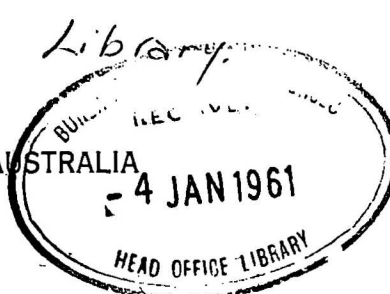


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DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS.

RECORDS

1959 NO. 132



THE GEOMAGNETIC WORK OF THE BUREAU OF
MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

| misleading.

NB. —————→ (in Antarctica)
Only.

by

L.S. PRIOR.

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RECORDS NO. 132.

THE GEOMAGNETIC WORK OF THE BUREAU OF
MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

by

L. S. PRIOR.

PREFACE.

The geomagnetic work described in this report, was planned and carried out by the Bureau of Mineral Resources, Geology and Geophysics of the Department of National Development. The instruments used in making the observations were supplied by the Bureau, but the observatory buildings, transport and living accommodation were provided by the Australian National Research Expedition which is responsible for the general administration of the stations.

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ABSTRACT.

A very brief description is given of the type of work in geomagnetism carried out by the Bureau of Mineral Resources, Geology and Geophysics, since the inception of the Australian National Antarctic Research Expedition.

The report is intended to serve as a reference to more complete publications on the work carried out rather than a discussion or presentation of results achieved.

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1. INTRODUCTION.

With the establishment of permanent research stations at Heard Island and Macquarie Island by the Australian National Research Expedition in 1947-48, there began a series of observations in geomagnetism in higher southern latitudes which has since been extended to the Antarctic continent.

The geomagnetic observatories which have been established have been operated and instrumentally equipped by the Bureau of Mineral Resources, Geology and Geophysics of the Commonwealth Department of National Development.

Field measurements have been made by officers of both the Bureau and the Australian National Research Expedition.

2. HEARD ISLAND.

Co-ordinates of the geomagnetic observatory were:-

- | | | | | |
|------|-------------|---|-----------|-----------|
| (i) | Geographic | - | Latitude | 53°01'.9S |
| | | | Longitude | 73°21'.9E |
| (ii) | Geomagnetic | - | Latitude | -61° |
| | | | Longitude | 129° |

Preliminary absolute and field variometer measurements were made on the proposed site in 1947 and 1950 (Jacka 1953) and in 1951 the station became fully operative. La Cour pattern normal run variometers recording horizontal intensity, declination and vertical intensity were installed and remained in operation until October, 1954, when the Australian National Research Expedition ceased its activities at Heard Island (Ingall 1955, Brooks 1956, Lodwick 1957).

Base line control was effected throughout the

period by weekly observations made with Quartz Horizontal magnetometers for horizontal intensity, with a modified Elliott magnetometer for declination and with a Magnetometric Zero Balance for vertical intensity.

During the stay of the annual relief expedition to the island, these instruments were intercompared with instruments calibrated against those at the Toolangi Magnetic Observatory.

3. MACQUARIE ISLAND.

Co-ordinates of the geomagnetic observatory are:-

- (i) Geographic - Latitude $54^{\circ}30' S$
Longitude $158^{\circ}57' E$
- (ii) Geomagnetic - Latitude $-60^{\circ}.7$
Longitude $243^{\circ}.0$

After preliminary absolute and field observations were made in 1948, 1949 and 1950 a series of continuous recordings of horizontal intensity was commenced in August, 1950 (Jacka 1953). In 1952 these recordings were succeeded by full-scale operation of La Cour pattern normal run variometers recording horizontal intensity, declination and vertical intensity. The station is still in operation although results have been published only up to 1954. (McGregor 1956, Tonni and Brooks 1956, Robertson 1957).

Baseline control and instrument comparison has followed the pattern described for Heard Island.

Situated on the "edge" of the auroral zone the Macquarie Island station has produced results useful for correlative studies with auroral effects. (Robertson 1959).

4. MAWSON.

Co-ordinates of the magnetic observatory are:-

- (i) Geographic - Latitude $67^{\circ}36' S$
Longitude $62^{\circ}53' E$
- (ii) Geomagnetic - Latitude -73°
Longitude 103°

Following the closing of the station at Heard Island by the Australian National Research Expedition the site for a geomagnetic observatory was selected at Mawson where full-scale operation commenced with La Cour pattern normal run variometers in August 1956 (Oldham 1959). Continuous recordings of horizontal intensity, declination and vertical intensity have been made since that date.

Baseline control and instrument comparison has followed the pattern described for Heard Island and Macquarie Island.

For special studies of short period ($T > 1$ sec.) variations during the International Geophysical Year a three component bar fluxmeter was installed in 1957 and remains in operation.

5. WILKES.

In 1959 the Australian National Antarctic Research Expedition took over the operation of the Wilkes (previously known as Knox Coast) station established by the United States of America. The geomagnetic observatory has been kept in operation in a manner similar to that described for previous stations. The instrumentation provided by the U.S. Coast and Geodetic Survey has been described elsewhere (I.A.G.A. 1957).

6. FIELD MAGNETIC OBSERVATIONS.

Since 1954, either during overland sledging operations organised by the Australian National Research Expedition or during coastal exploration voyages field magnetic measurements of declination, horizontal intensity, or dip have been made at selected intervals.

The distribution of stations at which these observations have been made is insufficient in scope for determining the field on a regional scale. However, the measurements when combined with those made by other nations should assist materially in the compilation of iso-magnetic maps (Pinn 1959).

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