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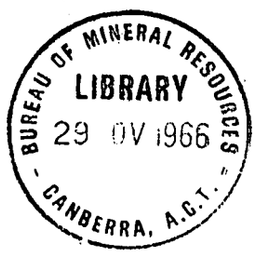

MELBOURNE OBSERVATORY GROUP ANNUAL REPORT, 1963

by

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SUMMARY

The magnetic and seismic recording instruments at Toolangi continued to operate throughout the year. Geomagnetic control observations were made every week. Magnetic instruments were calibrated when required, and some observations with the proton precession magnetometer were made.

The Milne-Shaw seismograph from Melbourne and the long-period Lamont seismographs from Perth were installed in the seismological observatory.

Electric power became available at the magnetic observatory and will be connected early in 1964.

The Antarctic observatories were operated continuously throughout the year.

The temporary seismological observatory at Darwin continued to operate, and the search for a site for a permanent standard station was continued.

At head office, data and records were analysed, and the results were distributed.

1. INTRODUCTION

This is the second in the series of annual reports on the activities of the Melbourne Observatory Group.

A brief description of the group and what it comprises is given in the report for 1962 (van der Waal, 1966). The relation between Mundaring and Port Moresby observatories and the Melbourne Observatory Group is also explained in that report.

Few changes have occurred during the year. Some additional seismometers were installed in the new observatory at Toolangi but no changes occurred at the magnetic observatory.

A request was received to consider the future take-over of a linear array seismic station that the United Kingdom Atomic Energy Authority proposes to establish in Australia. This was discussed but no recommendations could be made until further details were available.

2. TOOLANGI OBSERVATORIES

Magnetic recording

Recording of the three elements of the geomagnetic field with the La Cour magnetograph was continued throughout the year. The sensitivities of the variometers remained the same at 1.17 minutes per millimetre for D, 4.6 gammas per millimetre for H, and 4.4 gammas per millimetre for Z. Weekly control observations were carried out with the Ruska magnetometer for D, with three QHMs for H, and with a BMZ for Z.

The proton precession magnetometer was returned from Antarctica in April after unsuccessful observations at Macquarie Island and Mawson. At Macquarie Island the baselines were uncontrolled during the observations and at Mawson the instrument was out of range.

During the year the instrument was sent to Gnangara; the measured values differed from expected values by +2 gammas in H and -9 gammas in Z. After return, the instrument was tested at Toolangi and an inconsistency of about 7 gammas was observed between directly observed H and the value derived from F and Z. The levelling of the coil was suspected, and the coils were returned to the workshop for testing and adjusting.

The magnetometer without the coils was sent to Macquarie Island again in December 1963, and the observations were successful. The instrument is also being sent to Wilkes and Mawson.

Some pier differences in F were determined in the Toolangi absolute hut. It is proposed to measure the H and Z differences in 1964.

Comparison observations at Toolangi are listed in Appendix 2.

The micropulsation recorder being operated for the University of Queensland was maintained in continuous operation and the tapes were forwarded to Brisbane regularly.

Electric power became available at the magnetic observatory site in August. Wiring drawings were compiled by the Department of Works and tenders were called. A contract was let in November and was to be finished by 6th January. However, work had not started by the end of December.

Magnetic analysis

The results of all control and comparison observations were computed and checked in the Melbourne office, and the normal routine analysis and distribution of results were carried out as described in the report for 1962 (van der Waal, 1966).

The trace-reader was inoperative throughout the year and no magnetograms were scaled. However, previously scaled data were punched on to paper tape and the tapes were checked. By the end of the year, all hand-scaled data from recent years had been punched on to paper tape, and the tapes verified and compared. After this, punching of data from Toolangi for the years 1934 to 1938 was commenced.

A request was received from the National Aeronautics and Space Administration (N.A.S.A.) of the USA for copies of magnetograms from all our stations within two months of the recording date. The records were required in connexion with launchings of two series of satellites (the Orbiting Geophysical Observatory series and the Interplanetary Monitoring Probe series) which are expected to make high quality magnetic measurement from 1963 to 1965. During these measurements it is necessary to have information on the behaviour of the magnetic field at the Earth's surface. Consequently microfilm copies of magnetograms from 1st January 1963 onwards were sent to N.A.S.A. monthly.

Requests for copies of magnetograms, hourly mean values, and annual mean values were fulfilled for two local and eight overseas institutions. A number of telephone enquiries for values of declination in different parts of Australia were answered.

Seismic recording

Recording with the Benioff short-period seismograph was continued throughout the year. In May the Milne-Shaw seismograph from the Melbourne Observatory was installed at Toolangi. The instrument produced excellent records and proved to be very helpful in analysing some distant earthquakes.

The three-component long-period seismograph belonging to the Lamont Geological Observatory, which had been operated in Perth for several years, was transferred to Toolangi in October. This seismograph consists of a Columbia-type vertical seismometer with a period of 15 seconds and two Sprengnether horizontal seismometers with an adjustable period of 4 to 25 seconds. All three components were adjusted to operate at a 15-second period. The long-period Benioff three-channel recorder was used for these instruments because the three single-channel Lamont recorders did not fit on the existing recorder pier. A lot of trouble was experienced with the installation and operation of these instruments. Several parts were broken or unserviceable. Drift in the seismometers, especially the vertical one, often caused the boom to rest against the stops. Long-period oscillations occurred with temperature changes probably caused by

convection currents, and it will be necessary to construct styrene foam covers around the seisometers or find some other means of controlling this temperature. However, notwithstanding these troubles the present traces indicate that very good records will be obtained when all faults have been corrected.

Masks were fitted on the recorders so that the light intensity could be increased to enable fast-moving light spots to be recorded on the photographic paper. The masks reduce the effective width of the slit (thus decreasing the light intensity) when the light spot is near its equilibrium position but full light intensity is obtained when the light beam passes on either side of the masks. These masks are very effective and movements that were lost previously because of the rapid movement of a faint light spot are now recorded clearly.

The crystal clock broke down in March and the Synchronome pendulum clock took over the time marking while it was being repaired. Temperature tests were continued so that the behaviour of the clock can be checked over the full annual range of temperatures.

The proposed installation of a vertical seismograph in the Melbourne Observatory, with remote recording in the office, could not be carried out because of the delay in the construction of the auxiliary equipment.

The annual service to the Benioff recorders was done in July.

Seismic analysis

Normal analysis of earthquake data was done, and results were distributed as described in the annual report for 1962.

Co-operation with I.S.S. in the mark-sensing card experiment was continued.

No further progress was made with the proposed earthquake file.

3. ANTARCTIC OBSERVATORIES

R.J.S. Cooke, R. Underwood, and J.C. Branson, who were observers at Macquarie Island, Wilkes, and Mawson, respectively, were at head office most of the year to analyse the results of observations they made at these stations during 1962. Records were written describing the work done at the stations.

The seismograms were checked and re-analysed when necessary and the results were issued as observatory seismic bulletins.

Magnetic phenomena were abstracted and distributed.

Control observations were checked, and scale and baseline values were adopted. These data were prepared for punching on paper tape and further processing by electronic computer.

4. DARWIN SEISMOLOGICAL OBSERVATORY

The temporary seismological observatory at Darwin continued to operate for the whole year. However, all three recorders required overhaul, and one was sent to Melbourne in September. In December the second recorder broke down and was also sent to Melbourne for overhaul. Thus by the end of the year only one component was in operation.

The total number of earthquakes listed during the year was about 2300. Most of these were from a distance of 4.8° to 5.8° (about 530 to 670 km). A large earthquake, which was felt in several parts of Australia, occurred in this area on 4th November. For some time after this date, the rate of occurrence of tremors in this area increased by a factor of about three; i.e. from about 6 to about 18 per day.

The search for a site for a standard seismic station was continued. Seismic tests of the foundations were made by the Engineering Group of the Geophysical Branch (Andrew, 1963). It appears that a site near Manton Dam is suitable. Velocities of 13,000 ft/s in quartzite were found there. The site was then surveyed by R.G. Toy, and a Willmore seismometer and recorder from Darwin were installed there for a short time to test the noise level. It is proposed to check the weathering of the rock by drilling some holes.

In the meantime a submission was prepared requesting the Minister's approval of the project but no decision had been made by the end of the year.

5. REFERENCES

ANDREW, J.T.G. 1963 Darwin seismic observatory sites seismic refraction surveys, NT 1963. Bur. Min. Resour. Aust. Rec. 1963/151.

van der WAAL, C.A. 1966 Melbourne Observatory Group annual report, 1962. Bur. Min. Resour. Aust. Rec. 1966/173.

APPENDIX 1

Staff Movements and Visitors

Staff for the whole year

C.A. van der Waal

B.G. Cook

C.H. van Erkelens

R.J.S. Cooke

R.G. Toy

I. Bodo (Mrs.)

L. Stewart (Miss)

Commenced duty during the year on dates shown

V. O'Donnell (Miss)	Computer	7th February
G. Lodwick	Geophysicist Grade 1	19th March
G. Small	Geophysicist Grade 1	1st January

Resigned on dates shown

R.J.S. Hollingsworth	Geophysicist Grade 1	14th January
R. Underwood	Geophysicist Grade 1	21st October
E. Underwood (Mrs)	Computer	4th November

Antarctic staff movements

I.E. Black left for Mawson on 9th January.

R. Underwood returned from Wilkes on 11th March.

J.C. Branson returned from Mawson on 25th March.

G. Lodwick left for Port Moresby on 24th April for training and returned on 21st October. He attended the ANARE indoctrination course from 28th October to 1st November and a course at the Royal Melbourne Hospital, to train as assistant to the medical officer, from 18th to 29th November. He left for Macquarie Island on the Nella Dan on 12th December.

R.J.S. Cooke attended the ANARE indoctrination course from 28th October to 1st November.

J. Wilkie left for Mundaring on 29th July to train as observer at Wilkes but he did not pass the medical examination. He returned to Melbourne on 25th November.

G. Small was selected to go to Wilkes instead of Wilkie. He attended the ANARE indoctrination course from 28th October to 1st November. He

left for Mundaring for additional training on 11th November and returned on 16th December. He was due to leave for Wilkes on 3rd January 1964.

Vacation students

D. Horne, who joined the Group in November 1962, left on 1st March 1963.

D. Mines and J. Fok joined the group on 9th December 1963.

Miscellaneous

C.A. van der Waal acted as Supervising Geophysicist during W.D. Parkinson's absence overseas from February to September.

B.G. Cook acted as Senior Geophysicist during this time. He visited Darwin from 1st to 5th April in connexion with the testing of seismic observatory sites. He attended a Public Service Board Regional Management Conference from 8th to 19th July.

R.G. Toy left for Darwin for seismic site testing on 12th June and returned on 28th June.

Visitors

Lieut. Angeles of the Philippines visited the group for a few days from 10th February.

Rev. P.N. Mayaud S.J. visited the group from 17th to 26th June in connexion with his investigation of Lq.

C.L. Cookson of Port Moresby Observatory, who was in Melbourne for private reasons, visited the office on 20th and 26th June.

P.M. McGregor, O.I.C. Mundaring Geophysical Observatory, visited the Group on 30th September and 1st October after his return from overseas.

J.A. Brooks, O.I.C. Port Moresby Geophysical Observatory, visited Melbourne from 11th to 16th October.

The Public Service Arbitrator, Mr E.A. Chambers, visited Toolangi on 26th April and the Melbourne office on 3rd May.

The Director visited Toolangi on 3rd October.

The Geophysics class of the Melbourne University visited the office on 15th October.

APPENDIX 2

Comparison Observations at Toolangi during 1963

Instrument	Date
HTM 154	February, May
QHM 172	April
QHM 178	May, November
QHM 302	April, November
QHM 460, 461, 462	February, May
QHM 306 for D	March, May
Declinometer 580320	April
Declinometer 580339	March
BMZ 115	April, December
BMZ 211	April, October, November, December
BMZ 221	March, April