KEYWORDS *

Changes in membership of the Study Group are provided by the Secretary.

REFERENCE NO. A00048

FOX, T.

1986C
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memorandum
VOLUME/PAGE NO. 8
SUBJECT KEYWORDS * ICAO * Working groups *

This memorandum is simply a short covering note that accompanied copies of an article by Yeend (1985) distributed to VAW Study Group members.

REFERENCE NO. A00096

FOX, T.

1986D
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memorandum
VOLUME/PAGE NO. 9
SUBJECT KEYWORDS * ICAO * Working groups *

The Secretary advises of preparations for the first meeting of the VAW Study Group in Montreal, 14-17 October 1986. A change in membership is advised.

REFERENCE NO. A00439

FOX, T.

1986E
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memorandum
VOLUME/PAGE NO. 10
SUBJECT KEYWORDS * ICAO * Working groups *

Revisions to the draft proposal for changes in ICAO regulatory documents last dealt with in VAW-Memo/6, are listed in the light of members' comments. Suggested formats for a VOLCAIREP (volcanic-eruption reporting form) are also given.

REFERENCE NO. A00440

FOX, T.

1986F
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memorandum
VOLUME/PAGE NO. 11
SUBJECT KEYWORDS * ICAO * Working groups *

A detailed account is given of the proceedings of the first meeting of the VAW Study Group held in Montreal from 14 to 17 October 1986. Five agenda items were discussed, including particularly a review of the proposal to amend regulatory documents and a preliminary examination of a possible internationl observatory network.

REFERENCE NO. A00441

FOX, T.

1987
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memoradum
VOLUME/PAGE NO. 12
SUBJECT KEYWORDS * Aerosols * ICAO * Japan * Lidar * Mount St. Helens * Remote sensing * United States * Working groups *

Group members are advised that the ICAO Council had adopted the amendments to regulatory documents developed by the VAW group in relation to volcanic-ash warnings. The related proposal to establish a voluntary international airways volcano watch was presented to the Air Navigation Commission in June.

REFERENCE NO. A00437

FOX, T.

1988A
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memorandum
VOLUME/PAGE NO. 13
SUBJECT KEYWORDS * Early-warning measures * ICAO * Working groups *

Details of Air Navigation Bureau actions on the proposal to organise a voluntary international airways volcano watch are provided in this memo. A new task for the group is identified concerning the effect on international air routes of national air routes of radioactive debris and toxic chemical clouds spread into the atmosphere following industrial accidents.

REFERENCE NO. A00447

FOX, T.

1988B
Global airways volcano watch is steadily expanding.
JOURNAL/PUBLISHER ICAO Bulletin
VOLUME/PAGE NO. April, 21-23
SUBJECT KEYWORDS * Ash encounters * Early-warning measures * Galunggung * ICAO * Indonesia * Meteorology * Remote sensing * Working groups *

A short account is given of the development of a Special Air Report of Volcanic Activity to be used by pilots to advise ground control of observed volcanic eruptions. The establishment of a Voluntary International Airways Volcano Watch is described also. The 1982 Galunggung aircraft/ash-cloud incidents are highlighted.

REFERENCE NO. A00478

FOX, T.

1990
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memorandum
VOLUME/PAGE NO. 15
SUBJECT KEYWORDS * Ash encounters * Damage reports * Early-warning measures * Electrical effects * ICAO * Redoubt * United States * Working groups *

The Redoubt eruption, Alaska, features prominently in this memorandum. Attachments include preliminary accounts of the incident involving a KLM 747 aircraft and Redoubt ash of 15 December 1989, and of the damage inspection of the aircraft at Anchorage. The memo also includes a report of a feasibility study concerning toxic-chemical cloud warnings.

REFERENCE NO. A00537

FRANKLIN, B.

1784
Meteorological imaginations and conjectures.
JOURNAL/PUBLISHER Literary and Philosophical Society of Manchester.
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Aerosols * Climate change * Europe * Laki * Meteorology *

An extract from Benjamin Franklin's historic paper in which the cold northern-hemisphere winter of 1783-4 is ascribed to the effect of the 1783 Laki eruption, Iceland, was reprinted in the paper on the same subject by Sigurdsson (1982; this bibliography).

REFERENCE NO. A00232

FRIEDMAN, J.D., HEIKEN, G., RANDERSON, D., McKAY, D.S.

1976
Observations of eruption clouds from Sakura-zima volcano, Kyushu, Japan from Skylab 4.
JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research
VOLUME/PAGE NO. 1, 305-329
SUBJECT KEYWORDS * Atmosphere loading * Cloud dynamics * Gas/vapour plumes * Japan * Manned spacecraft * Sakurajima *

Skylab photographs were taken between 9 June 1973 and 1 February 1974 of several entire eruption clouds issuing from Sakurajima volcano. The clouds did not penetrate the tropopause. Their maximum height was 3.4 km. The results of kinetic and thermal energy release calculations are also given.

REFERENCE NO. A00054

FRIEND, J.P., CADLE, R.D., GRAEDEL, T.E., LAZRUS, A.L., TURCO, R.P.

1982

Chemistry of the Mount St. Helens effluent.

JOURNAL/PUBLISHER Mount St. Helens Eruptions of 1980 : Atmospheric Effects and Potential Climatic Impact (Editors, R.E. Newell and A. Deepak). National Aeronautics and Space Administration, Washington, D.C.

VOLUME/PAGE NO. NASA SP-458, 89-101

SUBJECT KEYWORDS * Aerosols * Climate change * Gas/vapour plumes * Mount St. Helens * United States * Working groups *

Chemical changes to the atmosphere brought about by the injection of Mount St. Helens material into the stratosphere are considered in this chapter of a Special Publication. The compositions of the injections as well as subsequent chemical reactions are considered. Most of the material would be sulphate aerosol.

REFERENCE NO. A00156

FULLER, W.H. Jr., SOKOL, S., HUNT, W.H.

1982

Airborne lidar measurements of the Soufriere eruption of 17 April 1979.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 216, 1113-1114

SUBJECT KEYWORDS * Airport effects * Ash encounters * Cloud dynamics * Lidar * Remote sensing * Soufriere *

Lidar measurements were made from on board a NASA aircraft only two hours after the 17 April eruption, and then again on 18 and 19 April. The volcanic plume is shown to have penetrated the stratosphere to a height of 20 km, and to have moved south during the first 48 hours after the eruption. Ash dustings of aircraft and airport are mentioned.

REFERENCE NO. A00115

GANDRUD, B.W., KRITZ, M.A., LAZRUS, A.L.

1983

Balloon and aircraft measurements of stratospheric sulfate mixing ratio following the El Chichon eruption.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 1037-1040

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon *

Sulphate concentrations at 15-28 km altitude were obtained in March - April 1982 from filter collections made from balloons and U2 aircraft. Sulphate mixing ratios were two orders of magnitude above background, and column abundance enhancements of 18-25x are in good agreement with the results from other studies.

REFERENCE NO. A00084

GANDRUD, B.W., LAZRUS, A.L.

1981

Filter measurements of stratospheric sulfate and chloride in the eruption plume of Mount St. Helens.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 211, 826-827

SUBJECT KEYWORDS * Aerosols * Fuego * Gas/vapour plumes * Mount St. Helens * United States *

Five flights of a U-2 aircraft with a filter sampler were flown from 19 May to 17 June 1980. Sulfate concentrations as large as 216 times the expected background were observed. The enhancements of acid chloride vapour were consistently smaller, suggestive of an insignificant increase of background hydrogen chloride after stratospheric mixing.

REFERENCE NO. A00559

GANNON, R.

1987

Going star-crazy. Mysteriously clouded airplane windows baffle scientists & cost airlines millions of dollars.

JOURNAL/PUBLISHER Earth Science

VOLUME/PAGE NO. Fall, 16-17

SUBJECT KEYWORDS * Aerosols * Damage reports * El Chichon * Galunggung * Indonesia * Japan * Routes and schedules * Sakurajima *

A short, popular article is given of the cause of crazing in the acrylic windows of polar-route aircraft in 1982. The cause was attributed by M.P.McCormick to sulphuric-acid aerosols mainly from El Chichon volcano, Mexico. A brief inset article also deals with aircraft/ash-cloud encounters in Japan and Indonesia.

REFERENCE NO. A00430

GELI, L., ORTEGA, C.

1989

Remote monitoring of active volcanoes using Argos satellite-aided data transmission. Status of CLS/Argos project.

JOURNAL/PUBLISHER Collecte Localisation Satellites, Toulouse, France, unpublished report

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Early-warning measures * Europe * Remote sensing * TIROS satellites * United States * Vanuatu *

A summary is provided of the design stage of a project whereby volcanoes would be equipped with sensors, transmitters, and antenna, and would transmit seismic signals via NOAA satellites to Toulouse (France) and Landover, Maryland (USA). Results have been obtained from Etna volcano (Italy). Matthew and Hunter volcanoes in Vanuatu are monitored.

REFERENCE NO. A00483

GEORKE, V.H., YOUNG, J.M., COOK, R.K.

1965

Infrasonic observations of the May 16, 1963, volcanic explosion on the island of Bali.

JOURNAL/PUBLISHER Journal of Geophyical Research

VOLUME/PAGE NO. 70 (24), 6017-6022

SUBJECT KEYWORDS * Agung * Indonesia * Infrasonics * United States *

Low-amplitude sound generated by the Agung eruption was recorded 14,700 km away at Boulder, Colorado. Perturbations travelled both by the short great-circle path and by the long great-circle path through the Antipodes and around the world. Transit velocities were 17 m/sec slower via the short path.

REFERENCE NO. A00162

GERLACH, T.M., CASADEVALL, T.J.

1986

Fumarole emissions at Mount St. Helens volcano, June 1980 to October 1981: degassing of a magma-hydrothermal system.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 28, 141-160

SUBJECT KEYWORDS * Gas/vapour plumes * Mount St. Helens * United States *

This study includes an investigation of the chemical changes in Mount St. Helens gases, the sources of the gases, and the stability of gas species in the shallow magma system. One conclusion is that the fumarole gas data for this type of volcano may be biased towards residual magmatic volatiles. CO2 and H2S may be abundant early in eruptions.

REFERENCE NO. A00502

GOODING, J.L., CLANTON, U.S., GABEL, E.M., WARREN, J.L.

1983

El Chichon volcanic ash in the stratosphere : particle abundances and size distributions after the 1982 eruption.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 1033-1036

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Atmosphere loading * Cloud dynamics *

Stratospheric ash particles after the April-May eruptions were mostly 2-40 micron glass shards. Ash abundances at 16.8 to 19.2 km altitude are given for different times. Ash particles were originally free, but by October were intimately associated with liquid droplets believed to be sulphuric acid.

REFERENCE NO. A00069

GORSHKOV, G.S.

1960

Determination of the explosion energy in some volcanoes according to barograms.

JOURNAL/PUBLISHER Bulletin Volcanologique

VOLUME/PAGE NO. 23, 141-144

SUBJECT KEYWORDS * Early-warning measures * Indonesia * Infrasonics * Krakatau *

The air-wave energy equation is evaluated and used to estimate volcanic-explosion energy release from barograms. Values are calculated for the 1956 Bezymianny, 1902 Pelee, and 1883 Krakatau eruptions. The author recommends that volcanological observatories be equipped with barographs and microbarographs.

REFERENCE NO. A00397

GORSHKOV, G.S.

1971

Prediction of volcanic eruptions and seismic methods of location of magma chambers - a review.

JOURNAL/PUBLISHER Bulletin Volcanologique

VOLUME/PAGE NO. 35 (1), 198-211

SUBJECT KEYWORDS * Indonesia * Japan * New Zealand * United States * Volcanic prediction *

A short, now somewhat out-dated review is given of volcanic forecasting techniques and methods for detecting magma chambers. Volcanic seismicity and ground-deformation studies are regarded as the most useful monitor- ing methods, but there is no method for precise volcanic predictions. Determining the times of eruption is still difficult.

REFERENCE NO. A00230

GOSSA

No date

Users guide for GOSSA Net : a computer bulletin board for exchange of information on stratospheric aerosols.

JOURNAL/PUBLISHER Aerosol Research Branch, Atmospheric Sciences Division, NASA Langley Research Centre, Hampton, Virginia

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Early-warning measures * Lidar * Remote sensing * SAMII/SAGE sensors * United States *

Global Observation and Studies of Stratospheric Aerosols (GOSSA) is a computerised bulletin board providing users with a forum for exchange of information on stratospheric aerosol loading and transient phenomena affecting the stratosphere. Data is from satellites and ground-based lidar systems. GOSSA Net can be accessed by telephone.

REFERENCE NO. A00039

GOURGAUD, A., CAMUS, G., GERBE, M.-C., MOREL, J.-M., SUDRADJAT, A., VINCENT, P.M.

1989

The 1982-83 eruption of Galunggung (Indonesia): a case study of volcanic hazards with particular relevance to air navigation.

JOURNAL/PUBLISHER Volcanic Hazards (Editor, J.H. Latter). IAVCEI Proceedings in Volcanology, Springer-Verlag, Berlin

VOLUME/PAGE NO. 1, 151-162

SUBJECT KEYWORDS * Ash encounters * Galunggung * Indonesia *

The characteristics of the phreatomagmatic, second stage of the Galunggung eruption are stressed in relation to the 747-aircraft incidents in June-July 1982. The authors claim that volcanic clouds characterised by the presence of water and chilled glass and extreme ash pulverisation, are the cause of ash fusion in aircraft engines.

REFERENCE NO. A00471

GOURGAUD, A., CAMUS, G., VINCENT, P.M.

1986

Volcanic hazards and air navigation : case study of the 1982-1983 eruption of Galunggung (Indonesia).

JOURNAL/PUBLISHER International Volcanological Congress, New Zealand, Abstracts Volume

VOLUME/PAGE NO. 244

SUBJECT KEYWORDS * Galunggung * Indonesia *

The interaction between pre-eruption magma and groundwater in the volcano is proposed as the reason for the higher eruption columns during Phase II of the 1982 Galunggung eruption. This abstract has a misleading title, as the aircraft/ash-cloud problem at Galunggung is not addressed.

REFERENCE NO. A00071

GOURGAUD, A., TJETJEP, W., RAMLI, L., SUDRADJAT, A., VINCENT, P.M. CAMUS,G.

1985

Volcanic risks and air navigation : case study of the 1982-1983 eruption of Galunggung volcano (Java, Indonesia). (Risques volcaniques et circulation aeronautique : causes des perturbations provoquees par l'eruption ... Galunggung).

JOURNAL/PUBLISHER Comptes Rendus des Seances de L'Academie des Sciences Serie II

VOLUME/PAGE NO. 301 (5), 351-353

SUBJECT KEYWORDS * Ash encounters * Galunggung * Indonesia *

The authors conclude from a field study that the major phase (May-September) of the 1982-3 Galunggung eruption was hydromagmatic, and that the magma was basic. Eruptions on 24 June and 13 July caused multiple-engine failures on two aircraft. The short article is in French.

REFERENCE NO. A00417

GOW, A.J., WILLIAMSON, T.

1971

Volcanic ash in the Antarctic Ice Sheet and its possible climatic implications.

JOURNAL/PUBLISHER Earth and Planetary Science Letters

VOLUME/PAGE NO. 13, 210-218

SUBJECT KEYWORDS * Antarctica * Ash characteristics * Climate change * Eruption frequencies * Glacier records *

Sustained ashfalls 16-30,000 years ago mainly from Antarctic volcanoes, appear to correspond to significant atmospheric cooling over Antarctica (using oxygen-isotope palaeotemperature data). Antarctic eruptions in the late Wisconsin may have triggered global cooling, intensifying the existing glacial regime.

REFERENCE NO. A00102

GRAS, J.L., LABY, J.E.

1979

Southern hemisphere aerosol measurements: 1. Time variations and the 1974-1975 aerosol events.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 84 (C1), 303-307

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Australia * Fuego * Manam * Papua New Guinea *

Two Australian atmospheric physicists report changes in Southern Hemis- phere aerosol particle morphology and loading for late 1974 to mid-1976, consistent with a new aerosol source operating in 1974. The Fuego eruption of October 1974 is identified as the most probable principal source, but Manam volcano, Papua New Guinea, may have been another.

REFERENCE NO. A00123

GREENLAND, L.P., ROSE, W.I., STOKES, J.B.

1985

An estimate of gas emissions and magmatic gas content from Kilauea volcano.

JOURNAL/PUBLISHER Geochimica et Cosmochimica Acta

VOLUME/PAGE NO. 49, 125-129

SUBJECT KEYWORDS * Atmosphere loading * Gas/vapour plumes * United States *

CO2 and SO2 measurements at Kilauea volcano, Hawaii, are presented and used to present a magma degassing model for the volcano. Magma is rapidly degassed of its CO2 in a shallow reservoir before transport to the eruption site. Emission rates for both gases are determined on the basis of airborne COSPEC surveys.

REFERENCE NO. A00597

HAMILL, P., SWISSLER, T.J., OSBORN, M., McCORMICK, M.P.

1980

Analysis and interpretation of lidar observations of the stratospheric aerosol.

JOURNAL/PUBLISHER Remote Sensing of Atmospheres and Oceans (Editor, A. Deepak). Academic Press, New York

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Fuego * Lidar * Remote sensing * United States *

The principles of remote-sensing of the stratosphere using lidar (light detection and ranging) are reviewed, and data from the 48-inch lidar system at the NASA Langley Research Center, Virginia, are discussed. The 1974 Fuego eruption is mentioned as a cause of aerosol increase.

REFERENCE NO. A00051

HAMMER, C.U.

1977

Past volcanism revealed by Greenland Ice Sheet impurities.

JOURNAL/PUBLISHER Nature

VOLUME/PAGE NO. 270, 482-486

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Eruption frequencies * Fuego * Galunggung * Glacier records * Katmai * Krakatau * Laki * Soufriere * Tambora * Tarawera *

Greenland ice cores contain acid layers that can be used to estimate the magnitude of individual eruptions. Recording of episodes of modern volcanic eruptions can be extended to help establish climate-change corellations, and to identify periodicity of major volcanic eruptions, at least in the Northern Hemisphere.

REFERENCE NO. A00072

HAMMER, C.U.

1980

Acidity of polar ice cores in relation to absolute dating, past volcanism, and radio-echoes.

JOURNAL/PUBLISHER Journal of Glaciology

VOLUME/PAGE NO. 25 (93), 359-372

SUBJECT KEYWORDS * Aerosols * Eruption frequencies * Glacier records * Katmai * Laki * Tambora *

A method is described for detecting annual stratification of ice cores, and layers of high acidity caused by past volcanic eruptions. The method is based on a relationship between the pH of melted samples and the electrical current between two brass electrodes moved along an ice-core surface. Well known volcanic eruptions are identified.

REFERENCE NO. A00078

HAMMER, C.U., CLAUSEN, H.B., DANSGAARD, W.

1980

Greenland ice sheet evidence of post-glacial volcanism and its climatic impact.

JOURNAL/PUBLISHER Nature

VOLUME/PAGE NO. 288, 230-235

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Eruption frequencies * Fuego * Galunggung * Glacier records * Katmai * Krakatau * Laki * Soufriere * Tambora * Tarawera *

Large volcanic eruptions in the Northern Hemisphere during the past 10,000 years are revealed in acidity profiles along well-dated Greenland ice cores. Clustered eruptions are shown to have a considerable cooling effect on climate, by comparison with a temperature index.

REFERENCE NO. A00075

HANDLER, P.

1984

Possible association of stratospheric aerosols and El Nino type events.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 11, 1121-1124

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * El Chichon * Indonesia * Krakatau * Lamington * Meteorology * Papua New Guinea * Rabaul * Soufriere * Volcano lists *

A significant warming of sea-surface temperatures in the region 0-10S, 90-180W is said to follow eruptions at low-latitude volcanoes, and the reverse for high-latitude eruptions. Low-latitude eruptions therefore could trigger El Nino-type events. The results are important in view of the 1982 El Chichon eruption which was followed by an intense El Nino.

REFERENCE NO. A00631

HANDLER, P.

1986

Association of volcanic stratospheric aerosols and the El Nino/Southern Oscillation.

JOURNAL/PUBLISHER Norman D Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 36

SUBJECT KEYWORDS * Aerosols * Climate change * El Chichon * Meteorology *

A decrease in solar radiation will produce climate anomalies that are associated with El Nino effects. The author notes that such effects followed the 1982 El Chichon eruption and attributes the El Nino to solar-eruption. The global climate model of Kutzbach and Guetter (1986) forms the basis of discussion.

REFERENCE NO. A00509

HANSEN, J

1986

Models of climate impact of volcanic eruptions.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 37

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * El Chichon *

The climate forcing caused by volcanic aerosols is compared with that of other global radiative forcing mechanisms such as changes of CO2 abundance, solar irradiance, and earth's surface properties. A three-dimensional global climate model is used to simulate the effects of atmospheric gases and volcanic aerosols.

REFERENCE NO. A00510

HANSEN, J.E., BRYSON, R.A., CRITCHFIELD, H.J. FIOCCO, G., KELLY, P.M. MITCHELL, J.M. Jr., NEWELL, R.E. TOON, O.B.

1982

Influence of Mount St. Helens and other volcanoes on climate and weather.

JOURNAL/PUBLISHER Mount St. Helens Eruptions of 1980 : Atmospheric Effects and Potential Climatic Impact (Editors, R.E. Newell and A. Deepak). National Aeronautics and Space Administration, Washington, D.C.

VOLUME/PAGE NO. NASA SP-458, 103-114

SUBJECT KEYWORDS * Agung * Climate change * Eruption frequencies * Indonesia * Mount St. Helens * United States * Working groups *

A succinct review is given of the problems involved in relating volcanic eruptions to climate change. The Mount St. Helens eruption caused an increase in planetary albedo, a warming of the lower stratosphere, and a cooling of the troposphere, but the magnitude of the radiative effects were expected to be small.

REFERENCE NO. A00157

HANSEN, J.E., WANG, W.-C., LACIAS, A.A.

1978

Mount Agung eruption provides test of a global climatic perturbation.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 199, 1065-1068

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Indonesia *

Computed parameters for temperature changes in both stratosphere and troposphere resulting from the 1963 Agung eruption, Indonesia, are in good agreement with direct observations. These provide evidence that the climatic response to global radiative perturbations is significant and support the use of theoretical models to predict climatic effects.

REFERENCE NO. A00139

HANSTRUM, B.N., WATSON, A.S.

1983

A case study of two eruptions of Mount Galunggung and an investigation of volcanic eruption cloud characteristics using remote sensing techniques.

JOURNAL/PUBLISHER Australian Meteorological Magazine

VOLUME/PAGE NO. 31 (3), 171-177

SUBJECT KEYWORDS * Australia * Cloud dynamics * GMS satellite * Galunggung * Indonesia * Meteorology * Remote sensing *

GMS satellite images are used to estimate the height of eruption clouds from Galunggung volcano in 1982. Cloud movement was also monitored, in conjunction with upperwind streamline analyses.

REFERENCE NO. A00020

HARRIS, B.

1964

Volcanic particles in the stratosphere.

JOURNAL/PUBLISHER Australian Journal of Physics

VOLUME/PAGE NO. 17 (4), 472-479

SUBJECT KEYWORDS * Aerosols * Agung * Australia * Indonesia * Meteorology *

Above-average concentrations of dust at stratospheric levels were indicated by measurements taken in May 1964 of intensities of sunlight reflected from a balloon during sunset. Measurements were taken at Melbourne, Australia, as a study of the effects of the 1963 Agung eruption on the stratosphere.

REFERENCE NO. A00351

HARRIS, D.M.

1987
Electric fields of volcanic ash clouds.
JOURNAL/PUBLISHER Unpublished manuscript, submitted to Bulletin of Volcanology
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Electrical effects *

A computer program simulating particle aggregation and settling in an ash cloud is used with an initial distribution of charged ash particles to model the charge distribution in an evolving ash cloud. Electrical fields are calculated. Remote detection of the electrical field may be a means of alerting pilots to the presence of ash clouds ahead of them.

REFERENCE NO. A00546

HARRIS, D.M., MITCHELL, H.J.

1986
Automated detection of volcanic ash clouds and evaluation of hazards along jet routes.
JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union
VOLUME/PAGE NO. 67 (16), 397
SUBJECT KEYWORDS * Early-warning measures * United States *

An automated system for detecting volcanic ash clouds and forecasting aviation hazard zones is considered feasible. The system would include instrumental detection of ash using electric potential gradient sensors. Most of the required components are available, and a prototype system with several sensors could be developed and tested at nominal cost.

REFERENCE NO. A00124

HARRIS, D.M., ROSE, W.I. Jr.

1983
Estimating particle sizes, concentrations, and total mass of ash in volcanic clouds using weather radar.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 88 (C15), 10969-10983
SUBJECT KEYWORDS * Ash characteristics * Meteorology * Mount St. Helens * Radar * Remote sensing * United States *

Eruption-cloud characteristics determined by weather-radar and fieldwork are reported for the 19 March 1982 eruption at Mount St. Helens. Even small, short eruptions should be considered a serious hazard to inflight aircraft. This study is a good example of the use of weather radar in monitoring eruption clouds.

REFERENCE NO. A00138

HARRIS, D.M., ROSE, W.I. Jr., ROE, R., THOMPSON, M.R.

1981

Radar observations of ash eruptions.

JOURNAL/PUBLISHER The 1980 Eruptions of Mount St. Helens, Washington (Editors, P.W. Lipman and D.R. Mullineaux). United States Geological Survey Professional Paper

VOLUME/PAGE NO. 1250, 323-333

SUBJECT KEYWORDS * Atmosphere loading * Cloud dynamics * GOES/SMS satellites * Mount St. Helens * Radar * Remote sensing * United States *

Three ground radar systems in Oregon and Washington were used to track the movement of the 18 May ash cloud across the northwestern part of the U.S. The authors demonstrate the potential of radar for measuring the heights of eruption columns, determining the duration of eruptions, and determining the downwind directions and rates of ashcloud movement.

REFERENCE NO. A00017

HARRIS, D.M., SATO, M., CASADEVALL, T.J., ROSE, W.I. Jr., BORNHORST, T.J.

1981

Emission rates of CO2 from plume measurements.

JOURNAL/PUBLISHER The 1980 Eruptions of Mount St. Helens, Washington (Editors, P.W. Lipman and D.R. Mullineaux). United States Geological Survey Professional Paper

VOLUME/PAGE NO. 1250, 201-207

SUBJECT KEYWORDS * Atmosphere loading * Gas/vapour plumes * Mount St. Helens * United States * Volcanic prediction *

CO2 fluxes from July to October were calculated using data obtained from an airborne, Miran, infrared spectrophotometer. CO2 mass was greater than SO2 mass, and CO2/SO2 valves decreased before three different Plinian eruptions. The source of the CO2 is probably degassing dacitic magma, but a groundwater source is also discussed.

REFERENCE NO. A00262

HEIKEN, G.

1988

Volcanic ash warnings for civil aviation: a summary report on activities of the Volcanic Ash Warnings Study Group of the International Civil Aviation Organisation.

JOURNAL/PUBLISHER Bulletin of Volcanology
VOLUME/PAGE NO. 50, 135-137
SUBJECT KEYWORDS * Early-warning measures * ICAO * NIMBUS/TOMS satellites * Working groups *

A summary is given of the achievements of the ICAO Ash Warnings Study Group resulting from a meeting in October 1986. These include: draft changes to ICAO regulatory documents in respect of volcanic activity; a proposed International Airways Volcano Watch; pilot education; and real-time observations of volcanic plumes using TOMS.

REFERENCE NO. A00455

HEIKEN, G., WOHLETZ, K.

1985

Volcanic Ash

JOURNAL/PUBLISHER University of California Press, Berkeley
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Ash characteristics * Cloud dynamics *

This volume is an atlas of descriptions of volcanic ash from different eruption types, sequences of ash layers, and weathered and metamorphosed ash. Divisions of eruptions are based on mechanisms of ash formation. 591 photographs are included. The book was designed for those in the atmospheric, engineering, and physical sciences, and in volcanology.

REFERENCE NO. A00242

HERRON, M.M.

1982

Impurity sources of F, Cl, NO3 and SO4 in Greenland and Antarctic precipitation.

JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 87 (C4), 3052-3060
SUBJECT KEYWORDS * Aerosols * Antarctica * Glacier records *

Five polar impurity sources are proposed: anthropogenic NO3 and SO4; marine aerosols, the dominant Cl source; volcanic eruptions which produce peaks of SO4, F, and Cl; biogenic sulphurous gases; and an unidentified source of background nitrate. Solar activity and supernova events do not modulate NO3 concentrations in Greenland snow.

REFERENCE NO. A00348

HINKLEY, E.D. (Editor)

1976
Laser Monitoring of the Atmosphere.
JOURNAL/PUBLISHER Topics in Applied Physics. Springer-Verlag, Berlin
VOLUME/PAGE NO. 14
SUBJECT KEYWORDS * Aerosols * Lidar * Remote sensing *

Nine contributors provide comprehensive accounts for this integrated volume on the principles behind, and the results obtained from, the use of lasers in studying the nature of the atomosphere. Atmosphere monitoring was stimulated by the controversy over potentially adverse effects on the ozone layer caused by aircraft, space shuttles, etc.

REFERENCE NO. A00176

HIRONO, M.

1988
On the trigger of El Nino Southern Oscillation by the forcing of early El Chichon volcanic aerosols.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 93 (D5), 5365-5384
SUBJECT KEYWORDS * Aerosols * Agung * Climate change * El Chichon * Indonesia * Meteorology *

Westerly winds produced near the central Pacific equatorial region as a result El Chichon aerosols absorbing solar radiation, may have amplified or triggered the El Nino Southern Oscillation. The location of the volcanic centre is critical in this model. Thus, the impact of the 1963 Agung eruption is less because of the western Pacific location.

REFERENCE NO. A00586

HIRONO, M., SHIBATA, T.

1983
Enormous increase of stratospheric aerosols over Fukuoka due to volcanic eruption of El Chichon in 1982.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (2), 152-154
SUBJECT KEYWORDS * Aerosols * El Chichon * Japan * Lidar * Remote sensing *

El Chichon aerosol is observed over Fukuoka, Japan (lat. 33N, long. 130E) for three months after 18 April 1982, mostly at heights of 15-33 km. The mean radius of the aerosols in the densest part of the cloud is estimated to be about 0.1 microns.

REFERENCE NO. A00107

HIRSCHBOECK, K.K.

1980

A new worldwide chronology of volcanic eruptions (with a summary of historical ash-producing activity and some implications for climatic trends of the last one hundred years).

JOURNAL/PUBLISHER Palaeogeography, Palaeoclimatology, Palaeoecology

VOLUME/PAGE NO. 29, 223-241

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Atmosphere loading * Climate change * Eruption frequencies * Fuego * Meteorology *

This study is an extension of the pioneering work of Lamb (1970) on relationships between the historical volcanic record and climate change. Conclusions are that episodes of ash-producing eruptions tend to be associated with cooler hemispheric temperatures, and quiescent volcanic periods with periods of warming.

REFERENCE NO. A00237

HOBBS, P.V., HEGG, D.A., RADKE, L.F.

1983

Resuspension of volcanic ash from Mount St. Helens.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 88 (C6), 3919-3921

SUBJECT KEYWORDS * Ash characteristics * Mount St. Helens * United States *

Airborne measurements at heights of 800 and 1372 m above the ground are presented for ash particles previously deposited on the ground from the 18 May 1980 eruption, and which were lofted into the air over eastern Washington state. Winds of only a few metres per second were capable of resuspending much fine ash, leading to reductions in visibility.

REFERENCE NO. A00209

HOBBS, P.V., McCORMICK, M.P. (Editors)

1989

Aerosols and Climate

JOURNAL/PUBLISHER A. Deepak Publishing, Hampton, Virginia, USA

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * Climate change * Remote sensing *

This volume contains 42 papers on different aspects of the relationship between aerosols and climate. One section entitled 'Volcanic effects' has four papers each of which is referred to elsewhere in this bibliography (see: Hofmann, Jager et al., Qun, and Zuev et al.). The papers were presented at the 1989 IUGG General Assembly held in Vancouver, Canada.

REFERENCE NO. A00626

HOBBS, P.V., RADKE, L.F., ELTGROTH, M.W., HEGG, D.A.

1981

Airborne studies of the emissions from the volcanic eruptions of Mount St. Helens.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 211, 816-818

SUBJECT KEYWORDS * Ash characteristics * Gas/vapour plumes * Mount St. Helens * United States *

Concentrations of particles less than 10 micrometers in diameter in Mount St. Helens emissions were more than 1000 times those in the ambient air. The concentrations of several trace gases in the 18 May 1980 ash clouds generally were low, but different concentrations of sulphur gases were measured in other emissions.

REFERENCE NO. A00555

HOBBS, P.V., RADKE, L.F., STITH, J.L.

1977

Eruptions of the St. Augustine Volcano : airborne measurements and observations.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 195, 871-873

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Augustine * Gas/vapour plumes * United States *

Airborne measurements of aerosol particles, vapour, and gas were made from 8 to 18 February 1976. 100,000 kg per second were emitted during brief (3-8 minute) eruptions. Steadier eruptions contained more vapour and gas but less aerosol.

REFERENCE NO. A00146

HOBBS, P.V., TUELL, J.P., HEGG, D.A., RADKE, L.F., ELTGROTH, M.W.

1982

Particles and gases in the emissions from the 1980-1981 volcanic eruptions of Mt.St. Helens.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 87 (C12), 11062-11086

SUBJECT KEYWORDS * Atmosphere loading * Gas/vapour plumes * Mount St. Helens * United States *

Detailed airborne measurements of particles and gases were made in the volcanic effluents from Mount St. Helens from March 1980 through August 1981, and are used to calculate emission fluxes from the volcano at different times. Emissions are classified into phreatic, paroxysmal, intra-eruptive, and post-eruptive categories.

REFERENCE NO. A00210

HODGES, J.A.

1972

Aerosol extinction contribution to atmospheric attenuation in infrared wavelengths.

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 11 (10), 2304-

SUBJECT KEYWORDS * Aerosols * Remote sensing * Spectral characteristics *

Atmospheric attenuation in several good transmission windows is estimated for long sea-level paths using relatively unsophisticated techniques. Estimates consist of separate estimates of gas and water-vapour absorption, aerosol extinction, and aerosol liquid absorption. Agreement between total-attenuation estimates and field measurements is good.

REFERENCE NO. A00468

HOECKER, W.

1980

Pressure waves from eruption recorded in Washington, D.C.

JOURNAL/PUBLISHER Weatherwise

VOLUME/PAGE NO. June, 121

SUBJECT KEYWORDS * Infrasonics * Mount St. Helens * United States *

This one-paragraph article contains a record from a NOAA barograph for 18 May 1980. An acoustic-gravity wave train began to be recorded three hours and twenty minutes after the Mount St. Helens eruption. The energy release of the explosion is calculated to be equal to 10 megatons of TNT. A later explosion was too small to be detected in Washington.

REFERENCE NO. A00421

HOFMANN, D.J.

1989

Aerosols from past and present volcanic emissions.

JOURNAL/PUBLISHER Aerosols and Climate (Editors P.V. Hobbs and M.P. McCormick). A. Deepak Publishing, Hampton, Virginia, USA

VOLUME/PAGE NO. 195-214

SUBJECT KEYWORDS * Aerosols * Agung * Antarctica * Atmosphere loading * Climate change * El Chichon * Indonesia * Lidar * Mount St. Helens * Remote sensing * SAMII/SAGE sensors * United States *

A review is provided of modern (post 1970) studies of the aerosols produced by major volcanic eruptions and monitored by balloonborne particle conters, surface- and aircraft-based lidar, aircraft impactor and filter techniques, and satellite-based extinction measurements. The 1982 El Chichon eruption produced the largest perturbation this century.

REFERENCE NO. A00627

HOFMANN, D.J., ROSEN, J.M.

1983

Sulfuric acid droplet formation and growth in the stratosphere after the 1982 eruption of El Chichon.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 222, 325-327

SUBJECT KEYWORDS * Aerosols * El Chichon *

Eruptions in March and April 1982 resulted in the nucleation of large numbers of new sulphuric-acid aerosols and an increase in the size of pre-existing particles. Nearly 100 million metric tons of sulphuric acid remained in the stratosphere by the end of 1982, about 40 times as much as was deposited by Mount St Helens in 1980.

REFERENCE NO. A00459

HOFMANN, D.J., ROSEN, J.M.

1987

On the prolonged lifetime of the El Chichon sulfuric acid aerosol cloud.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 92 (D8), 9825-9830

SUBJECT KEYWORDS * Aerosols * El Chichon * Fuego * Meteorology *

The decay of the aerosol mixing ratio after the 1982 El Chichon eruption was 20-30 percent slower than after the 1974 Fuego activity. This may have been caused by stratospheric warmings at 30 km in the polar regions leading to aerosol evaporation and recondensation during winter and spring, thus prolonging the lifetime of the stratospheric aerosols.

REFERENCE NO. A00585

HOFMANN, D.J., ROSEN, J.M., HARDEN, J.W., ROLF, S.R.

1987

Observations of the decay of the El Chichon stratospheric aerosol cloud in Antarctica.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 14 (6), 614-617

SUBJECT KEYWORDS * Aerosols * Antarctica * El Chichon * United States *

Balloonborne measurements of stratospheric aerosols in 1983, 1984, and 1985 in Antarctica and Wyoming are indicative that sulphuric-acid aerosol, formed as a result of the 1982 El Chichon eruption, decayed exponentially with a decay time of about 1 year. No relationship between ozone decay and the aerosols can be established.

REFERENCE NO. A00456

HOGG, A.R.

1963
The Mount Agung eruption and atmospheric turbidity.
JOURNAL/PUBLISHER Australian Journal of Science
VOLUME/PAGE NO. 26 (4), 119-120
SUBJECT KEYWORDS * Agung * Australia * Indonesia * Meteorology *

The meteorological optical effects of the 1963 Agung eruption are summarised - coronas around the sun, sky haze, and strikingly beautiful sunrises and sunsets. More particularly, the author reports direct measurements of atmospheric extinction of starlight during stellar photometry studies at Mount Bingar, near Griffith, New South Wales. BMR.

REFERENCE NO. A00171

HOHN, D.H.

1975
Atmospheric vision 0.35 - 14 microns
JOURNAL/PUBLISHER Applied Optics
VOLUME/PAGE NO. 14 (2), 404-
SUBJECT KEYWORDS * Meteorology * Remote sensing * Spectral characteristics *

A unique analytical description of atmospheric vision in the wavelength range 0.35-14 microns is presented, together with a general vision formula. Thermal vision in the atmosphere is discussed, as well as the relevant magnitudes for the description of photon-noise limited imaging devices.

REFERENCE NO. A00466

HONEY, F.R.

1982A
Notes on ash cloud discriminating radiometer and scanner.
JOURNAL/PUBLISHER Unpublished file report, CSIRO Division of Groundwater Research, Perth, Western Australia
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Ash characteristics * Australia * Early-warning measures * Indonesia * Remote sensing * Spectral characteristics *

A summary proposal to mount volcanic ash detectors on board aircraft is provided in this confidential report. A two-channel radiometer with band passes of 10-11 and 11.5-12.5 microns could be used to discrimate ash clouds from weather clouds. Discrimination would not be possible where the aircraft was in unbroken cloud or flying into the Sun.

REFERENCE NO. A00133

HONEY, F.R.

1982B

Notes on observation ofvolcanic ash cloud using NOAA-AVHRR data.

JOURNAL/PUBLISHER File Report. CSIRO, Division of Groundwater Research, Perth, Western Australia

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Cloud dynamics * Early-warning measures * Galunggung * Indonesia * Remote sensing * Spectral characteristics * TIROS satellites *

A description is given of the method used to discrimate volcanic from normal weather clouds using multi-channel, digitised data from the Advanced Very High Resolution Radiometer on board the NOAA-7 satellite. The technique was used to identify ash from Galunggung volcano, Indon-esia in July 1982, as it drifted over northwestern Australia.

REFERENCE NO. A00200

HOPKINS, A.T., BRIDGMAN, C.J.

1985

A volcanic ash transport model and analysis of Mount St. Helens ashfall.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 90 (D6), 10620-10630

SUBJECT KEYWORDS * Cloud dynamics * Mount St. Helens * United States *

A model is presented for the computation of the transport and deposition of volcanic-ash particles. Particles of different sizes are tracked through a wind field to the ground, defining a 'centerline'. Falling ash mass is analytically 'smeared' on and around the centreline. Agreement with the Mount St. Helens ashfall is good.

REFERENCE NO. A00349

HOYT, D.V.

1978

An explosive volcanic eruption in the Southern Hemisphere in 1928.

JOURNAL/PUBLISHER Nature

VOLUME/PAGE NO. 275, 630-632

SUBJECT KEYWORDS * Climate change * Early-warning measures * Eruption frequencies * FAA * Galunggung * ICAO * Indonesia * Indonesia * Meteorology * Remote sensing * Routes and schedules * Volcano lists * Working groups *

Solar radiation anomalies in 1928 and 1932 are related to explosive eruptions from Paluweh (Flores, Indonesia) and Quizapu (Chile) volcanoes, respectively. Both eruptions may have had an impact on global climate, as they correlate with 0.3 C drops in temperature, at least in the Northern Hemisphere.

REFERENCE NO. A00105

HUMPHREYS, W.J.

1913

Volcanic dust and other factors in the production of climatic changes, and their possible relation to ice ages.

JOURNAL/PUBLISHER Journal of the Franklin Institute

VOLUME/PAGE NO. 176, 131-172

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Eruption frequencies * Europe * Indonesia * Japan * Katmai * Krakatau * Meteorology * Soufriere * Tambora * United States *

This broad review of the causes of climate change concludes with the proposal that volcanic 'dust' in the high atmosphere decreases solar radiation in the lower atmosphere and therefore average surface temperatures. The effect is traced back through records to 1750 AD. Ice-age theories are reviewed and several volcanic eruptions considered.

REFERENCE NO. A00396

HUMPHREYS, W.J.

1929

Physics of the air.

JOURNAL/PUBLISHER McGraw-Hill, New York

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Atmosphere loading * Indonesia * Japan * Katmai * Krakatau * Meteorology * Tarawera * United States *

Two chapters in this major text book deal with volcanism and the atmosphere: theoretical aspects of the physics of volcanic 'dust' high in the atmosphere, and measurements using the pyrheliometer and other instruments. Discussion includes the effects on solar radiation of a wide range of volcanic eruptions from the eighteenth century onwards.

REFERENCE NO. A00480

HUNT, G.R., LOGAN, L.M.

1972

Variation of single particle mid-infrared emission spectrum with particle size.

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 11 (1), 142-147

SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

Emission spectra of single particles of inorganic solids have been recorded from 6 to 11.8 microns as a function of particle size. The emission behaviour is dominated by scattering and can be explained adequately in terms of Mie absorption efficiency factors. The data are of interest for interpreting spectra of circumstellar particles.

REFERENCE NO. A00498

ICAO

1987
Rules of the Air and Air Traffic Services (PANS-RAC)
JOURNAL/PUBLISHER International Civil Aviation Organisation, Montreal.
VOLUME/PAGE NO. DOC 4444, Appendix 1, A3-A4A
SUBJECT KEYWORDS * Ash encounters * Cloud dynamics * Early-warning measures * ICAO *

New changes to Recording and Reporting Instructions issued by ICAO include the necessity to report volcanic activity by means of special air reports (AIREPS). A special reporting form is provided for pilots who are asked to tick boxes in a checklist of volcanological features. Aircraft position, time, etc., are included in the form.

REFERENCE NO. A00534

ICAO, AIR NAVIGATION COMMISSION

1988
Voluntary InternationalAirways Volcano Watch
JOURNAL/PUBLISHER International Civil Aviation Organisation, Air Navigation Commission, Working Paper, Montreal. ANC Task No. MET-8201: Volcanic ash warnings
VOLUME/PAGE NO. AN-WP/6168
SUBJECT KEYWORDS * Early-warning measures * ICAO * Working groups *

The Director of the Air Navigation Bureau compiles the reaction of States and international organizations to the proposal to organise a voluntary international airways volcano watch. The replies were positive and the next step would be to develop operational procedures and co-ordination arrangements.

REFERENCE NO. A00438

ICAO, BANGKOK REGIONAL OFFICE

1986A
First Asia/Pacific Volcanological Airspace Meeting.
JOURNAL/PUBLISHER International Civil Aviation Organisation, Regional Office, Bangkok
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Australia * Defensive inflight measures * Early-warning measures * Europe * Galunggung * ICAO * Indonesia * Japan * Remote sensing * Routes and schedules * Working groups *

Information, discussion, and miscellaneous papers presented by aviation-authorities representatives at an ICAO meeting in Bangkok from 15 to 19 September 1986, are compiled in this document. The papers are wide-ranging but deal largely with aviation operational procedures. Many of the papers were presented by an Australian delegation.

REFERENCE NO. A00443

ICAO, BANGKOK REGIONAL OFFICE

1986B

Report on First Informal Asia/Pacific Volcanological/Airspace Meeting.

JOURNAL/PUBLISHER International Civil Aviation Organisation, Regional Office, Bangkok

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Early-warning measures * ICAO * Indonesia * Japan * Remote sensing * Routes and schedules * Working groups *

The proceedings of an ICAO meeting on 15-19 September 1986 are detailed in this unpublished report. Five agenda items include: status of the volcanic-ash threat in the region; requirements of ICAO interests; role of meteorological, volcanological, and air-traffic facilities; and ATS procedures (contingency arrangements) for ash avoidance.

REFERENCE NO. A00444

INN, E.C.Y., FARLOW, N.H., RUSSELL, P.B., McCORMICK, M.P., CHU, W.P.

1982

Observations.

JOURNAL/PUBLISHER The Stratospheric Aerosol Layer (Editor, R.C. Whitten). Springer-Verlag, Berlin

VOLUME/PAGE NO. 15-68

SUBJECT KEYWORDS * Aerosols * Agung * Ash characteristics * Fuego * Gas/vapour plumes * Indonesia * Lidar * Mount St. Helens * Remote sensing * SAMII/SAGE sensors * United States *

The wide range of instruments used in monitoring and characterising aerosols, and the results obtained from them, are reviewed in this comprehensive chapter. Major section headings are entitled: measurement of precursor gases; aircraft and balloon measurements of aerosol properties; lidar measurements; satellite observations. BMR.

REFERENCE NO. A00172

INN, E.C.Y., VEDDER, J.F., CONDON, E.P., O'HARA, D.
1981
Gaseous constituents in the plume from eruptions of Mount St. Helens.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 211, 821-823
SUBJECT KEYWORDS * Gas/vapour plumes * Mount St. Helens * United States *

Measurements of stratospheric gaseous constituents in the Mount St. Helens plume were obtained during five flights of a NASA U-2 aircraft between 19 May and 17 June 1980. Considerable enhancement over non-volcanic concentrations were noted for sulphur dioxide (100x), methyl chloride (10x), and carbon disulphide (more than three times).

REFERENCE NO. A00556

INN, E.C.Y., VEDDER, J.F., CONDON, E.P., O'HARA, D.
1982
Precursor gases of aerosols in the Mount St. Helens eruption plumes at stratospheric altitudes.
JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication
VOLUME/PAGE NO. 2240, 47-53.
SUBJECT KEYWORDS * Gas/vapour plumes * Mount St. Helens * United States *

The concentrations of aerosol precursor gases (OCS, SO2, CS2), CH3Cl, N20, CF2Cl2, and CFCl3 were measured by gas chromatography in 19 stratospheric samples from Mount St. Helens eruption plumes between 19 May and 17 June 1980. Cl, SO4, and NO3 ion concentrations were also measured. Enhancements for SO2, CS2, OCS, HCl, etc. were detected.

REFERENCE NO. A00343

IRVINE, W.M., POLLACK, J.B.

1968
Infrared optical properties of water and ice spheres.
JOURNAL/PUBLISHER Icarus
VOLUME/PAGE NO. 8, 324-360
SUBJECT KEYWORDS * Remote sensing * Spectral characteristics *

The literature on the absorption coefficient and reflectivity of water and ice in the infrared is reviewed critically, and best values are chosen for the complex index of refraction for particular wavelengths. A useful approximate formula for the single scattering albedo is given. Results are important for studies of cloud radiative transfer.

REFERENCE NO. A00401

ITABE, T., FUJIWARA, M., HIRONO, M., IGARASHI, T.

1980
On the long term decay rate of the post-Fuego stratospheric aerosols observed by lidar in Fukuoka.
JOURNAL/PUBLISHER Journal of the Meteorological Society of Japan
VOLUME/PAGE NO. 58 (2), 127-136
SUBJECT KEYWORDS * Aerosols * Agung * Fuego * Indonesia * Japan * Lidar * Remote sensing *

The decay rate of the non-molecular radar cross section of the post-1974 Fuego stratospheric aerosols observed by lidar was much smaller than that deduced by a earlier two-dimensional model. The discrepancy can be explained by a kinetic aerosol model including condensation growth of the aerosols. A closed incompressible air-parcel model is proposed.

REFERENCE NO. A00499

IWASAKA, Y.

1981A
Variation of stratospheric aerosol content measured by laser radar. Part I. Seasonal variation of aerosol content and flux of sulfur compounds from troposphere to stratosphere.
JOURNAL/PUBLISHER Journal of the Meteorological Society of Japan
VOLUME/PAGE NO. 59 (4), 439-445
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Japan * Lidar *

Winter maxima of aerosol content in the atmosphere above Nagoya, Japan, for 1976-78 were detected using ground-based lidar. Summer maxima at least in 1977 were observed also. A flux of sulphur compounds of 50 million S atoms per square centimeter per second from troposphere to stratosphere is required to compensate for sedimentological loss.

REFERENCE NO. A00599

IWASAKA, Y.

1981B

Variation of stratospheric aerosol content measured by laser radar. Part II. Long term trend of post-Fuego eruption.

JOURNAL/PUBLISHER Journal of the Meteorological Society of Japan

VOLUME/PAGE NO. 59 (4), 446-451

SUBJECT KEYWORDS * Aerosols * Fuego * Japan * Lidar *

The decay time of aerosols following the October 1974 Fuego eruptions is determined to be 2 years on the basis of lidar measurements at Nagoya, Japan. This is somewhat longer than proposed by other authors. The discrepancy is attributed to observational periods being too short in previous investigations.

REFERENCE NO. A00598

IWASAKA, Y., HAYASHIDA, S.

1981

The effects of the volcanic eruption of St. Helens on the polarization properties of stratospheric aerosols : lidar measurement at Nagoya.

JOURNAL/PUBLISHER Journal of the Meteorological Society of Japan

VOLUME/PAGE NO. 59 (4), 611-614

SUBJECT KEYWORDS * Aerosols * Japan * Lidar * Mount St. Helens * Remote sensing * United States *

Conclusions made in this study are that crystallised particles, possibly (NH4)2S04, made up part of the pre-eruption stratospheric aerosol, and that after the 1980 eruptions most of the particles were concentrated, liquid sulphuric acid. Particle identification is based on the polarisation properties of the aerosols detected by lidar.

REFERENCE NO. A00416

JAENICKE, R., D'ALMEIDA, G.A.

1983

Atmospheric turbidity over Africa - disturbed by the El Chichon eruption.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (3), 233-235

SUBJECT KEYWORDS * Aerosols * El Chichon * Meteorology *

Increased atmospheric optical depth detected by sunphotometer readings at Assekrem, central Saharah desert, is attributed to the effects of the 1982 El Chichon eruption.

REFERENCE NO. A00136

JAGER, H., CARNUTH, W.

1987

The decay of the El Chichon stratospheric perturbation, observed by lidar at northern midlatitudes.

JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 14 (7), 696-699
SUBJECT KEYWORDS * Aerosols * El Chichon * Lidar *

The stratospheric perturbation caused by the 1982 El Chichon eruption passed through a maximum at northern mid-latitudes 10 months after the event. The following decay was investigated by lidar in Germany until the end of 1985. Seasonal decay variations were observed, and the aerosol decayed with an e-folding lifetime of about one year.

REFERENCE NO. A00603

JAGER, H., LITTFAS, M., HOFMANN, D.J., ROSEN, J.M.

1989

Stratospheric extinction and mass variations after a major volcanic eruption, derived from lidar measurements at northern midlatitudes.

JOURNAL/PUBLISHER Aerosols and Climate (Editors P.V. Hobbs and M.P. McCormick). A Deepak Publishing, Hampton, Virginia, USA
VOLUME/PAGE NO. 215-222
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Lidar * Remote sensing *

Lidar backscatter profiles for the period of dispersion and decay of the El Chichon eruption cloud (1982-85), observed in west Germany, have been converted to extinction and mass values by using in situ particle measurements by the University of Wyoming. Cumulative concentrations are differentiated to fit a bimodal lognormal size distribution.

REFERENCE NO. A00628

JAKOSKY, B.M.

1986

Volcanoes, the stratosphere, and climate.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research
VOLUME/PAGE NO. 28, 247-255
SUBJECT KEYWORDS * Climate change * Cloud dynamics * Eruption frequencies * Volcano distribution *

A model for the rise of a buoyant volcanic plume is corrected for realistic temperature profiles and for the vertical extent of the resultant clouds. Plumes near the equator have the largest impact on surface temperatures globally, and stratospheric injection is more important climatically than explosivity and cloud height.

REFERENCE NO. A00189

JAPAN METEOROLOGICAL AGENCY

1986
Sakurajima volcano, Kyushu, Japan.
JOURNAL/PUBLISHER Scientific Event Alert Network Bulletin
VOLUME/PAGE NO. 11 (6), 6-7
SUBJECT KEYWORDS * Ash encounters * Damage reports * Japan * Sakurajima *

The JMA Office of Volcanic Observations provides a list of eight incidents from 1975 to 1986 involving damage (mainly windshield cracking) to aircraft that encountered volcanic-ash clouds from Sakurajima volcano. A Toa Domestic Airlines DC9 with 152 passengers flew into a cloud on 24 June 1986, but landed safely at nearby Kagoshima.

REFERENCE NO. A00192

JOHNSON, R.W.

1982
Assessment of Mount Galunggung volcanic activity with reference to early-warning notifications to aircraft.
JOURNAL/PUBLISHER Minute, 11 October 1982, Bureau of Mineral Resources, Australia - File
VOLUME/PAGE NO. 82/1379
SUBJECT KEYWORDS * Australia * Early-warning measures * Galunggung * Indonesia *

The author visited the Cikasasah volcanological observatory and meteorological post on Galunggung volcano in September 1982. The limitations of the single-side-band radio link between Cikasasah and the Kemayoran Meterorological office in Jakarta are stressed. Other problems of early notification of eruptive activity are mentioned.

REFERENCE NO. A00046

JOHNSON, R.W.

1986
Report on volcanological discussions held in Singapore, August 1986, on the aircraft/ash-cloud problem in Indonesia.
JOURNAL/PUBLISHER Bureau of Mineral Resources, Australia - Professional Opinion
VOLUME/PAGE NO. File 85/530, 26 September 1986
SUBJECT KEYWORDS * Australia * Early-warning measures * Indonesia * Volcanic prediction * Working groups *

Discussions on the impact of Indonesian volcanic eruptions on aircraft were held by volcanologists attending the 4th Circum-Pacific Conference. Details of the volcano-observatory system operated by the Volcanological Survey of Indonesia are compiled in this report, and a recommendation made that aircraft-mounted ash detectors should be developed.

REFERENCE NO. A00293

JOHNSON, R.W.

1988

Volcanic hazards and aviation.

JOURNAL/PUBLISHER Proceedings of the Kagoshima International Conference on Volcanoes

VOLUME/PAGE NO. 662-665

SUBJECT KEYWORDS * Ash encounters * Australia * Damage reports * Early-warning measures * ICAO * Remote sensing * Working groups *

A general account is given of the aircraft/ash-cloud problem. A summary of known encounters and the damage to aircraft is provided, followed by a definition of the threat to aviation and a statement on mitigation efforts. Solutions to the problem include improved satellite downlinks and, especially, the development of on-board ash detectors.

REFERENCE NO. A00530

JOHNSON, R.W. (Editor)

1976

Volcanism in Australasia : a Collection of Papers in Honour of the Late G.A.M. Taylor, G.C.

JOURNAL/PUBLISHER Elsevier, Amsterdam

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Eruption frequencies * Manam * Papua New Guinea * Rabaul * Ulawun * Volcano distribution *

The characteristics of several eruptions at many of the active volcanoes in Papua New Guinea are given in this volume of papers. The volcanoes considered are Manam, Karkar, Long Island, Ritter Island, Langila, Ulawun, Rabaul, Tuluman, and Bagana. One paper by Cooke and others deals with the striking sequence of volcanic eruptions in PNG in 1972-75.

REFERENCE NO. A00032

JOHNSON, R.W. (Editor)

1981

Cooke-Ravian Volume of Volcanological Papers.

JOURNAL/PUBLISHER Geological Survey of Papua New Guinea Memoir. Geological Survey of Papua New Guinea, Port Moresby

VOLUME/PAGE NO. 10

SUBJECT KEYWORDS * Papua New Guinea * Rabaul * Ulawun * Volcano distribution *

The authors of several papers in this memorial volume deal with the historical eruptions and eruptive histories of the following PNG volcanoes: Kadovar, Bam, Karkar, Long Island, Ritter Island, Langila, Pago, Ulawun, Rabaul, Bagana (and other Bougainville Island volcanoes), and Victory (plus other east Papuan volcanoes).

REFERENCE NO. A00047

JOHNSTON, D.A.

1980

Volcanic contribution of chlorine to the stratosphere : more significant to ozone than previously estimated.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 209, 491-493

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Augustine * United States *

Degassing of ash erupted during 1976 by Augustine volcano, Alaska, released an estimated 82-175 million kilograms of HCl into the stratosphere, equivalent to 17-36 percent of the 1975 world industrial production of chlorine in fluorocarbon. Released volcanic chlorine is calculated from the amounts analysed in ash and phenocryst inclusions.

REFERENCE NO. A00335

JPL UNIVERSE

1985

Ancient Chinese records confirm Earth's geologic, volcanic clues.

JOURNAL/PUBLISHER JPL Universe (Jet Propulsion Laboratory, University of California)

VOLUME/PAGE NO. 19 April

SUBJECT KEYWORDS * Aerosols * Climate change * Papua New Guinea * Rabaul *

A short article is given on research by K. Pang and H. Chou into volcanic-eruption records in ancient Chinese literature. The records are of changes to the climate in China inferred to have been caused by stratospheric aerosol injections. The 1400 yr BP Rabaul eruption, Papua New Guinea, is thought to have caused famine in China in 536 A.D.

REFERENCE NO. A00269

JUNGE, C.E., MANSON, J.E.

1961
Stratospheric aerosol studies.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 66 (7), 2163-2182
SUBJECT KEYWORDS * Aerosols * United States *

The aerosol layer, previously identified by balloon measurements, was studied extensively using rod-impactor samples obtained during aircraft flights at 20 km from 63S to 72N during March-November 1960. The conclusion of this important study is that the layer is stable, constant in time and space, and composed mainly of sulphate particles.

REFERENCE NO. A00177

KAGOSHIMA INTERNATIONAL CONFERENCE ON VOLCANOES, JAPAN.

1988
Numerous papers.
JOURNAL/PUBLISHER Proceedings of the Kagoshima International Conference on Volcanoes.
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Japan * Volcanic prediction *

These proceedings of a major volcanological conference contain numerous papers on a wide range of volcanological topics, including a major section on eruption forecasting and monitoring systems, and on prediction of volcanic eruptions. Two papers deal with eruptions and air-traffic safety (see Johnson, 1988, and Katow, 1988).

REFERENCE NO. A00529

KASTEN, F.

1968
Falling speed of aerosol particles.
JOURNAL/PUBLISHER Journal of Applied Meteorology
VOLUME/PAGE NO. 7, 944-947
SUBJECT KEYWORDS * Aerosols *

An equation is developed for the gravitational fallout of aerosol particles from the natural atmosphere. The equation is based on an earlier one published by Fuchs (1964). Calculated falling speeds are plotted against different values of particle radius and heights above sea level.

REFERENCE NO. A00353

KATILI, J.A., SUDRADJAT, A.

1984A

Galunggung : the 1982-1983 eruption.

JOURNAL/PUBLISHER Volcanological Survey of Indonesia

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Ash characteristics * GMS satellite * Galunggung * Gas/vapour plumes * Indonesia * Remote sensing * TIROS satellites *

Two Indonesian authors provide a comprehensive account (in English) of the eruption that interfered with two Australia-bound Boeing 747 aircraft in 1982. The report includes, for example, information on the number and heights of individual eruption clouds and on satellite monitoring.

REFERENCE NO. A00013

KATILI, J.A., SUDRADJAT, A.

1984B

The devastating 1983 eruption of Colo volcano, Una-Una Island, central Sulawesi, Indonesia.

JOURNAL/PUBLISHER Geol. Jb.

VOLUME/PAGE NO. A75, 27-47

SUBJECT KEYWORDS * Colo * Indonesia * Volcanic prediction *

The authors present a narrative of the 1983 Colo eruption that caused the destruction of the island of Una-Una on 23-25 July. Distinctive precursors allowed a prediction to be made and the 7000 population were evacuated before the paroxysms. A 747 aircraft encountered high-rising eruption clouds, although this is not referred to by the authors.

REFERENCE NO. A00547

KATOW, K.

1988

Flight operation procedure for avoiding volcanic eruption clouds.

JOURNAL/PUBLISHER Proceedings of the Kagoshima International Conference on Volcanoes

VOLUME/PAGE NO. 666-669

SUBJECT KEYWORDS * Airport effects * Ash encounters * Damage reports * Early-warning measures * Japan * Routes and schedules * Sakurajima *

A representative from the All Nippon Airways company provides an account of the procedures used at Kagoshima International Airport to warn pilots of explosive eruptions from nearby Sakurajima volcano. Flight conditions are divided into three categories, Kazan 1, 2, and 3. Seismic signals from the volcano are received in the ANA operations centre.

REFERENCE NO. A00531

KATTAWAR, G.W., PLASS, G.N.
1970
Thermal emission from haze and clouds.
JOURNAL/PUBLISHER Applied Optics
VOLUME/PAGE NO. 9 (2), 413-419
SUBJECT KEYWORDS * Aerosols * Remote sensing * Spectral characteristics *

Photons thermally emitted by atmospheric molecules and aerosols are followed by a Monte Carlo technique through subsequent collisions with the aerosols. The angular variation of the radiation at both the top and bottom of the atmosphere are studied as a function of several factors, including single-scattering albedo and aerosol size distribution.

REFERENCE NO. A00465

KEEN, R.A.
1983A
Volcanic aerosols and lunar eclipses.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 222, 1011-1013
SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * El Chichon * Fuego * Indonesia * Meteorology *

Stratospheric aerosols can significantly affect the brightness of the eclipsed moon. Globally averaged aerosol optical depths are obtained for 21 lunar eclipses during 1960-1982. Global aerosol loading from the 1982 eruption of El Chichon is similar in magnitude to that from the 1963 Agung eruption.

REFERENCE NO. A00053

KEEN, R.A.
1983B
Stratospheric aerosol loading estimation from lunar eclipse observations.
JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia
VOLUME/PAGE NO. 394-396
SUBJECT KEYWORDS * Aerosols * Agung * El Chichon * Fuego * Indonesia *

Sharp increases in the difference between the observed brightness of the moon during total eclipses and calculated brightness using the ray equations devised by Link (1963), are related to periods immediately following the 1963 Agung, 1974 Fuego, and 1982 El Chichon eruptions. The technique provides a measure of globally averaged aerosol abundance.

REFERENCE NO. A00218

KELLOGG, W.W., CADLE, R.D., ALLEN, E.R., LAZRUS, A.L., MARTELL, E.A.

1972
The sulphur cycle.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 175 (4022), 587-596
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Gas/vapour plumes * Meteorology *

A review is given of the factors involved in the global sulphur cycle. The contribution of volcanic activity to the cycle is rather poorly constrained, as the authors use data from papers published mainly before 1956.

REFERENCE NO. A00052

KELLY, P.M., SEAR, C.B.

1982
The formulation of Lamb's Dust Veil Index.
JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautical and Space Administration, Scientific and Technical Information Branch, Conference Publication
VOLUME/PAGE NO. 2240, 293-298
SUBJECT KEYWORDS * Aerosols * Eruption frequencies * Mount St. Helens * United States * Volcano lists *

The authors reformulate the Dust Veil Index (DVI) of Lamb (1970) and recommend the following: (1) use DVI values as indications of order of magnitude; (2) do not use DVI values without reference to the method of estimation (gauge reliability); (3) beware of circular argument if DVI values based on climate data have to be used.

REFERENCE NO. A00386

KELLY, P.M., SEAR, C.B.

1984
Climatic impact of explosive volcanic eruptions.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 311, 740-743
SUBJECT KEYWORDS * Agung * Climate change * Katmai * Krakatau * Meteorology * Soufriere * Tarawera *

The authors resolve the month-by-month development and decay of air temperatures for Northern Hemisphere land masses, and show that for Northern Hemisphere volcanic eruptions abrupt cooling takes place during the first 2-3 months. This is more rapid than previously assumed.

REFERENCE NO. A00076

KENT, G.S.

1982

SAGE measurements of Mount St. Helens volcanic aerosols.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 109-115

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Mount St. Helens * Remote sensing * SAMII/SAGE sensors * United States *

The SAGE satellite system was used to make measurements on the optical extinction produced by stratospheric aerosols from the Mount St. Helens eruption. Data for two periods of observation (21-31 May 1980, 19 July - 12 August 1980) are analysed. Details of areal extent, height, and migration directions and rates are given.

REFERENCE NO. A00359

KENT, G.S., McCORMICK, M.P.

1984

SAGE and SAM II measurements of global stratospheric aerosol optical depth and mass loading.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 89 (D4), 5303-5314

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Mount St. Helens * Papua New Guinea * Remote sensing * SAMII/SAGE sensors * Ulawun * United States *

Material injected into the stratosphere by volcanic eruptions at Sierra Negra, Mount St. Helens, Ulawun (PNG), Alaid, and Pagan volcanoes between November 1979 and April 1981, produced changes in optical depth that were mapped globally by satellites measuring the 1 micron extinction of the aerosols. Mass-loading calculations are given.

REFERENCE NO. A00277

KENT, G.S., PHILIP, M.T.
1980
Lidar observations of dust from the Soufriere volcanic eruptions of April 1979.
JOURNAL/PUBLISHER Journal of the Atmospheric Sciences
VOLUME/PAGE NO. 37, 1358-1362
SUBJECT KEYWORDS * Aerosols * Lidar * Remote sensing * Soufriere *

Lidar observations of the stratosphere were made at Kingston, Jamaica, following the 13-25 April eruptions at Soufriere. Anomalous optical scattering was observed between 1 and 5 May at a height of about 16 km. This is interpreted as being due to volcanic 'dust' that had been carried eastward once round the earth by upper tropospheric winds.

REFERENCE NO. A00581

KERR, J.B., EVANS, W.F.J., MATEER, C.L.
1982
Measurements of SO2 in the Mount St. Helens debris.
JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication
VOLUME/PAGE NO. 2240, 219-223
SUBJECT KEYWORDS * Gas/vapour plumes * Mount St. Helens * Remote sensing * Spectral characteristics * United States *

Large values for SO2 were observed with spectrophotometers at Downsview, Ontario. A simultaneous decrease in ozone was also detected, but the authors are not clear whether the decrease was caused by the volcanic cloud or natural ozone variability. The height of the cloud at the time of the measurements was 10-12 km.

REFERENCE NO. A00378

KERR, R.A.

1982

El Chichon forebodes climate change.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 217, 1023

SUBJECT KEYWORDS * Aerosols * Climate change * Cloud dynamics * El Chichon *

A short, magazine-style article is given on the research work being done by climate modellers on the 1982 El Chichon eruption cloud. Attempts were being made to predict the magnitude of any climate effects, especially in the northern hemisphere, but predictions were likely to be a considerable challenge.

REFERENCE NO. A00226

KIEFFER, S.W.

1984

Factors governing the structure of volcanic jets.

JOURNAL/PUBLISHER Explosive Volcanism : Inception, Evolution, and Hazards. Studies in Geophysics, National Academy Press, Washington, D.C.

VOLUME/PAGE NO. 143-157

SUBJECT KEYWORDS * Cloud dynamics * Gas/vapour plumes * Mount St. Helens * United States *

A highly theoretical assessment is given of the thermodynamics and fluid-dynamic conditions existing in the jet portions of eruptive clouds just as they leave the vent. The 18 May 1980 eruption at Mount St. Helens is considered in some detail.

REFERENCE NO. A00012

KIENLE, J.

1986

Augustine Volcano : awake again?

JOURNAL/PUBLISHER Transactions of the American Geophysical Union

VOLUME/PAGE NO. 67 (14), 172

SUBJECT KEYWORDS * Augustine * Early-warning measures * United States * Volcanic prediction *

Microearthquake activity and increased fumarolic activity are taken as evidence for impending eruptive activity at Augustine. A short account of past activity and of volcanic hazards in Cook Inlet is given. Specific attention is paid to hazards to aircraft travelling at high altitudes. Activity began at Augustine on 27 March.

REFERENCE NO. A00425

KIENLE, J., DAVIES, J.N., MILLER, T.P., YOUNT, M.E.

1986

1986 eruption of Augustine volcano: public safety response by Alaskan volcanologists.

JOURNAL/PUBLISHER Transactions of the American Geophysical Union

VOLUME/PAGE NO. 67 (29), 580-582

SUBJECT KEYWORDS * Airport effects * Ash encounters * Augustine * Damage reports * Early-warning measures * FAA * Routes and schedules * United States * Volcanic prediction *

A narrative is provided of the procedures adopted by volcanologists in keeping the general public, and aviation authorities, aware of the pending outbreak and development of the 1986 eruption. Commercial flights to Anchorage International Airport were cancelled or diverted, and an inflight DC10 aircraft suffered some damage.

REFERENCE NO. A00191

KIENLE, J., DEAN, K.G., GARBEIL, H., ROSE, W.I.

1990

The 1989-90 eruption of Redoubt Volcano. Satellite surveillance of volcanic ash plumes, applications to aviation safety.

JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union

VOLUME/PAGE NO. 71(7), 266

SUBJECT KEYWORDS * Ash encounters * Cloud dynamics * Damage reports * Early-warning measures * FAA * Redoubt * Remote sensing * TIROS satellites * United States *

NOAA 10 and 11 satellite images of the 14-16 December 1990 Mount Redoubt eruption plume are presented and discussed. Real-time processing of AVHRR data could be useful for warning aviation authorities of plumes, but distinguishing weather clouds from volcanic clouds on an operational basis remains problematical.

REFERENCE NO. A00523

KIENLE, J., SHAW, G.E.

1979

Plume dynamics, thermal energy and long-distance transport of vulcanian eruption clouds from Augustine volcano, Alaska.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 6, 139-164

SUBJECT KEYWORDS * Ash encounters * Atmosphere loading * Augustine * Cloud dynamics * Infrasonics * Japan * Radar * Remote sensing * TIROS satellites * United States *

A multi-faceted account is given of the 1976 eruption, especially the characteristics of its eruption clouds. Information from pilots reports, radar, satellites, and infrasonic systems are considered. Short accounts of aircraft/ash-cloud incidences involving two F-4E Phantom Jet planes and three Japanese Airline jet aircraft are also provided.

REFERENCE NO. A00141

KIMBALL, H.H.

1912

The dense haze of June 10-11, 1912.

JOURNAL/PUBLISHER Bulletin of the Mount Weather Observatory

VOLUME/PAGE NO. 5 (3), 161-165

SUBJECT KEYWORDS * Katmai * Meteorology * United States *

A detailed meteorological account is given of the haze that appeared over Virginia, USA, in June 1917. The haze is 'attributed to the effects of convection in quiescent air prevailing at the center of a nearly stationary area of high pressure'. However, the author subsequently (Kimball, 1914) identified the cause as the Katmai 1912 eruption.

REFERENCE NO. A00404

KIMBALL, H.H.

1913A

The effect upon atmospheric transparency of the eruption of Katmai volcano.

JOURNAL/PUBLISHER Monthly Weather Review

VOLUME/PAGE NO. 41, 153-159

SUBJECT KEYWORDS * Aerosols * Climate change * Katmai * Meteorology * United States *

The author compiles reports made by meteorologists and astronomers in North America of the atmospheric effects of the 1912 Katmai eruption, Alaska. Topics covered are ashfalls, haze and smoke, diminished atmos- pheric transparency (including instrumental measurements and photo- graphy), Marvin sunshine recorder data, and twilight colour glows.

REFERENCE NO. A00324

KIMBALL, H.H.

1913B

The effect of the atmospheric turbidity of 1912 on solar radiation intensities and skylight polarization.

JOURNAL/PUBLISHER Bulletin of the Mount Weather Observatory

VOLUME/PAGE NO. 5 (5), 295-312.

SUBJECT KEYWORDS * Indonesia * Katmai * Krakatau * Meteorology * United States *

The author follows up on his earlier paper (Kimball, 1913A) by considering in more detail the effects of the haziness (brought about by the 1912 Katmai eruption) on solar-radiation intensity and skylight polarisation. The data used are pyrheliometric measurements made at Mount Weather. Comments are made on the position of neutral points.

REFERENCE NO. A00492

KIMBALL, H.H.

1914

The relation between solar radiation intensities and the temperature of the air in the northern hemisphere in 1912-13.

JOURNAL/PUBLISHER Bulletin of the Mount Weather Observatory

VOLUME/PAGE NO. 6, 205-220

SUBJECT KEYWORDS * Climate change * Katmai * Meteorology * United States *

The haze reported by Kimball (1912) over Virginia in June 1912 is attributed to the eruption at Katmai, Alaska. Below-normal temperatures were reported from different parts of the northern hemisphere (average fall of 0.16 C). Solar-radiation intensities at Mount Weather Observatory are tabulated and discussed.

REFERENCE NO. A00405

KIMBALL, H.H.

1918

Volcanic eruptions and solar radiation intensities.

JOURNAL/PUBLISHER Monthly Weather Review

VOLUME/PAGE NO. 46, 355-356

SUBJECT KEYWORDS * Climate change * Eruption frequencies * Indonesia * Katmai * Krakatau * Meteorology * United States *

An updated curve of monthly averages of solar radiation intensity at the Earth's surface is given for the 1883-1919 period so as to include data collected after the 1912 Katmai eruption. Marked decreases in radiation followed 1912, as well as eruptions in 1883 (Krakatau) and 1902 (Pelee, Santa Maria, and Colima). Other decreases are unexplained.

REFERENCE NO. A00326

KINGWELL, J.

1991

Aviation workshop on Volcanic Ash Detection, 23 July 1990. Summary Report.

JOURNAL/PUBLISHER Unpublished report, CSIRO Office of Space Science and Applications

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Early-warning measures * Redoubt * United States * Working groups *

The rapporteur of this aviation meeting provides a summary of the proceedings, including notes on several formal presentations by speakers. A workshop discussion summary is provided, as well as comments and conclusions on the recommendations in the CSIRO final report of the Volcanic Ash Detection and Aviation Safety Group.

REFERENCE NO. A00574

KINGWELL, J., GRIERSMITH, D.C.

1986

Remote sensing glossary.

JOURNAL/PUBLISHER Bureau of Meteorology, Department of Sciences, Australia

VOLUME/PAGE NO. April

SUBJECT KEYWORDS * Australia * GMS satellite * GOES/SMS satellites * INSAT satellite * Lidar * METEOSAT satellite * Meteorology * NIMBUS/TOMS satellites * Radar * Remote sensing * TIROS satellites *

The stated objectives of this report are: to provide a 'first reference' on remote-sensing methods and instruments; to supply a reference list so that further information can be obtained; to focus attention on recent technical innovations of relevance and potential benefit to Australian meteorological services and research.

REFERENCE NO. A00314

KINGWELL, J., WARD, R.

1986

Selected bibliography of remote sensing in meteorology.

JOURNAL/PUBLISHER Meteorological Note, Bureau of Meteorology, Department of Science, Australia

VOLUME/PAGE NO. 168

SUBJECT KEYWORDS * Aerosols * Meteorology * Remote sensing *

About 1400 references in this bibliography are divided into five main subject groups. Section 2.3 on 'Pollution and atmospheric aerosols' has 24 entries. An additional 14 references are given in section 5.7 entitled 'Pollution, aerosol, and plume studies'. Some of these references are given elsewhere in this bibliography.

REFERENCE NO. A00315

KNOLLENBERG, R.G., HUFFMAN, D.

1983

Measurements of the aerosol size distributions in the El Chichon cloud.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 1025-1028

SUBJECT KEYWORDS * Aerosols * Ash characteristics * El Chichon *

Three particle-size spectrometers were flown on board a U2 aircraft before and after the El Chichon eruption. Strong, orders-of-magnitude enhancements in aerosol number and mass were measured. Aerosol particles larger than 2 microns are probably ash. The larger ash particles are of notably low density.

REFERENCE NO. A00067

KRUEGER, A.F.

1982
Geostationary satellite observations of the April 1979 Soufriere eruptions.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 216, 1108-1109
SUBJECT KEYWORDS * Cloud dynamics * GOES/SMS satellites * Remote sensing * Soufriere *

Infrared images from the geostationary satellite SMS-1 were used to study the growth of the major eruptions at Soufriere in 1979. The most intense eruption (17 April) formed an ash cloud of 96,000 square km in four hours. The weakest formed a cloud of only 16,000 square km.

REFERENCE NO. A00112

KRUEGER, A.F., OLIVER, V.J.

1980
The Soufriere Volcano :infrared photos trace evolution of eruptions.
JOURNAL/PUBLISHER Weatherwise
VOLUME/PAGE NO. 33, 71-74
SUBJECT KEYWORDS * Cloud dynamics * GOES/SMS satellites * Meteorology * Remote sensing * Soufriere *

Film loops prepared from infrared photographs at 30-minute intervals taken from the SMS-1 geostationary satellite, are used to show the horizontal expansion and upward growth of the April 1979 Soufriere eruption cloud. Temperature estimates for the cloud top of -80 C correspond to a cloud height of 18 km.

REFERENCE NO. A00164

KRUEGER, A.J.

1983
Sighting of El Chichon sulphur dioxide clouds with the Nimbus 7 Total Ozone Mapping Spectrometer
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 220, 1377-1379
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * El Chichon * Gas/vapour plumes * NIMBUS/TOMS satellites * Remote sensing * Spectral characteristics *

TOMS data are used to measure the volume, dispersion, and drift of volcanic ash clouds from the El Chichon eruptions of 28 March and 3-4 April, 1982. A preliminary estimate of 3.3 million tons is given for the mass of sulphur dioxide deposited in the stratosphere by the two April eruptions.

REFERENCE NO. A00050

KRUEGER, A.J.

1985

Detection of volcanic eruptions from space by their sulphur dioxide clouds.

JOURNAL/PUBLISHER AIAA 23rd Aerospace Sciences Meeting, Reno, Nevada. American Institute of Aeronautics and Astronautics, New York

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Colo * El Chichon * Galunggung * Gas/vapour plumes * Indonesia * Mount St. Helens * NIMBUS/TOMS satellites * Remote sensing * Soputan * Spectral characteristics * United States *

The author reviews the use of the Total Ozone Mapping Spectrometer (TOMS) on board the NIMBUS-7 satellite in detecting sulphur dioxide emitted from active volcanoes. The sulphur dioxide can be discriminated from normal weather clouds.

REFERENCE NO. A00031

KRUEGER, A.J.

1986

Monitoring of volcanic sulfur dioxide from space.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 43-44

SUBJECT KEYWORDS * El Chichon * Galunggung * Indonesia * Mystery volcano * NIMBUS/TOMS satellites * Remote sensing * United States *

A succint account is provided of the Nimbus 7 Total Ozone Mapping Spectrometer (TOMS) used to survey global ozone distribution. A side benefit is the ability to survey volcanic eruptions using absorption bands at the same wave lengths used for ozone. Technical details are provided. TOMS has been used to study several eruptions since October 1978.

REFERENCE NO. A00511

KUSUMADINATA, K. (Editor)
1979
Data Dasar Gunungapi Indonesia : Catalogue of References on Indonesian Volcanoes with Eruptions in Historical Time.
JOURNAL/PUBLISHER Volcanological Survey of Indonesia
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Agung * Colo * Galunggung * Indonesia * Krakatau * Soputan * Tambora * Volcano distribution * Volcano lists *

The VSI classifies the 67 active volcanoes in this Indonesian catalogue as 'Class A'-type - that is, those volcanoes whose eruptions have been recorded in Indonesian historical time (from 16th century onwards). The catalogue is written in Bahasa Indonesia and includes numerous maps and photographs of the listed volcanoes.

REFERENCE NO. A00014

KYLE, P., PALAIS, J., DELMAS, R.
1982
The volcanic record of Antarctic ice cores : preliminary results and potential for future investigations.
JOURNAL/PUBLISHER Annals of Glaciology
VOLUME/PAGE NO. 3, 172-177
SUBJECT KEYWORDS * Antarctica * Ash characteristics * Glacier records * Indonesia * Tambora *

Tephra layers from Antarctica ice cores are reviewed, and a new tephra from Vostok station ice core is described. Only a limited number of non-Antarctic volcanic eruptions have been identified, but one of these may be the 1815 Tambora eruption. Tephra layers can be characterised using grain size, ice chemistry, and particle composition.

REFERENCE NO. A00173

LABITZKE, K., NAUJOKAT, B., McCORMICK, M.P.
1983
Temperature effects on the stratosphere of the April 4, 1982 eruption of El Chichon, Mexico.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (1), 24-26
SUBJECT KEYWORDS * Aerosols * El Chichon * Europe * Lidar * Meteorology * Remote sensing * United States *

Significant warming by a few degrees of the stratosphere at 20-28 km is reported for late 1982 using U.S. lidar data and Berlin temperature records. A direct connection between temperature increase and an aerosol loading event is established in real time. The quasi-bienniel oscillation is taken into account.

REFERENCE NO. A00109

LAMARCHE, V.C. Jr, HIRSCHBOECK, K.K.

1984

Frost rings in trees as records of major volcanic eruptions.

JOURNAL/PUBLISHER Nature

VOLUME/PAGE NO. 307 (5947), 121-126

SUBJECT KEYWORDS * Aerosols * Climate change * Eruption frequencies * Indonesia * Krakatau * Papua New Guinea * Rabaul * United States * Volcano lists *

New information on volcanic eruptions during the past several thousand years may be contained in frost-damage zones in the annual rings of bristlecone pine trees in the USA. There is good agreement between the timing of frost events and recent eruptions. The damage can be linked to the climatic effects of stratospheric aerosol veils on global scales.

REFERENCE NO. A00552

LAMB, H.H.

1970

Volcanic dust in the atmosphere; with a chronology and assessment of its meteorological significance.

JOURNAL/PUBLISHER Philosophical Transactions of the Royal Society of London

VOLUME/PAGE NO. 266A, 425-533

SUBJECT KEYWORDS * Aerosols * Agung * Ash characteristics * Atmosphere loading * Climate change * Eruption frequencies * Glacier records * Indonesia * Krakatau * Laki * Meteorology * Papua New Guinea * Tambora * Volcano distribution *

The concept of the 'dust veil index' is defined in this major paper, and is evaluated for historical eruptions in relation to climate change. The author points out the weaknesses of the DVI concept, and is cautious in attributing climatic changes to volcanic activity. However, some associations between high DVIs and weather are indicated.

REFERENCE NO. A00235

LAMB, H.H.

1977
Supplementary volcanic dust veil index assessments.
JOURNAL/PUBLISHER Climate Monitor
VOLUME/PAGE NO. 6, 57-67
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Eruption frequencies *

The author provides tables of his 'dust veil index' assessments of volcanic eruptions for 1966-75 using the same DVI formulae as in his 1970 paper. The assessments are based largely on the available estimates of the quantity of rock dispersed. Lamb acknowledges the new methods now available for dust-veil studies - satellites, spacecraft, sondes etc.

REFERENCE NO. A00274

LANDSBERG, H.E., ALBERT, J.M.

1974
The summer of 1816 and volcanism.
JOURNAL/PUBLISHER Weatherwise
VOLUME/PAGE NO. 27 (1), 63-66.
SUBJECT KEYWORDS * Climate change * Europe * Indonesia * Meteorology * Tambora * United States *

Climatic data are assessed and used to question the interpretation that the unusually cold summer of 1816 in the Northern Hemisphere was caused by atmospheric injections of material from the 1815 Tambora (Indonesia) eruption. The cold in eastern North America and western Europe was not unprecedented nor statistically unique. Later years were also cold.

REFERENCE NO. A00122

LANGBEIN, F.

1987
Dust cloud detection and discrimination by LIDAR for aircraft.
JOURNAL/PUBLISHER Unpublished report, Physics Participation Program, University of New South Wales, Sydney
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Australia * Early-warning measures * Lidar * Remote sensing * Spectral characteristics *

The conclusion of a theoretical assessment is that the behaviour of ice and volcanic clouds are significantly different in the 10.2 to 10.8 micron range, and that a sufficiently powerful C02-laser (lidar) system would be able to discriminate ash clouds. There is an uncertainty whether such a system could be small enough for commercial aircraft.

REFERENCE NO. A00445

LATTER, J.H. (Editor)

1989

Volcanic Hazards.

JOURNAL/PUBLISHER IAVCEI Proceedings in Volcanology

VOLUME/PAGE NO. 1

SUBJECT KEYWORDS * Remote sensing * Volcanic prediction *

Thirty-five chapters in this book are concerned with volcanic hazards assessments or volcano monitoring. A few of the chapters mention the problem of aviation hazards caused by explosive volcanic eruptions, and these are referenced separately in this bibliography. See in particular: Gourgaud et al., Sawada, and Dibble.

REFERENCE NO. A00477

LAULAINEN, N.S.

1982

Ash loading and insolation at Hanford, Washington, during and after the eruption of Mount St. Helens.

JOURNAL/PUBLISHER Atmospheric Effects andPotential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 225-240

SUBJECT KEYWORDS * Atmosphere loading * GOES/SMS satellites * Meteorology * Mount St. Helens * Remote sensing * United States *

An insolation and turbidity monitoring program at Hanford Meteorological Station provides a method of estimating ash loading in the atmosphere after the 18 May eruption. Agreement between diffuse-to-direct insolation ratio and visibility observed at Hanford are generally good. Ash loading remained high for several days because of ash resuspension.

REFERENCE NO. A00379

LAVER, J.D.

1982

Distribution of Mount St. Helens dust inferred from satellites and meteorological data.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 131-140

SUBJECT KEYWORDS * Cloud dynamics * GOES/SMS satellites * Meteorology * Mount St. Helens * Remote sensing * United States *

The initial explosions, shock waves, and visible horizontal dust distribution during the week following the 18 May 1980 eruption at Mount St. Helens are seen on visible and infrared images from the GOES satellites. Meteorological wind and height data are used to infer the vertical and visible and non-visible distribution of volcanic ash.

REFERENCE NO. A00368

LAZRUS, A.L., CADLE, R.D., GANDRUD, B.W., GREENBERG, J.P., HUEBERT, B.J. ROSE, W.I. Jr.

1979

Sulfur and halogen chemistry of the stratosphere and of volcanic eruption plumes.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 84 (C12), 7869-7875

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Augustine * Fuego * Gas/vapour plumes * United States *

Aerosols from the 1974 Fuego eruption, Guatemala, were collected from aircraft between 75 N and 10 S over North and Central America. The eruption caused an enhancement of 1600 million kg of sulphate in the stratosphere six months later. Gas and particle measurements in eruption plumes from three Guatemalan volcanoes and Augustine are also given.

REFERENCE NO. A00160

LAZRUS, A.L., GANDRUD, B.W.

1974
Stratospheric sulfate aerosol.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 79 (24), 3424-3431
SUBJECT KEYWORDS * Aerosols * United States *

The distribution of stratospheric sulphate concentrations from 75 N to 51 S is given on a seasonal basis. Several balloon flights to 37 km provided data consistent with higher sulphate mixing ratios than in the main body of the stratospheric sulphate layer. New evidence is provided for the dynamic control of the sulphate distribution below 21 km.

REFERENCE NO. A00199

LAZRUS, A.L., GANDRUND, B., CADLE, R.D.

1971
Chemical composition of air filtration samples of the stratospheric sulfate layer.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 76 (33), 8083-8088
SUBJECT KEYWORDS * Aerosols *

The collection and analysis of stratospheric aerosols in 1970-1 are dealt with in this early paper. Sulphate concentrations are higher using filters rather than impactors. Concentrations in the tropics were not significantly higher than those in mid-latitudes. Isotopic values are consistent with,but do not prove, a volcanic origin for the aerosol.

REFERENCE NO. A00128

LE GUERN, F., REDDAN, M.

1982
Volcanic plumes and commercial aviation.
JOURNAL/PUBLISHER Intrado, Air France, Direction des Operations aeriennes
VOLUME/PAGE NO. 42, 1-8
SUBJECT KEYWORDS * Ash characteristics * Ash encounters * Cloud dynamics * Electrical effects * Europe *

A French volcanologist and Air France representative provide a general account, in French, of the aircraft/ash-cloud problem for a French aviation magazine. The authors concentrate on the characteristics of volcanic-ash clouds, but also report on damage to aircraft and provision of information to aircraft operators.

REFERENCE NO. A00545

LEIFER, R., HINCHLIFFE, L., FISENNE, I., FRANKLIN, H., KNUTSON, E., OLDEN, M., SEDLACEK, W., MROZ, E., CAHILL, T.

1981

Measurements of the stratospheric plume from the Mount St. Helens eruption : radioactivity and chemical composition.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 214, 904-907

SUBJECT KEYWORDS * Aerosols * Gas/vapour plumes * Mount St. Helens * United States *

A report of a large injection of radon-222 into the stratosphere on 18 May 1980 is not confirmed. No enrichment in polonium was found in filter samples, and the ratio of polonium-210 to lead-210 was not different from background values. A post-eruption increase of 1000 was found of the stratospheric number concentration of submicrometer sulphate.

REFERENCE NO. A00569

LEPEL, E.A., STEFANSSON, K.M., ZOLLER,W.H.

1978

The enrichment of volatile elements in the atmosphere by volcanic activity : Augustine volcano 1976.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 83 (C12), 6213-6220

SUBJECT KEYWORDS * Atmosphere loading * Augustine * Gas/vapour plumes *

Samples of particulate material were collected in the plume of August- ine volcano in February 1976 and analysed for 38 elements. Volatile elements such as Zn, Cu, Au, Cd, and Hg are enriched in the atmospheric samples compared to bulk-ash values by factors of up to several thousand. Values were also higher in early samples.

REFERENCE NO. A00395

LERFALD, G.

1982

Mount St. Helens dust veil observed at Boulder, Colorado, by optical techniques.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 241-250

SUBJECT KEYWORDS * Meteorology * Mount St. Helens * Remote sensing * United States *

The optical effects of volcanic dust in the atmosphere above Boulder were measured using photometers and time-lapse cameras. Optical thickness was nine times that expected for a 'clean atmosphere' model. The motion of the Mount St. Helens dust veil at times could be seen on time-lapse film.

REFERENCE NO. A00380

LEVIZZANI, V., PRODI, F.

1988

Atmospheric effects of the El Chichon volcanic eruption observed by a multiwavelength sun-photometer, 1982-1985.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 93 (D5), 5277-5286

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Lidar * Remote sensing * Spectral characteristics *

Sun-photometric measurements are shown to be effective in analysing stratospheric aerosol characteristics. Aerosol vertical load and size distributions are determined for the El Chichon aerosol layer using a mountain sun-photometer in northern Italy. Eight wavelengths of the instrument provide a series of spectral data unavailable from lidar.

REFERENCE NO. A00606

LEZBERG, E.A., OTTERSON, D.A., ROBERTS, W.K., PAPATHAKOS, L.C.

1982

Aircraft sampling of the sulfate layer near the tropopause following the eruption of Mount St. Helens.

JOURNAL/PUBLISHER Atmospheric Effects andPotential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 251-259

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Mount St. Helens * United States *

Twenty filter sampling flights of the NASA Lewis F-106 aircraft were conducted in the Great Lakes region between 4 June and 8 August 1980. Sulphur contents in the stratosphere on 5 June were fifty times baseline measurements, but dropped off to steady concentration levels of 10-18 times. Nitrate enhancements also may be of volcanic origin.

REFERENCE NO. A00381

LEZBERG, E.A., OTTERSON, D.A., ROBERTS, W.K., PAPATHAKOS, L.C.
1982B
Aircraft sampling of the sulfate layer near the tropopause following the eruption of Mount St. Helens.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 87 (C4), 3123-3127
SUBJECT KEYWORDS * Aerosols * Mount St. Helens * United States *

This is another version of the paper presented by Lezberg et al. (1982A) in the NASA volume edited by A. Deepak. Here data from 23 filter sampling flights between 4 June and 23 December are considered - that is, additional data to those considered in the first paper. The conclusions are basically the same.

REFERENCE NO. A00608

LIPMAN, P.W., MULLINEAUX, D.R. (Editors)
1981
The 1980 Eruptions of Mount St. Helens, Washington.
JOURNAL/PUBLISHER United States Geological Survey Professional Paper
VOLUME/PAGE NO. 1250
SUBJECT KEYWORDS * Ash characteristics * Atmosphere loading * Cloud dynamics * Gas/vapour plumes * Mount St. Helens * Radar * Remote sensing * United States *

Numerous papers on different aspects of the 1980 eruptions are given in this important volcanological monograph. Ash transport by upper-level winds, radar detection of drifting ash clouds, and emitted gas rates and compositions are among the topics discussed. See Sarna-Wojcicki and others, Harris and others, and Casadevall and others, for example.

REFERENCE NO. A00008

LIU, C.H., KLOSTERMEYER, J., YEH, K.C., JONES, T.B., ROBINSON, T., HOLT, O., LEITINGER, R., OGAWA, T., SINNO, K., KATO, S. and three others
1982
Global dynamic responses of the atmosphere to the eruption of Mount St. Helens on May 18, 1980.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 87 (A8), 6281-6290
SUBJECT KEYWORDS * Infrasonics * Mount St. Helens * United States *

Events such as volcanic eruptions may excite a number of acoustic-gravity wave modes in the atmosphere, but the observed surface pressure perturbations and distant ionospheric perturbations can be explained only in terms of propagation of Lamb modes with velocities slightly above 300 m per second.

REFERENCE NO. A00612

LOUGH, J.M., FRITTS, H.C.

1987

An assessment of the possible effects of volcanic eruptions on North American climate using tree-ring data, 1602 to 1900 A.D.

JOURNAL/PUBLISHER Climatic Change
VOLUME/PAGE NO. 10, 219-239
SUBJECT KEYWORDS * Climate change * Volcano lists *

Seasonal and annual temperature reconstructions derived from western North American tree-ring chronologies are used to examine the possible response of North American climate to volcanic eruptions in the 1602-1900 A.D. period. Low-latitude eruptions appear to give the strongest response.

REFERENCE NO. A00580

MAC FLYER

1984

High altitude volcanic ash clouds.

JOURNAL/PUBLISHER MAC Flyer
VOLUME/PAGE NO. September, 12-15
SUBJECT KEYWORDS * Ash encounters * Damage reports * Early-warning measures * Galunggung * Indonesia * Remote sensing *

A general, non-technical account is given of the aircraft/ash-cloud problem. The 1982 Galunggung incidents are highlighted.

REFERENCE NO. A00090

MACKINNON, I.D.R., GOODING, J.L., McKAY, D.S., CLANTON, U.S.

1984

The El Chichon stratospheric cloud : solid particulates and settling rates.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research
VOLUME/PAGE NO. 23, 125-146
SUBJECT KEYWORDS * Aerosols * Ash characteristics * El Chichon *

Particulate materials in stratospheric collections made in June and July after the March/April 1982 eruptions are dominantly of silicate shards. Other solid grains may include reaction products, and many particles may have been clusters or aggregates. Particle shape is confirmed as an important factor in controlling the settling of ash from clouds.

REFERENCE NO. A00575

MALINCONICO, L.L. Jr

1987

On the variation of SO2 emission from volcanoes.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 33, 231-237

SUBJECT KEYWORDS * Atmosphere loading * Gas/vapour plumes * United States * Volcanic prediction *

Two main points are made in this paper. First, non-eruptive emission levels of SO2 are not constant at volcanoes and probably differ in relation to time-proximity to eruptive periods. Second, the measured differences may provide long- and short-term premonitory signs of impending volcanic eruptions. However, more data are required.

REFERENCE NO. A00619

MALINGREAU, J.P., KASWANDA

1986

Monitoring volcanic eruptions in Indonesia using weather satellite data: the Colo eruption of July 28, 1983.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 27, 179-194

SUBJECT KEYWORDS * Colo * Early-warning measures * Indonesia * Remote sensing * TIROS satellites *

Imaging data for the Colo eruption cloud was obtained from the NOAA-7 satellite Advanced Very High Resolution Radiometer and analysed. Important and timely information on eruptions can be extracted from such multispectral satellite data, and can be useful in providing input to early-warning operations.

REFERENCE NO. A00134

MANKIN, W.G., COFFEY, M.T.

1984

Increased stratospheric hydrogen chloride in the El Chichon cloud.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 226, 170-172

SUBJECT KEYWORDS * El Chichon * Gas/vapour plumes * Spectral characteristics *

Spectroscopic observations above 12 km altitude were made between 20 and 40N before and after El Chichon eruptions in March-April 1982. Hydrogen chloride in the cloud increased by about 40 percent, even after allowing for a global secular increase of 5 percent per year. Hydrogen fluoride amounts did not increase.

REFERENCE NO. A00576

MANKIN, W.G., COFFEY, M.T.

1986

The impact of the 1982 eruptions of El Chichon on the chemistry of the stratosphere.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 56-61

SUBJECT KEYWORDS * Atmosphere loading * El Chichon * Remote sensing * Spectral characteristics * United States *

A high-resolution spectrometer was flown on a jet aircraft between 20 and 40 N in 1982-83, and observations made for a range of trace gases using the sun as a source. HCl amounts were higher than observed previously and attributed to injection of chlorine into the atmosphere from El Chichon volcano. The chlorine may have been derived from halite.

REFERENCE NO. A00512

MANNINGHAM, D.

1990

Ashes, ashes, all fall down.

JOURNAL/PUBLISHER Business and Commercial Aviation

VOLUME/PAGE NO. December, 90-95

SUBJECT KEYWORDS * Ash encounters * Defensive inflight measures *

An aviation journalist provides a general background account of the aircraft/ash-cloud problem, mentioning the 1980 Mount St Helens, 1982 Galunggung, and 1989 Redoubt eruptions. Particular attention is paid to providing advice to pilots on the procedures to adopt in the event of an encounter with an ash cloud.

REFERENCE NO. A00587

MASS, C., SCHNEIDER, S.H.

1977

Statistical evidence on the influence of sunspots and volcanic dust on long-term temperature records.

JOURNAL/PUBLISHER Journal of the Atmospheric Sciences

VOLUME/PAGE NO. 34 (12), 1995-2004

SUBJECT KEYWORDS * Aerosols * Climate change * Meteorology *

Continuous temperature histories of more than 85 years, held in the data libarary of the National Center for Atmospheric Research, Boulder, are used to assess the climatic effects of sunspots and volcanic eruptions. A volcanic signal can be detected weakly in the data, but a sunspot influence cannot be inferred reliably.

REFERENCE NO. A00583

MATHEWS, L.A., ROQUEMORE, G.R., AMAND, P. St.

1982

An incursion of dust inthe southwestern United States from April 1980 eruptions of Mount St. Helens.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 261-267

SUBJECT KEYWORDS * Ash characteristics * Cloud dynamics * Meteorology * Mount St. Helens * United States *

Volcanic dust from the 13 April eruptions at Mount St. Helens drifted over the northern Mojave Desert affecting visibility. Military missile tests depending on clear visibility are conducted in the deserts. These could be significantly affected under certain meteorological conditions by ash from other Mount St. Helens eruptions.

REFERENCE NO. A00382

MATSON, M.

1984

The 1982 El Chichon volcano eruptions - a satellite perspective.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 23, 1-10

SUBJECT KEYWORDS * Cloud dynamics * El Chichon * GOES/SMS satellites * Remote sensing * TIROS satellites *

The 28 March, 3 and 4 April, 1984 eruptions at El Chichon were detected and monitored using the GOES and NOAA-6 environmental satellites. Plume height and dispersal data were obtained. The 28 March eruption, one of two eruptions on 3 April, and the 4 April eruption injected material into the stratosphere at heights of between 17 and 31 km.

REFERENCE NO. A00568

MATSON, M.

1985

Detection and tracking of volcanic ash clouds by meteorological satellite systems.

JOURNAL/PUBLISHER AIAA 23rd Aerospace Sciences Meeting, Reno, Nevada. American Institute of Aeronautics and Astronautics, New York

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Cloud dynamics * Early-warning measures * El Chichon * Europe * GMS satellite * GOES/SMS satellites * INSAT satellite * Japan * METEOSAT satellite * Meteorology * Remote sensing * TIROS satellites * United States *

The author reviews the application of meteorological satellites to the monitoring of volcanic ash clouds. Lists of operational satellites are given, together with an assessment of advantages and limitations. The 1982 El Chichon clouds are treated as examples.

REFERENCE NO. A00055

MATSON, M.

1986

The proposed NOAA/FAA warning plan for volcanic hazards to aircraft.

JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union

VOLUME/PAGE NO. 67 (16), 397

SUBJECT KEYWORDS * Early-warning measures * FAA * Remote sensing * United States *

The National Oceanic and Atmospheric Administration has formulated an operational plan for the Federal Aviation Administration to warn pilots of volcanic hazards. The plan involves the use of satellite data and trajectory models for forecasting volcanic debris movement. Information would be relayed to the FAA for dissemination to pilots.

REFERENCE NO. A00125

MATSON, M., ROBOCK, A.

1983

Satellite detection of the 1982 El Chichon eruptions and stratospheric cloud.

JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia

VOLUME/PAGE NO. 359-370

SUBJECT KEYWORDS * Cloud dynamics * El Chichon * GOES/SMS satellites * Meteorology * Remote sensing * TIROS satellites *

Images from the GOES and NOAA-6 satellites are used to map out the westward movement around the Earth of the 4 April 1982 eruption cloud. Earlier, non-stratosphere-penetrating clouds were also detected. Six images are published with the extended abstract. Figure 6 is a 21-part map of the 4 April cloud using both visible and infrared data.

REFERENCE NO. A00213

MATSON, M., STAGG, S.J.

1981

The Mt. St. Helens Ash Cloud.

JOURNAL/PUBLISHER Bulletin of the American Meteorological Society

VOLUME/PAGE NO. 62 (10), 1486

SUBJECT KEYWORDS * GOES/SMS satellites * Mount St. Helens * Remote sensing * United States *

A brief description is given of a computer-enhanced GOES satellite image (thermal infrared) of the 18 May 1980 ash cloud, as published on the front cover of the October issue of the Bulletin. The cloud had a satellite-derived brightness temperature of -58 to -54 C, and a height range of 10.5-11.0 km.

REFERENCE NO. A00178

MAUK, F.J.
1983
Utilization of seismically recorded infrasonic-acoustic signals to monitor volcanic explosions : the El Chichon sequence 1982 - a case study.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 88 (B12), 10385-10401
SUBJECT KEYWORDS *

Infrasonic-acoustic signals from five explosive eruptions at El Chichon volcano from 29 March through 4 April 1982 were recorded by a micro- baragraph array and seismograph near McKinney, Texas. Data are presented and discussed, together with a general review of estimating volcanic explosivity.

REFERENCE NO. A00360

MEINEL, A., MEINEL, M.
1983
Sunsets, twilights, and evening skies.
JOURNAL/PUBLISHER Cambridge University Press, Cambridge
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Augustine * El Chichon * Fuego * Indonesia * Katmai * Krakatau * Lidar * Meteorology * Remote sensing * Tambora * United States *

The volcanic causes of such phenomena as brilliant sunsets, glow stratum, dry fogs, and Bishop's ring, feature in this book written for the amateur scientist. A comprehensive set of colour photographs of sunsets, twilights, and so on, is presented, including some of the atmospheric effects produced by the 1963 Agung eruption, Indonesia.

REFERENCE NO. A00389

MEINEL, A.B., MEINEL, M.P.
1964
Height of the glow stratum from the eruption of Agung on Bali.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 201 (4902), 657-658
SUBJECT KEYWORDS * Aerosols * Indonesia * Krakatau * Meteorology * Philippines * Tambora *

The optical meteorological effects (seen from Tucson, Arizona) produced by the 17 March 1963 Agung eruption, Indonesia, are reported, and the mean apparent height of the 'dust' layer found to be 17.8 km. Comparisons are made with sunset glows related to the 1883 Krakatau, 1815 Tambora, and 1814 Mayon eruptions.

REFERENCE NO. A00180

MEINEL, A.B., MEINEL, M.P.

1967

Volcanic sunset-glow stratum : origin

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 155, 189

SUBJECT KEYWORDS * Aerosols * Agung * Indonesia * Krakatau * Meteorology *

The authors propose that vivid sunsets lasting years after major volcanic eruptions are caused by continual precipitation of sulphates, like those in the normal aerosol layer. Initial ash layers settle within a few weeks or months. Sulphate aerosol derives from injections of volcanic sulphur dioxide.

REFERENCE NO. A00174

MEINEL, A.B., MEINEL, M.P.

1975

Stratospheric dust-aerosol event of November 1974.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 188, 477-478

SUBJECT KEYWORDS * Aerosols * Climate change * Fuego * Meteorology * United States *

A strong incursion of dust and aerosol at 20 km altitude was noted over the western USA in mid-November 1974. Ashen daylight skies and colourful twilight glows were seen. Volcanic sources of possible oceanic origin in the eastern Pacific were discounted, and the stratum is attributed to the extensive October 1974 eruption at Fuego volcano, Guatemala.

REFERENCE NO. A00578

MEINEL, A.B., MEINEL, M.P., SHAW, G.E.

1976

Trajectory of the Mt. St. Augustine 1976 eruption ash cloud.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 193, 420-422

SUBJECT KEYWORDS * Augustine * Meteorology * United States *

The ash clouds from the 23 January 1976 eruption at Augustine volcano, Alaska, drifted over Arizona on 25 January at an altitude of 6 km as deduced from air trajectories and the observation of an unusual cloud. The cloud appeared in an otherwise clear sky and consisted of bluish-gray windrows parallel to the direction of flow.

REFERENCE NO. A00621

MEINEL, M.P., MEINEL, A.B.

1963

Late twilight glow of the ash stratum from the eruption of Agung Volcano.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 142, 582-583

SUBJECT KEYWORDS * Aerosols * Agung * Indonesia * Meteorology * United States *

Ground-based observations after September 1963 of the height of the 'dust' layer responsible for the brilliant sunsets in the United States at 30 N, are used to propose that ash had diffused from Agung volcano, Indonesia. A height of 22 km is derived for the top of the primary stratum.

REFERENCE NO. A00158

METEOROLOGICAL OFFICE

1971

Handbook of Aviation Meteorology.

JOURNAL/PUBLISHER Her Majesty's Stationary Office, London (Second Edition)

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Europe * Indonesia * Japan * Meteorology * New Zealand * Routes and schedules * United States *

This textbook on aviation meteorology is comprehensive and wide-ranging but is oriented towards conditions in Europe. Natural hazards to aircraft are dealt with on pages 156-8, but volcanic eruptions are not listed. The meteorology of the world's main aviation routes, including those in the Australian region, is described systematically.

REFERENCE NO. A00321

METEOROLOGICAL SATELLITE CENTER

1980

The GMS user's guide.

JOURNAL/PUBLISHER Meteorological Satellite Center, Tokyo, Japan

VOLUME/PAGE NO. Issue 1

SUBJECT KEYWORDS * GMS satellite * Japan * Meteorology * Remote sensing *

This is a manual providing in English background technical details for users of the Japanese Geostationary Meteorological Satellite (GMS). The basic GMS system and its functions are outlined, followed by discussion of data production, formating, and archiving, including types of images and extraction of meteorological data.

REFERENCE NO. A00539

MICHALSKY, J.J., KLECKNER, E.W., STOKES, G.M.

1982

Mount St. Helens related aerosol properties from solar extinction measurements.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 269-273

SUBJECT KEYWORDS * Aerosols * Meteorology * Mount St. Helens * United States *

An eight-station network of solar radiometers throughout North America was used to collect solar data during the eruptive period of Mount St. Helens. The authors of this paper concentrate on a two-week period centred on the major eruption of 22 July 1980. The wavelength dependence of the aerosol-optical depth is discussed.

REFERENCE NO. A00383

MICHELANGELI, D.V., ALLEN, M., YUNG, Y.L.

1986

Impact of volcanic aerosols on stratospheric chemistry.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 68-75

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon *

Stratospheric photochemical modelling can be tested using its response to a perturbation. This is done in this paper in relation to the El Chichon aerosol. Results of radiative transfer calculations are summarised, and photochemical calculations were done first for a steady-state case and then 'time-marched' for three months with aerosols present.

REFERENCE NO. A00513

MILLAR, D.H.M.

1981
Radio-echo layering in polar ice sheets and past volcanic activity.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 292, 441-443.
SUBJECT KEYWORDS * Aerosols * Antarctica * Glacier records *

Airborne radio-echo sounding is used to detect layering in polar ice caused by acid aerosol deposition from explosive volcanic eruptions. New RES data from Antarctica are reported in this paper. A gap in the layer record appears to corellate with a similar one in a Greenland ice core.

REFERENCE NO. A00074

MILLIGAN, F.S.

1987
Close encounters with volcanic ash : human factors perspective.
JOURNAL/PUBLISHER Retrospect
VOLUME/PAGE NO. 1, 43-46
SUBJECT KEYWORDS * Ash encounters * Australia * Defensive inflight measures *

An awareness of 'human factors' may allow aircrew (and other industry personnel) to make an objective analysis, and to determine a suitable course of action, when confronted with an unanticipated development either in the air or on the ground. Encounters of aircraft with volcanic-ash clouds are taken as an example of the 'human factors' approach.

REFERENCE NO. A00406

MITCHELL, J.M.

1980
Mt. St. Helens. A climate change.
JOURNAL/PUBLISHER Weatherwise
VOLUME/PAGE NO. 32, 120-121
SUBJECT KEYWORDS * Climate change * Mount St. Helens * Remote sensing * United States *

Attention is drawn in this short, magazine-style article to the potential climatic effects of the Mount St. Helens eruption. Cooling of less than one tenth of a degree Celcius is predicted which would be inconsequential to normal life. The article is illustrated by satellite images provided by NASA.

REFERENCE NO. A00420

MOORE, J.G., RICE, C.J.
1984
Chronology and character of the May 18, 1980, explosive eruptions of Mount St. Helens.
JOURNAL/PUBLISHER Explosive Volcanism : Inception, Evolution, and Hazards. Studies in Geophysics, National Academy Press, Washington, D.C.
VOLUME/PAGE NO. 133-142
SUBJECT KEYWORDS * Cloud dynamics * Military satellites * Mount St. Helens * Remote sensing * United States *

The authors describe the timing and nature of the explosive activity at Mount St. Helens. Their paper includes the unusual instance of the reporting of remote-sensing data obtained from high-security U.S. military satellites.

REFERENCE NO. A00011

MORI, J., McKEE, C., TALAI, B., ITIKARI, I.
1989
A summary of precursors to volcanic eruptions in Papua New Guinea.
JOURNAL/PUBLISHER Volcanic Hazards (Editor, J.H. Latter), IAVCEI Proceedings in Volcanology, Springer-Verlag, Berlin
VOLUME/PAGE NO. 1, 260-291
SUBJECT KEYWORDS * Lamington * Manam * Papua New Guinea * Rabaul * Ulawun * Volcanic prediction *

A summary is provided of information on precursory activity for 50 eruptions since 1930 at 16 volcanoes in Papua New Guinea. A range of seismic, ground deformation, thermal and chemical precursors have been identified at many of the volcanoes. Seismic precursors were the most commonly recorded (11 cases).

REFERENCE NO. A00474

MORTON, B.R., TAYLOR, G., TURNER, J.S.
1956
Turbulent gravitationalconvection from maintained and instantaneous sources.
JOURNAL/PUBLISHER Proceedings of the Royal Society of London
VOLUME/PAGE NO. A234 (1196), 1-23
SUBJECT KEYWORDS * Cloud dynamics *

This fundamental paper on the fluid dynamics of buoyant plumes includes the development of theories of convection from maintained and instantaneous sources of buoyancy. Predictions are made of the height to which smoke plumes from typical sources of heat should rise in a still, stably stratified atmosphere under diffent conditions.

REFERENCE NO. A00350

MOSSOP, S.C.

1963
Stratospheric particles at 20 km.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 199 (4891), 325-326
SUBJECT KEYWORDS * Aerosols * Agung * Ash characteristics * Australia * Indonesia *

Eight collections of particles were made from a U2 aircraft over Australia at 20 km in January-May 1963. The particles are almost exclusively hygroscopic ammonium sulphate. Many of the small, dense, insoluble particles are said to be of extra-terrestrial origin. The 11 April collection included dust from the 17 March Agung eruption, Indonesia.

REFERENCE NO. A00372

MOSSOP, S.C.

1964
Volcanic dust collected at an altitude of 28 km.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 203, 824-827
SUBJECT KEYWORDS * Aerosols * Agung * Ash characteristics * Australia * Indonesia *

An Australian atmospheric physicist describes the size distribution of volcanic-ash particles collected on 17 U2-aircraft flights over Australia between April 1963 and May 1964, following the Agung eruption, Indonesia. Coatings of sulphuric acid to the particles increased after the eruption, and are attributed to the injection of volcanic gases.

REFERENCE NO. A00361

MOSSOP, S.C.

1965
Stratospheric particles at 20 km altitude.
JOURNAL/PUBLISHER Geochimica et Cosmochimica Acta
VOLUME/PAGE NO. 29, 201-207
SUBJECT KEYWORDS * Aerosols * Agung * Australia * Indonesia *

An Australian atmospheric physicist reports on the collection and analysis of aerosols obtained in early 1963 over Australia between 16 and 45 S. The aerosol is said to be ammonium sulphate surrounding non-water-soluble particles. The investigations were cut short by the stratospheric injection of 'dust' from the Agung eruption of March 1963.

REFERENCE NO. A00179

MOUGINIS-MARK, P.J.

1988A

Volcanic hazards in the Circum-Pacific Basin: a proposed ISY project.

JOURNAL/PUBLISHER Planetary Geosciences Division Contribution, Hawaii Institute of Geophysics, University of Hawaii, Honolulu

VOLUME/PAGE NO. 529

SUBJECT KEYWORDS * NIMBUS/TOMS satellites * Remote sensing * United States *

A proposal is presented to use earth-orbiting satellites during the International Space Year for the mapping of volcanoes in the Circum-Pacific Basin and in the assessment of volcanic hazards. Methodologies using satellite data and measurements on the ground during the ISY, are presented.

REFERENCE NO. A00454

MOUGINIS-MARK, P.J.

1988B

A global assessment of active volcanism, volcanic hazards, and volcanic inputs to the atmosphere from the Earth Observing System (EOS).

JOURNAL/PUBLISHER Hawaii Institute of Geophysics, Planetary Geosciences Division, unpublished project proposal

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Early-warning measures * Earth Observing System * NIMBUS/TOMS satellites * Remote sensing * United States *

A proposal is advanced to use the EOS in the collection of synoptic data in order to provide 'eruption alerts' based on detection of thermal and sulphur-dioxide anomalies. Site-specific high-resolution coverage of impending/on-going eruption sites then would be requested. The proposal contains material used by Mouginis-Mark et al. (1989).

REFERENCE NO. A00490

MOUGINIS-MARK, P.J., PIERI, D.C., FRANCIS, P.W., WILSON, L., SELF, S., ROSE, W.I., WOOD, C.A.

1989

Remote sensing of volcanos (sic) and volcanic terrains.

JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union

VOLUME/PAGE NO. 70 (52), 1567-1575

SUBJECT KEYWORDS * Early-warning measures * Earth Observing System * NIMBUS/TOMS satellites * Papua New Guinea * Rabaul * Radar * Remote sensing * United States *

A broad review is presented of current satellite technology being used in volcanology. Several polar-orbiting satellites are scheduled for launch in the 1990s that can be used to study volcanoes, including the Earth Observing System. A new radar system (SIR-C), and Orbiting Volcano Observatory (OVO), and laser retro-ranger also are being planned.

REFERENCE NO. A00489

MOYERS, J.L., CHARLSON, R.J., FARLOW, N.H., INN, E.C.Y., LEIFER, R. ROSEN, J.M.

1982

Chemical and physical measurements of the volcanic cloud made in situ.

JOURNAL/PUBLISHER Mount St. Helens Eruptions of 1980 : Atmospheric Effects and Potential Climatic Impact (Editors, R.E. Newell and A. Deepak). National Aeronautics and Space Administration, Washington, D.C.

VOLUME/PAGE NO. NASA SP-458, 47-62

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Atmosphere loading * Gas/vapour plumes * Mount St. Helens * United States * Working groups *

Eruption gases, aerosol, and ash that were collected from aircraft and balloons, are discussed in this chapter of a Special Publication. Stratospheric sulphuric acid appeared very early in the eruption plume, and the cloud was inhomogeneous with respect to acid and ash. Gas to particle conversion and residual aerosol burden are discussed.

REFERENCE NO. A00154

MROZ, E.J., MASON, A.S., LEIFER, R., JUZDAN, Z.R.
1984
Stratospheric impact ofEl Chichon.
JOURNAL/PUBLISHER Geofisica Internacional
VOLUME/PAGE NO. 23 (3), 321-333
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Gas/vapour plumes * Mount St. Helens * Mystery volcano * Ulawun *

Stratospheric aerosols and gases collected by high-altitude aircraft and balloons are used to assess the effect of the 1982 El Chichon eruption on the stratosphere. About 7.6 Tg of sulphate was produced. The 1971-83 trend of mean stratospheric sulphate mixing ratio is presented from Project Airstream measurements.

REFERENCE NO. A00163

MROZ, E.J., MASON, A.S., SEDLACEK, W.A.
1983
Stratospheric sulfate from El Chichon and the Mystery Volcano.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (9), 873-876
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Mystery volcano * United States *

Stratospheric sulphate was collected by high-altitude aircraft and balloons to assess the impacts of El Chichon and an unidentified volcano on the stratosphere. The Mystery Volcano placed about 0-85 Tg of sulphate in the northern-hemisphere stratosphere. El Chichon injected about 7.6 Tg sulphate into the global stratosphere.

REFERENCE NO. A00412

MURCRAY, D.G., MURCRAY, F.J., BARKER, D.B., MASTENBROOK, H.J.
1981
Changes in stratospheric water vapour associated with the Mount St. Helens eruption.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 211, 823-824
SUBJECT KEYWORDS * Gas/vapour plumes * Mount St. Helens * United States *

A frost-point hygrometer designed for aircraft operation was included in the complement of instruments assembled for NASA U-2 flights through the Mount St. Helens plume. The water-vapour mixing ratio in the plume by mass on 22 May was as high as 40 million compared to values of 2-3 million outside of the plume.

REFERENCE NO. A00557

MURROW, P.J., ROSE, W.I. Jr, SELF, S.

1980

Determination of the total grain size distribution in a vulcanian eruption column and its implications to stratospheric aerosol perturbation.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 7 (11), 893-896

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Atmosphere loading * Fuego *

Grain-size analyses of airfall ash from the 14 October 1974 Fuego eruption, Guatemala, are reported, and estimates made of amounts of ash injected into the stratosphere - namely, no more than 0.8 percent of ash less than 2 microns in diameter. Acid aerosol particles are more important than silicate ash by at least an order of magnitude.

REFERENCE NO. A00236

McCLELLAND, L., SIMKIN, T., SIEBERT, L.

1985A

Volcanic activity near commercial air routes.

JOURNAL/PUBLISHER AIAA 23rd Aerospace Sciences Meeting, Reno, Nevada. American Institute of Aeronautics and Astronautics, New York

VOLUME/PAGE NO. ?

SUBJECT KEYWORDS * Colo * Early-warning measures * Eruption frequencies * Indonesia * Japan * Remote sensing * Remote sensing * Routes and schedules * United States * Volcanic prediction * Volcano distribution *

The authors are volcanologists with the Smithsonian Institution (see: Simkin et al., 1981; Simkin and Siebert, 1984). Here they propose the use of an eruption reporting form for pilots who could transmit information to centres such as ICAO and IATA. The Smithsonian could provide volcanological information. Indonesian volcanoes are highlighted.

REFERENCE NO. A00266

McCLELLAND, L., SIMKIN, T., SIEBERT, L.

1985B

Volcanic activity near commercial air routes.

JOURNAL/PUBLISHER AIAA 23rd Aerospace Sciences Meeting, Reno, Nevada. American Institute of Aeronautics and Astronautics, New York

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Early-warning measures * Eruption frequencies * Indonesia * Routes and schedules * Volcano distribution *

A review is given of the type and use of data on the Smithsonian Institution's volcano reference data file. A form is described for use by pilots, allowing their observations of volcanic activity to be radioed to regional air traffic control centres. The Smithsonian could provide data on the volcano concerned, contact addresses, etc.

REFERENCE NO. A00144

McCLELLAND, L., SIMKIN, T., SUMMERS, M., NIELSEN, E., STEIN, T.C.

1989

Global Volcanism 1975-1985

JOURNAL/PUBLISHER Prentice Hall, Englewood Cliffs, New Jersey, and American Geophysical Union, Washington, DC

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * Antarctica * Ash encounters * Colo * Europe * Galunggung * Indonesia * Mount St. Helens * Mystery volcano * Nevado del Ruiz * Nyamuragira * Remote sensing * United States * Volcano lists *

The authors of this book compile the first decade of reports from the Scientific Event Alert Network of the Smithsonian Institution. The extensive index allows access to information on observations of volcanic eruptions from aircraft, aircraft encounters with ash clouds, and references to individual airlines. A detailed chronology of events in 1975-85 is provided also.

REFERENCE NO. A00611

McCORMICK, M.P.

1982A

Lidar measurements of Mount St. Helens effluents.

JOURNAL/PUBLISHER Optical Engineering

VOLUME/PAGE NO. 21 (2), 340-342

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Lidar * Mount St. Helens * Remote sensing * United States *

Ground and airborne lidar measurements of the world-wide movement of stratospheric aerosols produced by the 18 May 1980 eruption are described. Material 10-12 km high circled the globe in 16 days, and that at 23 km (maximum height) circled it in about 56 days. 0.5 million metric tons of stratospheric material were produced.

REFERENCE NO. A00258

McCORMICK, M.P.

1982B

Ground-based and airborne measurements of the Mount St. Helens stratospheric effluents.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 125-130

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * Fuego * Lidar * Mount St. Helens * Remote sensing * SAMII/SAGE sensors * United States *

Data from both airborne lidar flights and ground-based systems are compiled and discussed with reference to the stratospheric impact of the 18 May 1980 Mount St. Helens eruption. Heights and dispersal rates of the cloud are recorded. The data are compared with SAGE-satellite data and with pre- and post Fuego lidar data complied at Hampton, Va.

REFERENCE NO. A00363

McCORMICK, M.P.

1983?

Mystery clouds in the stratosphere?

JOURNAL/PUBLISHER National Aeronautics and Space Administration, Washington D.C. Abstract.

VOLUME/PAGE NO. NASA CP-2228, 2-3

SUBJECT KEYWORDS * Aerosols * Lidar * Mystery volcano * Remote sensing * SAMII/SAGE sensors * United States *

Ground-based and airborne lidar measurements of the 'mystery' cloud first noted at a Japanese lidar station in late-January 1982, are reported for a mid-February flight to Costa Rica. The stratospheric enhancement probably covered the northern hemisphere by March 1982, and was produced probably by a low-latitude eruption a few months before.

REFERENCE NO. A00330

McCORMICK, M.P.

1983A

Satellite and lidar measurement of the El Chichon stratospheric cloud.

JOURNAL/PUBLISHER 18th General Assembly of the International Union of Geodesy and Geophysics, Hamburg, Federal Republic of Germany. Abstract

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * El Chichon * Lidar * Remote sensing * SAMII/SAGE sensors * United States *

This brief abstract is a summary of work reported in greater detail in other papers by the author and his co-workers (see, for example: McCormick et al., 1984; McCormick, 1985). Results deal with both ground-based and airborne lidar systems and with SAMII satellite observations of volcanic aerosol anomalies, particularly those of El Chichon.

REFERENCE NO. A00331

McCORMICK, M.P.

1983B

Stratospheric aerosol climatology in the polar regions as observed by SAM II.

JOURNAL/PUBLISHER 18th General Assembly of the International Union of Geodesy and Geophysics, Hamburg, Federal Republic of Germany. Abstract.

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * El Chichon * Mount St. Helens * Remote sensing * SAMII/SAGE sensors * United States *

Results of a four-year (1979-82) aerosol climatology study using SAMII satellite data are reported briefly in this abstract. Seasonal, polar stratospheric clouds are identified for cold regions but, excluding these, the major perturbation of stratospheric aerosols is of volcanic origin - most notably, the El Chichon eruption of 1982.

REFERENCE NO. A00332

McCORMICK, M.P.

1983C

Global distribution of stratospheric aerosols by satellite measurements.

JOURNAL/PUBLISHER American Institute of Aeronautics and Astronautics Journal, Technical Notes

VOLUME/PAGE NO. 21 (4), 633-635

SUBJECT KEYWORDS * Aerosols * Antarctica * Climate change * Mount St. Helens * Remote sensing * SAMII/SAGE sensors * United States *

A short report is given of the developing data set for stratospheric aerosols obtained from the satellite sensors SAMII and SAGE. Typical values for aerosol extinction are given, as well as enhanced values for the northern hemisphere resulting from the 1980 Mount St. Helens eruption. The existence of polar strotospheric clouds is also recorded.

REFERENCE NO. A00250

McCORMICK, M.P.

1983D

Aircraft and ground-based lidar measurements of El Chichon stratospheric aerosols.

JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia

VOLUME/PAGE NO. 386-389

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Augustine * El Chichon * Fuego * Lidar * Mount St. Helens * Mystery volcano * Remote sensing * Ulawun * United States *

The 1982 El Chichon event was the largest of a series of volcanic stratospheric injections over the 1977-82 period. It was detected by the ground-based lidar system at Langley, Virginia, and by airborne lidar measurements over the western Atlantic. The height of the El Chichon cloud at 25-26 km is higher than those of the other eruptions. .

REFERENCE NO. A00216

McCORMICK, M.P.

1985A

Aerosol observations for climate studies.

JOURNAL/PUBLISHER Advances in Space Research

VOLUME/PAGE NO. 5 (6), 67-73

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Meteorology * Mount St. Helens * SAMII/SAGE sensors * Ulawun *

The significance of SAMII/SAGE satellite data is reviewed in relation to global aerosol climatology, including the existence of polar stratospheric clouds and tropical stratospheric cirrus. Volcanic eruptions - including that of Ulawun, Papua New Guinea, in 1980 - greatly affect stratospheric aerosol loading.

REFERENCE NO. A00057

McCORMICK, M.P.

1985B

El Chichon : lidar and satellite measurements versus time and latitude.

JOURNAL/PUBLISHER Topical Meeting on Optical Remote Sensing of the Atmosphere, Incline Village, Nevada. Abstract.

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Augustine * Cloud dynamics * El Chichon * Fuego * Lidar * Mount St. Helens * Papua New Guinea * Remote sensing * SAMII/SAGE sensors * Ulawun * United States *

A short review is given of the results of five airborne lidar surveys, ten years of ground-based lidar measurements, and six years of SAMII satellite observations, and the results used to demonstrate the large atmospheric perturbation produced by the 1982 El Chichon eruption. Additive effects of other eruptions are also considered.

REFERENCE NO. A00329

McCORMICK, M.P., DeLUISI, J., KENT, G.S., LERFALD, G.M. MURCRAY, D.G., STOWE, L.L. SWISSLER, T.J.

1982

Remote sensing of Mount St. Helens effluent.

JOURNAL/PUBLISHER Mount St. Helens Eruptions of 1980 : Atmospheric Effects and Potential Climatic Impact (Editors, R.E. Newell and A. Deepak). National Aeronautics and Space Administration, Washington, D.C.

VOLUME/PAGE NO. NASA SP-458, 63-87

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * Lidar * Meteorology * Mount St. Helens * Radar * Remote sensing * SAMII/SAGE sensors * United States * Working groups *

Remote-sensing techniques considered in this chapter of a Special Publication are satellites (especially SAGE), lidar, radar, ground-based passive optical measurements, and balloon photographs. Data from all these sources are compiled and assessed in a comprehensive overview of the environmental impact on the middle atmosphere.

REFERENCE NO. A00155

McCORMICK, M.P., FULLER, W.H. Jr, HUNT, W.H., SWISSLER, T.J.

1980

Lidar measurements of ash clouds from the St. Helens volcanic eruption.

JOURNAL/PUBLISHER 10th International Laser Radar Conference, Silver Spring, Maryland. Conference Abstracts.

VOLUME/PAGE NO. 138-139

SUBJECT KEYWORDS * Lidar * Mount St. Helens * Remote sensing * Spectral characteristics * United States *

An airborne, two-colour laser system was used over the eastern USA in late May 1980 to investigate the nature of the lower stratospheric volcanic clouds from the 18 May Mount St. Helens eruption. Layers 0.2-1 km thick and 12-16 km high were detected. The ratio of the two-colour returns were those expected from silicate particles.

REFERENCE NO. A00328

McCORMICK, M.P., HAMILL, P., PEPIN, T.J., CHU, W.P., SWISSLER, T.J., MCMASTER, L.R.

1979

Satellite studies of the stratospheric aerosol.

JOURNAL/PUBLISHER Bulletin of the American Meteorology Society

VOLUME/PAGE NO. 60 (9), 1038-1046

SUBJECT KEYWORDS * Aerosols * Remote sensing * SAMII/SAGE sensors * United States *

Two recently deployed NASA satellite systems, SAMII and SAGE, monitor stratospheric aerosol. The instruments are sun photometers that measure solar intensity at each sunrise and sunset. Latitudinal, longitudinal, and temporal differences in the aerosol layer can be evaluated. The instruments, mode of operation, and methodologies are described.

REFERENCE NO. A00618

McCORMICK, M.P., KENT, G.S., YUE, G.K., CUNNOLD, D.M.

1981

SAGE measurements of the stratospheric aerosol dispersion and loading from the Soufriere volcano.

JOURNAL/PUBLISHER National Aeronautics and Space Administration, Scientific and Technical Information Branch, Technical Report

VOLUME/PAGE NO. 1922

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * Lidar * Remote sensing * SAMII/SAGE sensors * Soufriere *

The April 1979 activity of Soufriere volcano although of low magnitude was the first opportunity for the SAGE satellite to detect and measure the particulate clouds from a volcanic eruption. The SAGE system is described in this paper, and results are given for dispersal rates and directions and for mass loading of the atmosphere.

REFERENCE NO. A00327

McCORMICK, M.P., KENT, G.S., YUE, G.K., CUNNOLD, D.M.

1982

Stratospheric aerosol effects from Soufriere Volcano as measured by the SAGE satellite system.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 216, 1115-1118

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * Remote sensing * SAMII/SAGE sensors * Soufriere *

Two, major, stratospheric plumes of the 1979 eruption were tracked to West Africa by the Stratospheric Aerosol and Gas Experiment (SAGE) satellite system. The total mass of the plumes was less than 0.5 percent of the global aerosol burden. No temperature or climate perturbation was expected.

REFERENCE NO. A00116

McCORMICK, M.P., OSBORN, M.T.

1985A

Airborne lidar measurements of El Chichon stratospheric aerosols, October 1982 to November 1982.

JOURNAL/PUBLISHER Langley Research Center, National Aeronautics and Space Administration, Hampton, Virginia

VOLUME/PAGE NO. NASA-RP-1136

SUBJECT KEYWORDS * Aerosols * Cloud dynamics * El Chichon * Lidar * Remote sensing * United States *

Airborne lidar data on the El Chichon aerosols were collected between 46N and 46S. The bulk of the material produced by the March-April 1982 eruption was between 5-7S and 35-37N, and concentrated above 21 km in a layer that peaked at 23-25 km.

REFERENCE NO. A00142

McCORMICK, M.P., OSBORN, M.T.

1985B

Airborne lidar measurements of El Chichon stratospheric aerosols.

JOURNAL/PUBLISHER Langley Research Center, National Aeronautics and Space Administration, Hampton, Virginia

VOLUME/PAGE NO. NASA-RP-1148

SUBJECT KEYWORDS * Aerosols * Cloud dynamics * El Chichon * Lidar * Remote sensing * United States *

Stratospheric material produced by the late March to early April 1982 El Chichon eruptions was measured with a lidar system on board a NASA aircraft flown in January-February 1982. The largest amount of material was found between 35 N and 52 N. A primary purpose of the flight was to determine aerosol characteristics and spacial distribution.

REFERENCE NO. A00143

McCORMICK, M.P., OSBORN, M.T.

1987
Airborne lidar measurements of El Chichon stratospheric aerosols - January 1984
JOURNAL/PUBLISHER NASA Reference Publication
VOLUME/PAGE NO. 1175
SUBJECT KEYWORDS * Aerosols * El Chichon * Lidar * Remote sensing *

A NASA aircraft fitted with a lidar system flew in January 1984 between 30 and 90N in order to determine the spatial distribution and aerosol characteristics of 1982 El Chichon-produced stratospheric material. Lidar data for 38-77N are presented. The aerosol was mostly north of 55N and below a height of 17 km.

REFERENCE NO. A00462

McCORMICK, M.P., SWISSLER, T.J.

1983
Stratospheric aerosol mass and latitudinal distribution of the El Chichon eruption cloud for October 1982.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (9), 877-880
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Lidar * Remote sensing * United States *

A lidar aircraft mission to investigate the El Chichon aerosol cloud was undertaken between 46N and 46S in October-November 1982. The global stratospheric mass of material is estimated to be 12 megatonnes. Most of it resided from 5-7S to 35-37N and was concentrated above 21 km in a layer peaked at 24-25 km.

REFERENCE NO. A00625

McCORMICK, M.P., SWISSLER, T.J., CHE, W.P., FULLER, W.H., Jr

1978
Post-volcanic stratospheric aerosol decay as measured by lidar
JOURNAL/PUBLISHER Journal of the Atmospheric Sciences
VOLUME/PAGE NO. 35, 1296-1303
SUBJECT KEYWORDS * Agung * Fuego * Indonesia * Lidar * Remote sensing * United States *

Details are provided of lidar observations of stratospheric aerosol distribution from October 1974 to July 1976 over Hampton, Virginia. Stratospheric aerosol contents increased rapidly after the Fuego eruption in October 1974, but then declined. The exponential 1/e decay time from January 1975 to July 1976 was 11.6 months.

REFERENCE NO. A00504

McCORMICK, M.P., SWISSLER, T.J., FULLER, W.H., HUNT, W.H., OSBORN, M.T.

1984
Airborne and ground-based lidar measurements of the El Chichon stratospheric aerosol from 90 N to 56 S.
JOURNAL/PUBLISHER Geofisica Internacional
VOLUME/PAGE NO. 23 (2), 187-221
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Augustine * El Chichon * Fuego * Lidar * Mount St. Helens * Mystery volcano * Papua New Guinea * Remote sensing * SAMII/SAGE sensors * SME satellite * Ulawun * United States *

Results of NASA airborne lidar campaigns designed to determine the characteristics of aerosol produced by the March-April 1982 El Chichon eruptions, are integrated with a 10-year ground-based lidar data set. The October 1980 Ulawun eruption, Papua New Guinea, is identified as having produced a significant atmospheric impact.

REFERENCE NO. A00056

McINTURFF, R.M., MILLER, A.J., ANGELL, J.K., KORSHOVER, J.

1971
Possible effects on the stratosphere of the 1963 Mt. Agung volcanic eruption.
JOURNAL/PUBLISHER Journal of Atmospheric Sciences
VOLUME/PAGE NO. 28, 1304-1307
SUBJECT KEYWORDS * Agung * Climate change * Indonesia * Meteorology *

Temperature data from eight tropical stations for the 1951-69 period are used to suggest that the effect of the atmospheric impact of the Agung eruption may be impossible to isolate. However, the authors concede that the data do correspond to an absolute maximum in late 1963 or early 1964 (see Newell, 1970).

REFERENCE NO. A00168

McNUTT, S.R.

1989

Some seismic precursors to eruptions at Pavlof Volcano, Alaska, October 1973 - April 1986.

JOURNAL/PUBLISHER Volcanic Hazards (Editor, J.H. Latter), IAVCEI Proceedings in Volcanology, Springer-Verlag, Berlin

VOLUME/PAGE NO. 1, 463-485

SUBJECT KEYWORDS * Airport effects * Routes and schedules * United States * Volcanic prediction *

Cold Bay is a village 58 km southwest of Pavlof Volcano and has been subjected to ash falls of several centimetres. It is also the site of an international airport used chiefly as a refueling stop for commercial aircraft flying polar routes. Eruptions in the last 3 years have caused some local rerouting of aircraft.

REFERENCE NO. A00475

NANCOO, M.E.

1983

VAW-Memo.

JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organisation, Montreal, Memorandum

VOLUME/PAGE NO. 1

SUBJECT KEYWORDS *

Attachments to the first memorandum of the VAW Study Group include a statement on the origin and purpose of the group, and extracts from papers presented at the ASIA/PAC Regional Air Navigation Meeting in 1983 in Singapore, on volcanic ash warnings, especially in relation to the Galunggung incidents in 1982.

REFERENCE NO. A00095

NANCOO, M.E.

1984A

VAW-Memo.

JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organization, Montreal, Memorandum

VOLUME/PAGE NO. 2

SUBJECT KEYWORDS * Early-warning measures * ICAO * Working groups *

This memorandum contains notification of changes of membership, interim measures for issuing volcanic ash warnings, and replies from members to VAW-Memo/1, including a comprehensive paper by Smith (1984). Attachments also include contributions by Dilda (1982), Tracy (1983), Le guern and Reddan (1983), and Hanstrum and Watson (1983).

REFERENCE NO. A00019

NANCOO, M.E.

1984B
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organization, Montreal, Memorandum
VOLUME/PAGE NO. 3
SUBJECT KEYWORDS * ICAO * Working groups *

Changes in Study Group membership and a request for replies to VAW-Memos 1 and 2, are given in this short memorandum.

REFERENCE NO. A00023

NANCOO, M.E.

1985
VAW-Memo.
JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organization, Montreal, Memorandum
VOLUME/PAGE NO. 4
SUBJECT KEYWORDS * Early-warning measures * ICAO * Working groups *

Concern over the lack of member responses to earlier memoranda is expressed and notification given of Mr T. Fox becoming Secretary of the Study Group.

REFERENCE NO. A00024

NARANJO, J.L., SIGURDSSON, H., CAREY, S.N., FRITZ, W.

1986
Eruption of the Nevado del Ruiz volcano, Columbia, on 13 November 1985 : tephra fall and lahars.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 233, 961-963
SUBJECT KEYWORDS * Cloud dynamics * Nevado del Ruiz *

A concise account is given of the Ruiz 1985 eruption. Most of the paper is concerned with the disastrous lahars, but some information is given on the Plinian column. A maximum column height of 31 km above sea-level is estimated on the basis of the geometry of a lithic isopleth (3.2 cm). The total erupted volume is 35 million cubic metres.

REFERENCE NO. A00442

NATIONAL ENVIRONMENTAL SATELLITE,, DATA, AND INFORMATION SERVICE (NESDIS)

1985

NESDIS Programs : NOAA Satellite Operations : NOAA Satellite Programs Briefing.

JOURNAL/PUBLISHER NESDIS, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.

VOLUME/PAGE NO.

SUBJECT KEYWORDS * GMS satellite * GOES/SMS satellites * INSAT satellite * METEOSAT satellite * NIMBUS/TOMS satellites * Remote sensing * TIROS satellites *

This is a clearly illustrated handbook on the use of NOAA satellites. A section on environmental satellites deals with polar-orbiter and geostationary satellites, satellite data archives, academic ties, and international exchange of weather satellite data. Appendix A is a satellite-history listing from 1960 to 1985.

REFERENCE NO. A00197

NATIONAL ENVIRONMENTAL SATELLITE,, DATA, AND INFORMATION SERVICE (NESDIS)

1986

No title

JOURNAL/PUBLISHER Annex to unidentified report, NESDIS, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Early-warning measures * FAA * NIMBUS/TOMS satellites * Remote sensing * TIROS satellites * United States *

An outline of the satellite capabilities of NOAA in responding to impacts on air operations following volcanic eruptions is provided in an annex to a report. NOAA support can be obtained by the US FAA in an expeditious manner, but identification and tracking of ash clouds is not possible in every case. See also Aviation Week & Sp. Tech. (1987).

REFERENCE NO. A00446

NEUMANN VAN PADANG, M.

1951
Indonesia.
JOURNAL/PUBLISHER Catalogue of the Active Volcanoes of the World including Solfatara Fields. International Volcanological Association, Naples
VOLUME/PAGE NO. Part 1
SUBJECT KEYWORDS * Agung * Colo * Galunggung * Indonesia * Krakatau * Soputan * Tambora * Volcano distribution * Volcano lists *

The active volcanoes of Indonesia are listed and described in this IAV catalogue. The information is useful, but only pre-1950 eruptions are listed. See Kusumadinata (1979) and Simkin and others (1981) for information on more recent Indonesian eruptions.

REFERENCE NO. A00003

NEUMANN VAN PADANG, M.

1953
Philippine Islands and Cochin China.
JOURNAL/PUBLISHER Catalogue of the Active Volcanoes of the World including Solfatara Fields. International Volcanological Association, Naples
VOLUME/PAGE NO. Part 2
SUBJECT KEYWORDS * Philippines * Volcano distribution * Volcano lists *

Basic information on the active volcanoes of the Philippines region are provided in this IVA catalogue. Data on only pre-1953 eruptions are given so the catalogue is somewhat out-of-date. See Simkin and others (1981) for information on more recent Philippines eruptions.

REFERENCE NO. A00004

NEW SCIENTIST

1988
Volcanoes poised to blow another ozone hole.
JOURNAL/PUBLISHER New Scientist
VOLUME/PAGE NO. 1 September 1988, 42
SUBJECT KEYWORDS * Atmosphere loading * Gas/vapour plumes *

The work of Symonds et al. (1988) on chlorine and fluorine fluxes from active volcanoes is highlighted in this brief article. The role of bromine (non-volcanic) in the destruction of ozone is also mentioned based on measurements taken by west-German atmospheric scientists in 1987 using balloons up to 34 km high.

REFERENCE NO. A00448

NEWELL, R.E.

1970

Stratospheric temperature change from the Mt. Agung volcanic eruption of 1963.

JOURNAL/PUBLISHER Journal of the Atmospheric Sciences

VOLUME/PAGE NO. 27, 977-978

SUBJECT KEYWORDS * Aerosols * Agung * Australia * Climate change * Indonesia * Meteorology *

The author presents 'fairly strong circumstantial evidence' that the 1963 Agung aerosol caused increases in stratospheric temperatures of about 5 C. Temperature data are presented for six different isobaric levels above Port Hedland, Western Australia.

REFERENCE NO. A00132

NEWELL, R.E., DEEPAK, A. (Editors)

1982

Mount St. Helens Eruptions of 1980: Atmospheric Effects and Potential Climatic Impact.

JOURNAL/PUBLISHER National Aeronautics and Space Administration, Washington, D.C.

VOLUME/PAGE NO. NASA SP-458

SUBJECT KEYWORDS * Aerosols * Climate change * Mount St. Helens * Remote sensing * United States * Working groups *

Each of the six chapters in this volume represents a working group report by participants in a workshop held in Washington D.C. in November 1980. The Editors provide an Executive Summary of conclusions and recom- mendations. See also: Rose et al., Danielson et al., Moyers et al., McCormick et al., Friend et al., and Hansen et al.

REFERENCE NO. A00151

NEWELL, R.E., WEARE, B.C.

1976

Factors governing tropospheric mean temperature.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 194, 1413-1414

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Indonesia * Meteorology *

Mean temperatures of the tropical troposphere are shown to be related to Pacific sea-surface temperature and volcanic aerosol loading. They do not appear to be related to Atlantic sea-surface temperatures. The Agung eruption (Indonesia) of March 1963 is thought to have produced a decrease of 0.5 C in mean temperature of the tropical troposphere.

REFERENCE NO. A00280

NEWHALL, C.G.

1984
Short-term forecasting of volcanic hazards.
JOURNAL/PUBLISHER United States Geological Survey Open File Report, Proceedings of the Geologic and Hydrologic Hazards Training Program, 5-30 March, 1984, Denver Colorado
VOLUME/PAGE NO. 84-760, 507-592
SUBJECT KEYWORDS * United States * Volcanic prediction *

Comprehensive notes for a hazards course cover the range of techniques used to detect and interpret common precursors to volcanic activity. The author also addresses such problems as forecasting the courses and ends of eruptive periods. This account was used as the basis for an update paper published by Banks et al. (1989).

REFERENCE NO. A00541

NEWHALL, C.G., SELF, S.

1982
The Volcanic Explosivity Index (VEI) : estimate of explosive magnitude for historical volcanism
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 87 (C2), 1231-1238
SUBJECT KEYWORDS * Eruption frequencies * Volcano lists *

A semi-quantative, composite estimate of the magnitude of past explosive eruptions, termed VEI, is proposed as a compromise between poor data and the need for a quantitative evaluation of historical volcanism. A VEI is assigned to over 8000 historical and prehistoric eruptions. Column height and stratospheric penetration are two of the criteria used.

REFERENCE NO. A00256

NICHOLLS, N.

1988
Low latitude volcanic eruptions and the El Nino-Southern Oscillation.
JOURNAL/PUBLISHER Journal of Climatology
VOLUME/PAGE NO. 8 (1), 91-95
SUBJECT KEYWORDS * Agung * Australia * Climate change * El Chichon * Indonesia * Lamington * Meteorology * Papua New Guinea * Rabaul * Volcano lists *

An analysis of pressure anomalies at Darwin, Australia, before and after the dates of ten low-latitude volcanic eruptions has been carried out to test the hypothesis that eruptions trigger ENSOs. The hypothesis is not supported. Rather, the reverse may be true - that ENSOs may cause eruptions. However, no cause-and-effect mechanism is proposed.

REFERENCE NO. A00620

NILSSON, B.

1979

Meteorological influence on aerosol extinction in the 0.2-40 micron wavelength range.

JOURNAL/PUBLISHER Applied Optics

VOLUME/PAGE NO. 18 (20), 3457-3473

SUBJECT KEYWORDS * Aerosols * Meteorology * Remote sensing * Spectral characteristics *

Aerosol extinction in different weather situations is calculated from Mie theory using an aerosol model that starts from dry particles. Particle number concentration in different size ranges has a dominating influence on the relation between infrared aerosol transmission and meteorological visibility. Humidity affects extinction only partially.

REFERENCE NO. A00494

NISHIO, F., KATSUSHIMA, T., OHMAE, H.

1985

Volcanic ash layers in bare ice areas near the Yamato Mountains, Dronning Maud Land and the Allan Hills, Victoria Land, Antarctica.

JOURNAL/PUBLISHER Annals of Glaciology

VOLUME/PAGE NO. 7, 34-42

SUBJECT KEYWORDS * Antarctica * Ash characteristics * Glacier records *

Tephra layers on bare ice in the Yamato Mountains have the chemical composition of island-arc rocks, so their source is identified as a volcano in the South Sandwich Islands. In contrast, tephras from the Allan Hills are trachybasaltic, and a young volcano in the McMurdo volcanic group, Antarctica, is proposed as a possible source.

REFERENCE NO. A00260

NOAA, FAA

1989

Memorandum of Understanding between the National Oceanic and Atmospheric Administration and the Federal Aviation Administration on volcanic hazards alert

JOURNAL/PUBLISHER Unpublished typescript

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Early-warning measures * FAA * GOES/SMS satellites * Remote sensing * TIROS satellites * United States *

This MOU was established to allow a formal operational relationship between NOAA and FAA in the USA. NOAA/NESDIS will supply the National Aviation weather Advisory Unit with information on the location and time of volcanic eruptions, height and horizontal distribution of the ash cloud, and cloud trajectory, as obtained from satellite images.

REFERENCE NO. A00481

NOGUCHI, K.

1977
Damage to aircraft by volcanic activity of Mt. Augustine in Jan., 1976.
JOURNAL/PUBLISHER Letter, 9 February 1977, Japan Air Lines, Anchorage, Alaska.
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Ash encounters * Augustine * Damage reports * United States *

The Dispatcher, JAL Distict Office of Operations, Anchorage, lists in a letter to Dr J. Kienle the damage to JAL aircraft caused by the 25 January 1976 activity at Augustine volcano. A DC8 cargo aircraft had to have its windscreen replaced and other aircraft parts inspected. 747 and DC8 passenger flights on the same day were also affected.

REFERENCE NO. A00429

O'LONE, R.G.

1980A
Volcanic eruption disrupts air traffic.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 112 (21), 18-21
SUBJECT KEYWORDS * Airport effects * Ash encounters * Damage reports * FAA * GOES/SMS satellites * Mount St. Helens * Remote sensing * Routes and schedules * TIROS satellites * United States *

A comprehensive, illustrated account is given of the effects on aviation of the 18-19 May 1980 eruptions at Mount St. Helens. Details are provided on airlines affected, rerouting, and damage effects. A DC9 flew into the plume on the 18th, and FAA issued a warning on possible multiple engine failures. Rescue and research aircraft were also affected.

REFERENCE NO. A00303

O'LONE, R.G.

1980B
Volcano continues to snarl air traffic.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. 112 (22), 18-19
SUBJECT KEYWORDS * Airport effects * Ash encounters * Damage reports * Mount St. Helens * Remote sensing * Routes and schedules * United States *

Additional eruptions at Mount St. Helens on 24-25 May 1980 caused the most serious damage up to that date to an aircraft, a Lockheed transport (see also O'Lone, 1980A). Effects of ash at McChord and Fairchild Air Force Bases are detailed. A C-130 aircraft operated as a command and control centre for helicopter rescue work on the volcano.

REFERENCE NO. A00302

O'LONE, R.G.

1980C

Aviation in volcano area resuming with caution.

JOURNAL/PUBLISHER Aviation Week and Space Technology

VOLUME/PAGE NO. 112 (23), 25-26

SUBJECT KEYWORDS * Airport effects * Ash encounters * Damage reports * FAA * Mount St. Helens * Routes and schedules * United States *

The author provides an update of two previous articles (see O'Lone, 1980A,B) on the effects on aviation of the May 1980 eruptions at Mount St. Helens. Damage incurred by a Lockheed L-100 transport is detailed, and information given on search-and-rescued statistics, airport closures airspace restrictions, and FAA and USAF warnings to pilots.

REFERENCE NO. A00307

O'LONE, R.G.

1980D

Uncertainty over volcano continuing.

JOURNAL/PUBLISHER Aviation Week and Space Technology

VOLUME/PAGE NO. 112 (25), 31,33

SUBJECT KEYWORDS * Airport effects * Ash encounters * Damage reports * FAA * GOES/SMS satellites * Japan * Mount St. Helens * Remote sensing * Routes and schedules * United States *

The author provides another review of the impact of the 1980 Mount St. Helens eruptions on aviation (see also O'Lone, 1980A-C). Boeing moved its training operations to Montana. Damage to 727 and 747 aircraft is documented, and interruptions to Japan Air Lines operations and airspace restrictions imposed by FAA are discussed.

REFERENCE NO. A00309

O'LONE, R.G.

1981

Mt. St. Helens observations providing science data.

JOURNAL/PUBLISHER Aviation Week and Space Technology

VOLUME/PAGE NO. 114 (1), 44-46

SUBJECT KEYWORDS * Climate change * Mount St. Helens * United States *

A report is given of an American Geophysical Union meeting on the 1980 Mount St. Helens eruptions. The importance of the aerial observations made by the Stoffels is stressed. Climatic impact of the eruptions caused by stratospheric aerosols was judged to be minimal. Mercury pollution was detected downwind of the volcano.

REFERENCE NO. A00311

O'LONE, R.G.

1987
Volcanic residue cited as possible source of misleading ozone data.
JOURNAL/PUBLISHER Aviation Week and Space Technology
VOLUME/PAGE NO. ( ), 91-92
SUBJECT KEYWORDS * Aerosols * Antarctica *

University of Colorado scientists report at an American Geophysical Union meeting that the recently discovered Antarctica 'ozone hole' in the stratosphere may be caused by volcanic aerosols which give misleading indications of ozone depletions at the South Pole. 'There are serious problems in measuring anything' where aerosols are present.

REFERENCE NO. A00334

OBERBECK, V.R., DANIELSEN, E.F., SNETSINGER, K.G., FERRY, G.V., FONG, W. HAYES, D.M.

1983
Effect of the eruption of El Chichon on stratospheric aerosol size and composition.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 1021-1024
SUBJECT KEYWORDS * Aerosols * Cloud dynamics * El Chichon * Meteorology *

The effects are: growth of 'background' aerosol; development of a large- particle mode by sedimentation; change from sulphate-coated silicates to sulphate aerosols; a 100-fold increase in sulphate mass in the large- particle mode. Mixing of air from low and high latitudes can produce bimodal or trimodal distributions.

REFERENCE NO. A00066

OFFICE OF THE UNITED NATIONS, DISASTER RELIEF CO-ORDINATOR (UNDRO), GENEVA

1985
Volcanic Emergency Management.
JOURNAL/PUBLISHER United Nations, New York
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Galunggung * Indonesia * Mount St. Helens * Papua New Guinea * Philippines * Soufriere * United States * Volcanic prediction *

The eight chapters in this handbook deal with volcanic hazards, volcanic emergencies, hazard assessment and prediction, protective measures, volcanic emergency planning, risk perception, communication between scientists, media, and public, and examples of organisation for volcanic emergency management.

REFERENCE NO. A00033

OGREN, J.A., CHARLSON, R.J., RADKE, L., DOMONKOS, S.K.
1981
Absorption of visible radiation by aerosols in the volcanic plume of Mount St. Helens.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 211, 834-836
SUBJECT KEYWORDS * Aerosols * Climate change * Gas/vapour plumes * Mount St. Helens *

Particles from the Mount St. Helens plumes were collected for measurement of light absorption coefficients. Stratospheric particles had a small but finite coefficient, estimated to yield an albedo for single scatter of 0.98 or greater. Similar high albedo values were obtained for tropospheric particles.

REFERENCE NO. A00186

ONDOH, T., SUGIUCHI, H., KAWAHARA, M.
1988
Nighttime enhancements of LF atmospherics at times of great eruptions of the Izu-Oshima volcano in November 1986.
JOURNAL/PUBLISHER Journal of the Radio Research Laboratory
VOLUME/PAGE NO. 35 (144), 69-83
SUBJECT KEYWORDS * Electrical effects * Japan *

Low-frequency radio waves from the November 1986 eruptions at Izu-Oshima volcano were detected at two distant localities in eastern Japan. Nighttime enhancements of the radio signals were notable features. The enhancements appear to have been caused by electrical discharges (lightning) in the eruption column and associated warm air.

REFERENCE NO. A00602

OSKARSSON, N.
1980
The interaction between volcanic gases and tephra : fluorine adhering to tephra of the 1970 Hekla eruption.
JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research
VOLUME/PAGE NO. 8, 251-266
SUBJECT KEYWORDS * Ash characteristics * Europe * Gas/vapour plumes *

Soluble fluorine is shown to be chemically adsorbed on the surface of tephra particles. The adsorption is shown by experiment to take place at temperatures below 600 C in the cooling eruption column. Formation of water-soluble compounds adhering to tephra is shown to be controlled mainly by environmental factors and by the gas composition.

REFERENCE NO. A00407

PALAIS, J

1986

Glaciochemical record of volcanic aerosols.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 76-78

SUBJECT KEYWORDS * Aerosols * Agung * Antarctica * Atmosphere loading * Fuego * Galunggung * Glacier records * Indonesia * Krakatau * New Zealand * Tambora * Tarawera *

A comparison is made between Arctic and Antarctic ice cores as records of global stratospheric volcanic aerosol loading from large volcanic eruptions. Antarctica has a lower accumulation rate, but ice cores from there are probably a better volcanic record because of the absence of significant volcanic events in high southern latitudes.

REFERENCE NO. A00514

PALAIS, J. (Editor)

1986

Environmental impact of volcanism.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Aerosols * Climate change * Remote sensing * United States *

Several papers in this compilation of conference abstracts deal with the impact of volcanism on the middle atmosphere. Remote sensing and climate change are considered also, but no one paper deals with the impact of ash clouds on aviation. Selected papers from the conference are listed elsewhere in this bibliography - for example, Sigurdsson et al.

REFERENCE NO. A00522

PALAIS, J.M.

1985

Particle morphology, composition and associated ice chemistry of tephra layers in the Byrd ice core : evidence for hydrovolcanic eruptions.

JOURNAL/PUBLISHER Annals of Glaciology

VOLUME/PAGE NO. 7, 42-48

SUBJECT KEYWORDS * Antarctica * Ash characteristics * Atmosphere loading * Glacier records *

A 2164 m-long ice core recovered in 1968 at Byrd Station, Antarctica, contains about 2000 tephra layers. These are identified ash and dust bands on the basis of grain size and particle concentration. Their probable source is Mount Takahe, a local volcano in Marie Byrd Land. The hydrovolcanic eruptions probably had reduced atmospheric impact.

REFERENCE NO. A00255

PALAIS, J.M., KYLE, P.R., MOSLEY-THOMPSON, E., THOMAS, E.

1987

Correlation of a 3,200 year old tephra in ice cores from Vostok and South Pole stations, Antarctica.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 14 (8), 804-807

SUBJECT KEYWORDS * Antarctica * Ash characteristics * Glacier records *

3200 yr-old tephra layers in two widely separated ice cores in Antarctica are correlated on the basis of their chemical composition and estimated ages. The tephras are thought to have been produced from a major explosive eruption from Candlemas Island in the South Sandwich Islands. Tephra layers may serve as stratigraphic markers in cores.

REFERENCE NO. A00460

PALAIS, J.M., SIGURDSSON, H.

1989

Petrologic evidence of volatile emissions from major historic and pre-historic volcanic eruptions.

JOURNAL/PUBLISHER Understanding Climate Change (Editors, A. Berger, R.E. Dickinson, and J.W. Kidson). American Geophysical Union Geophysical Monograph

VOLUME/PAGE NO. 52, 31-53

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Europe * Glacier records * Krakatau * Mount St. Helens * New Zealand * Papua New Guinea * Rabaul * Soufriere * Tambora * Tarawera * United States *

Estimates of volcanic volatile composition and mass release of S, Cl, and F to the atmosphere from 12 large Quaternary eruptions has been made on the basis of pre-eruption volatile composition. Several estimates agree well with other independent estimates. Volatile yield is dependent on erupted mass and magma composition. See also Devine et al. (1984).

REFERENCE NO. A00622

PALAIS, J.M., SIGURDSSON, H., BROWNING, D.

1986

Volatile emissions from historic and prehistoric eruptions : a petrologic estimate.

JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union

VOLUME/PAGE NO. 67 (16), 397

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Mount St. Helens * New Zealand * Papua New Guinea * Tarawera * United States *

Sulphur yields for seven eruptions from 186 to 1912 A.D. are calculated from analyses of glass inclusions in mafic and felsic phenocrysts. Inclusions in pyroxenes have more sulphur than do those in feldspar. The sulphur yield for the 1400 yr B.P. Rabaul eruption, Papua New Guinea, is given as 10 to the power of 13 gm (but see Sigurdsson et al., 1986).

REFERENCE NO. A00267

PARDYANTO, L., SUPARTO, S., OLAS, S., CASADEVALL, T.

1986

Volcanic activity in Indonesia between 1980-1985.

JOURNAL/PUBLISHER International Volcanological Congress, New Zealand, Abstracts Volume

VOLUME/PAGE NO. 270

SUBJECT KEYWORDS * Colo * Eruption frequencies * Galunggung * Indonesia * Soputan *

Volcanologists of the Volcanological Survey of Indonesia, Bandung, describe the 1980-5 period as one of a 'high level' of volcanic activity. There were 35 eruptions in the Indonesian region during this time, the largest of which was the 1982-3 Galunggung activity. The impact of these eruptions on aircraft is not mentioned.

REFERENCE NO. A00170

PARKER, D.E.

1985

Climatic impact of explosive volcanic eruptions.

JOURNAL/PUBLISHER The Meteorological Magazine

VOLUME/PAGE NO. 114 (1355), 149-161

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Indonesia * Katmai * Krakatau * Meteorology * New Zealand * Soufriere * Tarawera * United States *

No consistent trend of post-eruption cooling is revealed by an analysis of sea surface temperatures for the northern hemisphere around the times of major volcanic eruptions in the 100 years before 1985. Cooling reported over land may be correct, but may be biased by the effect of the Southern Oscillation.

REFERENCE NO. A00041

PARUNGO, F., ACKERMAN, E., CALDWELL, W., WEICKMANN, H.K.

1979
Individual particle analysis of Antarctic aerosols.
JOURNAL/PUBLISHER Tellus
VOLUME/PAGE NO. 31 (6), 521-529
SUBJECT KEYWORDS * Aerosols * Antarctica *

Particles in aerosol samples collected at South Pole Station were analysed with an electron microscope for their morphology, size distribution, and concentration. The results provide basic information on the physical and chemical properties of Antarctic aerosols as well as their source and travel path.

REFERENCE NO. A00410

PATTERSON, E.M.

1981
Measurements of the imaginary part of the refractive index between 300 and 700 nanometers for Mount St. Helens ash.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 211, 836-838
SUBJECT KEYWORDS * Mount St. Helens * Spectral characteristics * United States *

Absorption properties of ash from the 18 May eruption were measured by diffuse reflectance techniques for both surface and stratospheric samples. Imaginary index of refraction values for the stratospheric samples decrease from 0.01 at 300 nanometers to 0.0015 at 700 nanometers, whereas the wavelength range is less for surface samples.

REFERENCE NO. A00562

PEARSON, E.W., LEBARON, B.A., MICHALSKY, J.J.

1988
Decay of the El Chichon perturbation to the stratospheric aerosol layer : multispectral ground-based radiometric observations.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 15 (1), 24-27
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * El Chichon * Remote sensing * Spectral characteristics * United States *

A 9-year time series of multispectral radiometric observations taken in Washington State is analysed to determine the long-term behaviour of the El Chichon aerosol layer. Time series data for the volcanic enhancement are presented for five separate wavelengths. Seasonal oscillation and wavelength dependence are superimposed on the exponential decay.

REFERENCE NO. A00607

PETERSON, K.R.

1982

Deposition and dose from the May 18, 1980 eruption of Mount St. Helens.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 275-281

SUBJECT KEYWORDS * Ash characteristics * Gas/vapour plumes * Mount St. Helens * United States *

Radiation doses from the 18 May eruption are calculated using a large-cloud diffusion model. The population dose is much greater than the annual person-rem routinely released by a typical nuclear plant. Subse quent eruptions doubled or tripled the dose, such that the total amount is about the same as that for the 1979 Three Mile plant accident.

REFERENCE NO. A00384

PICARD, J.

1989

FAA seeks better ash-tracking system.

JOURNAL/PUBLISHER Anchorage Times

VOLUME/PAGE NO. 24 December 1989, A1-A8

SUBJECT KEYWORDS * Ash encounters * Early-warning measures * FAA * Meteorology * Redoubt * Remote sensing * TIROS satellites * United States *

A journalist provides a detailed account of the need to provide an early warning communication system for aviation authorities in the Aslaska region. The newspaper article was published shortly after an encounter between a KLM 747 jetliner and ash from Redoubt volcano on 15 December which caused multiple-engine failure.

REFERENCE NO. A00526

PITARI, G., VERDECCHIA, M., VISCONTI, G.

1987

A transformed Eulerian model to study possible effects of the El Chichon eruption on the stratospheric circulation.

JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 92 (D9), 10961-10975
SUBJECT KEYWORDS * Cloud dynamics * El Chichon * Meteorology *

A zonally averaged model using 'residual circulation formalism' is derived in order to study the possible dynamical effects of the El Chichon 'dust' cloud in the middle atmosphere. The numerical experiment starts about three months after the eruption and continues for about one year.

REFERENCE NO. A00464

PITTOCK, A.B.

1966

A thin stable layer of anomalous ozone and dust content.

JOURNAL/PUBLISHER Journal of the Atmospheric Sciences
VOLUME/PAGE NO. 23, 538-542
SUBJECT KEYWORDS * Aerosols * Agung * Australia * Indonesia * Meteorology * United States *

An Australian atmospheric physicist describes a sharp minimum in the vertical distribution of ozone over Boulder, Colorado, which was observed to be at a height of 20-21 km for a month during the spring of 1964. Debris from the 17 March 1963 Agung eruption, Indonesia, injected into a thin layer of advecting tropical air, is thought to be responsible.

REFERENCE NO. A00270

POLLACK, J.B.

1981

Measurements of the volcanic plumes of Mount St. Helens in the stratosphere and troposphere : Introduction

JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 211, 815-816
SUBJECT KEYWORDS * Aerosols * Mount St. Helens * United States *

The author provides a general preview of 11 articles dealing with the impact of the 1981 (March-August) eruptions on the middle atmosphere. These articles appear elsewhere in this bibliography (for example: Hobbs and others, Danielsen, Inn et al.).

REFERENCE NO. A00554

POLLACK, J.B., ACKERMAN, T.P.

1983
Possible effects of the El Chichon volcanic cloud on the radiation budget of the northern tropics.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 1057-1060
SUBJECT KEYWORDS * Atmosphere loading * Climate change * El Chichon *

The cloud is predicted to have caused an increase in planetary albedo of 10 percent, a decrease in total solar radiation of 2-3 percent at the ground on cloudless days, and an increase in temperature of 3.5 K at 24 km (the height of the cloud). Little change in surface temperature is expected because of the oceans' high heat capacity.

REFERENCE NO. A00086

POLLACK, J.B., TOON, O.B., DANIELSEN, E.F.

1983
The El Chichon volcanic cloud: an introduction.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 989-992
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * El Chichon * Remote sensing *

This introductory account provides background to the papers contained in a special issue of GRL on the climatic effects of the 1982 El Chichon eruption. Other papers in this special issue are to be found elsewhere in the bibliography (see El Chichon).

REFERENCE NO. A00058

POLLACK, J.B., TOON, O.B., KHARE, B.N.

1973
Optical properties of some terrestrial rocks and glasses.
JOURNAL/PUBLISHER Icarus
VOLUME/PAGE NO. 19, 372-389
SUBJECT KEYWORDS * Ash characteristics * Remote sensing * Spectral characteristics * United States *

The optical properties of five volcanic rocks and glasses are determined in the spectral range between 0.2 and 50 microns. The optical constants obtained are said to be valuable for studies of the interaction of light with rock surfaces, atmospheric dust, and interplanetary and inter-stellar dust grains.

REFERENCE NO. A00469

POLLACK, J.B., TOON, O.B., SAGEN, C., SUMMERS, A., BALOWIN, B. VAN CAMP, W.

1976

Volcanic explosions and climatic change : a theoretical assessment.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 81 (6), 1071-1083

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Climate change * Fuego * Indonesia *

Surface cooling is calculated to follow stratospheric injection of silicate and aerosol, but is offset by an enhanced 'greenhouse' warming caused by aerosol opacity at infrared wavelengths. Stratosphere temperatures increase. Net surface cooling takes place later when the size of the dust and sulphuric acid particles are smaller.

REFERENCE NO. A00129

POPOVICH, M.P., SMIRNOVA, N.N., SABITOVA, L.V., FILIPPOV, J.V.

1987

Decomposition of ozone on the surface of volcanic ash.

JOURNAL/PUBLISHER Vestrik Moskovskogo Universiteta Seriya Khimiya

VOLUME/PAGE NO. 28 (6), 548-550

SUBJECT KEYWORDS * Aerosols * Gas/vapour plumes *

This article is in Russian. No English translation is available.

REFERENCE NO. A00595

PORTER, S.C.

1981

Recent glacier variations and volcanic eruptions.

JOURNAL/PUBLISHER Nature

VOLUME/PAGE NO. 291, 139-142

SUBJECT KEYWORDS * Antarctica * Climate change * Eruption frequencies * Europe * Glacier records * United States * Volcano distribution *

Sequences of glacial advances and retreats in each of the Northern and Southern Hemispheres match the acidity record in polar ice cores and the frequency of volcanic eruptions. Glaciers therefore seem to respond to atmospheric build-up of volcanic aerosols produced during large eruptions.

REFERENCE NO. A00092

PRATA, A.J.

1989A

Observations of volcanic ash clouds in the 10-12 micron window using AVHRR/2 data.

JOURNAL/PUBLISHER International Journal of Remote Sensing

VOLUME/PAGE NO. 10, 751-761

SUBJECT KEYWORDS * Early-warning measures * Remote sensing * Spectral characteristics * TIROS satellites *

AVHRR thermal channel measurements can be used to detect and discriminate volcanic clouds during the first few hours of an explosive eruption. Dispersed clouds also may be detectable using a reverse absorption effect in channels 4 and 5. The temperature difference image could be used operationally to warn of the presence of volcanic clouds.

REFERENCE NO. A00486

PRATA, A.J.

1989B

Infrared radiative transfer calculations for volcanic ash clouds.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 16 (11), 1293-1296

SUBJECT KEYWORDS * Aerosols * Australia * Early-warning measures * Remote sensing * Spectral characteristics *

Calculations are performed for volcanic ash clouds. Nascent volcanic eruption clouds are shown to have a reverse absorption effect in the infrared window between 10 and 13 microns where absorption of infrared radiation increases with increasing wavelength. This effect may be of use in detecting hazardous, volcanic clouds from space.

REFERENCE NO. A00588

PRATA, A.J.

1990

Volcanic ash detection and air safety. Final report to the CSIRO Office of Space Science and Applications.

JOURNAL/PUBLISHER CSIRO Division of Atmospheric Research, Mordialloc, Australia

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Ash characteristics * Australia * Cloud dynamics * Early-warning measures * GMS satellite * NIMBUS/TOMS satellites * Remote sensing * TIROS satellites * Working groups *

The author is Chairman of an ad hoc working group on volcanic-ash detection and air safety set up by COSSA. He here summarises the deliberations of the group. Three new technologies that could be developed as aircraft-mounted detection systems on commercial aircraft are described. An operation satellite system to detect ash is also viable.

REFERENCE NO. A00590

PRATA, A.J., KINGWELL, J.

1990

Remote sensing of volcanic ash clouds : implications for aviation safety in the Australasian region.

JOURNAL/PUBLISHER 5th Australasian Remote Sensing Conference, October 1990, Perth, Western Australia

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Damage reports * Early-warning measures * Indonesia * Remote sensing * Spectral characteristics *

The authors describe some observations of volcanic ash clouds and present a simple theory showing how thermal infrared imagery can be used to determine the presence of ash clouds. A scheme is presented showing how current satellite technology can be used to detect and monitor volcanic clouds in the Australasian region.

REFERENCE NO. A00589

PRATA, A.J., WELLS, J.B., IVANAC, M.W.

1985

A 'satellite's eye view' of volcanoes on the Lesser Sunda Islands.

JOURNAL/PUBLISHER Weather

VOLUME/PAGE NO. 40 (8), 245-250

SUBJECT KEYWORDS * Ash encounters * Australia * Galunggung * Indonesia * Remote sensing * Spectral characteristics * TIROS satellites *

Four colour photographs are presented of NOAA-7/AVHRR satellite images. Figure 5 is a computer-enhanced image showing a successful colour discrimination of the volcanic-ash cloud of Galunggung volcano on 30 July 1982. The accompanying text is a useful general account of the use of TIROS-satellite imagery.

REFERENCE NO. A00190

PROBERT-JONES, J.R.

1962

The radar equation in meteorology.

JOURNAL/PUBLISHER Quarterly Journal Royal Meteorological Society

VOLUME/PAGE NO. 88, 485-495

SUBJECT KEYWORDS * Meteorology * Radar * Remote sensing *

The radar equation for a meteorological target is derived in this key paper. Particular attention is given to the effect of the shape of the main lobe of the beam and of the radiation outside it. Previous theoretical equations overestimated the received power. The equation in this paper is in good agreement with all the experimental data.

REFERENCE NO. A00196

QANTAS

1982A
Indonesian volcanic activity information folder.
JOURNAL/PUBLISHER Qantas Airways Limited, Sydney
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Ash encounters * Australia * Damage reports * Early-warning measures * Galunggung * Indonesia * Remote sensing * Routes and schedules *

Copies of twelve different reports on the Indonesian aircraft/ash-cloud problem in 1982 are compiled in this folder produced for internal company use. The reports include telexes from Boeing and IATA about aircraft damage and early-warning systems, and a summary of diversionary flying hours and additional costs incurred by Qantas since 14 July.

REFERENCE NO. A00188

QANTAS

1982B
Volcanic ash detection and avoidance.
JOURNAL/PUBLISHER Qantas Airways Limited, Electronic Engineering Department, Sydney
VOLUME/PAGE NO. Attachment to DEE:1010/11-34-00
SUBJECT KEYWORDS * Australia * Early-warning measures * Remote sensing * TIROS satellites *

A report is given of the results of visits in August 1982 to CSIRO in Perth and to the Department of Aviation, Canberra. CSIRO staff informed of a concept to provide airborne detection of volcanic-ash clouds (see Honey, 1982). Prototype costs are given. Ash-cloud warnings might also be obtained by monitoring VLF radio signals at suitable localities.

REFERENCE NO. A00193

QANTAS

1982C
No title
JOURNAL/PUBLISHER Qantas Airways Limited, Sydney
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Ash characteristics * Ash encounters * Australia * Damage reports * Defensive inflight measures * Galunggung * Indonesia *

A range of short reports and correspondence from IATA, British Airways, Singapore Airlines, Boeing, the Australian Bureau of Meteorology, and others, dealing with the two 747 incidents involving Galunggung ash clouds in 1982, are compiled in this set of documents provided by Qantas. The damage and incident reports are particularly useful.

REFERENCE NO. A00388

QANTAS

1985A
No title
JOURNAL/PUBLISHER Qantas Airways Limited, Sydney
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Ash encounters * Australia * Damage reports * Electrical effects * Indonesia * Soputan *

A set of documents from company files contains reports on the encounter between a Qantas 747 aircraft en route between Hong Kong and Sydney, and volcanic ash from Soputan, Suluwesi (Indonesia), on 19 May 1975. There were no engine failures, but after landing the aircraft was withdrawn from service and all four engines removed and cleaned.

REFERENCE NO. A00391

QANTAS

1985B
Aspects of airline scheduling affecting Sydney Airport.
JOURNAL/PUBLISHER Fleet Planning and Scheduling, Qantas Airways Limited, Sydney
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Australia * Routes and schedules *

The factors involved in airline schedules at Sydney are airport curfews, commercial considerations, and aircraft and crew utilisation. Sydney-bound aircraft must fly over Indonesia during darkness in order to comply with the scheduling. Pilots are unable to see those volcanic clouds that are otherwise visible in daylight.

REFERENCE NO. A00098

QANTAS

1987
Anatomy of an inflight incident.
JOURNAL/PUBLISHER Vigilance (Qantas Safety Department, reproduced from 'The Log', British Airways).
VOLUME/PAGE NO. 2, 10-15
SUBJECT KEYWORDS * Ash encounters * Damage reports * Defensive inflight measures * Electrical effects * Galunggung * Indonesia *

The encounter between a Galunggung ash cloud and a British Airways 747 is detailed in this non-technical article written originally for the BA magazine Crewman (no. 4) in February 1984. The article concludes with a section entitled 'Lessons learned' in which the importance of pilot checklists is stressed.

REFERENCE NO. A00501

QANTAS

1988-89
Three documents on flight operations in volcanic dust.
JOURNAL/PUBLISHER Qantas Airways Limited, Sydney
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Australia * Damage reports * Defensive inflight measures *

Three separate documents issued by Qantas contain advice to Qantas pilots on the procedures to adopt during aircraft/ash-cloud encounters. One of the documents is based on information provided by the Boeing aircraft company, another is a Qantas Standing Order entitled 'Flight operations in volcanic dust', and the other an 'Operations' document.

REFERENCE NO. A00528

QUI, S.Y., ARNOLD, F.

1988
Abnormal increase in HNO3 concentration in Elchichon volcanic clouds.
JOURNAL/PUBLISHER Kexue Tongbao
VOLUME/PAGE NO. 33 (7), 591-595
SUBJECT KEYWORDS * El Chichon * Gas/vapour plumes *

The article is in Chinese. No translation is available.

REFERENCE NO. A00591

QUIROZ, R.S.

1983
The isolation of stratospheric temperature change due to the El Chichon volcanic eruption from nonvolcanic signals.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 88 (C11), 6773-6780
SUBJECT KEYWORDS * Aerosols * Climate change * El Chichon *

The stratospheric temperature change caused by 1982 El Chichon aerosols is isolated from those of dynamic origin, those relating to El Nino, and those caused by the quasibiennial oscillation. Residual anomalies attributable to the eruption amount to about 1-3C between the equator and 35N.

REFERENCE NO. A00570

QUN, X.

1989

The abnormally cold summers of central China and their relation to volcanic eruptions.

JOURNAL/PUBLISHER Aerosols and Climate (Editors P.V. Hobbs and M.P. McCormick). A. Deepak Publishing, Hampton, Virginia, USA

VOLUME/PAGE NO. 223-231

SUBJECT KEYWORDS * Agung * Climate change * El Chichon * Glacier records * Indonesia * Katmai * Krakatau * Laki * United States * Volcano lists *

Ninety-eight abnormally cold summers since 1500 A.D. have been identified from Chinese historical writings, and corellated with Greenland icecore acidity records and historical eruption data. Most abnormally cold summers were 0-2 years after great volcanic eruptions. Lowering of summer temperatures could exceed 20 degrees Celcius.

REFERENCE NO. A00629

RADKE, L.F.

1981

Airborne measurements of particle size distributions in noneruptive volcanic emissions.

JOURNAL/PUBLISHER Antarctic Journal

VOLUME/PAGE NO. 16, 196-197

SUBJECT KEYWORDS * Aerosols * Antarctica * Gas/vapour plumes *

Data is presented for particle-size distributions in semi-continuous emissions from Erebus and several New Zealand volcanoes and compared with emission data from Northern Hemisphere volcanoes. Size distributions are remarkably similar. Particles less than 0.1 micron diameter are more concentrated for volcanoes that had erupted more recently.

REFERENCE NO. A00184

RADKE, L.F.
1982A
Sulphur and sulphate from Mt Erebus.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 299, 710-712
SUBJECT KEYWORDS * Aerosols * Antarctica * Gas/vapour plumes *

Total sulphate emissions from Erebus volcano, Antarctica, are estimated to be 0.042 million ton per year. This value is higher than previous estimates and means that as much as 32 percent of Antarctic total sulphate could be provided Erebus.

REFERENCE NO. A00101

RADKE, L.F.
1982B
Contribution of Mount Erebus to the antarctic sulfate budget.
JOURNAL/PUBLISHER Antarctic Journal
VOLUME/PAGE NO. 17, 211-212
SUBJECT KEYWORDS * Antarctica * Atmosphere loading * Gas/vapour plumes *

Sulphur dioxide fluxes in November 1980 ranged from 0.4 to 1.8 kilograms per second. These results are substantially greater than estimates made by previous investigators. As much as 32 percent of the Antarctic total sulphate budget could be provided by Mount Erebus.

REFERENCE NO. A00208

RADKE, L.F., HOBBS, P.V., ELTGROTH, M.W., HEGG, D.A.
1980
Preliminary airborne observations of the Mt. St. Helens eruptions.
JOURNAL/PUBLISHER Journal of the Air Pollution Control Association
VOLUME/PAGE NO. 30 (8), 904-905
SUBJECT KEYWORDS * Aerosols * Ash characteristics * Gas/vapour plumes * Mount St. Helens * United States *

Notification is given of the University of Washington's study of emissions from Mount St. Helens using airborne collection techniques. Measurements include the size, concentration, and chemical characteristics of airborne particles of about 0.01 microns to 4.5 mm diameter, and the nature and concentration of trace gases.

REFERENCE NO. A00182

RADKE, L.F., HOBBS, P.V., STITH, J.L.
1976
Airborne measurements of gases and aerosols from volcanic vents on Mt. Baker.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 3 (2), 93-96
SUBJECT KEYWORDS * Aerosols * Gas/vapour plumes * United States *

Airborne measurements of gases and aerosols from recently activated volcanic vents on a western United States volcano were made on 27 March and 30 June 1975. Total rates of emission of gaseous sulphur on these days were estimated to be 0.35 and 1.35 kg/s, respectively.

REFERENCE NO. A00194

RAMPINO, M.R., SELF, S.
1982
Historic eruptions of Tambora (1815), Krakatau (1883), and Agung (1963), their stratospheric aerosols, and climatic impact.
JOURNAL/PUBLISHER Quaternary Research
VOLUME/PAGE NO. 18, 127-143
SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Climate change * Indonesia * Krakatau * Tambora *

A volcanological assessment is given of the relative atmospheric impact of three important historical eruptions. Relative amounts of fine ash produced by the Tambora, Krakatau, and Agung eruptions are estimated to be about 150:20:1, whereas the masses of atmospheric sulphate aerosols produced were of the order of 7.5:3:1.

REFERENCE NO. A00082

RAMPINO, M.R., SELF, S.
1984
Sulphur-rich volcanic eruptions and stratospheric aerosols.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 310, 677-679
SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * El Chichon * Eruption frequencies * Gas/vapour plumes * Indonesia *

Small-volume eruptions (less than 0.5 km3) such as those of Agung (Indonesia) in 1963 and El Chichon in 1982 generate substantial aerosol clouds because they are sulphur rich. Atmospheric effects may be equal to or even greater than much larger sulphur-poor eruptions, and are probably the most frequent cause of increased stratospheric aerosols.

REFERENCE NO. A00259

RAMPINO, M.R., SELF, S., FAIRBRIDGE, R.W.

1979

Can rapid climatic change cause volcanic eruptions?

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 206, 826-829

SUBJECT KEYWORDS * Aerosols * Climate change * Indonesia * New Zealand * United States * Volcano lists *

Many major volcanic eruptions coincide with cooling trends of decadal or longer duration that began before the eruptions. Dust veils account for short-term cooling, but seem unlikely to trigger glaciations. However, loading and unloading of ice and water masses and axial and spin-rate changes may augment volcanic and seismic potential.

REFERENCE NO. A00553

RAMPINO, M.R., SELF, S., STOTHERS, R.B.

1988

Volcanic winters.

JOURNAL/PUBLISHER Annual Reviews of Earth and Planetary Sciences

VOLUME/PAGE NO. 16, 73-99

SUBJECT KEYWORDS * Aerosols * Climate change * El Chichon * Europe * Glacier records * Indonesia * Krakatau * Meteorology * Mount St. Helens * Papua New Guinea * Rabaul * Tambora *

The largest historical eruptions are shown to be associated with atmospheric perturbations that have had a considerable impact on climate and agriculture. A 'scaling up' of these eruptions is attempted, and much larger eruptions are shown to have brought about possibly severe, short-term 'volcanic winters' over large parts of the globe.

REFERENCE NO. A00453

RAMPINO, M.R., STOTHERS, R.B., SELF, S., WOLFF, J.A.

1986

Climatic effects of Quaternary volcanic eruptions.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 79-81

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Indonesia * Krakatau * Mount St. Helens * United States *

Large eruptions in the past may have had a significant effect on climate. A brief review is given of several such eruptions and their predicted effects, including explosive eruptions as well as flood basalts produced by fire fountaining. Aerosol mass loadings are calculated and comments made on optical depths and 'nuclear winter' scenarios.

REFERENCE NO. A00515

RAO, C.R.N., BRADLEY, W.A.

1983

Effects of the El Chichon volcanic dust cloud on insolation measurements at Corvallis, Oregon (U.S.A.)

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (5), 389-391

SUBJECT KEYWORDS * Aerosols * El Chichon * Meteorology *

The following atmospheric anomalies recorded since November 1982 are considered to have been caused by the El Chichon eruption cloud: an increase in atmospheric clearness index; increase in the ratio of diffuse sky irradiation to global irradiation; a decrease in the transmittance of the atmosphere.

REFERENCE NO. A00137

RASMUSSEN, J.L. (Convenor)

1983

The El Chichon eruptions and resulting climatic effects.

JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Session 6, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Climate change * El Chichon * Meteorology *

Nine papers by the following authors make up this session proceedings: Matson and Robock, Strong and others, DeLuisi, McCormick, Thomas, Keen, Toon, Angell and Korshover, and Robock. Rasmussen provides a preface to the entire workshop proceedings. The nine papers are indexed elsewhere in this bibliography.

REFERENCE NO. A00212

REED, J.W.

1987

Air pressure waves from Mount St. Helens eruptions.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 92 (DIO), 11979-11992

SUBJECT KEYWORDS * Infrasonics * Mount St. Helens * United States *

Barograph and infrasonic recordings of the pressure wave from the 18 May 1980 eruption are used to estimate an equivalent explosion airblast yield of a 'few megatons' of TNT. A peculiar audibility pattern (blast heard only beyond about 100 km) is explained by finite amplitude effects of propagation.

REFERENCE NO. A00451

REITER, R., JAGER, H., CARNUTH, W., FUNK, W.

1982

The stratospheric aerosol increase in February and March 1982.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 9 (8), 858-859

SUBJECT KEYWORDS * Aerosols * Europe * Lidar * Mystery volcano * Remote sensing *

An aerosol increase in the lower atmosphere was observed by ground-based lidar in West Germany early in 1982. The source of the aerosol cloud was most probably an unobserved volcanic eruption. The data are consistent with an eruption that probably took place in the first half of January in central Africa or in the northern Pacific Ocean.

REFERENCE NO. A00409

REITER, R., JAGER, H., CARNUTH, W., FUNK, W.

1983

The El Chichon cloud over central Europe, observed by lidar at Garmisch-Partenkirchen during 1982.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 1001-1004.

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * El Chichon * Lidar * Remote sensing *

The characteristics of the El Chichon volcanic cloud are reported on the basis of lidar measurements made from a station in the Federal Republic of Germany (lat.47.5N, long.11E). Two aerosol layers are reported for June-October 1982.

REFERENCE NO. A00061

REMSBERG, E.E.

1980

Diffusion in the lower stratosphere as determined from lidar measurements of volcanic aerosol dispersion.

JOURNAL/PUBLISHER Journal of the Atmospheric Sciences

VOLUME/PAGE NO. 37, 2105-2112

SUBJECT KEYWORDS * Atmosphere loading * Fuego * Lidar * Remote sensing * United States *

Previously published lidar data sets for the 1974 Fuego aerosol layer are used to obtain effective vertical mixing coefficients for the stratosphere. Coefficients are calculated for 19N and altitude 19 km, and for 37N and 19 km height. The values are interpreted as being caused mainly by diffusion.

REFERENCE NO. A00497

REMSBERG, E.E., BROWELL, E.V., NORTHAM, G.B.

1976

Lidar measurement of stratospheric dust from St. Augustine Volcano.

JOURNAL/PUBLISHER Bulletin American Meteorological Society

VOLUME/PAGE NO. 57 (9), 1152-1153

SUBJECT KEYWORDS * Aerosols * Augustine * Cloud dynamics * Lidar * Remote sensing * United States *

The passage over the United States of volcanic materials from the 23-24 January 1976 Augustine eruption was detected using the light detection and ranging (lidar) system at Hampton, Virginia. Upper-air meteorological charts are analysed and used to show the trajectories of the volcanic material from Alaska.

REFERENCE NO. A00148

RICHARD, J.J.

1962

Kermadec, Tonga and Samoa.

JOURNAL/PUBLISHER Catalogue of the Active Volcanoes of the World including Solfatara Fields. International Association of Volcanology, Rome.

VOLUME/PAGE NO. Part 13

SUBJECT KEYWORDS * Samoa * Tonga-Kermadec * Volcano distribution * Volcano lists *

The active volcanoes of the Kermadec to Samoa chain are provided in this IAV catalogue. Most of the reported volcanic activity is pre-Second World War. See Simkin and others (1981) for information on more recent eruptions in the chain.

REFERENCE NO. A00006

RIETMEIJER, F.J.M.

1988

Enhanced residence of submicron Si-rich volcanic particles in the lower stratosphere.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 34, 173-184

SUBJECT KEYWORDS * Aerosols * Ash characteristics * United States *

Analysis of submicron Si-rich grains collected from the stratosphere over North America between May 1981 and January 1982, has shown the particles to consist of keatite. This mineral forms by devitrification of amorphous Si-rich grains that condensed in ascending eruption clouds. The grains are platey and so have low settling rates.

REFERENCE NO. A00604

RIMMER, W.B.

1937

The depletion of solar radiation by volcanic dust.

JOURNAL/PUBLISHER Gerlands Beitrage zur Geophysik

VOLUME/PAGE NO. 50, 388-393

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Australia * Meteorology *

A volcanic eruption in the South American Andes on 10 April 1932 caused a widespread decrease in atmospheric transparency. The decrease was measured at Mount Stromlo Observatory, Canberra, beginning in May 1932, and continuing in 1933. Transmission coefficients were calculated, and residuals gave a measure of the depletion caused by the 'dust'.

REFERENCE NO. A00257

ROBERTS, D.H., KLOBUCHAR, J.A., FOUGERE, P.E., HENDRICKSON, D.H.

1982A

A large-amplitude travelling ionospheric disturbance produced by the May 18, 1980, explosion of Mount St. Helens.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 87 (A8), 6291-6301

SUBJECT KEYWORDS * Infrasonics * Mount St. Helens * United States *

A remarkable long-lived, large-scale travelling ionospheric disturbance, excited by the 18 May eruption, was detected in total electron content monitor data. This disturbance, by analogy with bomb-excited disturbances, is interpreted as the ionospheric fluctuations induced by a gravity wave propagating in the neutral atmosphere.

REFERENCE NO. A00457

ROBERTS, D.H., ROGERS, A.E.E., ALLEN, B.R., BENNETT, C.L., BURKE, B.F., GREENFIELD, P.E., LAWRENCE, C.R., CLARK, T.A.

1982B

Radio interferometric detection of a travelling ionospheric disturbance excited by the explosion of Mount St. Helens.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 87 (A8), 6302-6306

SUBJECT KEYWORDS * Infrasonics * Mount St. Helens * United States *

A large-amplitude, travelling ionospheric disturbance was detected over Owens Valley, California, on 18 May 1980, by a highly sensitive very long baseline interferometry radio astronomy experiment. The disturbance was also detected from total electron content monitor data (see Roberts & others, 1982A).

REFERENCE NO. A00458

ROBOCK, A.

1981

The Mount St. Helens volcanic eruption of 18 May 1980 : minimal climatic impact.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 212 (4501), 1383-1384

SUBJECT KEYWORDS * Climate change * Mount St. Helens * United States *

An energy-balance numerical climatic model is used to simulate the effects of the Mount St. Helens eruption. The resulting surface temperature depression is a maximum of 0.1 C in the winter in the polar region, but is an order of magnitude smaller than the observed natural variability from other effects and will therefore be undetectable.

REFERENCE NO. A00374

ROBOCK, A.

1983

Energy balance climate model calculations of the effects of the El Chichon eruption.

JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia

VOLUME/PAGE NO. 415-422

SUBJECT KEYWORDS * Climate change * El Chichon *

Calculations based on the author's 1981 climate model are used to determine the effects of the 1982 El Chichon eruption on surface air temperatures. Simulated distribution of the optical depth of the volcanic cloud is given, together with hemisphere and global annual average responses to the event. Several conclusions are drawn.

REFERENCE NO. A00221

ROBOCK, A., MATSON, M.

1983

Circumglobal transport of the El Chichon volcanic dust cloud.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 221, 195-197

SUBJECT KEYWORDS * Cloud dynamics * El Chichon * GOES/SMS satellites * Remote sensing * TIROS satellites * United States *

The stratospheric 'dust' cloud from the 1982 El Chichon eruption was observed to travel completely around the world in a 3-week period. NOAA satellite images were used to prepare daily maps of the position of the volcanic cloud which is the largest and longest-lasting one so far observed with satellite imagery.

REFERENCE NO. A00503

ROGERS, C.F., HUDSON, J.G., KOCMOND, W.C.

1981

Measurements of cloud condensation nuclei in the stratosphere around the plume of Mount St. Helens.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 211, 824-825

SUBJECT KEYWORDS * Aerosols * Mount St. Helens * United States *

Measurements of cloud condensation nuclei were made from small samples of stratospheric air taken from a U-2 aircraft at 13-19 km altitudes. Concentrations of nuclei in and outside the plume in the May and June 1980 eruptions were higher than expected, ranging 100-1000 per cubic centimeter at 1-percent supersaturation.

REFERENCE NO. A00558

ROGERS, J.T.

1984

Results of El Chichon - Part I. Premature acrylic window crazing.

JOURNAL/PUBLISHER Airliner (Boeing)

VOLUME/PAGE NO. April-June, 19-25

SUBJECT KEYWORDS * Aerosols * Damage reports * El Chichon * Japan * Routes and schedules * United States *

Numerous explanations were advanced for the formation of tiny fissures in the surface of aircraft acrylic windows (crazing), but the volcanic aerosol cloud of the 1982 El Chichon eruption was finally diagnosed as the cause. Long-distance 747 aircraft on northern or polar routes were the most affected because they flew above the tropopause.

REFERENCE NO. A00240

ROGERS, J.T.

1985

Results of El Chichon - Part II. Premature acrylic window crazing status report.

JOURNAL/PUBLISHER Airliner (Boeing)

VOLUME/PAGE NO. April-June, 1-5

SUBJECT KEYWORDS * Aerosols * Damage reports * El Chichon * Japan * Lidar * Remote sensing * United States *

A report is given of the effects of aerosol acid attack on aircraft windows during the stratospheric migration of the 1982 El Chichon volcanic clouds towards the north pole. An explanation of the mechanism of acid attack on the acrylic is also provided.

REFERENCE NO. A00038

ROLLS-ROYCE LIMITED

1985

The volcanic cloud encounter of a Rolls-Royce powered Boeing 747 of British Airways fleet 24 June 1982.

JOURNAL/PUBLISHER Rolls-Royce Limited, Derby, England

VOLUME/PAGE NO. MISC 952

SUBJECT KEYWORDS * Ash encounters * Damage reports * Galunggung * Indonesia *

This document consists of tables and illustrations used for lecture purposes. It deals with the effects to the jet engines on a British Airways flight, caused by the ingestion of volcanic ash from Galunggung volcano, Indonesia, on 24 June 1982 (GMT). Illustrations include photographs of damage to different parts of the engines.

REFERENCE NO. A00337

ROMICK, G.J., MURCRAY, D.G., WILLIAMS, W.J.

1982

Stratospheric nitrogen dioxide in the vicinity of Soufriere, St. Vincent.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 216, 1123-1124

SUBJECT KEYWORDS * Gas/vapour plumes * Soufriere *

A nitrogen dioxide enhancement of 25 percent over earlier abundances, was measured in April 1979 near Soufriere volcano by twilight optical-absorption techniques. However, this enhancement may represent normal stratospheric variability rather than an input from the volcano.

REFERENCE NO. A00120

ROSE, W.I.

1985

A volcanologist's perspective of the interaction of aircraft and eruption clouds.

JOURNAL/PUBLISHER AIAA 23rd Aerospace Sciences Meeting, Reno, Nevada. American Institute of Aeronautics and Astronautics, New York

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Ash characteristics * Ash encounters * Cloud dynamics * Early-warning measures * Gas/vapour plumes * NIMBUS/TOMS satellites * Radar * Remote sensing * Routes and schedules *

Background volcanological information is provided on the nature and type of volcanic eruptions, the composition of high-rising eruption clouds, and the impact of eruptions on in-flight aircraft. Seven suggestions are made to assist in making progress with the aircraft/ash-cloud problem.

REFERENCE NO. A00145

ROSE, W.I.

1986A

Interaction of aircraft and explosive eruption clouds : a volcanologist's perspective.

JOURNAL/PUBLISHER AIAA Journal

VOLUME/PAGE NO. 25 (1), 52-58

SUBJECT KEYWORDS * Ash characteristics * Ash encounters * Cloud dynamics * Early-warning measures * Gas/vapour plumes * NIMBUS/TOMS satellites * Radar * Remote sensing * Routes and schedules *

This paper is based on an earlier one presented by the author at the American Institute of Aeronautics and Astronautics 23rd Aerospace Sciences Meeting, Reno, Nevada (see Rose, 1985). Background volcanological information is provided on the nature of volcanic eruptions, and suggestions made on how to mitigate aircraft/ash-cloud encounters.

REFERENCE NO. A00355

ROSE, W.I.

1986B

Direct measurement of rates of volcanic degassing.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 82-84

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Gas/vapour plumes * Mount St. Helens * NIMBUS/TOMS satellites * United States *

The techniques used in estimating gas fluxes from volcanoes and amounts released to the atmosphere are reviewed. COSPEC is versatile in measuring SO2 during repose periods, but not during eruptions. SO2-release estimates using erupted magma volumes and original magmatic sulphur content are considered to be inaccurate.

REFERENCE NO. A00516

ROSE, W.I. Jr
1977
Scavenging of volcanic aerosol by ash : atmospheric and volcanologic implications.
JOURNAL/PUBLISHER Geology
VOLUME/PAGE NO. 5, 621-624
SUBJECT KEYWORDS * Aerosols * Ash characteristics * Atmosphere loading * Fuego * Gas/vapour plumes *

Initial concentrations of sulphur and chlorine in basalt from the 1974 Fuego eruption are inferred from trapped glass inclusions in phenocrysts. Much of the sulphur and chlorine fell back to the Earth during the explosive eruptions as acid aerosol particles absorbed on ash. The remainder was released to the atmosphere.

REFERENCE NO. A00030

ROSE, W.I. Jr, CHUAN, R.L., CADLE, R.D., WOODS, D.C.
1980
Small particles in volcanic eruption clouds.
JOURNAL/PUBLISHER American Journal of Science
VOLUME/PAGE NO. 280, 671-696
SUBJECT KEYWORDS * Aerosols * Ash characteristics * Gas/vapour plumes *

Sub-25-micron particles were sampled from the plumes of three Guatemalan volcanoes using conventional and cascade impactors. Particles were acid droplets and silicate ash mantled by acid. The ash has a bimodal size distribution. A major conclusion is that crystal-rich magmas may produce more submicron-size ash than aphyric magmas.

REFERENCE NO. A00239

ROSE, W.I. Jr, HOFFMAN, M.F.
1982
The May 18, 1980, eruption of Mount St. Helens : the nature of the eruption, with an atmospheric perspective.
JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication
VOLUME/PAGE NO. 2240, 1-14
SUBJECT KEYWORDS * Ash characteristics * Gas/vapour plumes * Mount St. Helens * United States *

A general account is given of the 18 May volcanic activity as an introduction to a special publication on the atmospheric impact of the eruption. The character of the ashes is described, and the phreatomagmatic character of 18 May activity is discussed. Eruptions later than 18 May were mainly magmatic.

REFERENCE NO. A00341

ROSE, W.I. Jr, STOIBER, R.E., MALINCONICO, L.L.
1982
Eruptive gas compositions and fluxes of explosive volcanoes : budget of S and Cl emitted from Fuego volcano, Guatemala.
JOURNAL/PUBLISHER In: Thorpe, R.S. (Editor), Andesites, John Wiley and Sons, Chichester
VOLUME/PAGE NO. 669-676
SUBJECT KEYWORDS * Atmosphere loading * Fuego * Gas/vapour plumes *

Six different methods are described for the determination of S and Cl budgets of explosive eruptions. Estimates for S and Cl fluxes from Fuego volcano in 1974 are provided, together with data for the following three years. Most of the S released and only a small fraction of Cl were released in the short-lived 1974 eruption.

REFERENCE NO. A00593

ROSE, W.I., CHUAN, R.L., GIGGENBACH, W.F., KYLE, P.R., SYMONDS, R.B.
1986
Rates of sulfur dioxide and particle emissions from White Island volcano, New Zealand, and an estimate of the total flux of major gaseous species.
JOURNAL/PUBLISHER Bulletin of Volcanology
VOLUME/PAGE NO. 48, 181-188
SUBJECT KEYWORDS * Ash characteristics * Gas/vapour plumes * New Zealand *

COSPEC-determined SO2 emission rates from White Island at three different times in 1983-5 range from 320 to 1230 metric tons per day. Particle flux determined by a cascade impactor in November 1983 was an unusually low 1.3 tons/day. Emission rates for other gas species and an estimate of long-term thermal power output are also given.

REFERENCE NO. A00276

ROSE, W.I., CHUAN, R.L., KYLE, P.R.
1985
Rate of sulphur dioxide emission from Erebus volcano, Antarctica, December 1983.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 316, 710-712
SUBJECT KEYWORDS * Aerosols * Antarctica * Atmosphere loading * Gas/vapour plumes *

Erebus had an estimated rate of SO2 emission of 230 tonnes/day over an 11-day period. This is a more accurate and much higher estimate than previous ones. Erebus is the principal source of volcanic emanations to the Antarctic atmosphere..

REFERENCE NO. A00135

ROSE, W.I., HARRIS, D.M., HEIKEN, G., SARNA-WOJCICKI, A., SELF, S.

1982

Volcanological description of the 18 May 1980 eruption of Mount St. Helens.

JOURNAL/PUBLISHER Mount St. Helens Eruptions of 1980 : Atmospheric Effects and Potential Climatic Impact (Editors, R.E. Newell and A. Deepak). National Aeronautics and Space Administration, Washington, D.C.

VOLUME/PAGE NO. NASA SP-458, 1-36

SUBJECT KEYWORDS * Ash characteristics * Atmosphere loading * Cloud dynamics * Gas/vapour plumes * Mount St. Helens * Radar * Remote sensing * United States * Working groups *

A background volcanological account is given of the eruption as an introduction to a volume of papers on the eruption's climatic impact. An eruption description is provided, a description given of both the solid and gaseous products, and a comparison made with other volcanic explosive eruptions. Remote sensing observations are mentioned.

REFERENCE NO. A00152

ROSE, W.I., WUNDERMAN, R.L., HOFFMAN, M.F., GALE, L.

1983

A volcanologist's review of atmospheric hazards of volcanic activity : Fuego and Mount St. Helens.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 17, 133-157

SUBJECT KEYWORDS * Aerosols * Ash characteristics * Atmosphere loading * Fuego * Gas/vapour plumes * Mount St. Helens *

A summary is given of the impact on the atmosphere of two particular eruptions. The primary atmospheric hazard of volcanic eruptions is volcanic sulphur rather than the fine ash. The authors emphasise that the sulphur amount provided to the atmosphere depends on the amount of near-surface non-eruptive magma, not just that of the erupted magma.

REFERENCE NO. A00029

ROSEN, J.M.

1964

The vertical distribution of dust to 30 kilometers.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 69 (21), 4673-4676

SUBJECT KEYWORDS * Aerosols * Agung * Indonesia * United States *

Atmospheric aerosol concentration and size distribution were measured up to 30 km altitude north of Minneapolis, by means of a balloon-borne photoelectric particle counter. The profile may have been perturbed by the 1963 Agung eruption. Stratospheric dust is suggested to be of extraterrestrial origin with a mass flux of 4 million metric tons.

REFERENCE NO. A00347

ROSEN, J.M., HOFMANN, D.J.

1982

Dustsonde measurements of the Mount St. Helens volcanic dust cloud over Wyoming.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 65-81

SUBJECT KEYWORDS * Aerosols * Mount St. Helens * United States *

Numerous balloon soundings of Mount St. Helens aerosols and condensation nucleii were made over Laramie after the 18 May 1980 eruption. The volatility of particles was tested. The initial cloud was relatively large and non-volatile, but a dominant volatile component developed in a relatively short time.

REFERENCE NO. A00345

RUSSELL, P.B., HAKE, R.D. Jr

1977

The post-Fuego stratospheric aerosol: lidar measurements, with radiative and thermal implications.

JOURNAL/PUBLISHER Journal of the Atmospheric Sciences

VOLUME/PAGE NO. 34, 163-177

SUBJECT KEYWORDS * Aerosols * Fuego * Lidar * Remote sensing * United States *

Greatly increased particulate scattering following the October 1974 Fuego eruption, was detected as a result of 15 lidar measurements in 1975. Most of the scattering was at altitudes of less than 20 km. Modelling was undertaken and the predicted temperature decrease at the surface is considerably less than 1 K.

REFERENCE NO. A00491

SALTZMAN, E.S., BRASS, G.W., PRICE, D.A.

1983

The mechanism of sulfate aerosol formation: chemical and sulfur isotopic evidence.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (7), 513-516

SUBJECT KEYWORDS * Aerosols * United States *

A seasonal control on the conversion rate of sulphur dioxide to sulphate is established for data collected in 1980 over New Hampshire, United States. In addition, the authors infer that on a yearly, integrated basis, aerosol sulphate is formed primarily by gaseous oxidation rather than in cloud droplets or on the wetted surfaces of particles.

REFERENCE NO. A00106

SARNA-WOJCICKI, A.M., SHIPLEY, S., WAITT, R.B. Jr, DZURISIN, D., WOOD, S.H.

1981

Areal distribution, thickness, mass, volume, and grain size of air-fall ash from the six major eruptions of 1980.

JOURNAL/PUBLISHER The 1980 Eruptions of Mount St. Helens, Washington (Editors, P.W. Lipman and D.R. Mullineaux). United States Geological Survey Professional Paper

VOLUME/PAGE NO. 1250, 577-600

SUBJECT KEYWORDS * Ash characteristics * Atmosphere loading * Cloud dynamics * Mount St. Helens * United States *

A detailed description of the characteristics of the air-fall ash deposits is given and is integrated with a review of the known vertical growth and downwind progress of the ash plume from the 18 May eruption. The 18 May plume rose to at least 23 km (perhaps to 27 km). Average rates of ascent between 0838 and 0842 hours was 44m/sec.

REFERENCE NO. A00207

SAWADA, Y.

1983

Analysis of eruption clouds by the 1981 eruptions of Alaid and Pagan volcanoes with EMS images.

JOURNAL/PUBLISHER Papers in Meteorology and Geophysics

VOLUME/PAGE NO. 34 (4), 307-324

SUBJECT KEYWORDS * Alaid * Cloud dynamics * GMS satellite * Japan * Pagan * Remote sensing *

GMS images are used to analyse the characteristics of eruption clouds from volcanoes in the Kuriles (Alaid) and Mariana Islands (Pagan). Estimated cloud heights are 11.7 and 16.5 km, respectively. Horizontal speeds and thermal-energy releases are calculated also. GMS images can be used to detect clouds several kilometres high and 20 km across.

REFERENCE NO. A00550

SAWADA, Y.

1985A

Detection capability of eruption sequences by GMS images.

JOURNAL/PUBLISHER Journal title in Japanese

VOLUME/PAGE NO. 5 (3), 23-39

SUBJECT KEYWORDS * Colo * GMS satellite * Galunggung * Indonesia * Japan * Papua New Guinea * Philippines * Remote sensing * Soputan * Tonga-Kermadec * Ulawun * Vanuatu *

The capability of GMS images in detecting volcanic eruption clouds is assessed. 26 out of 196 events (about 13 percent) are identified. The lowest altitude and dimension of detected eruption clouds are about 5 km and 30 km, respectively. The paper is in Japanese, but includes an abstract and figure captions in English.

REFERENCE NO. A00081

SAWADA, Y.

1985B

GMS observation of eruption clouds of the 1984 September-October Mayon eruption.

JOURNAL/PUBLISHER Philippine Journal of Volcanology

VOLUME/PAGE NO. 2 (1-2), 143-155

SUBJECT KEYWORDS * GMS satellite * Philippines * Remote sensing *

Eruption clouds from Mayon volcano were seen on GMS images for September-October 1984. Activity on 23-25 September was the strongest, but the cloud did not penetrate the tropopause. The total thermal energy released from the eruption clouds is estimated to be 8x10 to the power of 22 ergs.

REFERENCE NO. A00393

SAWADA, Y.

1986

Detection capability of explosive eruption by GMS image and behaviour of dispersing eruption cloud.

JOURNAL/PUBLISHER International Volcanological Congress, New Zealand, Abstracts Volume

VOLUME/PAGE NO. 275

SUBJECT KEYWORDS * Cloud dynamics * Colo * GMS satellite * Galunggung * Indonesia * Japan * Philippines * Remote sensing * Soputan *

Thirteen percent of recorded eruptions from late 1977 through mid 1985 were detectable in the field of view of the Geostationary Meteorological Satellite. The smallest eruption cloud detected was 5 km high, 10 km wide, and 30 km long. Eruption clouds contain significant thermal energy even after the eruption has stopped, thus facilitating dispersion.

REFERENCE NO. A00225

SAWADA, Y.

1988

Regional monitoring of eruption clouds, and estimation of amount of air-borne ejecta, using satellite imagery.

JOURNAL/PUBLISHER Proceedings of the Kagoshima International Conference on Volcanoes

VOLUME/PAGE NO. 539-542

SUBJECT KEYWORDS * Colo * GMS satellite * Galunggung * Indonesia * Japan * Mayon * Pagan * Remote sensing * Soputan * Vanuatu *

Images from the Japanese GMS satellite are useful in the observation of widespread eruption clouds. Explosion strength and thermal energy released can be estimated. However, greater ground resolution is required for smaller, low-altitude eruption and multispectral satellite data are required to distinguish volcanic clouds from weather clouds.

REFERENCE NO. A00533

SAWADA, Y.

1989

The detection capability of explosive eruptions using GMS imagery, and the behaviour of dispersing eruption clouds.

JOURNAL/PUBLISHER Volcanic Hazards (Editor, J.H. Latter). IAVCEI Proceedings in Volcanology, Springer-Verlag, Berlin

VOLUME/PAGE NO. 1, 233-245

SUBJECT KEYWORDS * Cloud dynamics * Colo * GMS satellite * Galunggung * Indonesia * Japan * Pagan * Philippines * Remote sensing * Soputan *

A short review is provided of the capabilities of the Japanese GMS satellite in providing images for detecting the appearance and dispersal of explosive-eruption clouds. Determination of cloud altitude, surface temperature, and thermal energy release values are discussed with reference to western-Pacific volcanoes, especially Indonesia.

REFERENCE NO. A00472

SAWADA, Y., TANAKA, Y., SEINO, M.

1989

Volcanic activity in Japan monitored by the Japan Meteorological Agency using detected precursory phenomena

JOURNAL/PUBLISHER Volcanic Hazards (Editor, J.H. Latter). IAVCEI Proceedings in Volcanology, Springer-Verlag, Berlin.

VOLUME/PAGE NO. 1, 246-259

SUBJECT KEYWORDS * Japan * Volcanic prediction *

Systematic volcanological work by JMA has been carried out since 1960 on 17 of Japan's 76 potentially active volcanoes. Seismicity is the most clearly defined precursory event, but increases in fumarolic activity are also important. Relevant observational data are insufficient in the case of volcanoes that have been dormant for long periods.

REFERENCE NO. A00473

SCANDONE, R.

1983

The energy of volcanic processes.

JOURNAL/PUBLISHER Forecasting Volcanic Events (Editors, H. Tazieff and J.C. Sabroux). Developments in Volcanology 1. Elsevier, Amsterdam

VOLUME/PAGE NO. 27-41

SUBJECT KEYWORDS * Cloud dynamics * Volcanic prediction *

An energy-balance approach in studying volcanic phenomena is taken in this review paper. Studies of a single eruption require information on the total energy of the system, the parameters that control its distribution, and the boundary conditions that determine its state of equilibrium. The trend from mafic to felsic magmatism reflects energy loss.

REFERENCE NO. A00252

SCARONE, H.

1984

Volcanic ash clouds - a continuing threat to international aviation.

JOURNAL/PUBLISHER ICAO Bulletin

VOLUME/PAGE NO. 39 (10), 13-19

SUBJECT KEYWORDS * Aerosols * Ash encounters * Damage reports * Defensive inflight measures * Early-warning measures * El Chichon * GMS satellite * Galunggung * ICAO * Remote sensing * TIROS satellites * Working groups *

This is a general article on the aircraft/ash-cloud problem by a staff member of the International Civil Aviation Organisation, Montreal.

REFERENCE NO. A00040

SCHNELL, R.C., DELANY, A.C.

1976

Airborne ice nuclei near an active volcano.

JOURNAL/PUBLISHER Nature

VOLUME/PAGE NO. 264, 535-536

SUBJECT KEYWORDS * Aerosols * Augustine * Gas/vapour plumes * Meteorology * United States *

The authors report that 1976 eruptions at Augustine volcano, Alaska, did not contribute significantly to background atmospheric ice nucleus concentrations on the days studied, in contrast to other investigators who claimed that active volcanoes were sources of atmospheric ice nucleii.

REFERENCE NO. A00043

SCIENTIFIC EVENT ALERT NETWORK

1989

Redoubt Volcano, SW Alaska, USA

JOURNAL/PUBLISHER Scientific Event Alert Network Bulletin

VOLUME/PAGE NO. 14(11), 2-6

SUBJECT KEYWORDS * Ash encounters * Early-warning measures * FAA * Redoubt * Remote sensing * TIROS satellites * United States *

An account is given of the volcanic activity at Mount Redoubt between 14 and 19 December 1989. Aviation authorities advised pilots of the danger, but several aircraft encountered ash and one, a 747 with 245 people on board, lost power to all four engines for eight minutes. Hazard mitigation effects for aviation are outlined.

REFERENCE NO. A00525

SEAR, C.B., KELLY, P.M.
1980
Eruption of Mount St. Helens: effects on climate.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 285 (5766), 533-535
SUBJECT KEYWORDS * Climate change * Mount St. Helens * United States *

A short review is provided of the effect of major volcanic activity on climate, in view of the 18 May 1980 eruption at Mount St. Helens. The effects of the 1980 eruption cannot be predicted with certainty, but the dust veil is expected to produce noticeable optical effects. New data from the eruption will be important in assessing climatic impacts.

REFERENCE NO. A00563

SEDLACEK, W.A., HEIKEN, G., ZOLLER, W.H., GERMANI, M.S.
1982
Aerosols from the Soufriere eruption plume of 17 April 1979.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 216, 1119-1121
SUBJECT KEYWORDS * Aerosols * Ash characteristics * Soufriere *

The compositions of aerosol samples from the plume at 1.8 and 5.5 km altitude are similar to that of the ash that fell on St. Vincent. Samples at 7.3 and 9.5 km had lower ash content, but similar above-background concentrations of sulphate.

REFERENCE NO. A00118

SEDLACEK, W.A., HEIKEN, G.H., MROZ, E.J. GLADNEY,E.S. PERRIN, D.R., LEIFER, R. FISENNE, I., HINCHLIFFE, L. CHUAN, R.N.
1982
Physical and chemical characteristics of Mount St. Helens airborne debris.
JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication
VOLUME/PAGE NO. 2240, 83-107
SUBJECT KEYWORDS * Aerosols * Ash characteristics * Atmosphere loading * Mount St. Helens * Sierra Negra * Soufriere * United States *

Tephra and aerosols from the 18 May 1980 eruption were sampled in the stratosphere with a WB-57F aircraft. Concentration of ash and SO4 ions are given. Follow-up observations were made later in the year and SO4 concentrations were 2.5 times above April levels. This increase is attributed primarily to the November 1979 Sierra Negra eruption.

REFERENCE NO. A00346

SEDLACEK, W.A., MROZ, E.J., LAZRUS, A.L., GANDRUD, B.W.

1983

A decade of stratospheric sulfate measurements compared with observations of volcanic eruptions.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 88 (C6), 3741-3776

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Augustine * Fuego * Mount St. Helens * Mystery volcano * Papua New Guinea * Sierra Negra * Soufriere * Ulawun * United States *

Sulphate aerosols concentrations were measured for 11 years (1971-1981) using portions of filters collected during the High Altitude Sampling Program from 75N to 51S. Several unreported eruptions, or eruptions to heights greater than reported, took place during the decade. Most of the stratospheric sulphate was volcanically derived.

REFERENCE NO. A00493

SEHMEL, G.A.

1982

Ambient airborne solids concentrations including volcanic ash at Hanford, Washington, sampling sites subsequent to the Mount St. Helens eruption.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 283-292

SUBJECT KEYWORDS * Ash characteristics * Meteorology * Mount St. Helens * United States *

Airborne particulates were classified using three types of sampling equipment at Hanford. Concentrations were greater for the site farthest from the volcano. Rain on 26 May decreased concentration which increased again as resuspension took place. 0.2-0.6 inches of rain may be required to reduce, at least for a day, concentrations of resuspended ash.

REFERENCE NO. A00385

SEISMOLOGY AND VOLCANOLOGY RESEARCH, DIVISION, MRI

1987

Study on analyses of volcanic eruptions based on eruption cloud image data obtained by the Geostationary Meteorological Satellite (GMS).

JOURNAL/PUBLISHER Technical Reports of the Meteorological Research Institute

VOLUME/PAGE NO. 22

SUBJECT KEYWORDS * Cloud dynamics * Colo * GMS satellite * Galunggung * Indonesia * Japan * Papua New Guinea * Philippines * Remote sensing * Sakurajima * Soputan * Ulawun * Vanuatu *

This 335-page report is a compendium of observations of the eruption plumes of volcanoes within the field of view of the Japanese GMS satellite (see also Sawada). The clouds of 23 volcanoes in 1977-85 are illustrated and discussed in detail. About 14 percent of the known eruptions during this period were detected by the GMS.

REFERENCE NO. A00375

SELF, S., RAMPINO, M.R.

1988

The relationship between volcanic eruptions and climate change : still a conundrum?

JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union

VOLUME/PAGE NO. 69 (6), 74-75, 85-86

SUBJECT KEYWORDS * Aerosols * Agung * Antarctica * Atmosphere loading * Climate change * El Chichon * Europe * Glacier records * Indonesia * Krakatau * Mount St. Helens * Tambora * United States *

A comprehensive review is given of volcanism and its relationship to climate change using both historical and modern references. Eruptions such as Laki 1783, Tambora 1815, Krakatau 1883, and Agung 1963, are all considered. 'Volcanic winters' may be produced by particularly large eruptions, especially of magmas rich in sulphur dioxide.

REFERENCE NO. A00436

SELF, S., RAMPINO, M.R., BARBERA, J.J.
1981
The possible effects of large 19th and 20th century volcanic eruptions on zonal and hemispheric surface temperatures.
JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research
VOLUME/PAGE NO. 11, 41-60
SUBJECT KEYWORDS * Agung * Augustine * Climate change * Fuego * Indonesia * Krakatau * Tambora * United States *

The chronology of major explosive volcanic eruptions is compared with a record of mean surface-temperature deviation for the same interval. Large eruptions appear to have produced a temperature decrease of 0.2 to 0.5C on a hemispheric scale for periods of 1-5 years. Some smaller eruptions, such as Agung 1963, may have produced similar effects.

REFERENCE NO. A00565

SETTLE, M.
1978
Volcanic eruption clouds and the thermal output of explosive eruptions.
JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research
VOLUME/PAGE NO. 3, 309-324
SUBJECT KEYWORDS * Agung * Cloud dynamics * Indonesia *

The maximum height attained by six historical volcanic-eruption clouds is correlated positively with the emission rate (mass flux) of pyroclastic material. Empirical scaling relationships between plume height and thermal flux developed for industrial plumes are used to propose that thermal-energy release rates are proportional to mass flux.

REFERENCE NO. A00261

SHAH, G.M., EVANS, W.F.J.
1984
Aircraft latitude survey measurements of the El Chichon eruption cloud.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 11 (11), 1125-1128
SUBJECT KEYWORDS * Aerosols * Cloud dynamics * El Chichon *

Large increases in aerosol optical thicknesses were measured by solar spectral extinction using a sunphotometer on board an aircraft in May-December 1982. The thick part of the El Chichon cloud was found to be confined between the Equator and 30N in May-July. Two parts of the cloud are shown to have different size distributions of aerosols.

REFERENCE NO. A00634

SHANAHAN, B.W.

1988

Report of visit to Indonesia - 26 to 27 August 1988.

JOURNAL/PUBLISHER Bureau of Meteorology, Melbourne, unpublished report

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Early-warning measures * GMS satellite * Indonesia * Meteorology * Remote sensing * TIROS satellites *

The author visited the Indonesian METGEOF in Jakarta to progress the effectiveness of the volcanic-ash warning system. Technical problems in Jakarta lead the author to suggest that the Australian BOM retain the current advisory service for the time being. A document on 'Identification of volcanic ash clouds by satellite imagery' is presented.

REFERENCE NO. A00484

SHAW, D.M., WATKINS, N.D., HUANG, T.C.

1974

Atmospherically transporated volcanic glass in deep-sea sediments: theoretical considerations.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 79 (21), 3087-3093

SUBJECT KEYWORDS * Cloud dynamics *

A simple model is developed relating distance from source to volcanic dust-particle size for eruptions of different intensities and winds of different strengths, to facilitate the design of efficient piston-coring programs. Palaeowind velocity determinations can be made by measuring the downwind increase in width of the dust-cloud fallout pattern.

REFERENCE NO. A00579

SHAW, G.E.

1980

Optical, chemical and physical properties of aerosols over the Antarctic ice sheet.

JOURNAL/PUBLISHER Atmospheric Environment

VOLUME/PAGE NO. 14, 911-921

SUBJECT KEYWORDS * Aerosols * Antarctica * Atmosphere loading * Glacier records * Indonesia * New Zealand *

A detailed account is provided of the nature of aerosols over Antarctica during the period 1974-79, based on sampling near the surface and vertical column characteristics. Sulphate is predominant. Oceanic sources of sulphur gases are regarded as the most likely source. Erebus, New Zealand, and Indonesian volcanoes are discounted as sources.

REFERENCE NO. A00596

SHIMOZURU, D.

1983

Volcano surveillance and prediction of eruptions in Japan.

JOURNAL/PUBLISHER Forecasting Volcanic Events (Editors, H. Tazieff and J.C. Sabroux). Developments in Volcanology 1. Elsevier, Amsterdam

VOLUME/PAGE NO. 173-192

SUBJECT KEYWORDS * Japan * Volcanic prediction * Volcano distribution *

Japan has a highly developed and integrated national program of volcano monitoring aimed at predicting eruptions. A comprehensive review of this program is given, including a description of the activities of the Japan Meteorological Agency and universities. Observatories and their equipment are listed. Future plans are also discussed.

REFERENCE NO. A00254

SIGURDSSON, H.

1982A

Tephra from the 1979 Soufriere explosive eruption.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 216, 1106-1108

SUBJECT KEYWORDS * Ash characteristics * Soufriere *

37.5 million cubic metres of tephra were produced by the eruption's explosive phase. 60 percent derived from fragmentation of the 1971-2 lava island during phreatomagmatic explosions. Features of the land deposit are attributed to particle aggregation and formation of accretionary lapilli in a wet eruption column.

REFERENCE NO. A00111

SIGURDSSON, H.

1982B

Volcanic pollution and climate : the 1783 Laki eruption.

JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union

VOLUME/PAGE NO. 63 (32), 601-602

SUBJECT KEYWORDS * Aerosols * Climate change * Europe * Gas/vapour plumes * Glacier records * Laki * Meteorology * United States *

The Laki eruption, Iceland, produced one of the most severe volcano-related climatic effects in historical time, although it was largely non-explosive. The author highlights his work on Laki phenocryst fluid inclusions, and concludes that magma sulphur contents and sulphur-gas volumes are critical factors in determining volcano climatic impact.

REFERENCE NO. A00231

SIGURDSSON, H., DEVINE, J.D., DAVIS, A.N.

1985

The petrologic estimation of volcanic degassing.

JOURNAL/PUBLISHER Jokull

VOLUME/PAGE NO. 35, 1-8

SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * El Chichon * Europe * Glacier records * Indonesia * Krakatau * Laki * Mount St. Helens * Soufriere * Tambora * United States *

A review is given, and the limitations discussed, of the method of estimating eruption volatile loss to the atmosphere using microprobe analyses of sulphur, chlorine, and fluorine in the phenocryst inclusions of volcanic rocks (see Devine et al., 1984). Estimates are given for several historical eruptions, including three Indonesian ones.

REFERENCE NO. A00281

SIGURDSSON, H., PALAIS, J., BROWNING, D.

1986

Petrologic evidence of volcanic degassing.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, Univeristy of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 85-91

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Europe * Katmai * Mount St. Helens * Nevado del Ruiz * New Zealand * Papua New Guinea * Rabaul * Tarawera * United States *

Results of petrological studies of volcanic degassing are summarised for nine prehistoric or historical eruptions. Agreement is good with results for volcanic aerosol mass determined from ice-core studies and atmospheric measurements. Complete correspondence would not be expected, as only part of the emitted gases may form an aerosol.

REFERENCE NO. A00279

SIMKIN, T., FISKE, R.S.

1983

Krakatau 1883 : the Volcanic Eruption and its Effects.

JOURNAL/PUBLISHER Smithsonian InstitutionPress, Washington D.C.

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Atmosphere loading * Indonesia * Krakatau * Meteorology *

'Krakatau 1883' was published to commemorate the centenary of a major historical volcanic eruption that produced global atmospheric effects. The volume includes eyewitness accounts, an English translation of Verbeek's classic monograph (1885), and a compilation of scientific interpretative accounts.

REFERENCE NO. A00015

SIMKIN, T., SIEBERT, L.

1984

Explosive eruptions in space and time : durations, intervals, and a comparison of the world's active volcanic belts.

JOURNAL/PUBLISHER Explosive Volcanism : Inception, Evolution, and Hazards. Studies in Geophysics, National Academy Press, Washington, D.C.

VOLUME/PAGE NO. 110-121

SUBJECT KEYWORDS * Eruption frequencies * Volcano distribution *

The authors provide an account of global explosive volcanism throughout historical time. They analysed data held on the Smithsonian Institute's volcano reference data file. See Simkin et al. (1981).

REFERENCE NO. A00010

SIMKIN, T., SIEBERT, L., McCLELLAND, L., BRIDGE, D., NEWHALL, C. LATTER, J.H.

1981

Volcanoes of the World : a Regional Directory, Gazetteer, and Chronology of Volcanism during the last 10,000 Years.

JOURNAL/PUBLISHER Hutchinson Ross, Stroudsburg, Pennsylvania

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Eruption frequencies * Volcano distribution * Volcano lists *

The Smithsonian Institution, Washington D.C., maintains and operates a volcano reference data file in its National Museum of Natural History. This volume consists mainly of computer-generated listings from the file on volcano locations, eruption durations, dates, and types, plus other important data. The authors provide a comprehensive introduction.

REFERENCE NO. A00002

SINGAPORE AIRLINES

1982
Flight through volcanic dust cloud SQ21A/13.7.1982.
JOURNAL/PUBLISHER Flight Safety Review, Singapore Airlines Limited, Singapore
VOLUME/PAGE NO. July/October, 1-4
SUBJECT KEYWORDS * Ash encounters * Damage reports * Defensive inflight measures * Early-warning measures * Electrical effects * Galunggung * Indonesia *

A brief account is given of the 13 July 1982 encounter between a Singapore Airlines 747 aircraft and drifting ash from Galunggung volcano (Indonesia). Rectifications carried out are described, and preventative actions are listed for the benefit of inflight crews.

REFERENCE NO. A00203

SLAUGHTER, M., HAMIL, M.

1970
Model for deposition of volcanic ash and resulting bentonite.
JOURNAL/PUBLISHER Geological Society of America Bulletin
VOLUME/PAGE NO. 81, 961-968
SUBJECT KEYWORDS * Cloud dynamics * United States *

A 'mushroom cloud' model describing the depositional features of volcanic ash from highly explosive volcanoes, is represented as an expanding disc-shaped cloud from which deposition takes place. The model allows for aggregation of particles caused by water and static electricity in the volcanic cloud.

REFERENCE NO. A00450

SMITH, W.K.

1980
A plotting program for producing ashfall prediction maps from output of the NOAA forecast trajectory program : application to and examples from the 1980 Mount St. Helens eruptions.
JOURNAL/PUBLISHER United States Geological Survey Open-File Report
VOLUME/PAGE NO. 80-2005
SUBJECT KEYWORDS * Cloud dynamics * Mount St. Helens * United States *

A NOAA trajectory-forecast program developed for nuclear-explosion debris, is adapted for volcanic-ash particles using wind data and time- sharing computer terminals. However, the program does not take into account particle settling or dispersion about the trajectories. Examples are given for Mount St. Helens using 1980 wind data.

REFERENCE NO. A00222

SMITH, W.S.

1983

High-altitude conk out.

JOURNAL/PUBLISHER Natural History

VOLUME/PAGE NO. 11, 26-34

SUBJECT KEYWORDS * Ash encounters * Damage reports * Defensive inflight measures * Early-warning measures * GOES/SMS satellites * Galunggung * Indonesia * Remote sensing * TIROS satellites * United States *

This accurate, popular account of the aircraft/ash-cloud problem is based on two incidents involving the 1982 activity of Galunggung volcano, Indonesia. The cause of multiple engine failure is explained clearly, and the difficulties in devising a safe early-warning system for aviation are stressed.

REFERENCE NO. A00338

SMITH, W.S.

1984

Effects of volcanic ashon air operations.

JOURNAL/PUBLISHER Volcanic Ash Warnings (VAW) Study Group, International Civil Aviation Organization, Montreal. VAW-Memo/2

VOLUME/PAGE NO. Attachment F

SUBJECT KEYWORDS * Ash characteristics * Ash encounters * Defensive inflight measures * Early-warning measures * FAA * GOES/SMS satellites * Meteorology * NIMBUS/TOMS satellites * Radar * Remote sensing * TIROS satellites * United States * Working groups *

A comprehensive, multidisciplinary account is given of the aircraft/ashcloud problem. Topics include: the characteristics of volcanic ash, effects on air operations, detection and tracking of ashclouds, and air traffic control strategy.

REFERENCE NO. A00018

SNETSINGER, K.G., FERRY, G.V., RUSSELL, P.B., PUESCHEL, R.F., OBERBECK, V.R., HAYES, D.M., FONG, W.

1987

Effects of El Chichon on stratospheric aerosols late 1982 to early 1984.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 92 (D12), 14761-14771

SUBJECT KEYWORDS * Aerosols * El Chichon * United States *

The strong effects of the 1982 El Chichon erupted are shown by aerosols collected over the western United States using a wire impactor on board a NASA U2 aircraft. Mineral particles disappeared during the 1982-84 period, but large acid drops were still common. The influence of El Chichon on 15-21 km air was still significant 22 months after the eruption.

REFERENCE NO. A00594

SOREM, R.K.

1982

Volcanic ash clusters : tephra rafts and scavengers.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 13, 63-71

SUBJECT KEYWORDS * Ash characteristics * Mount St. Helens *

Ash at Pullman, Washington, during the 1980 Mount St. Helens eruption, fell as porous clusters. These clusters rafted large ash particles for great distances and scavenged particles of all sizes, producing poorly sorted deposits a long way from source.

REFERENCE NO. A00028

SPARKS, R.J.S.

1986

The dimensions and dynamics of volcanic eruption columns.

JOURNAL/PUBLISHER Bulletin of Volcanology

VOLUME/PAGE NO. 48 (1), 3-15

SUBJECT KEYWORDS * Cloud dynamics * Mount St. Helens * Soufriere *

Numerical calculations are presented on the shape of eruption columns and on the relationships between column height, magma discharge rates, magma temperatures, and atmospheric temperature gradients. Columns typically ascend at velocities from a few tens over 200m/sec. Radial velocities in the 'umbrella' region can be substantial.

REFERENCE NO. A00070

SPARKS, R.S.J., MOORE, J.G., RICE, C.J.

1986

The initial giant umbrella cloud of the May 18th, 1980, explosive eruption of Mount St. Helens.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 28, 257-274

SUBJECT KEYWORDS * Cloud dynamics * Military satellites * Mount St. Helens * United States *

The initial eruption column reached a height of nearly 30 km within 20 minutes, and was initiated when a pyroclastic blast flow became buoyant by decompression, sedimentation, and by mixing with and heating the surrounding air. This proposed mechanism is in contrast to the standard one of vertical jetting and expansion above an active vent.

REFERENCE NO. A00285

SPARKS, R.S.J., WILSON, L.

1982

Explosive volcanic eruptions - V. Observations of plume dynamics during the 1979 Soufriere eruptions, St Vincent.

JOURNAL/PUBLISHER Geophysical Journal of the Royal Astronomical Society

VOLUME/PAGE NO. 69, 551-570

SUBJECT KEYWORDS * Cloud dynamics * Soufriere *

Measurements of the dimensions, velocities, and spreading rates of explosive activity from Soufriere on 22 April 1979, were taken from a film and used to estimate plume parameters such as temperature, particle content, and volume discharge rate of magma, using theoretical relations. Plume ascent velocities were 8.5-61.7 metres per second.

REFERENCE NO. A00571

SPARROW, J.G.

1965

Stratospheric temperatures over Australia.

JOURNAL/PUBLISHER Australian Journal of Physics

VOLUME/PAGE NO. 18, 579-588

SUBJECT KEYWORDS * Aerosols * Agung * Australia * Indonesia * Meteorology *

Twelve-month, running-mean, air temperatures at 100, 60, and 50 mb above Australian stations are compiled and assessed for 1957-65. A warming of the stratosphere in late 1963 is attributed to the 17 March 1963 Agung eruption, Indonesia; or, alternatively, to a change in the nature of the biennial oscillation taking place during solar minimum.

REFERENCE NO. A00229

SPARROW, J.G.

1971
Stratospheric properties and Bali dust.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 229, 107
SUBJECT KEYWORDS * Aerosols * Agung * Indonesia * Meteorology *

The interpretation of Newell (1970) that a 5 C temperature increase took place in the stratosphere as a result of the 1963 Agung (Bali island) volcanic eruption is questioned because, Sparrow claims, Newell did not take into consideration the effects of a breakdown in the quasi-biennial oscillation.

REFERENCE NO. A00099

STACKHOUSE, J.

1982
WA scientists pin down the deadly ash cloud.
JOURNAL/PUBLISHER Bulletin. Australian Consolidated Press, Sydney
VOLUME/PAGE NO. 10 August, 32,34,37
SUBJECT KEYWORDS * Australia * Early-warning measures * Galunggung * Indonesia * Remote sensing * Spectral characteristics * TIROS satellites *

The Honey-and-Caroll method for distinguishing volcanic from normal weather clouds using AVHRR data from the NOAA-7 satellite, is highlighted in this short article on Australian remote-sensing studies published in a popular Australian news magazine (see also: Honey, 1982; Engineers Australia, 1982).

REFERENCE NO. A00296

STEENBLIK, J.W.

1990
Volcanic ash : a rain of terra.
JOURNAL/PUBLISHER Airline Pilot
VOLUME/PAGE NO. 59 (6), 9-56
SUBJECT KEYWORDS * Ash encounters * Damage reports * Defensive inflight measures * Early-warning measures * FAA * NIMBUS/TOMS satellites * Redoubt * United States *

An aviation journalist presents a popular account of the 1989-90 Redoubt eruption, Alaska, and its effect on aviation. A general account is given also of the aircraft/ash-cloud problem and its possible solutions, including the use of satellite images, the FAA-NOAA agreement, and recommendations for flight crews.

REFERENCE NO. A00544

STITH, J.L., HOBBS, P.V., RADKE, L.F.

1978

Airborne particle and gas measurements in the emissions from six volcanoes.

JOURNAL/PUBLISHER Journal of Geophysical Research

VOLUME/PAGE NO. 83 (8), 4009-4017

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Augustine * Gas/vapour plumes * United States *

Paroxysmal and intraeruptive emissions contain few particles less than 0.1 microns in diameter and little gaseous sulphur compared to posteruptive and extraeruptive emissions. Most 1976 Augustine SO2 was probably intraeruptive and posteruptive. New measurements are discussed with reference to previous estimates of volcanic emissions worldwide.

REFERENCE NO. A00185

STOIBER, R.E., JEPSEN, A.

1973

Sulfur dioxide contributions to the atmosphere by volcanoes.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 182 (4112), 577-578

SUBJECT KEYWORDS * Atmosphere loading * Gas/vapour plumes *

About 1000 metric tons of sulphur dioxide gas enter the atmosphere daily from Central American volcanoes, according to the first extensive measurements by remote-sensing correlation spectrometry of the sulphur dioxide emitted by volcanic plumes. A minimum estimate of the annual amount of sulphur dioxide emitted globally is 10 million tons.

REFERENCE NO. A00365

STOIBER, R.E., MALINCONICO, L.L. Jr, WILLIAMS, S.N.

1983

Use of the correlation spectrometer at volcanoes.

JOURNAL/PUBLISHER Forecasting Volcanic Events (Editors, H. Tazieff and J.C. Sabroux). Developments in Volcanology 1. Elsevier, Amsterdam

VOLUME/PAGE NO. 425-444

SUBJECT KEYWORDS * Atmosphere loading * Europe * Fuego * Gas/vapour plumes * Japan * Soufriere * United States * Volcanic prediction *

The techniques and principles adopted in measuring sulphur-dioxide fluxes at volcanoes using COSPEC are described and evaluated. Measurements can be made either from the ground or air. Plume speeds and cross-sectional area need to be measured. SO2 changes precursory to eruptions may be either decreases or increases.

REFERENCE NO. A00251

STOIBER, R.E., WILLIAMS, S.N., HUEBERT, B.

1987

Annual contribution of sulphur dioxide to the atmosphere by volcanoes.

JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research

VOLUME/PAGE NO. 33, 1-8

SUBJECT KEYWORDS * Agung * Augustine * El Chichon * Europe * Fuego * Gas/vapour plumes * Indonesia * Katmai * Krakatau * Mount St. Helens * Sakurajima * Tambora * United States * Volcano lists *

The average contribution of SO2 to the atmosphere by volcanoes is estimated to be 18.7 Tg per year. Non-erupting degassing volcanoes provide 36 percent of it, and the remainder comes from volcanoes in eruption. The estimate is 23 percent greater than the previous, most recent estimate. 9 percent of global SO2 flux is from volcanoes.

REFERENCE NO. A00609

STOIBER, R.E., WILLIAMS, S.N., MALINCONICO, L.L.

1980

Mount St. Helens, Washington, 1980 volcanic eruption : magmatic gas component during the first 16 days.

JOURNAL/PUBLISHER Science

VOLUME/PAGE NO. 208 (4449), 1258-1259

SUBJECT KEYWORDS * Gas/vapour plumes * Mount St. Helens * United States *

Low rates of sulphur-diozide emission characterised Mt St. Helens eruption plumes, and ash leachates had low ratios of sulphur to chlorine. These data and the non-vesicularity of the ash fragments are said to be indicative of only a small eruptive magmatic component in the period 30 March to 12 April 1980, but violent activity is possible.

REFERENCE NO. A00566

STOLARSKI, R.S., BUTLER, D.M.

1979

Possible effects of volcanic eruptions on stratospheric minor constituent chemistry.

JOURNAL/PUBLISHER Pure and Applied Geophysics

VOLUME/PAGE NO. 117 (3), 486-497

SUBJECT KEYWORDS * Aerosols * Agung * Gas/vapour plumes * Indonesia *

Mechanisms that affect stratospheric chemistry are reviewed. A major stratosphere-penetrating eruption could deplete the ozone column by several percent. The estimate for the 1963 Agung eruption is 1 percent. Estimates are provided also for the long-term contribution to stratospheric chlorine for 1900-1960 and 1780-1840.

REFERENCE NO. A00600

STOLARSKI, R.S., CICERONE, R.J.

1974
Stratospheric chlorine : a possible sink for ozone
JOURNAL/PUBLISHER Canadian Journal of Chemistry
VOLUME/PAGE NO. 52, 1610-1615
SUBJECT KEYWORDS * Gas/vapour plumes *

The oxides of chlorine may constitute an important sink for stratospheric ozone. A photochemical scheme is devised that includes two catalytic cycles through which ozone is destroyed. Sample calculations are performed for several altitude profiles. Direct injection of chlorine by volcanic eruptions is also considered.

REFERENCE NO. A00461

STOMMEL, H.M., STOMMEL, E.

1983
Volcano Weather : the Story of 1816, the Year without a Summer.
JOURNAL/PUBLISHER Seven Seas, Newport, Rhode Island
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Indonesia * Meteorology * Tambora * United States *

The climate and its sociological and economic effects during 1816 are described mainly from the point of view of the eastern United States. Reasons for the climate deterioration are discussed, particularly the popular theory that the 1816 Tambora eruption, Indonesia, was the main cause.

REFERENCE NO. A00091

STOTHERS, R.B.

1984
The great Tambora eruption in 1815 and its aftermath.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 224 (4654), 1191-1198
SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Europe * Glacier records * Indonesia * Krakatau * Meteorology * Tambora * United States *

The course of events during and after the cataclysmic Tambora eruption, Indonesia, on 10-11 April 1815 is reconstructed. About 150 km3 of ash was ejected in probably the largest explosive eruption since the last Ice Age. Atmospheric effects were notable in Europe, the eastern USA, and probably globally.

REFERENCE NO. A00336

STOTHERS, R.B.

1984
Mystery cloud of AD536
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 307 (5949), 344-345
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Europe * Papua New Guinea * Rabaul *

The densest and most persistant 'dry fog' on record was observed in Europe and the Middle East during AD 536-537. The mass and climatic consequences of the cloud appears to greatly exceed those of any other volcanic clouds during the past 3000 years. The source volcano is not known, but could have been Rabaul volcano in Papua New Guinea.

REFERENCE NO. A00549

STOTHERS, R.B., RAMPINO, M.R.

1983
Historic volcanism, European dry fogs, and Greenland acid precipitation, 1500 B.C. to A.D. 1500.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 222 (4622), 411-413
SUBJECT KEYWORDS * Aerosols * Europe * Glacier records * Papua New Guinea * Rabaul *

Historic dry fogs in Europe, acid precipitation in Greenland, and major explosive volcanic eruptions correlate well with each other between 1500 B.C. and A.D. 1500. European eruptions appear to be the source of at least five of the nine largest acidity signals found in Greenland ice for this period. Etna eruptions account for smaller acidity signals.

REFERENCE NO. A00551

STOTHERS, R.B., RAMPINO, M.R., SELF, S., WOLFF, J.A.

1989
Volcanic winter? Climatic effects of the largest volcanic eruptions.
JOURNAL/PUBLISHER Volcanic Hazards (Editor, J.H. Latter), IAVCEI Proceedings in Volcanology, Springer-Verlag, Berlin
VOLUME/PAGE NO. 1, 3-9
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Indonesia * United States *

A short account is provided of the impact of large explosive eruptions on world climate. Parallels are drawn with nuclear-winter scenarios. Emphasis is given to the Pleistocene Toba eruption, Indonesia, and the Miocene Roza flow eruption, USA. Significant perturbation of the global atmosphere is anticipated from such major eruptions.

REFERENCE NO. A00470

STOTHERS, R.B., WOLFF, J.A., SELF, S., RAMPINO, M.R.

1986

Basaltic fissure eruptions, plume heights, and atmospheric aerosols.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 13 (8), 725-728

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Cloud dynamics * Gas/vapour plumes * Glacier records * Laki *

Plume theory is applied to the case of gas-rich, ash-poor columns generated by Hawaiian-type fire fountains at both central-type and fissure vents. The 1783 Laki eruption, Iceland, is unlikely to have produced a stratospheric injection, but larger volume eruptions, such as represented by the Columbia River basalts, may have done so.

REFERENCE NO. A00318

STRONG, A.E., GRUBER, A., VARNADORE, M.

1983

An assessment of the impact of El Chichon on planetary radiation budget and satellite-derived sea surface temperature.

JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia

VOLUME/PAGE NO. 371-382

SUBJECT KEYWORDS * Aerosols * Climate change * El Chichon * Galunggung * Indonesia * Japan * Lidar * Remote sensing * TIROS satellites *

Satellite measurements of planetary radiation following El Chichon's activity were obtained using NOAA-7 AVHRR data. Albedo valves over cloud-free ocean doubled up to August. Eruptions at Galunggung may have contributed to albedo changes, because aerosols detected over Japan are at 20-23 km. This is below the height of El Chichon aerosol.

REFERENCE NO. A00214

SUDRADJAT, A.

1984

Weather satellite and volcanic eruption monitoring in Indonesia.

JOURNAL/PUBLISHER Pacific Volcanology : Forecasting Eruptions Workshop, Hilo, Hawaii, 9-11 June 1984. Circum- Pacific Council for Energy and Mineral Resources.

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Colo * GMS satellite * Galunggung * Indonesia * Remote sensing * TIROS satellites *

The Director of the Volcanological Survey of Indonesia reviews the use of satellite images in the monitoring of volcanoes in eruption, especially those in Indonesia. GMS and NOAA-7 images of the 1982 Galunggung and 1983 Colo eruptions are discussed in detail. Air-traffic safety is mentioned briefly in relation to Galunggung.

REFERENCE NO. A00272

SUDRADJAT, A., TILLING, R.

1984

Volcanic hazards in Indonesia : the 1982-83 eruption of Galunggung

JOURNAL/PUBLISHER Episodes

VOLUME/PAGE NO. 7 (2), 13-19

SUBJECT KEYWORDS * Ash encounters * Galunggung * Indonesia *

A general account is provided of the multifaceted aspects of the 1982-83 Galunggung eruption, including eruptive history and narrative, monitoring studies, national workshop, physical effects, lahar control, and interagency activities. Encounters between commercial aircraft and ash plumes are mentioned briefly.

REFERENCE NO. A00564

SULLIVAN, W.

1985

Volcanoes' risks to jets spur search for signs of warning.

JOURNAL/PUBLISHER New York Times

VOLUME/PAGE NO. Tuesday, 31 December, C3

SUBJECT KEYWORDS * Ash encounters * Augustine * Early-warning measures * FAA * Galunggung * Indonesia * Remote sensing * TIROS satellites * United States *

A well-informed, general, newspaper account is given of the aircraft/ash-cloud problem. Particular attention is given to eruptions from Augustine volcano, Alaska, and Galunggung volcano, Indonesia, which caused threats to aviation in 1976 and 1982. The use of satellites in monitoring high-rising eruption clouds is also considered.

REFERENCE NO. A00428

SURYO, I.

1981
Report on the volcanic activity in Indonesia during the period 1961-1963.
JOURNAL/PUBLISHER Bulletin of the Volcanological Survey of Indonesia
VOLUME/PAGE NO. 104
SUBJECT KEYWORDS * Agung * Indonesia *

Eruptive events at 22 volcanic centres in Indonesia are reported for the 1961-3 period. A major eruptive phase during this time was the 1963 activity of Agung volcano, Bali, which is described more fully than in other reports of this important event. The paroxysmal eruptions of 17 March produced an eruption column that reached higher than 10 km.

REFERENCE NO. A00390

SWANSON, D.A., CASADEVALL, T.J.

1989
Letters to Gudmundur Sigvaldason, World Organisation of Volcano Observatories.
JOURNAL/PUBLISHER United States Geological Survey, unpublished letter, 17 March 1989.
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Early-warning measures * FAA * United States *

The authors report on the establishment of the MOU between NOAA and FAA (see NOAA 1989) at the Flight Information Regional Office in San Francisco. They describe the firming up of links between the Cascades Volcano Observatory in Vancouver (Washington) and NOAA in Washington DC and NOAA's weather service in Kansas City. Links should be two-way.

REFERENCE NO. A00482

SWANSON, D.A., CASADEVALL, T.J., DZURISIN, D., HOLCOMB, R.T. NEWHALL, C.G., MALONE, S.D. WEAVER, C.S.

1985
Forecasts and predictions of eruptive activity at Mount St. Helens, USA : 1975-1984.
JOURNAL/PUBLISHER Journal of Geodynamics
VOLUME/PAGE NO. 3, 397-423
SUBJECT KEYWORDS * Eruption frequencies * Mount St. Helens * United States * Volcanic prediction *

U.S. Geological Survey volcanologists issue three kinds of public statements in relation to volcanic activity at Mount St. Helens: factual statements, forecasts (relatively imprecise statements), and predictions (relatively precise statement on impending activity). Examples are given for the 1975-84 period.

REFERENCE NO. A00284

SWISSLER, T.J., McCORMICK, M.P., SPINHIRNE, J.D.
1983
El Chichon eruption cloud: comparison of lidar and optical thickness measurements for October 1982.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (9), 885-888
SUBJECT KEYWORDS * Aerosols * El Chichon * Lidar * Remote sensing *

Sun photometer and lidar backscatter measurements of the El Chichon volcanic cloud were obtained in late 1982 between 46N and 46S. Lidar-derived optical depths agree with sun-photometer optical-thickness determinations. Little is presented on the significance of the measurements or on the extent and dynamics of the cloud.

REFERENCE NO. A00463

SYMONDS, R.B., ROSE, W.I., REED, M.H.
1988
Contribution of Cl- and F-bearing gases to the atmosphere by volcanoes.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 334, 415-418
SUBJECT KEYWORDS * Atmosphere loading * Gas/vapour plumes * Mount St. Helens * United States *

Equilibrium thermodynamics are used to predict the speciation of Cl and F in volcanic gases and to provide new estimates of the global emission rates to the atmosphere. HCl and HF are the dominant species of Cl and F gases, and significant amounts may be injected into the stratosphere by large volcanic eruptions, contributing to ozone decay.

REFERENCE NO. A00449

TAHIRA, M.
1981
A study of the infrasonic wave in the atmosphere. Multi-pipe line microphone for infrasonic observation.
JOURNAL/PUBLISHER Journal of the Meteorological Society of Japan
VOLUME/PAGE NO. 59 (4), 477-486
SUBJECT KEYWORDS * Infrasonics * Japan * Sakurajima *

Continuous observation of infrasonic waves has been started at Kariya City, Honshu island. A multi-pipe line microphone has been designed to reduce wind noise and has been tested successfully. The major interest is in detecting and analysing infrasounds radiated frequently into the atmosphere from Sakurajima volcano on Kyushu island.

REFERENCE NO. A00614

TAHIRA, M.

1982

A study of the infrasonic wave in the atmosphere (II) Infrasonic waves generated by the explosions of the volcano Sakura-jima.

JOURNAL/PUBLISHER Journal of the Meteorological Society of Japan
VOLUME/PAGE NO. 60 (3), 896-907
SUBJECT KEYWORDS * Infrasonics * Japan * Sakurajima *

Results are presented of a study of infrasonic waves recorded at Kariya, Honshu island, and generated by explosions at Sakurajima volcano, 710 km to the southwest. The infrasonic waves are shown to be channelled mainly in the tropospheric duct formed by strong westerly winds in the upper troposphere. Propagation in the stratospheric duct is less significant.

REFERENCE NO. A00615

TAHIRA, M.

1988A

A study of the long range propagation of infrasonic waves in the atmosphere (I) observation of the volcanic infrasonic waves propagating through the thermospheric duct.

JOURNAL/PUBLISHER Journal of the Meteorological Society of Japan
VOLUME/PAGE NO. 66 (1), 17-26
SUBJECT KEYWORDS * Infrasonics * Japan * Sakurajima *

Infrasonic signals from Sakurajima volcano, Kyushu, include some recorded in the summer and made up of a few peaks and dips of very low frequencies (0.08 Hz). Separation of signals into different waveform types is shown to be caused by the number of times the rays have been reflected from thermospheric heights.

REFERENCE NO. A00616

TAHIRA, M.

1988B

A study of the long range propagation of infrasonic waves in the atmosphere (II) Numerical study of the waveform deformation along thermospheric ray paths.

JOURNAL/PUBLISHER Journal of the Meteorological Society of Japan
VOLUME/PAGE NO. 66 (1), 27-37
SUBJECT KEYWORDS * Infrasonics * Japan * Sakurajima *

Calculations are performed to obtain the waveform deformation features of infrasonic waves propagating through the thermospheric duct. These are applied to waves generated from Sakurajima volcano. The calculated characteristics of rays reflected twice at the thermospheric level are in good agreement with those observed from Sakurajima in summer.

REFERENCE NO. A00617

TAHIRA, M., ISHIHARA, K., IGUCHI, M.

1988

Monitoring volcanic eruptions with infrasonic waves.

JOURNAL/PUBLISHER Proceedings of the Kagoshima International Conference on Volcanoes.

VOLUME/PAGE NO. 530-533

SUBJECT KEYWORDS * Infrasonics * Japan * Sakurajima *

The authors advocate the usefulness of infrasonics in recording eruptions that otherwise might be undetected. They have conducted infrasonic observations in central Japan and have detected activity from Sakurajima and from Asamayama, Fukutoku-Okanoba, and Izu-Oshima volcanoes. Examples of recordings are illustrated and discussed.

REFERENCE NO. A00532

TAYLOR, G.A.M.

1958

The 1951 Eruption of Mount Lamington, Papua.

JOURNAL/PUBLISHER Bureau of Mineral Resources, Australia - Bulletin (Second Edition 1983)

VOLUME/PAGE NO. 38

SUBJECT KEYWORDS * Ash encounters * Australia * Cloud dynamics * Defensive inflight measures * Lamington * Papua New Guinea *

A description is given of a major volcanic eruption from a Papua New Guinea volcano. Captain Jacobson piloting a Qantas Douglas aircraft observed and photographed the rise of the eruption cloud to about 50,000 feet. The aircraft diverted and avoided damage.

REFERENCE NO. A00045

TAZIEFF, H.

1983

Volcanological forecasting and medical diagnosis : similarities

JOURNAL/PUBLISHER Forecasting Volcanic Events (Editors, H. Tazieff and J.C. Sabroux). Developments in Volcanology 1. Elsevier, Amsterdam

VOLUME/PAGE NO. 3-7

SUBJECT KEYWORDS * Volcanic prediction *

A well-known French volcanologist expounds his personal philosophies on volcanic forecasting by a comparison with medical prognostications. He stresses the importance of being able to predict the development of catastrophic events rather than simply the initial outbreak of activity which in most cases may not be hazardous.

REFERENCE NO. A00245

TAZIEFF, H.

1983

Some general points about volcano monitoring and forecasting.

JOURNAL/PUBLISHER Forecasting Volcanic Events (Editors, H. Tazieff and J.C. Sabroux). Developments in Volcanology 1. Elsevier, Amsterdam

VOLUME/PAGE NO. 165-171

SUBJECT KEYWORDS * Volcanic prediction *

A short review is given of the techniques involved in volcano monitoring. Some emphasis is given to gas monitoring and 'phenomenology' (observation of 'everything that is not actually measured') and to the concept that several monitoring signatures are required for the basis of a forecast.

REFERENCE NO. A00248

TAZIEFF, H., SABROUX, J.C. (Editors)

1983

Forecasting Volcanic Events.

JOURNAL/PUBLISHER Developments in Volcanology, 1. Elsevier, Amsterdam

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Volcanic prediction *

This comprehensive volume on volcanic prediction, hazards, and eruptive mechanisms consists of 37 chapters written by a wide range of authors, including the following who are referred to elsewhere in this bibliog- raphy: Tazieff, Scandone, Shimozuru, Zen, Stoiber and others, Vie Le Sage, and Allard.

REFERENCE NO. A00241

THOMAS, E, VAREKAMP, J C

1986

Element transport in volcanic plumes and fumaroles.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 96-98

SUBJECT KEYWORDS * Aerosols * Gas/vapour plumes * Mount St. Helens * United States *

Data on condensate particles from volcanic plumes and fumaroles and on the trace-element composition of fumarolic incrustations are presented for Mount St. Helens, Etna, and Colina. A general discussion is given on the transport of different elements and compounds in volcanic clouds, and the chemistry of different reactions.

REFERENCE NO. A00517

THOMAS, G.E.

1983

Satellite measurements of the El Chichon stratospheric cloud.

JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia

VOLUME/PAGE NO. 390-393

SUBJECT KEYWORDS * El Chichon * Remote sensing * SME satellite *

A brief account is given of the spatial and temporal evolution of the El Chichon eruption cloud based on data from three instruments on board the Solar Mesosphere Explorer (SME) satellite. These type of data combined with ground observations, such as lidar, have the potential for providing zonally averaged altitude profiles during the cloud's lifetime.

REFERENCE NO. A00217

THOMAS, G.E., JAKOSKY, B.M., WEST, R.A., SANDERS, R.W.

1983

Satellite limb-scanning thermal infrared observations of the El Chichon stratospheric aerosol: first results.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 997-1000.

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Cloud dynamics * El Chichon * Gas/vapour plumes * Remote sensing * SME satellite *

An infrared radiometer on board the Solar Mesosphere Explorer satellite can be used to measure the rate of aerosol production from volcanic eruptions. Data from the SME is used in this paper to estimate that the mass of aerosol resulting from the April 1982 El Chichon volcanic activity reached 8 Tg about 15 weeks after the eruption.

REFERENCE NO. A00060

TOMBLIN, J.

1982

Eruption of Galunggung volcano, Indonesia, 1982. Mission report by John Tomblin (4-9 May 1982).

JOURNAL/PUBLISHER United Nations Office of the Disaster Relief Co-ordinator, Geneva, 10 May 1982, UNDRO

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Galunggung * Indonesia *

An UNDRO mission visited west Java following the 25 April 1982 eruption, to co-ordinate international assistance, to issue a relief appeal, and to assist with the assessment of the on-going volcanic activity. This report covers all aspects of the visit, and includes relevant UNDRO telexes. However, no mention is made of aircraft/ash-cloud encounters.

REFERENCE NO. A00548

TOON, O.B.

1982

Volcanoes and climate.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 15-36

SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Fuego * Glacier records * Krakatau * Mount St. Helens * Tambora * United States *

A concise, comprehensive review is given of the relationships between volcanic eruptions and climate. Topics considered are: changes in climate after single eruptions; changes during epochs of volcanic activity; and theoretical relationships between eruptions and climate. Climate change would not be expected to follow the 1980 eruption.

REFERENCE NO. A00342

TOON, O.B.
1983
Oddities and unsolved problems in the theory of the effects of volcanic eruptions on climate.
JOURNAL/PUBLISHER Proceedings of the Seventh Annual Climate Diagnostics Workshop, Boulder, Colorado, 1982. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Springfield, Virginia
VOLUME/PAGE NO. 397-402
SUBJECT KEYWORDS * Climate change * El Chichon * Meteorology *

The author uses the results of empirical studies of earlier eruptions and theoretical calculations to suggest that the 1982 El Chichon eruption may produce 'potential changes in climate in 1982-84'. The eruption is the first time in the history of modern meteorology that a clear external cause of climate changes and its effects can be observed.

REFERENCE NO. A00219

TOON, O.B.
1986
The evolution of volcanic clouds.
JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island
VOLUME/PAGE NO. 99-100
SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Cloud dynamics * El Chichon * Indonesia * Krakatau * Mount St. Helens * United States *

A short, general, and partly historical review is provided on volcanic clouds, their composition, evolution, and effect on climate. Eruptions at Mount St. Helens, Agung, Krakatau, and especially El Chichon are highlighted. The author concludes with a list of the type of research still to be done.

REFERENCE NO. A00518

TOON, O.B., POLLACK, J.B.
1973
Physical properties of the stratospheric aerosols.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 78 (30), 7051-7056
SUBJECT KEYWORDS * Aerosols *

A theoretical assessment is given of equilibrium vapour pressures over nitric and sulphuric acid solutions. Conclusions are that nitric acid cannot be present as an aerosol product in the lower stratosphere, and that sulphuric acid aerosol particles are 75 percent acid by weight in water, in good agreement with direct observations.

REFERENCE NO. A00042

TOON, O.B., POLLACK, J.B.
1980
Atmospheric aerosols and climate.
JOURNAL/PUBLISHER American Scientist
VOLUME/PAGE NO. 68, 268-278
SUBJECT KEYWORDS * Aerosols * Agung * Atmosphere loading * Climate change * Eruption frequencies * Indonesia *

A readable overview is provided in this semi-technical account of the effects on the Earth's radiation balance of aerosol concentrations in the stratosphere. Volcanogenic aerosols and effects on climate are discussed.

REFERENCE NO. A00159

TOON, O.B., POLLACK, J.B.
1982
Stratospheric aerosols and climate.
JOURNAL/PUBLISHER The Stratospheric Aerosol Layer (Editor, R.C.Whitten). Springer-Verlag, Berlin.
VOLUME/PAGE NO. 121-147
SUBJECT KEYWORDS * Aerosols * Agung * Climate change * Eruption frequencies * Glacier records * Indonesia * Mount St. Helens * Remote sensing * Tambora *

A comprehensive review is provided of the control by aerosols on sunlight absorption and infrared radiation emitted from the Earth's surface. Times of intense volcanic activity are cooler than non-volcanic periods. Historical volcanic eruptions such as Agung 1963 are considered and used to review models of the climatic effects of eruptions.

REFERENCE NO. A00149

TOOTELL, B.

1985A

All Four Engines Have Failed : the True and Triumphant Story of Flight BA 009 and the 'Jakarta Incident'.

JOURNAL/PUBLISHER Andre Deutsch, London

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Ash encounters * Australia * Damage reports * Defensive inflight measures * Electrical effects * Galunggung * Indonesia *

The author was a passenger on board British Airways flight BA009 on 24 June 1982 when the Boeing 747 aircraft ran into volcanic ash from Galunggung volcano, Indonesia, en route to Perth, Western Australia. Her non-technical account deals largely with passenger reactions, but also includes the procedures adopted by flightdeck officers.

REFERENCE NO. A00001

TOOTELL, B.

1985B

All four engines have failed

JOURNAL/PUBLISHER Australian Women's Weekly

VOLUME/PAGE NO. July, 115-118

SUBJECT KEYWORDS * Ash encounters * Australia * Damage reports * Defensive inflight measures * Electrical effects * Galunggung * Indonesia *

The author of 'All Four Engines have Failed' (Tootell, 1985A) provides an abbreviated version of her book on her experiences on board the British Airways 747 aircraft that encountered volcanic ash from Galunggung volcano, Indonesia, in 1982. The incident is described as 'the most terrifying ordeal of her life'.

REFERENCE NO. A00313

TRACY, R.F.

1983

Operational recommendations for inadvertent entry into volcanic ash clouds.

JOURNAL/PUBLISHER United Technologies, Pratt and Whitney, Flight Operations Engineering Bulletin

VOLUME/PAGE NO. 83-1

SUBJECT KEYWORDS * Ash encounters * Damage reports * Defensive inflight measures *

The manager of Flight Operations Engineering, Pratt and Whitney company, provides a list of the procedures to be adopted by airborne pilots of Boeing 747 aircraft, in the event of engine failure caused by volcanic ash ingestion. An engines damage report is also given. See also Dilda (1982).

REFERENCE NO. A00022

TURCO, R.P., TOON, O.B., WHITTEN, R.C., KEESEE, R.G., HAMILL, P.

1982

Simulation studies of the physical and chemical processes occurring in the stratospheric clouds of the Mount St. Helens eruptions of May and June 1980.

JOURNAL/PUBLISHER Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mount St. Helens (Editor, A. Deepak). National Aeronautics and Space Administration, Scientific and Technical Information Branch, Conference Publication

VOLUME/PAGE NO. 2240, 161-189

SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Climate change * Gas/vapour plumes * Mount St. Helens * United States *

A comprehensive description and assessment is given of the physical and chemical properties of the stratospheric clouds of 18 May, 25 May, and 13 June 1980. Data are used to construct detailed model simulations of the eruptions in which a one-dimensional model of stratospheric sulphate aerosols, precursor sulphur gases, ash, and dust is used.

REFERENCE NO. A00370

UNDRO

1977

Disaster prevention and mitigation. A compendium of current knowledge. Volume 1 : Volcanological aspects..

JOURNAL/PUBLISHER Office of the United Nations Disaster Relief Co-ordinator, Geneva

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Indonesia * Japan * United States * Volcanic prediction *

UNDRO produced this report in conjunction with USGS volcanologist G.A. Macdonald. The main topic is volcanic-hazard identification, but the report includes a chapter on volcanic prediction. Numerous examples of volcanoes and their eruptions are given, including many from the Indonesian region.

REFERENCE NO. A00244

UNESCO

1971
The Surveillance and Prediction of Volcanic Activity : a Review of Methods and Techniques.
JOURNAL/PUBLISHER Earth Sciences. UNESCO, Paris
VOLUME/PAGE NO. 8
SUBJECT KEYWORDS * NIMBUS/TOMS satellites * Remote sensing * Volcanic prediction *

This UNESCO report is a compilation of ten papers by authors who deal with the different techniques used to monitor volcanoes and predict eruptions. The volume is a little out-of-date, but is still a useful general reference to the principles of volcanic prediction and volcano surveillance.

REFERENCE NO. A00009

VAREKAMP, J.C., LUHR, J.F., PRESTEGAARD, K.L.

1984
The 1982 eruptions of El Chichon volcano (Chiapas, Mexico) : character of the eruptions, ash-fall deposits, and gasphase.
JOURNAL/PUBLISHER Journal of Volcanology and Geothermal Research
VOLUME/PAGE NO. 23, 39-68
SUBJECT KEYWORDS * Aerosols * Ash characteristics * El Chichon * United States *

This comprehensive account of 1982 El Chichon pyroclastic eruptions includes the results of leachate analysis of ashes. Large amounts of adsorbed sulphate and chlorine, and moderate quantities of adsorbed fluorine, were detected. The exceptionally high sulphur content (2.6 wt percent SO3) resulted in a large stratospheric aerosol cloud.

REFERENCE NO. A00605

VEDDER, J.F., CONDON, E.P., INN, E.C.Y., TABOR, K.D., KRITZ, M.A.

1983
Measurements of stratospheric S02 after the El Chichon eruptions.
JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 1045-1048
SUBJECT KEYWORDS * Aerosols * El Chichon * Gas/vapour plumes * Mystery volcano *

Stratospheric sulphur dioxide concentrations at 15-20 km altitude and 23-50 N latitude are reported for April-December 1982. Samples obtained on some later flights may have been from the El Chichon eruption cloud, but were taken when most of the volcanically injected sulphur dioxide should have converted to sulphuric acid.

REFERENCE NO. A00089

VIE LE SAGE, R.

1983
Chemistry of the volcanic aerosol.
JOURNAL/PUBLISHER Forecasting Volcanic Events (Editors, H. Tazieff and J.C. Sabroux). Developments in Volcanology 1. Elsevier, Amsterdam
VOLUME/PAGE NO. 445-474
SUBJECT KEYWORDS * Aerosols *

An attempt is made to review the subject of aerosol characteristics, especially chemistry. Compositions and particle-flux measurements are considered, and the importance of relative particle size, chemical properties, and mode of generation is stressed. An aerosol classification is also given.

REFERENCE NO. A00253

VIEBROCK, H.J., FLOWERS, E.C.

1968
Comments on the recent decrease in solar radiation at the South Pole.
JOURNAL/PUBLISHER Tellus
VOLUME/PAGE NO. 20 (3), 400-411
SUBJECT KEYWORDS * Aerosols * Agung * Antarctica * Cloud dynamics * Indonesia * Meteorology *

The solar-radiation decrease is attributed to the 17 March 1963 Agung eruption, Indonesia, and results are integrated comprehensively with those published elsewhere into a global sequence of events. The 'dust' particles at the South Pole were 16-22 km high, and were primarily scatterers of solar radiation rather than absorbers.

REFERENCE NO. A00227

VISCONTI, G., MATARESE, A., PITARI, G.

1988
A study of the El Chichon perturbation in the stratospheric dynamics : results from a 3D model.
JOURNAL/PUBLISHER Physica Scripta
VOLUME/PAGE NO. 37 (3), 466-468
SUBJECT KEYWORDS * Aerosols * El Chichon * Meteorology *

A general circulation model of the stratosphere has been used to assess the effects on the circulation of the heating introduced in the stratosphere by the 1982 El Chichon eruption. The authors suggest that even a large eruption such as El Chichon has a marginal influence on stratospheric circulation and the quasi-biennial oscillation.

REFERENCE NO. A00632

VISCONTI, G., VERDECCHIA, M., PITARI, G.
1988
A comparison of lidar data and two-dimensional simulation of dust transport from the eruption of El Chichon.
JOURNAL/PUBLISHER Journal of the Atmospheric Sciences
VOLUME/PAGE NO. 45 (7), 1097-1109
SUBJECT KEYWORDS * Aerosols * El Chichon * Meteorology *

A two-dimensional model has been integrated for two years to study the evolution of the El Chichon aerosol cloud in the stratosphere, starting about three months after the eruption. Discrepancies are noted between the model and measured optical thicknesses. The authors conclude that two-dimensional models are not suitable for simulation purposes.

REFERENCE NO. A00633

VOLZ, F.E.
1964
Twilight phenomena caused by the eruption of Agung volcano.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 144 (3622), 1121-1122
SUBJECT KEYWORDS * Agung * Indonesia * Meteorology * United States *

Increase in twilight glow and in the dust stripes in the twilight arch were observed from several places in the northern hemisphere from the fall of 1963 onwards. A considerable increase of dustiness in the stratosphere was indicated by measurements of twilight brightness. The turbidity is attributed to the Agung eruption, Indonesia.

REFERENCE NO. A00356

VOLZ, F.E.
1965
Note on the global variation of stratospheric turbidity since the eruption of Agung Volcano.
JOURNAL/PUBLISHER Tellus
VOLUME/PAGE NO. 17 (4), 513-515
SUBJECT KEYWORDS * Aerosols * Agung * Cloud dynamics * Europe * Indonesia * Krakatau * Meteorology * United States *

Atmospheric turbidity and twilight phenomena reported world-wide after the 1963 Agung eruption (Indonesia) are reviewed. Observations include those of the author in the United States, and in West Germany where a small increase in stratospheric turbidity was noted as early as May only two months after the eruption.

REFERENCE NO. A00246

VOLZ, F.E.
1975A
Burden of volcanic dust and nuclear debris after injection into the stratosphere at 48-58 N.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 80 (18), 2649-2652
SUBJECT KEYWORDS * Aerosols * Atmosphere loading * Katmai * United States *

A comparison is made between atmospheric turbidity (obtained from solar radiation data) after the 1912 Katmai eruption and the debris burden from Chinese nuclear tests. Turbidity and burden generally peak in Arctic latitudes. The residence time of Katmai 'dust' was about 1 year, and the aerosol amount about 13 million metric tons.

REFERENCE NO. A00121

VOLZ, F.E.
1975B
Distribution of turbidity after the 1912 Katmai eruption in Alaska.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 80 (18), 2643-2648
SUBJECT KEYWORDS * Aerosols * Cloud dynamics * Katmai * Meteorology * United States *

The spread and abatement of the aerosol injected into the stratosphere by the 1912 Katmai eruption is discussed. Turbidity was determined from solar-radiation data obtained mainly from central and northern Europe and the United States. The turbidity disappeared rather suddenly in late 1914. Average residence time of the dust was nearly one year.

REFERENCE NO. A00198

VOLZ, F.E.
1975C
Volcanic twilights from the Fuego eruption.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 189 (4196) 48-50
SUBJECT KEYWORDS * Fuego * Meteorology * United States *

Striated twilight glows were observed on 26 November and afterwards in New England, corresponding to the spread of stratospheric 'dust' observed earlier over Arizona. Similar photometric results were obtained elsewhere in the United States. The source of the dust is attributed to eruptions at Fuego volcano, Guatamala, in October, 1974.

REFERENCE NO. A00357

VOSSLER, T., ANDERSON, D.L., ARAS, N.K., PHELAN, J.M., ZOLLER, W.H.

1981
Trace element composition of the Mount St. Helens plume : stratospheric samples from the 18 May eruption.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 211, 827-830
SUBJECT KEYWORDS * Ash characteristics * Mount St. Helens * United States *

Atmospheric particulate material in the stratospheric plume of 18 May eruption was similar in composition to that of ash that fell to the ground in western Washington. However, there were small differences in concentrations of some elements with altitude, indicating that the stratospheric material was produced mainly from fresh magma.

REFERENCE NO. A00560

W., L.A.

1989
Satellite images monitor volcanoes.
JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union.
VOLUME/PAGE NO. 70 (5), 74-75.
SUBJECT KEYWORDS * Early-warning measures * FAA * Remote sensing * TIROS satellites * United States *

A brief announcement is given of the establishment of a volcano advisory and monitoring service under an agreement between the FAA and NOAA. Information on volcanic eruptions obtained by NOAA would lead to an assessment of an eruption using satellite images and, later, to projections of plume movement. The results would then be sent to FAA and pilots.

REFERENCE NO. A00520

WALKER, G.P.L.

1981
Plinian eruptions and their products.
JOURNAL/PUBLISHER Bulletin Volcanologique
VOLUME/PAGE NO. 44 (2), 223-240
SUBJECT KEYWORDS * Cloud dynamics * Eruption frequencies * Europe * Japan * New Zealand * Papua New Guinea * Rabaul * Tarawera * United States * Volcano lists *

Historical data on 12 plinian eruptions, and available quantitative data on the deposits of these plus 37 other plinian eruptions, are collated in order to characterise further the plinian eruptive style. Almost all volcanic magma compositions apart from the most mafic are represented among the juvenile products. Rhyolite and dacite deposits are common.

REFERENCE NO. A00624

WALLACE, C.

1988
Qantas runs the Pacific's gauntlet.
JOURNAL/PUBLISHER The Herald
VOLUME/PAGE NO. 6 January 1988
SUBJECT KEYWORDS * Ash encounters * Australia * Early-warning measures * Indonesia * Working groups *

A journalist provides a short newspaper article dealing with Australian and Indonesian efforts to mitigate the threat of volcanic ash clouds to aircraft on Australia-bound flights. The work of Australia's Airways Volcano Watch and of VULCAN/AUS is highlighted and is said to be a model for similar warning systems overseas.

REFERENCE NO. A00452

WANG, P.-H., McCORMICK, M.P.

1985
Variations in stratospheric aerosol optical depth during northern warmings.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 90 (D6), 10597-10606
SUBJECT KEYWORDS * Aerosols * Meteorology * Remote sensing * SAMII/SAGE sensors * United States *

The properties of the stratospheric aerosol depth above 50 mbar have been studied by using aerosol extinction profiles derived from the Stratospheric Aerosol Measurement (SAMII) and Stratospheric Aerosol and Gas Experiment (SAGE) at high northern latitudes. Results are discussed in relation to the effects of the circumpolar cyclonic vortex.

REFERENCE NO. A00505

WEINERT, R.A.

1967
The movement and dispersion of volcanic dust from the eruption of Mt. Agung, Bali, 17 March
JOURNAL/PUBLISHER Australian Meteorological Magazine
VOLUME/PAGE NO. 15, 225-229
SUBJECT KEYWORDS * Agung * Ash characteristics * Australia * Cloud dynamics * Indonesia * Meteorology *

Dispersion southeastwards across Australia of the ash from Agung volcano (Indonesia) is described and analysed from a meteorological viewpoint. The ash is believed to have been within a layer of relative calm between lower-level westerly winds and upper-level easterlies. Its height increased in a southeasterly direction from 14 to 27 km.

REFERENCE NO. A00249

WEISBURD, S.

1985

Excavating words : a geological tool. Human histories unravel geological mysteries.

JOURNAL/PUBLISHER Science News

VOLUME/PAGE NO. 127, 91-94

SUBJECT KEYWORDS * Aerosols * Climate change * Papua New Guinea * Rabaul *

The author reviews research by Rampino, Stothers, Pang, and others into ancient historical documents that contain reference to volcanic activity - mainly indirect records of atmospheric/climate changes caused by inferred stratospheric aerosol injections. An A.D. 536 eruption is highlighted and attributed to the 1400 yr BP eruption at Rabaul, PNG.

REFERENCE NO. A00268

WEXLER, H.

1951

On the effects of volcanic dust on insolation and weather (I).

JOURNAL/PUBLISHER Bulletin American Meteorological Society

VOLUME/PAGE NO. 32 (1), 10-15

SUBJECT KEYWORDS * Aerosols * Climate change * Europe * Indonesia * Katmai * Krakatau * Meteorology *

The effects of volcanic dust in the atmosphere are predicted to be: reduction of solar radiation; increase in the north-south gradient of solar radiation; and increased cloud cover because of nucleation caused by ash particles. Meteorological effects following the 1883 Krakatau, 1912 Katmai, and other eruptions are discussed.

REFERENCE NO. A00286

WEXLER, H.

1952

Volcanoes and world climate.

JOURNAL/PUBLISHER Scientific American

VOLUME/PAGE NO. 186, 74-80

SUBJECT KEYWORDS * Climate change * Indonesia * Katmai * Krakatau * Meteorology *

A short, popular account is given of the theory that large explosive volcanic eruptions like Krakatau 1883 and Katmai 1912 may cause climate changes by reducing the amount of solar radiation for up to three years. Other theories of climate change are criticised, but the author concludes that volcanism may not be the sole cause of changes.

REFERENCE NO. A00263

WEXLER, R., ATLAS, D.
1963
Radar reflectivity and attenuation of rain.
JOURNAL/PUBLISHER Journal of Applied Meteorology
VOLUME/PAGE NO. 2, 276-280
SUBJECT KEYWORDS * Meteorology * Radar * Remote sensing *

Radar reflectivity and attenuation of rain are computed for different drop-size distributions using more accurate and systematic calculations of the back-scatter and attenuation cross sections from Mie theory. Attenuation is roughly proportional to rain intensity.

REFERENCE NO. A00195

WHITTEN, R.C. (Editor)
1982
The Stratospheric Aerosol Layer.
JOURNAL/PUBLISHER Springer-Verlag, Berlin
VOLUME/PAGE NO.
SUBJECT KEYWORDS * Aerosols *

Five comprehensive papers comprise this book on stratospheric aerosol studies. Three of the papers appear elsewhere in the bibliography. See: Whitten and Hamill, Inn et al., and Toon and Pollack.

REFERENCE NO. A00140

WHITTEN, R.C., HAMILL, P.
1982
Introduction.
JOURNAL/PUBLISHER The Stratospheric Aerosol Layer (Editor, R.C.Whitten). Springer-Verlag, Berlin
VOLUME/PAGE NO. 1-14
SUBJECT KEYWORDS * Aerosols * Climate change * Gas/vapour plumes *

The editor of this book and his co-author provide an introductory background paper on stratospheric aerosols. They consider measurement techniques, the influence of aerosols on climate, and microphysical processes such as condensation, coagulation, and transport.

REFERENCE NO. A00150

WICKMAN, F.E.

1966A

Repose period patterns of volcanoes I. Volcanic eruptions regarded as random phenomena.

JOURNAL/PUBLISHER Arkiv for Mineralogi och Geologi
VOLUME/PAGE NO. 4 (7), 291-301
SUBJECT KEYWORDS * Eruption frequencies *

This paper is the first in a series of five on eruption periodicity based on world-wide data. Statistical principles of renewal theory are adapted to define the concepts of 'age-specific eruption rate' and 'survival numbers' which are then used to determine whether eruption repose periods are random or not.

REFERENCE NO. A00288

WICKMAN, F.E.

1966B

Repose period patterns of volcanoes II. Eruption histories of some East Indian Volcanoes.

JOURNAL/PUBLISHER Arkiv for Mineralogi och Geologi
VOLUME/PAGE NO. 4 (8), 303-317
SUBJECT KEYWORDS * Eruption frequencies * Indonesia *

Eruption periodicities for ten Indonesian volcanoes using mainly data compiled by Neumann van Padang (1951) are analysed using statistical concepts discussed in the first part of this series of five papers (Wickman, 1966A). The periodicities for each of the ten volcanoes are markedly different.

REFERENCE NO. A00289

WICKMAN, F.E.

1966C

Repose period patterns of volcanoes III. Eruption histories of some Japanese volcanoes.

JOURNAL/PUBLISHER Arkiv for Mineralogi och Geologi
VOLUME/PAGE NO. 4 (9), 319-335
SUBJECT KEYWORDS * Eruption frequencies * Japan *

Repose periods for eruptions from nine Japanese volcanoes (data from the 1962 IAVCEI Catalogue) are analysed by calculation of survival-number functions and equivalent age-specific eruption rate curves (see Wickman, 1966A). The volcanoes have different eruption patterns which also seem different from those of Indonesian volcanoes.

REFERENCE NO. A00290

WICKMAN, F.E.

1966D

Repose period patterns of volcanoes IV. Eruption histories of some selected volcanoes.

JOURNAL/PUBLISHER Arkiv for Mineralogi och Geologi

VOLUME/PAGE NO. 4 (10), 337-350

SUBJECT KEYWORDS * Eruption frequencies * Europe * Philippines * United States *

Survival number functions and age-specific eruption-rate curves (see Wickman, 1966A) are presented for ten volcanoes from Europe, USSR, Philippines, Mexico, and Hawaii. The volcanoes represent many different kinds of volcanic activity, yet many have simple eruption-rate curves. Three of them seem to have roughly constant eruption rates.

REFERENCE NO. A00291

WICKMAN, F.E.

1966E

Repose period patterns of volcanoes V. General discussion and a tentative stochastic model.

JOURNAL/PUBLISHER Arkiv for Mineralogi och Geologi

VOLUME/PAGE NO. 4 (11), 351-367

SUBJECT KEYWORDS * Eruption frequencies * Europe * Indonesia * Japan * Philippines * United States *

The author concludes his series of five statistical papers on eruption periodicities with a general discussion of results. The volcanoes considered are regarded first as 'simple Poisson' in type (constant eruption rates). One and two-magma-chamber models and 'loading time' volcanoes are also considered.

REFERENCE NO. A00292

WILLIAMS, D.

1984

Sydney's climate since 1788 - a preliminary investigation.

JOURNAL/PUBLISHER B.Sc. Honours thesis, School of Earth Sciences, Macquarie University

VOLUME/PAGE NO.

SUBJECT KEYWORDS * Australia * Climate change * Indonesia * Tambora *

An historical review is given of early records of Sydney's climate, including the effects of volcanic eruptions in determining climate change. Tasmanian temperature data extend back to the late eighteenth century and include a 1.50 C temperature drop about 1815, corresponding to the Tambora eruption of that year.

REFERENCE NO. A00479

WILSON, C.R.

1976
Infrasonic pressure waves from the eruption of Augustine volcano.
JOURNAL/PUBLISHER Abstract (unpublished), American Geophysical Union, Spring Meeting. See Transactions of AGU for published abstracts of 1976 Augustine-eruption meeting.
VOLUME/PAGE NO. 67 (44), 1259-1260
SUBJECT KEYWORDS * Augustine * Infrasonics * United States *

Infrasonic waves from Augustine were received at Fairbanks, Alaska, 22 January to 6 February 1976. The largest signals were at 1737 and 1820 U.T. on 23 January. Average horizontal trace velocity was 357 m/sec, and the infrasound propagated from the volcano 688 km to Fairbanks by the stratospheric sound channel. Fourteen separate signals were recorded.

REFERENCE NO. A00426

WILSON, C.R., FORBES, R.B.

1969
Infrasonic waves from Alaskan volcanic eruptions.
JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 74 (18), 4511-4522
SUBJECT KEYWORDS * Augustine * Infrasonics * United States *

Explosive eruptions at Trident volcano and Redoubt volcano, Cook Inlet, were found by triangulation to be the sources of infrasonic waves received at College and Palmer, Alaska, during 1967 and 1968. The volcanic infrasonic waves propagated by lower and upper atmospheric sound channels. Velocities from College to Palmer ranged 275-289 m per sec.

REFERENCE NO. A00427

WILSON, C.R., NICHPARENKO, S., FORBES, R.B.

1966
Evidence of two sound channels in the polar atmosphere from infrasonic observations of the eruption of an Alaskan volcano.
JOURNAL/PUBLISHER Nature
VOLUME/PAGE NO. 211, 163-165
SUBJECT KEYWORDS * Agung * Infrasonics * United States *

The authors conclude that infrasonic pressure waves travelled from Mount Redoubt volcano during 24 January to 20 February 1966 by two different acoustic channels in the atmosphere. No evidence was found of infrasonic waves propagating around the Earth by a great-circle path through the Antipodes, as observed after the 1963 Agung eruptions.

REFERENCE NO. A00165

WILSON, J.C., BLACKSHEAR, E.D., HYUN, J.H.

1983

Changes in the sub-2.5 micron diameter aerosol observed at 20 km altitude after the eruption of El Chichon.

JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 1029-1032
SUBJECT KEYWORDS * Aerosols * El Chichon * Gas/vapour plumes * Mystery volcano *

Measurements of large concentrations of sub-0.1 micron particles in April and May 1982 imply that new particles formed after the eruption. Decreased numbers of sub-0.1 micron particles compared to pre-El Chichon measurements, were recorded in November and December 1982. Sulphur dioxide conversion rates are also given.

REFERENCE NO. A00068

WILSON, L., SPARKS, R.S.J., HUANG, T.C., WATKINS, N.D.

1978

The control of volcanic column heights by eruption energetics and dynamics.

JOURNAL/PUBLISHER Journal of Geophysical Research
VOLUME/PAGE NO. 83 (B4), 1829-1836
SUBJECT KEYWORDS * Cloud dynamics *

Observed eruption columns from eight eruptions with cloud heights in the range 2-45 km and volume rates of magma production in the range 10 to 0.23 million cubic metres per second are compared with predicted values from theoretical relationships for fluid convection. The maximum height expected for a stable plume is about 55 km.

REFERENCE NO. A00567

WITTEBORN, F.C., O'BRIEN, K., CREAN, H.W., POLLACK, J.B., BILSKI, K.H.

1983

Spectroscopic measurements of the 8- to 13-micrometer transmission of the upper atmosphere following the El Chichon eruptions.

JOURNAL/PUBLISHER Geophysical Research Letters
VOLUME/PAGE NO. 10 (11), 1009-1012
SUBJECT KEYWORDS * Aerosols * El Chichon * Remote sensing *

Infrared spectra of the atmosphere above 11 km were obtained between 2 S and 50 N in December 1982 using a spectrometer on board an aircraft. Absorption near 8.5 microns consistent with aerosols of sulphuric acid composition was measured from transmission spectra of the Sun.

REFERENCE NO. A00063

WOOD, C.A.
1984
Amazing and portentous summer of 1783.
JOURNAL/PUBLISHER EOS, Transactions of the American Geophysical Union
VOLUME/PAGE NO. 65 (26), 410
SUBJECT KEYWORDS * Aerosols * Climate change * Gas/vapour plumes * Laki * Meteorology *

A 1783 weather description by an English vicar is interpreted in relation to the atmospheric impact of the Laki fissure eruption, Iceland, which was characterised by largely non-explosive, highly voluminous, lava effusion. Stratospheric injection of volcanic S02 need not necessarily be a prerequisite for a major atmospheric imapct.

REFERENCE NO. A00228

WOOD, C.A.
1986
Space Shuttle observations of volcanic activity.
JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island
VOLUME/PAGE NO. 107-108
SUBJECT KEYWORDS * Europe * Indonesia * Japan * Manned spacecraft * Remote sensing * Sakurajima * United States * Vanuatu *

Space Shuttle astronauts have taken more than 30,000 photographs of the Earth using hand-held cameras, including shots of eruption plumes. Such an imaging approach is useful because 'the astronauts take full advantage of their orbital perspective and human intelligence to notice anomalous features. Space Station capabilities are mentioned.

REFERENCE NO. A00519

WOODS, D.C., CHUAN, R.L.
1982
Fine particles in the Soufriere eruption plume.
JOURNAL/PUBLISHER Science
VOLUME/PAGE NO. 216, 1118-1119
SUBJECT KEYWORDS * Ash characteristics * Soufriere *

Bimodal size distributions (peak concentrations at 1.1 and 0.23 microns) are reported for fine particles collected at 3 and 1.5 km altitude on 17 April and 15 May 1979, respectively.The submicrometer-sized particles were covered with liquid presumed to be sulphuric acid.

REFERENCE NO. A00117

WOODS, D.C., CHUAN, R.L.

1983

Size-specific composition of aerosols in the El Chichon volcanic cloud.

JOURNAL/PUBLISHER Geophysical Research Letters

VOLUME/PAGE NO. 10 (11), 1041-1044

SUBJECT KEYWORDS * Aerosols * Ash characteristics * El Chichon *

An impactor on board a U2 aircraft was used to collect El Chichon stratospheric materials. Particles included ash and lithic fragments, sulphuric acid, halite (believed to be from a salt dome beneath El Chichon), copper-zinc particles, and fluffy carbonaceous aggregates which are abundant but which may be independant of the eruption.

REFERENCE NO. A00085

YEEND, F.E.

1985

Methods of tracking clouds of volcanic ash.

JOURNAL/PUBLISHER ITA Magazine, Instituteof Air Transport

VOLUME/PAGE NO. December, 13-20

SUBJECT KEYWORDS * Ash encounters * Australia * Damage reports * Early-warning measures * Europe * GMS satellite * Galunggung * Indonesia * METEOSAT satellite * Remote sensing * Routes and schedules * TIROS satellites *

The author is the former First Assistant Secretary of the Flight Standards Division, Australian Department of Aviation. Mr Yeend provides a short, general account to the aircraft/ash-cloud problem from a largely Australian perspective. The article is well illustrated with satellite images of eruption plumes and dust storms.

REFERENCE NO. A00044

YOKOYAMA, I., TILLING, R.I., SCARPA, R.

1984

International Mobile Early-Warning System(s) for Volcanic Eruptions and Related Seismic Activities.

JOURNAL/PUBLISHER UNESCO and United Nations Environment Program, Paris

VOLUME/PAGE NO. FP/2106-82-01 (2286)

SUBJECT KEYWORDS * El Chichon * Europe * Galunggung * Indonesia * Japan * Manam * Mount St. Helens * New Zealand * Papua New Guinea * Ulawun * United States * Volcanic prediction * Volcano lists * Working groups *

The results of a UNESCO/UNEP-sponsored preparatory study of the proposed IMEWS programme are presented in this report. Recent case histories of volcanic crises are reviewed, and a list of so-called 'high-risk' volcanoes is given. Volcano-monitoring capabilities are also reviewed.

REFERENCE NO. A00035

ZEN, M.T.

1983

Mitigating volcanic disasters in Indonesia.

JOURNAL/PUBLISHER Forecasting Volcanic Events (Editors, H. Tazieff and J.C. Sabroux). Developments in Volcanology 1. Elsevier, Amsterdam

VOLUME/PAGE NO. 219-236

SUBJECT KEYWORDS * Indonesia * Volcanic prediction *

The author deals primarily with his own work on Merapi volcano, and with lahars (volcanic mudflows) and pyroclastic flows, but he also considers generalised aspects of national volcanic-mitigation policy in Indonesia. He concludes that 'present forecasting techniques have not yet had much success...'.

REFERENCE NO. A00247

ZEN, M.T., HADIKUSUMO, D.

1964

Preliminary report on the 1963 eruption of Mt. Agung in Bali (Indonesia).

JOURNAL/PUBLISHER Bulletin Volcanologique

VOLUME/PAGE NO. 27, 269-299

SUBJECT KEYWORDS * Agung * Indonesia * Krakatau * Tambora *

Agung had been dormant for about 120 years until eruptions began on 18 February 1963. The activity culminated in two paroxysms (17 March and 16 May) both of which are said to have produced eruption columns that reached heights of 10 km. Ash from the 17 March eruption spread into west Java, reaching Jakarta. Effects on aviation are not mentioned.

REFERENCE NO. A00275

ZOLLER, W H

1989

The enrichment of volatile metals in volcanic aerosols.

JOURNAL/PUBLISHER Norman D. Watkins Symposium Abstracts Volume, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

VOLUME/PAGE NO. 110-112

SUBJECT KEYWORDS * Gas/vapour plumes * United States *

An account is given of the analysis of particles and gas from Kilauea and Mauna Loa volcanoes, Hawaii, with particular reference to halogens and trace metals (arsenic, platinum-group elements, gold, etc.). Only a few percent of metal concentrations in the magma are released to the atmosphere. Samples were collected using Teflon and LiOH filters.

REFERENCE NO. A00521

ZUEV, V.E., KREKOV, G.M., RAKHIMOV, R.F.
1989
Modelling of optical properties of postvolcanic stratospheric layer.
JOURNAL/PUBLISHER Aerosols and Climate (Editors P.V. Hobbs and M.P. McCormick). A. Deepak Publishing, Hampton, Virginia, USA
VOLUME/PAGE NO. 233-240
SUBJECT KEYWORDS * Aerosols * Climate change *

Soviet atmospheric scientists present theoretical optical models of the stratospheric aerosol layer in order to predict the effects on climate of volcanic injections. Results are compared with observed altitude profiles of extinction coefficients and are claimed to be good.

REFERENCE NO. A00630