COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES.
GEOLOGY AND GEOPHYSICS

RECORDS 1952 No. 52

DETERMINATION OF DIFFERENCES IN THE MAGNETIC ELEMENTS BETWEEN THE ABSOLUTE STATIONS ON THE NORTH END OF MACQUARIE ISLAND

by

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INTRODUCTION

Prior to the establishment of a magnetic observatory at Macquarie Island in July 1950, terrestrial magnetic observations had been made on the northern end of the island by the following expeditions:-

Australasian Antarctic Expedition 1911-14 (Webb 1925).

British, Australian, New Zealand, Antarctic Research Expedition 1929-31 (Farr 1944).

Australian National Antarctic Research Expedition 1947-8 (Chamberlain 1952).

Australian National Antarctic Research Expedition 1950 (unpublished report Schaefler).

The Australasian Antarctic Expedition 1911-14 established four absolute magnetic stations, namely Stations A,B,C and D, the main one being Station A. Subsequent observations were made on Station A until the magnetic observatory came into partial operation on the 10th July 1950, from which date all regular observations have been made in the absolute magnetic building on what is known as Station E.

In 1952, during the course of a series of instrumental intercomparisons an auxiliary station designated Station F was established about 25 feet approximately north-east of Station E.

The location of the various magnetic stations is shown on the attached map.

Because absolute magnetic observations had been made at different stations it was essential that the differences in the magnetic elements between the various stations be determined so that all data could be reduced to a common point. The observations were carried out during the period 31st March to 6th April 1952, whilst the Australian National Antarctic Research Expeditions relief operations were in progress. The writer was assisted by Messrs. W.H. Oldham and P.M. McGregor, Geophysicists of the Bureau of Mineral Resources, Geology and Geophysics.

INSTRUMENTS

The instruments used were:-

La Cour pattern Quartz Horizontal Magnetometers No's. 177 & 179.

Askania Magnetometer No.508810.

Watts pattern Vertical Force Magnetic Variometer No. 15887.

METHODS OF OBSERVATION

The differences in declination and horizontal intensity between Stations A and E were obtained from observations made simultaneously on each station, the instruments being interchanged. The difference in the vertical intensity was obtained from observations made alternately on Station A and Station E, corrections for changes in the vertical field with time being obtained from the magnetograms of the Macquarie Island Magnetic Observatory.

Only the differences in declination and horizontal intensity between Stations E and F were determined. These differences were derived from the results of instrumental intercomparisons made during this period.

Although the magnetic conditions were extremely disturbed throughout the period of observations, the methods of observation used enabled an accurate determination of the station differences to be made.

RESULTS

Considering easterly declination as positive and vertical intensity in the Southern Hemisphere as negative, the following station differences were obtained:-

Station A - Station E.	Declination:-	+ 27.0'
	Horizontal Intensity:-	+ 57 gammas.
	Vertical Intensity:-	-51 gammas.
Station E - Station F.	Declination:-	+1.0'
	Horizontal Intensity:-	+2 gammas.

Rex E Ervin

(Rex E. Ervin)
24/7/52.

Melbourne.

REFERENCES

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(3) Chamberlain, N.G. 1952. Observations of Terrestrial Magnetism at Heard, Kerguelen and Macquarie Islands 1947-1948. Bureau of Mineral Resources, Geology and Geophysics, Commonwealth of Australia, Report No.5.

(4) Schaefler, G.F. 1950. Absolute Magnetic Observations in Sub-Antarctic Areas 1950. Bureau of Mineral Resources, Geology and Geophysics - Unpublished Report.

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158°57'21"E

54°29'54"8

HASSELBOROUGH BAY

WIRELESS HILL

SEISMOLOGICAL OBSERVATORY

A.N.A.R.E. STATION AREA

TERN ROCK

Rocky platform

Shingle beach

CAMP HILL

GARDEN COVE

HAYTER'S ROCK

Cosmic Ray Hut

Mast

Underground power line

Meteorological and Wireless Huts

MAGNETIC STATION B

MAGNETOGRAPH HUT

MAGNETIC STATION F

ABSOLUTE MAGNETIC HUT (MAGNETIC STATION E)

TIDE GAUGE

Rock

niggerheads

reefs

Offshore

beach

Old tussocks

Sea elephant wallow

Landing beach

Sandy

BUCKLES BAY

MAGNETIC STATION A

D

C

B

351° 52'.8 400 yds. approx.

354° 56'.9 200 yds. approx.

280 yds. approx. 12° 29'

174° 56'.9 120 yds. approx.

A.N.A.R.E. STATION AREA

MACQUARIE I.

SANTIAGO

LA PLATA

CAPE TOWN

JOHANNESBURG

HEARD ISLAND

KERGUELEN ISLAND

WELLINGTON

MELBOURNE

ADELAIDE

PERTH

RIVERVIEW SYDNEY

WATHEROO

APIA

SUVA

True North

Declination

LOCALITY DIAGRAMS

SKETCH MAP OF

A.N.A.R.E. STATION AREA

MACQUARIE ISLAND

SHOWING THE LOCATION OF THE ABSOLUTE MAGNETIC STATIONS ON THE NORTH END

All Bearings are True Bearings measured from the North

Reference: Seismological Observatory, Lat. 54° 29′ 54″.8 S Long. 158° 57′ 21″.9 E. Astronomical Fix by Dovers, A.N.A.R.E., 1950

Control: Triangulation Survey by Dovers, 1950

Detail: Stadia detail survey by Dovers, 1950 with additional information from air and ground photography by Summons, Bureau of Mineral Resources, 1950

Reliability: Accurate.

FEET 0 100 200 300 400 500 600 700 800 900 1000 FEET

SCALE

CONTOUR INTERVAL 10 FEET

LEGEND

Cliffs

800 Contours

18′ Spot heights

Reproduced by Royal Australian Survey Corps

Compiled and drawn by Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics. 1950

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