# BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

# RECORD

BMR RECORD 1982/20

GEOPHYSICAL MAPS OF PARTS OF ENDERBY, KEMP AND Mac.ROBERTSON LANDS, ANTARCTICA, 45 TO 82°E

by

Peter Wellman

BMR RECORD 1982/20

# GEOPHYSICAL MAPS OF PARTS OF ENDERBY, KEMP AND Mac.ROBERTSON LANDS, ANTARCTICA, 45 TO 82°E

by

Peter Wellman

CONTENTS



2

## ABSTRACT

This Record describes the collection, reduction, and mapping of geophysical information over the sector of Antarctica between longitudes 45° and 82° E. It accompanies the recent release by BMR of a group of geophysical maps and profiles (33 sheets). In the Prince Charles Mountains area (60° to 82°E) maps at 1:2 000 000 scale give ice-surface altitude, rock-surface altitude, and gravity anomalies. In the Mawson-Molodezhnaya area (45° -64° E) maps at 1:1 000 000 scale give ice-surface altitude, rock-surface altitude, and gravity and magnetic anomalies. Details of ice-radar/ aeromagnetic flights are given at 1:1 000 000 scale in flight-line maps and in profiles of aeromagnetic anomaly and ice thickness.

3

## INTRODUCTION

Geophysical surveys in the Antarctic sector between 45° and 82° E have been conducted by numerous Australian, Soviet and Japanese expeditions (Fig. 1). Gravity and altitude surveys have generally been conducted using helicopter transport in conjunction with geological mapping programs. Gravity, altitude, ice-thickness, and magnetic surveys have been carried out in association with glaciological traverses using either tractor train or fixed-wing aircraft.

Although the results of most surveys are available, the observational details and interpretation for many of them have not been reported because of the limited geographic extent of the observations during any single field season. However, when all the geophysical information is considered together there is a good regional coverage over most of the coastal part of Enderby, Kemp, and Mac.Robertson Lands, and of the Prince Charles Mountains.

This record is an explanatory note accompanying the recent release by BMR of a group of geophysical maps and profiles compiled from the geophysical data available so far. It describes the available geophysical information and gives details of field observation procedures, data reduction methods, and methods used to prepare flight line sections and maps. The observational data are available in list form from BMR, the maps and sections are available from the Copy Service, Government Printer (Production), GPO Box 84, Canberra A.C.T. 2600, and published geophysical interpretations are listed later in this Record.

Much of the data has been computer-plotted and contoured using a suite of computer programs written by Murray (1974, 1977). Observed values of irregularly spaced data points are interpolated and extrapolated by the computer to derive values at all points on a regular grid covering the map area. Contour lines are calculated from the grid points by fitting a bicubic spline. It is desirable to have grids with nearly equal spacing east-west and north-south so that contours are not biassed in direction; hence the grid spacing in minutes east is greater than that in minutes south. The Mawson-Molodezhnaya maps and sections have the same 1:1 000 000 scale and the same boundaries as a geographic map of the area produced by the (Australian) Division of National Mapping (NATMAP,1976). A 1:2 000 000 scale was used for the new maps of the Prince Charles Mountains area so that all the geophysical data in the area could be plotted on a single map.

## GEOGRAPHIC AND ICE SURFACE CONTOUR MAPS

Early maps of the area produced by NATMAP are based on trimetrogon photographs, with horizontal positions controlled by sparsely distributed astronomical stations, or, in a few coastal areas, by local horizontal surveying. The published maps of Enderby Land and the southern Prince Charles Mountains are of this type (NATMAP, 1971a). Maps based on geodetic surveying cover the northern Prince Charles Mountains (NATMAP, 1971b). Subsequent to the maps being produced, satellite doppler positions have been determined for some trig stations north of 69° S. Accurate coordinates of the major trig stations are available from the Division of National Mapping (P.O. Box 31, Belconnen, A.C.T. 2617, Australia). Vertical colour air photographs at 1:60 000 scale are available for the rock outcrops of most of the area; they have not been used to produce geographic maps.

The positions of the rock outcrops on the Division of National Mapping 1:1 000 000 maps are considered accurate over all the area except in the Southern Prince Charles Moutains. There the rock positions used are those traced by R.J. Tingey (BMR) from a controlled mozaic of LANDSAT images.

The ice-surface contours are based on sea level, and the altitudes of first order trig stations were determined by NATMAP using vertical angles. The altitude of the ice surface and secondary trigs were determined from barometic heights , using dog sled, tractor train, helicopter and fixed wing aircraft for transport. The data sources for contours in the various areas are as follows:

Mawson-Molodezhnaya area: inland - Allison & others (in press)
: close to the coast - NATMAP (1976)
Southern Prince Charles Mountains: Morgan & Budd (1975)
Davis area: Williams (1981), Wellman & Williams (1982)
Remaining areas: Australian and Soviet gravity station altitudes.

## GRAVITY MAPS

Gravity surveys are listed in Table 1. The total number of useful gravity stations in the Prince Charles Mountains map area is 565, and in the Mawson-Molodezhnaya area is 564. The gravity values are measured with respect to permanent reference stations situated at Davis, Mawson, Molodezhnaya and Syowa bases. There are no air services to these bases so the adopted gravity values for these reference stations have uncertainties of about 10 µm s-2. Away from the reference stations there is consistency of gravity values between surveys to within the field station precision of 10 µm s-2. Australian gravity values based on Mawson are 5-10 µm s-2 higher at Molodezhnaya than the Soviet values (Wellman & Tingey, 1982)., and 10 µm s-2 lower at Sanderock Nunatak trig than Japanese values based on Syowa Base (assuming Australian station 7707.0524 is in the same location as the Japanese station B). All gravity values have been derived using the Potsdam gravity datum, the 1930 International Gravity Formula, and densities of 2.67 t m-3 for rock, 0.917 t m-3 for ice, and 1.04 t m-3 for ocean water.

The altitude of most gravity stations has been measured using barometers. The precision obtained is about 10 m (Wellman & Tingey, 1982). The adopted altitudes are based on sea level and on those trig stations whose altitude is known from vertical angle measurements. For the Mawson-Knuckey Peaks glaciological traverse they are based on satellite doppler observations at eight glaciological stations, the spheroid observations being reduced to the geoid. Soviet altitudes in the Prince Charles Mountains are consistent with Australian altitudes because of the Soviet use of NATMAP 1:1 000 000 base maps with reliable altitudes for the major trigs. At Sandercock trig (NMS227) near the southwestern edge of the survey area (68° 33'S, 52° 08'E), the Japanese barometric derived altitude is 2158 m, the Australian barometric derived altitude is 2264 m, and the doppler satellite altitude (after correction for the geoid-spheroid separation of 25 m) is 2297 m. There appears to be a systematic error in the Japanese altitudes on this traverse.

In most areas the position of the gravity station is accurate to few kilometres, reflecting the accuracy of plotting on the available maps. This accuracy is acceptable for reconnaissance surveys with, generally, wide station spacing. Helicopter survey stations on the ice sheet were positioned by dead reckoning and sun fixes. The ground position of Australian gravity stations has generally been marked on poorly controlled large- scale maps, on oblique air photographs, or on high-altitude vertical colour air photographs at approximately 1:60 000 scale.

To calculate Bouguer anomalies it is necessary to know ice thickness for the gravity stations on ice. The few pre-1970 measurements of ice thickness used seismic reflection methods. Subsequent measurements have been made by ice- radar. The accuracy of ice-radar measurements can be estimated as follows. Along the Mawson-Knuckey Peaks glaciological traverse (Fig. 2;

Morgan & Jacka, 1981) gravity stations were at 1.5 km intervals, and they gave Bouguer anomalies with standard deviations of ± 100 μm s-2 about the long wavelength mean anomaly. This scatter gives an estimate of the combined effect of errors in ice thickness under the gravity station, and the terrain correction for the station, so errors in the spot ice- thickness measurements are less than 135 m. Radar ice thicknesses are considered to have adequate accuracy for reconnaissance gravity work because gravity stations have a spacing of about 50 km on ice, and gravity anomaly values are contoured at 100 to 200 μm s-2 intervals.

A few gravity stations on ice in the Lambert Glacier region and the Davis region give Bouguer anomalies which are inconsistent with the adjacent stations. The ice thickness measurements at these stations are thought to be incorrect because the combination of exceptional thickness of ice and insufficient ice-radar power leads to the incorrect identification of noise as the bottom echo. As a result the ice thicknesses of the following stations were rejected as probably being incorrect: Soviet stations 7470.0152, 7470.0161, 7470.0167, 7470.1005, 7470.1006, and Australian station 8007.0034.

Terrain corrections are a major source of error for anomalies both on ice and on rock. Many gravity stations are located on small steep nunataks whose topography is unmapped, and the surrounding sub-ice topography is known only in broad outline. The differences between simple Bouguer anomalies measured at different locations on the same nunatak are as much as 200 μm s-2, the whereas the average difference between stations is only about 50 μm s-2. For these nunataks the terrain corrections cannot be calculated accurately. These terrain corrections are always positive, hence, if the altitudes are correct, the station with the maximum Bouguer anomaly is the one with the lowest terrain correction, and therefore the best measure of the true Bouguer anomaly. For gravity stations on ice the combined terrain-correction and ice-thickness errors were shown above to be 100 μm s-2. Here terrain corrections for sub-ice topography may be either positive or negative.

Table 2 gives an approximate error budget for Bouguer gravity anomalies within the mapped areas. For stations on rock the major sources of error are uncertainties in gravity station altitude and terrain correction, and for stations on ice the gravity station altitude and combined ice thickness and terrain correction. Combined errors are estimated to be 60-100 μm s-2, so gravity map contours should not be at less than 100 μm s-2 intervals.

7

Bouguer gravity anomalies were calculated, plotted and contoured using the computer programs of Murray (1974,1977). Gravity stations range in altitude from 0 m at the coastline, to over 2000 m along the southern margin of the mapped area. There is thus a strong Bouguer anomaly gradient over the area, the gradient reflecting the change in mass-per-unit-area above sea level.

The primary purpose of mapping gravity anomalies is to investigate density changes in the upper crust that correspond to geological structure boundaries. For this purpose it is desirable to remove the Bouguer anomaly gradient, because the residual anomaly correlates more closely with density changes. Isostatic anomalies have not been calculated because (i) the sub-ice and sub-bottom topography necessary for this is not well known immediately outside the mapped area, and (ii) isostatic compensation mechanisms in the area are not known.

It is believed that the most satisfactory anomaly that removes the Bouguer gradient is the terrain-corrected free-air anomaly, called the Faye anomaly (Sazhina & Grushinsky,1971). This anomaly is calculated by subtracting from the calculated simple Bouguer anomaly the mean simple Bouguer correction for the 100 x 100 km area surrounding the gravity station. The anomaly is essentially an isostatic anomaly for zero crustal thickness.

The gravity maps associated with this Record show simple Bouguer anomalies, mean simple Bouguer corrections for 100 x 100 km areas (Faye corrections), and Faye gravity anomalies.

## ICE THICKNESS / AEROMAGNETIC SURVEYS

### Soviet surveys

Soviet ice thickness radar measurements by fixed wing aircraft were obtained on two surveys: (1) a survey based on Molodezhnaya (Kozlov & Fedorov, 1968; Fedorov, 1973), for which the basic data are available as widely spaced points (AARI, 1975 a & b), and (2) a survey of the Davis-Mawson-Prince Charles Mountains area for which only a small-scale map of rock surface altitude has been published (Fedorov & others, 1982). Almost all the area considered in this Record is covered by a Soviet aeromagnetic survey, but the only available map showing this information is of very small scale (Demenitskaya, 1977).

8

Pre-1977 Australian surveys

Seismic measurements of ice thickness were made along glaciological traverses south of Mawson in 1957-59 (Fowler, 1971). A radar ice- thickness survey of the Southern Prince Charles Mountains was conducted in 1971-74 (Morgan & Budd, 1975).

Australian surveys in 1977, 1978, and 1980

In 1977, 1978, and 1980 combined ice-radar / aeromagnetic surveys were conducted in the Mawson-Molodezhnaya area. In 1977 the ice radar worked for about 75% of the flight length, but the magnetometer for about 10% of the flight length. In 1978 only a few hours were flown, and because the navigation was not good, these measurements have not been analysed. In 1980 the magnetometer worked 100% of the time, but the ice radar only 90%.

The ice-radar records have initially been used for glaciological purposes. The 1977 ice-radar films were read at 1-minute intervals and maps of ice thickness and rock altitude were published (Allison & others, in press). Those parts of the 1980 records acquired down the axes of glaciers were read, and published in section form by Morgan & others (in press).

To enable details of the profiles to be used for geomorphological studies both the 1977 and 1980 films were subsequently read again in BMR at 0.25-minute intervals. Two-way travel times on the 35 mm films were measured to 0.1 mm accuracy using a magnifying glass scale, and coded directly on computer coding forms. All subsequent calculations and plotting were carried out by computer. Because of difficulties in recording the leading edge of the transmission pulse and ice surface reflections on the film, there are probabaly minor systematic errors in the data from some flights. For the 1977 flights, the adopted aircraft altitude above the ice was that manually recorded from a radar altimeter and used by Allison & others (in press). For the 1980 flights it was picked from the ice-radar film. The ice- surface altitudes adopted were those of Allison & others (in press). A total of 15 993 point values of ice thickness were determined.

To interpret whether the rock topography was cut by water or glaciers it is important to know whether the bases of the valleys are below sea level after the effect of depression of the rock by ice is removed. The expected glacial rebound was calculated for 25 km sections of flight by calculating the mean of the measured ice thicknesses and dividing this by 3.0 - the approximate ratio of the density of mantle to ice (3.20 t m-3 / 0.917 t m-3).

The Australian aeromagnetic measurements were carried out using a MNS2 proton precession magnetometer designed and built in the Bureau of Mineral Resources (Seers, 1979). The detector head was in a 'bird' towed behind the aircraft. The 20 m cable connecting the detector and magnetometer had low noise characteristics (Belden type 8428). The cable was extended and retracted using a small electric winch. The readings were recorded on an electrostatic chart record of 6-inch (1977), or 10-inch (1980) width. These chart records were read at 0.25-minute intervals, which is equivalent to a ground distance of between 0.4 and 1.6 km. A total of 13 961 point values were observed. For the 1980 flights, diurnal variation of the total magnetic intensity was derived at 2.5-minute intervals from the horizontal and vertical continuous magnetic rocords of Mawson Observatory. The compilation and reduction of navigation, aeromagnetic, ice-thickness, and ice-altitude information was by a Fortran program run on a Cyber 76 computer. The compiled information was subsequently plotted in profile form, mapped, and contoured.

## GEOLOGICAL INTERPRETATIONS

Interpretations of the gravity surveys have been made by Koriakine & others (1970), Wellman & Tingey (1982), and Wellman (in press) for the Mawson-Molodezhnaya area; by Wellman & Tingey (1976) and Kurinin (1980a, b) for the Prince Charles Mountains area; and by Wellman & Williams (1982) for the Davis area. Interpretations of the magnetic results have been made by Kadmina (1980), Kolobov & Kurinin (1980), and Fedorov & others (1982) in the Prince Charles Mountains area; by Wellman & Williams (1982) in the Davis area; and by Wellman (in press) in the Mawson-Molodezhnaya area. Interpretation of the ice-thickness results have been made by Fedorov (1973), Kolobov & Kurinin (1980), Wellman & Tingey (1981), and Fedorov & others (1982). Seismic refraction results have been discussed by Fedorov & others (1982).

## ACKNOWLEDGEMENTS

I am very grateful to R.J. Tingey who initiated and carried out much of the Australian gravity work in Antarctica, to I. Allison, V.I. Morgan and N. Young who initiated and conducted the airborne and ground traverses for glaciology and geophysics, to S. Scherl for equipment preparation and the 1978 and 1980 aeromagnetic measurements, to J.W. Williams for the Davis work, and to A.S. Murray for help over a long period in writing new computer programs and in running existing programs. The work also greatly depended on help from Divison of National Mapping surveyors in the field and office, fixed wing and helicopter pilots, and computer plotting room staff of the BMR Cartography Section. I am grateful to Prof. N. Grushinsky for providing principal facts of the Soviet gravity surveys in the area. The hand cartographic work required to finalise the maps was by M. Steele.

## REFERENCES

AARI, 1975a - Map of Enderby Land, 1:2 500 000 scale. Compiled by E.C. Korotkevich, Ya.P. Koblents & N.G. Kocenko. Arctic and Antarctic Research Institute, Leningrad.

AARI, 1975b - Map of bedrock relief, Enderby Land, 1:2 500 000 scale. Compiled by E.C. Korotkevich, Ya.P. Koblents & N.G. Kocenko. Arctic and Antarctic Research Institute, Leningrad.

ALLISON, I.,FREW, R., & KNIGHT, I., in press - Bedrock and ice surface topography of the coastal regions of Antarctica between 48°E and 65°E. Polar Record.

COOKE, R.J.S., 1970- Reconnaissance gravity observations near Amery Ice Shelf, Antarctica, Summer 1968/69. Bureau of Mineral Resources, Australia, Record 1970/31 (unpublished).

COOKE, R.J.S., 1975 - Reconnaissance gravity observations near Mawson and in the Prince Charles Mountains, Antarctica, 1969-1971. Bureau of Mineral Resources, Australia, Record 1975/59 (unpublished).

DEMENITSKAYA, R.M., 1977 - Earth's crust structure in Antarctica and some problems of its geodynamics. Paper presented at the Third Symposium on Antarctic Geology and Geophysics, Madison, Wisconsin, 22-27 August, 1977.

FEDOROV, B.A., 1973 - Radar sounding of the ice sheet in the area of Molodezhnaya Station. Trudy, Sovetskoy Antartkticheskoy Ekspeditsii, 56, 121-124.

FEDOROV, L.V., GRIKUROV, G.E., KURININ, R.G., & MASOLOV, V.N., 1982 - Crustal structure of the Lambert Glacier area from geophysical data. In ANTARCTIC GEOSCIENCE, ed. C Craddock, University of Wisconsin Press, Madison.

FOWLER, K.F., 1971 - Ice thickness measurements in McRobertson Land, 1957-1959. Bureau of Mineral Resources, Australia, Bulletin 105.

GRUSHINSKY, N., & SAZHINA, N., 1975 - Gravity map of Antarctica, scale 1:5 000 000. Ministry of Geology of the USSR, Moscow.

11

HILL, P.J., 1979 - Magnetic and gravity survey, Mawson-Molodezhnaya region, Antarctica, 1975-76. Bureau of Mineral Resources, Australia, Record 1979/6 (unpublished).

KADMINA, I.N., 1980 - Struktura magnitoaktivnogo sloi zemni kori v raione lednika Lamberta. Geofizicheskie Issledovanii v Antarktide, Nauchno Issledovatelskii Institut Geologii Arktiki, Leningrad.

KOLOBOV, D.D., & KURININ, R.G., 1980 - Main features of the Lambert Glacier subglacial topography (East Antarctica). Trudy Sovetskoi Antarkticheskoi Ekspeditsii, 70, 76-86.

KORIAKINE, E.D., STROEV, P.A., & FROLOV, A.I., 1970 - Results of gravity measurements in Enderby Land (East Antarctica). In Gravity measurements at sea - collection of articles, No. 5, ed. V.V. Fedinski. University of Moscow, Moscow, 83-93.

KOZLOV, A.I., & FEDOROV, B.A., 1968 - Radio echo sounding of the Antarctic ice sheet, Summer 1967/68. Informatsionnyy Byulleten Sovetskoy Antarkticheskoy Ekspeditsii, 71, 53-57.

KURININ, R.G., 1980 a - On the geological information derived from certain presentations of gravity observations results in Antarctica. Trudy Sovetskoi Antarkticheskoi Ekspeditsii, 70, 122-133.

KURININ, R.G., 1980 b - Geological interpretation of the gravity anomalies in the Lambert Glacier area. Trudy Sovetskoi Antarkticheskoi Ekspeditsii, 70, 134-145.

LANGRON, W.J., 1966 - Gravity ties to Australian Antarctica, 1953-1963. Bureau of Mineral Resources, Australia, Record 1966/24 (unpublished).

MORGAN, V.I., & BUDD, W.F., 1975 - Radio-echo sounding of the Lambert Glacier basin. Journal of Glaciology, 15, 103-111.

MORGAN, V.I., & JACKA, T.H., 1981 - Mass balance studies in East Antarctica. Sea level, ice, and climatic change (Proceedings of the Canberra Symposium, December 1979). IAHS Publication 131.

MORGAN, V.I., JACHA, T.H., AKERMAN, G.J., & CLARKE, A.L., in press - Outlet glacier and mass budget studies in Enderby, Kemp, and McRobertson Lands, Antarctica. Annals of Glaciology.

MURRAY, A.S., 1974 - The Australian National Gravity Repository computer system. Bureau of Mineral Resources, Australia, Record 1974/68 (unpublished).

MURRAY, A.S., 1977 - A guide to the use and operation of program CONTOR. Bureau of Mineral Resources, Australia, Record 1977/17 (unpublished).

NATMAP, 1971 a - Base compilation maps, 1:1 000 000 scale, sheets SS40-42 & SS43-45. Division of National Mapping, Australia.


12

NATMAP, 1971 b - Base compilation maps, 1:1 000 000 scale. Sheets SQ41-42, SR41-42 & SR43-44. Divison of National Mapping, Canberra.

NATMAP, 1976 - Molodezhnaya-Mawson 1:1 000 000 operational map. Division of National Mapping, Australia.

SAZHINA, N., & GRUSHINSKY, N., 1971 - Gravity Prospecting. Transl. A.K. Chaterjee. MIR Publishers, Moscow.

SEERS, K.J., 1979 - MNS-2 proton-magnetometer. Bureau of Mineral Resources, Australia, Record 1979/59 (unpublished).

WATANABE, O., & YOSHIMURA, A., 1972 - Preliminary geoscientific researches on Sandercock Nunataks, Enderby Land, East Antarctica. Antarctic Record, 45, 47-65.

WELLMAN, P., in press - Interpretation of geophysical surveys, longitude 45° to 65° E, Antarctica. Proceedings of the Fourth Symposium on Antarctic Geology and Geophysics, Adelaide, 16-20 August 1982.

WELLMAN, P., & TINGEY, R.J., 1976 - Gravity evidence for a major crustal fracture in eastern Antarctica. BMR Journal of Australian Geology & Geophysics, 1, 105-108.

WELLMAN, P., & TINGEY, R.J., 1981 - Glaciation, erosion and uplift over part of East Antarctica. Nature, 291, 142-144.

WELLMAN, P.,& TINGEY, R.J., 1982 - A gravity survey of Enderby and Kemp Lands, Antarctica. In ANTARCTIC GEOSCIENCE, ed., C. Craddock. University of Wisconsin Press, Madison, 937-940.

WELLMAN, P., & WILLIAMS, J.W., 1982 - The extent of Archaean and Late Proterozoic rocks under the ice cap of Princess Elizabeth Land, Antarctica, inferred from geophysics. BMR Journal of Australian Geology & Geophysics, 7.

WILLIAMS, J.W., 1981 - Geophysical and surveying work along the Ingrid Christensen Coast near Davis Base, Antarctica, 1980/1981 Summer. Bureau of Mineral Resources, Australia, Record, 1981/59 (unpublished).

YOSHIDA, M., & YOSHIMURA, A., 1972 - Gravimetric survey of the Mizuho Plateau - west Enderby Land area, East Antarctica, 1969-1971. JARE Data Reports 17 (Glaciology), Polar Research Centre, National Science Museum, Tokyo.

Table 1. List of gravity surveys in Kemp, Mac.Robertson and eastern Enderby Lands

| BMR Survey number | Year | Number of stations* A | B | C | D | Reference to data or interpretations |
|---|---|---|---|---|---|---|
| **Australian surveys** | | | | | | |
| 5615 | 1953-63 | 12 | | | | Langron, 1966 |
| 5615 | 1957-59 | | 39 | 189 | | Fowler, 1971 |
| 6905 | 1969 | 11 | | | | Cooke, 1970 |
| 7015 | 1970 | 16 | | | | Cooke, 1975 |
| 7105 | 1971 | 20 | | | | Cooke, 1975 |
| 7207 | 1972 | 37 | 11 | | | Wellman & Tingey, 1976 |
| 7307 | 1973 | 78 | | | | Wellman & Tingey, 1976 |
| 7507 | 1975 | | 161 | 75 | | Wellman, in press |
| 7607 | 1976 | 8 | | | | Hill, 1979 |
| 7707 | 1977 | 180 | | 4 | | Wellman & Tingey, 1982 |
| 8007 | 1980 | 6 | 51 | 2 | | Williams, 1981 |
| **Soviet surveys** | | | | | | |
| 7170 | 1971 | 56 | 45 | | 78 | Koriakine & others, 1970 |
| 7270 | 1972 | | 93 | 76 | | |
| 7370 | 1972-73 | 65 | 9 | 3 | 10 | |
| 7470 | 1973-74 | 41 | 66 | | 5 | Grushinsky & Sazhina, 1975 ) |
| **Japanese surveys** | | | | | | |
| 7001 | 1970 | only partly in area | | | | Watanabe & Yoshimura, 1972; Yoshida & Yoshimura, 1972 |

* A = on rock; B = on ice, ice thickness known; C = on ice, ice thickness unknown; D = on sea ice, water depth known.

14

Table 2. Approximate error budget for Bouguer gravity anomalies

| Cause of error | Amount of error | Effect | Effect on Bouguer anomaly (µm s-2) Rock station | Ice station |
|---|---|---|---|---|
| latitude | 2 km | 5.7 µm s-2/km | 11 | 11 |
| station altitude | 10 m | 2.0 µm s-2/m | 20 | 20 |
| observed gravity: | | | | |
| -base station | 10 um s-2 | | 10 | 10 |
| -field tie | 10 um s-2 | | 10 | 10 |
| terrain correction | | | ~50 | 100 |
| ice thickness | 135m | 0.7 µm s-2/m | | |
| total error | | | ~60µm s-2 | ~100 µm s-2 |

Table 3. Maps and sections released in association with this Record

| | | |
|---|---|---|
| **Mawson - Molodezhnaya area, 1:1 000 000 scale** | | |
| Base map with ice surface altitude | | 25/09/18 |
| Rock altitude after deglaciation (contour grid 11 km) | | 25/09/16 |
| Rock altitude after deglaciation (contour grid 22 km) | | 25/09/17 |
| Simple Bouguer gravity anomaly | | 25/09/19 |
| Faye gravity correction | | 25/09/20 |
| Faye gravity anomaly | | 25/09/21 |
| Magnetic anomaly map - total magnetic intensity residuals | | 25/09/15 |
| Compilation of rock-surface profiles - east west direction | | 25/09/22 |
| Compilation of rock-surface profiles - north-south direction | | 25/09/23 |
| Flight paths in 1980 - flights 0 to 25 | | 25/09/12 |
| Flight paths in 1977 - flights 102 to 125 | | 25/09/11 |
| Ice thickness profiles | sheets 1 to 10 | 25/09/13 |
| Aeromagnetic profiles | sheets 1 to 7 | 25/09/14 |
| **Prince Charles Mountains area, 1:2 000 000 scale** | | |
| Base map with ice surface altitude | | 25/09/24 |
| Rock altitude | | 25/09/25 |
| Simple Bouguer gravity anomaly | | 25/09/26 |
| Faye gravity correction | | 25/09/27 |
| Faye gravity anomaly | | 25/09/28 |

These are available as dyelines or transparencies from Copy Service, Government Printer (Production), GPO Box 84, Canberra 2600, Australia. Orders should give map name and number.

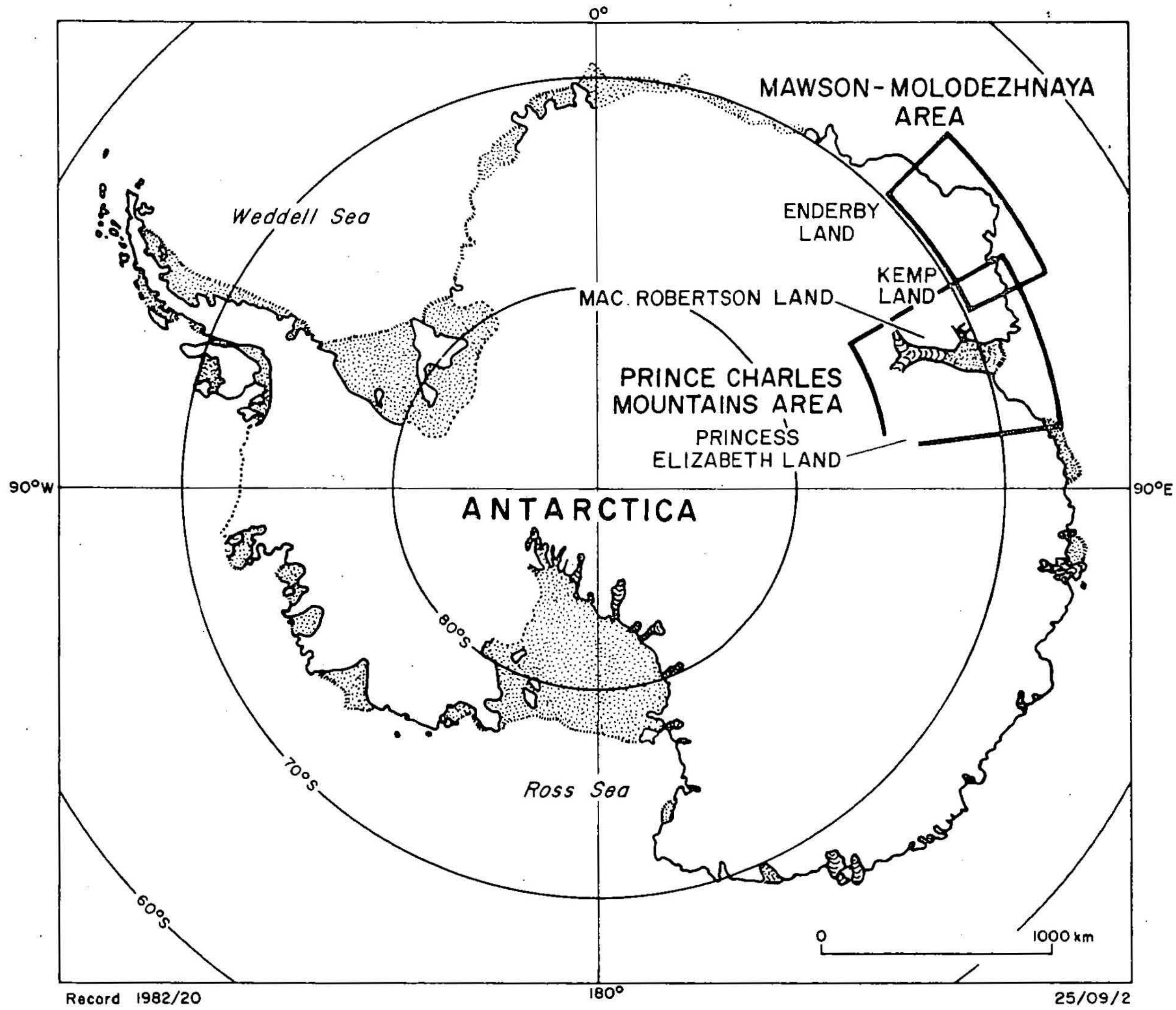


Fig. 1 Locality diagram

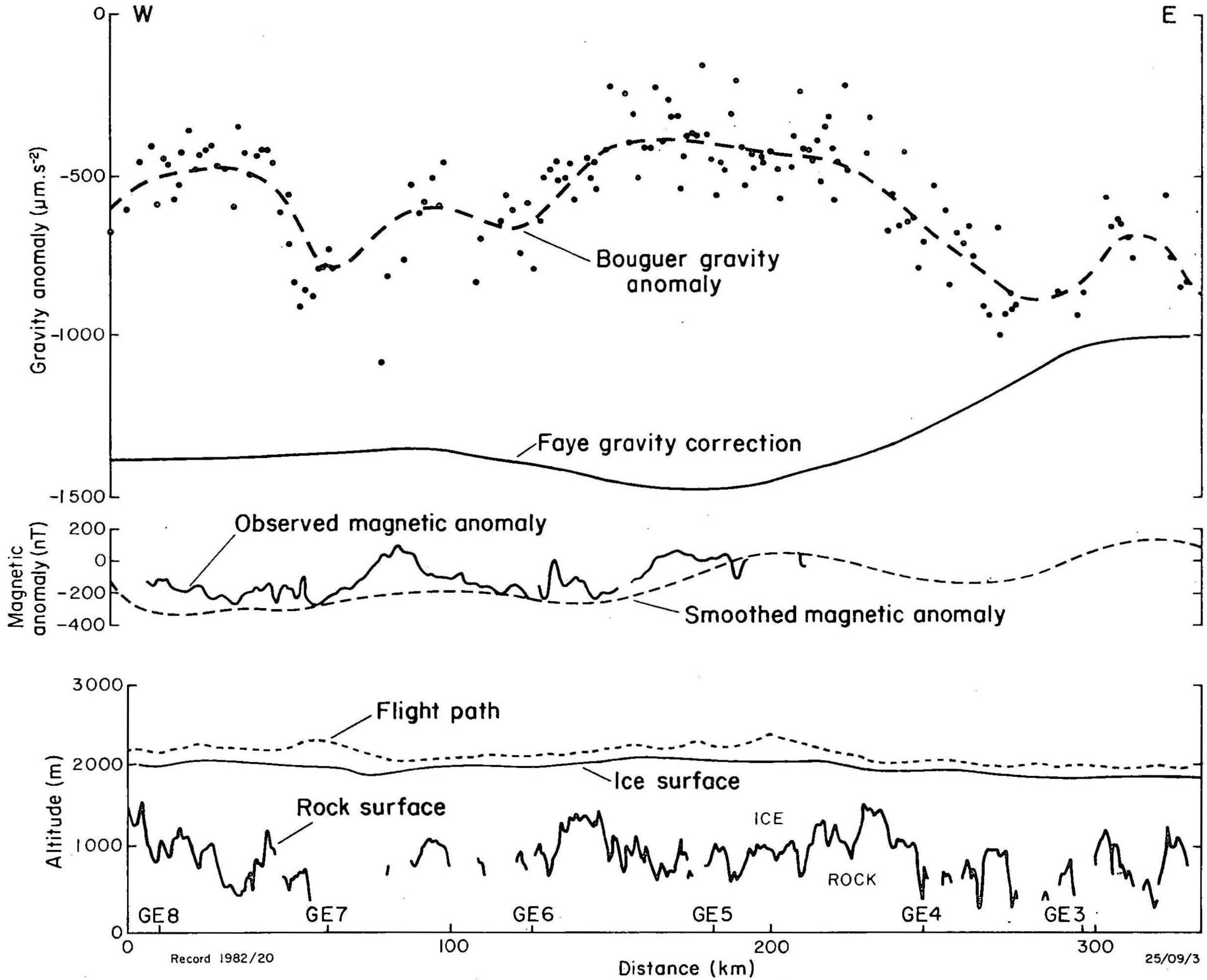


Fig. 2 Geophysical results along the Mawson—Knucky Peaks glaciological traverse