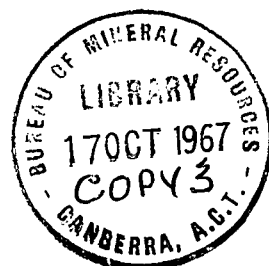


COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD NO. 1967/117



MELBOURNE OBSERVATORY GROUP
ANNUAL REPORT, 1965

by

C.A. van der Waal

The information contained in this report has been obtained by the Department of National Development as part of the policy of the Commonwealth Government to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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ILLUSTRATION

Plate 1. Pier plan, Toolangi absolute house
(Drawing No. G82/3-90)

SUMMARY

The magnetic and seismic recording instruments were maintained in continuous operation throughout the year and the normal magnetic control observations were made weekly.

The Head Office section of the Observatory Group was transferred to Canberra in May.

1. INTRODUCTION

A brief description of the Melbourne Observatory and its relation to the Mundaring and Port Moresby Observatories is given in the annual report for 1962 (van der Waal, 1966).

The history of the Toolangi Magnetic Observatory is published in Magnetic Results from Toolangi Observatory 1949-1951 (Dooley, 1959). Toy (1966) describes the Toolangi Seismic Observatory installation and equipment.

The main change during 1965 was the transfer of the BMR to Canberra. The Head Office section of the Observatory Group was transferred in May. The author remained in Melbourne in charge of the Toolangi and Antarctic Observatories. He was assisted by a Geophysicist Class 1 (later reclassified as Senior Technical Officer Grade 1), a Geophysical Assistant, and a Computing Assistant (female).

At Toolangi all records were changed and processed daily by a local resident who also kept the buildings clean and attended to the grounds. He mailed the processed records every day to the Melbourne Office.

In February several possible offices in the outer eastern suburbs were investigated but it was decided later that the office of the Melbourne Observatory Group would remain in the city. The office was moved to its permanent location on the 3rd Floor of Wentworth House on 30th November.

Apart from the main office there is a record and instrument store room and a small workshop.

Throughout the year Toolangi data were analysed in and distributed from the Melbourne Office. Data from the Antarctic Observatories were sent to and distributed from this office also.

2. TOOLANGI MAGNETIC OBSERVATORY

Buildings and grounds

All buildings were maintained in good order and grass and bracken were cut before the summer to reduce fire risk.

The locks of all buildings and gates were changed to a Master Key system, so that although all doors have different locks they can be opened by one Master Key.

Crushed rock paths between the magnetic buildings were completed in May.

Identification plates were fixed to the magnetic piers as shown in Plate 1. The azimuth of the new declination mark from Pier NM was determined by a surveyor of the Division of National Mapping in January and February by means of a series of star observations (Plate 1).

Operations

The normal-run La Cour magnetograph which records variations in D, H, and Z was maintained in continuous operation. Magnetograph data are summarised in Appendix 2. The Z and temperature traces had moved gradually closer together and commenced to overlap. In November the separation was increased and the light and trace intensities were adjusted.

Control observations were carried out once every week using the same instruments as in previous years, i.e. the Ruska Magnetometer 4813 for declination (D), QHMs 288, 289, and 290 for horizontal intensity (H), and BMZ 119 for vertical intensity (Z).

The QHMs and the BMZ were calibrated against the proton precession magnetometer in August. Initially some difficulty was experienced in levelling the H vector coil but later a good series of observations was obtained. Instrument corrections are given in Appendix 2.

The instruments which were returned from calibrating the control instruments at the Antarctic stations were compared in April and again in November/December before being sent to these stations again with the 1965/66 relief ships. All comparison observations are listed in Appendix 3.

The magnetic tape pulsation recorder at the Seismic Observatory belonging to the University of Queensland was adjusted by Dr J. Mainstone in August. However, in November it broke down completely and, at Dr Mainstone's request, was returned to Brisbane.

Analysis of results

Computation of control observations, scaling of K-indices, and extraction of geomagnetic storms and phenomena were done regularly.

Before the Head Office section of the group moved to Canberra the mean hourly scalings for Mawson 1959 and Macquarie Island 1964 were commenced but had to be discontinued in April to prepare the scaling equipment for transport to Canberra.

Distribution of results

K-indices and rapid variations were sent every month to the World Data Centres W.D.C. A (Rockville, USA), W.D.C. C1 (Charlottenlund,

Denmark), W.D.C. C2 (Kyoto, Japan), and to the Permanent Service in de Bilt (Netherlands) as well as to some interested organisations in Australia.

Geomagnetic storms were sent to Miss J.V. Lincoln in Boulder (USA) for publication in the Journal of Geophysical Research.

All the above data were also published in the BMR monthly Geophysical Observatory Reports for 1965.

Requests for magnetic data and copies of records were received from a number of local and overseas sources.

3. TOOLANGI AND MELBOURNE SEISMIC OBSERVATORIES

Buildings and grounds

The buildings at Toolangi were maintained in good order and bracken was kept short to reduce fire danger.

The proposed wall for better temperature control in the seismic vault was constructed around the exposed south side and proved very successful. The temperature inside the vault is now very steady and the long-period fluctuations in the long-period seismograph have been eliminated.

Operation

The Benioff short-period and the Lamont long-period seismographs operated continuously and required only minor adjustments. The Milne-Shaw seismograph was originally installed with the recorder and light source standing loose on a table in front of the pier on which the seismometer was installed. This table was frequently knocked in the dark, which resulted in the recorder and light source getting out of alignment. To prevent this the table was fixed to the floor, and the recorder and light source fixed to the table. Recording was resumed in February.

Seismograph data are given in Appendix 2.

The annual servicing of the Benioff recorders was done in May.

The crystal of the seismic power supply was put in a temperature controlled oven in September. The frequency stability was better after this, but occasional adjustments still had to be made.

The telephone time signal amplifier gave trouble and another amplification stage was added. It has been working without interruption since (Toy, 1966).

After it was decided that the Observatory office would remain in Melbourne, a Willmore seismometer was installed in the basement of the Old Melbourne Observatory building and a visual recorder in the office.

The output of the Willmore seismometer is fed into a phototube amplifier and the output of this into a modulator. The modulated signal is transmitted by telephone line to a demodulator in the office which is connected to the amplifier of the visual recorder.

This visual recorder is a Geotech Helicorder, which writes with a heated stylus on waxed paper.

Important earthquakes, especially local ones, can thus be checked immediately and if requested, information regarding these can be given, without having to wait for the seismograms from Toolangi.

Analysis and distribution of results

The analysis of earthquakes was continued throughout the year. The results were sent to the USCGS 'Determination of Epicenter' centre immediately after analysis and distributed to a number of Australian and overseas organisations every week. Once a month the final data were sent to Head Office to be punched for despatch to the International Seismological Research Centre in Edinburgh (Scotland).

The long-period seismograms were copied on microfilm and the originals were then forwarded to the Lamont Geological Observatory, which owns the seismograph and supplies the photographic paper and chemicals for its operation.

A number of requests for seismic data and copies of records were received from local and New Zealand sources.

4. ANTARCTIC OBSERVATORIES

Operation

In future the operation of the Antarctic observatories will be directed from the Melbourne Office, but the final analysis of results after the observers return to Australia will be done in Canberra because scaling and computing facilities are not available in Melbourne.

Separate reports are written about the operation of the Antarctic observatories by the 1965 observers : R.G. Sutton, Macquarie Island (in preparation); J. Haigh, Mawson (1967); and P.J. Browne-Cooper, Wilkes (in preparation).

Distribution of results

K-indices were received by telegram in the Melbourne office every month and forwarded to W.D.C. A, C1, C2, and the permanent centre as well as to the Geophysical Institute, Göttingen (West Germany).

These were also published in the monthly Geophysical Observatory Reports for 1965.

Earthquake phases were sent when available and forwarded to the USCGS 'Determination of Epicenter' centre.

The observers for 1964 commenced their report writing and analysis of results in Melbourne and continued in Canberra after their transfer in May.

As the stores did not transfer to Canberra until the end of the year, the 1966 re-orders were prepared by the Melbourne observatory staff.

5. REFERENCES

- | | | |
|---------------------|------|--|
| BROWNE-COOPER, P.J. | | Wilkes Geophysical Observatory annual report, 1965. <u>Bur. Min. Resour. Aust. Rec.</u> (in preparation). |
| DOOLEY, J.C. | 1959 | Preface to magnetic results from Toolangi Observatory, Victoria 1949-1951. <u>Bur. Min. Resour. Aust. Rep. 44.</u> |
| HAIGH, J. | 1967 | Mawson Geophysical Observatory annual report, 1965. <u>Bur. Min. Resour. Aust. Rec. 1967/28.</u> |
| SUTTON, R.G. | | Macquarie Island Geophysical Observatory Work, 1965. <u>Bur. Min. Resour. Aust. Rec.</u> (in preparation). |

6.

TOY, R.G.	1966	Toolangi Seismic Observatory installation and equipment. <u>Bur. Min. Resour. Aust. Rec.</u> 1966/42.
van der WAAL, C.A.	1966	Melbourne Observatory Group annual report, 1962. <u>Bur.</u> <u>Min. Resour. Aust. Rec.</u> 1966/173.

APPENDIX 1STAFF MOVEMENTSContinuous for the whole year

C.A. van der Waal
C.H. van Erkelens
R.G. Toy

Resignations on date shown

V. O'Donnel (Miss)	Computing Assistant	8th January
I. Black	Geophysicist Cl. 1	15th January
G. Smith	Geophysicist Cl. 1	24th March
I. Bode	Computing Assistant	21st April

Commenced duty on date shown

P. Woolley (Miss)	Computing Assistant	18th February
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Transfers

L. Stewart (Miss)	Punch operator - to gravity group	24th February
G. Lodwick	Geophysicist Cl. 1 to Canberra	27th April
B.G. Cook	Geophysicist Cl. 2 to Canberra	3rd May
J. Branson	Geophysicist Cl. 1 to Canberra	3rd May
G. Small	Geophysicist Cl. 1 to Canberra	7th May
R. Whitworth	Geophysicist Cl. 1 to Canberra	10th May
R.J.S. Cooke	Geophysicist Cl. 1 to Canberra	24th May

Antarctic staff

P.J. Browne-Cooper left for Wilkes on 8th January.
R. Whitworth and G. Small returned from Wilkes on 20th February.
R.J.S. Cooke returned from Mawson on 16th March.
E. Muir joined the group on 2nd August and left for Canberra on 9th August.
E. Muir, P. Towson, and F.J. Taylor attended the ANARE indoctrination course from 25th to 29th October.
P. Towson attended a course for assistant to the doctor at the Royal Melbourne Hospital from 22nd November till 3rd December.
E. Muir left for Macquarie Island on 6th December.
R.G. Sutton returned from Macquarie Island on 22nd December.
P. Towson left for Mawson on 29th December.

Miscellaneous

B.G. Cook was on relieving duty at Port Moresby from 13th January until 15th February.

Visitors

Dr. D. Carder of the USCGS visited the office on 13th February.

B.G. Cook visited 26th-30th July, 16th and 17th August, and 22nd November.

J.C. Dooley and Dr W.D. Parkinson visited 11th November.

J.A. Brooks and R.J.S. Cooke visited 22nd November.

P.M. McGregor returned from Macquarie Island on 24th March.

APPENDIX 2INSTRUMENT DATAMagnetic instrumentsMagnetograph data

Magnetograph	Element	Scale value	Standard deviation	
			Scale value	Baseline value
Normal	D	1.2 min/mm		0.1 minute
15 mm/hr	H	4.49 gammas/mm	0.02 gamma/mm	1.2 gammas
	Z	4.38-4.50 gammas/mm	0.01 gamma/mm	1.4 gammas

Control instrument data

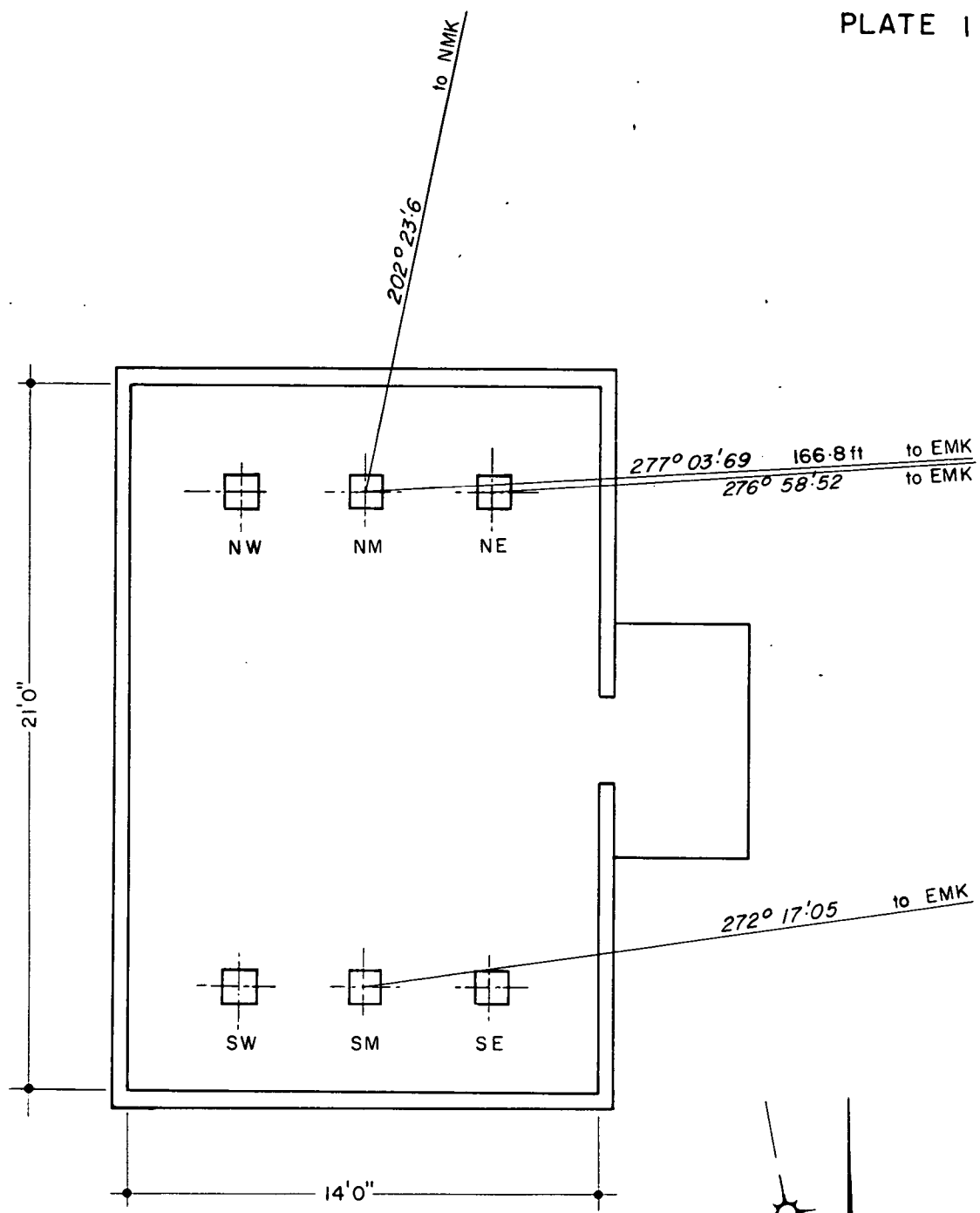
Magnetometer	Element	Instrument correction
Ruska 4813	D	- 0.3 minute
QHN 288	H	- 14 gammas
QHM 289	H	- 16 gammas
QHM 290	H	- 18 gammas
BMZ 119	Z	+ 32 gammas

Seismic instruments

Seismometer	T _s (sec)	T _g (sec)	Magnification	Recorder	Recording speed (mm/min)
Benioff E-W, N-S, Vert.	1	0.2	180,000 max at 0.4 second	Benioff 3 Channel	60
Sprengnether E-W, N-S	15	90	-	} Benioff } 3 Channel)	30
Columbia Vert.	15	90	-		
Milne Shaw E-W	12	-	250	Milne Shaw	7
Willmore Vert.	1	-	-	Geo Tech. Helicorder	30

APPENDIX 3COMPARISON OBSERVATIONS AT TOOLANGI DURING 1965

<u>Instrument</u>	<u>Date</u>
HTM 154	April, November
QHM 172	April, November
" 174	April, November
" 179	November
" 288)	
" 289)	April, July, August
" 290)	
" 300	April, November
" 493	April, November
Declinometer 509320	December
" 580333	November/December
" 630813	November, December
BMZ 115	April, November
" 119	April, July, August
" 211	April, December
" 221	January, November



NMK = Old mark on tree to north

EMK = New mark on concrete block to east

Bearings measured from south through west 0°-360°

TOOLANGI ABSOLUTE HOUSE
PIER PLAN