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Record 1979/6

MAGNETIC AND GRAVITY SURVEY, MAWSON-MOLODEZHNAYA REGION, ANTARCTICA 1975-76

by

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SUMMARY

This report presents the results of magnetic and gravity surveys carried out by the author in the Mawson-Molodezhnaya region of Antarctica during the 1975/76 ANARE Enderby Land expedition.

Multiple observations of magnetic declination, horizontal intensity, and vertical intensity were made at fourteen stations, including the station at Observation Island which had been established in 1956 and which was re-occupied exactly. At Molodezhnaya, geomagnetic data from 1964 onwards were obtained from the USSR observatory.

Previous magnetic observations made between Mawson and Molodezhnaya have been combined with the new results to compile isomagnetic charts of the region; these show the four magnetic components D, H, Z, and F and their respective annual rates of change for epoch 1975.0.

The gravity tie between Mawson and the Australian network was re-determined and gravity meter readings were taken at eighteen stations in the field.

Descriptions of the geophysical stations occupied, and other pertinent information, are given in order to facilitate future re-occupations.

1. INTRODUCTION

The Australian National Antarctic Research Expeditions (ANARE) launched its second full-scale scientific expedition into the Enderby Land region of Australian Antarctic Territory during the 1975/76 summer. The author, who had manned the Mawson Geophysical Observatory from the beginning of 1975 (Hill, 1978), joined the expedition as geophysicist responsible for making regional magnetic and gravity measurements.

Operations in Enderby Land during the previous summer (1974/75) were based on a camp at Knuckey Peaks. This site proved to be a bad choice owing to presistent high winds and drifting snow, which resulted in the loss of much valuable aircraft flying time. Cameron (1976) had provided a brief account of the magnetic work.

The Enderby Land 1975/76 field season commenced late in October 1975 when a tractor-train operated by wintering expeditioners and towing vital equipment, fuel, and other supplies set out from Mawson to prepare a new base-camp at Mount King. This was accomplished successfully but various mechanical problems with two of the tractors caused the cancellation of a proposed second traverse to carry extra fuel from Mawson. This was a significant setback to the summer work as it meant that aircraft movements had to be restricted to only the most essential flights in order to keep fuel consumption to a minimum.

The expedition ship Nella Dan moored at the edge of the sea-ice off Mawson on 23 December, and summer personnel and their equipment were landed over the next few days using three helicopters and one fixed-wing aircraft. The author flew out of Mawson on 30 December to begin his field work, and during the ensuing five weeks made gravity and magnetic observations as far west as the Russian base at Molodezhnaya. Plate 1 shows the survey area.

The Division of National Mapping's geodetic surveying and aerial photography had top priority in the field program, and though some flexibility did exist, the geophysical program was dictated largely by the surveying requirements - particularly so because of restricted helicopter mobility caused by fuel shortage. Most of the observations were made while accompanying and assisting one of the surveyors during the ground traversing. This arrangement was beneficial for a number of reasons - multiple observations, often extending over a number of days, were possible; stations could be adequately marked for future re-occupation; the surveyor could provide accurate azimuths for declination readings; and lastly, good height control was available for the gravity work.

2. GEOLOGY OF THE REGION

An up-to-date description of the geology of Enderby Land is given by Sheraton & Offe (1977). Earlier BMR reports (Crohn, 1959; Trail & others, 1967; Trail, 1970) are also of interest, as is the Russian paper by Kamenev (1972), and the book by Ravich & Kamenev (1972). The following resume of the geology is taken from these works.

The area, considered to be part of the East Antarctic Shield, is predominantly ice-covered with small and isolated outcrops, except along the coastal strip from the Nye Mountains to the Tula Mountains. Though some dolerite dykes, granitic veins, and pegmatites occur, the rock consists almost entirely of high-grade (granulite facies) metamorphics. Slightly discordant mafic and ultramafic rocks are thought to be metamorphosed dykes.

Layers of quartz-garnet-orthopyroxene rock, usually less than a few metres thick and containing up to 25 percent magnetite by volume, have been found at a number of places. The existence of zones of such highly magnetic material suggests that anomalous magnetic fields should not be unexpected in the area, particularly in the vicinity of outcrops.

The structural details of the Enderby Land area have yet to be ascertained, but it is thought that Mesozoic-Cainozoic disjunctive displacements of the shield have resulted in the block structure of the region. Evidence of tectonism is inferred from the geomorphology indicated by the major outlet glaciers.

3. MAGNETIC OBSERVATIONS

Magnetometers and their calibration

At all magnetic stations the three components horizontal intensity (H), declination (D), and vertical intensity (Z) were measured. These components define the magnetic field in magnitude and direction.

Details of the instruments used in making these measurements are provided below; standard observatory texts such as Wienert (1970) describe their use:

H: QHM (quartz horizontal magnetometer) 301 and telescope 146 used on QHM circle 53; the affixed thermometer (no number) had 0.2°C divisions and a temperature range from -35°C to +10°C. For all measurements, 2 torsion was applied.

This QHM is one of the observatory instruments and was used at Mawson throughout 1975 for baseline control on the La Cour magnetographs.

D: (a) Nearly all D measurements were made by using QHM 301 as a declinometer.

(b) Wild compass theodolite TO 104407 was used at two stations (Fold Island and Rippon Depot). A Roelofs solar prism attachment and split-hand stop-watch were used in conjunction with the instrument for making the sun observations for azimuth.

Z: BMZ (balance magnetometrique zero) 121 fitted with long-range adjustable compensating magnet A. This instrument is kept at Mawson for field observations and is not used for routine observatory work. The disc correction was 0.0° when checked before leaving for the field.

The field instruments were calibrated against the Mawson Observatory standards through the normal magnetograph baselines before and after the field work. The adopted instrument corrections were:

QHM 301	-2 nT (-110 x 10^3 nT/T)
QHM 301 (as declinometer)	-1° 08.6'
TO 104407	+ 0° 02.1'
BMZ 121A	- 92 nT

Wild compass theodolite TO 93794, used by the glaciologists on the tractor train traverse, was calibrated at the Observatory on its return to Mawson. The instrument correction was +0° 36.7'.

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Occupation of stations

Localities were visited in the following sequence (underlining indicates magnetic occupation):

Fold Island, Mawson, Rippon Depot, Mount King Base, Mount Pardoe, Lamykin Dome, Molodezhnaya (Russian data obtained), Pinn Island, Observation Island, Mount Riiser-Larsen, Mount McMaster, Proclamation Island, Mount Breckinridge, Mount King Base, Rayner Peak, Alphard Island, Depot Island, Rippon Depot, Mawson.

Magnetic station sites were generally made close to the survey stations, yet sufficiently distant from them and the camp area to be clear of significant artificial fields. A sheltered position was preferred, away from any outcrops which might be excessively magnetic. Except at stations situated on extensive neve plains (Lamykin Dome and Mount King Base), each magnetic station was marked by a rock cairn about one metre high. In addition, to assist in identifying the cairns, a small aluminium tag (23 mm x 80 mm) bearing the inscription 'MAGNETIC STATION BMR 1975-76' was secured to a rock of each cairn by a length of thick copper wire.

When an adjacent survey station (the distance between survey stations was of the order of 65 km) was situated on a readily recognisable landmark, it was taken as the declination mark. Otherwise a suitable distant prominent feature which could be sighted through the QHM telescope was chosen.

Plates 2, 3, and 4 show the details of each of the magnetic stations. The azimuths of the marks used are indicated: they have been corrected for the offset between magnetic station and survey station. Notes describing each of the magnetic stations appear in the Appendix; with the sketches, they should enable the stations to be re-occupied within a metre. (with the exception of Lamykin Dome and possibly Mount King Base).

Operation of instruments in the field

Except for the difficulty of making observations under adverse weather conditions, no major problems were encountered in using the instruments in the field.

When exposed to winds, particularly if gusty, some quivering of the QHM magnet was evident. It is estimated, however, that winds up to about 10 knots would not introduce too much reading error. On occasions the tripod was

secured by rope to the surrounding rock as a precaution against a sudden gust of wind blowing it and the instrument over. Sometimes drifting snow or mist obscured the azimuth mark and D observations had to be delayed until visibility improved.

To make the cross-hair in the BMZ stand out more clearly in poor light (e.g. under heavy cloud cover or late at 'night'), a white piece of laminex was used to direct light into the telescope. Also by piling snow around the tripod legs during sunny weather the tendency for them to melt in and upset the level was reduced.

Results of magnetic station occupations

The magnetic survey data were reduced on return to Canberra.

The results of individual observations of H, D, and Z at each station are presented in Tables 1 to 14. Included in these tables are the numbers of the reference survey stations with their geographic co-ordinates and elevations. For Depot Island, the co-ordinates and elevation apply to the magnetic station, because the nearest survey station (Alphard Island) is some distance away. Instrument corrections have been applied to the observed data but no adjustment has been made for station elevation. As a summary of the field results, the means of observations at individual stations have been listed in Table 19.

The declination values at Fold Island were obtained by taking sun shots with the compass theodolite. This instrument was also used on 2 January at Rippon Depot by sighting onto Point '130', the bearing of which was later determined by a surveyor. Thereafter all declination measurements were made with QHM 301 used as a declinometer, the compass theodolite being left at Mount King to reduce the helicopter load.

Declination measurements made on glaciological traverse

ANARE glaciologists V. Morgan and T. Jacka joined the tractor train on its return to Mawson from Mount King to conduct glaciological measurements. Using compass BMR theodolite Wild TO 93794 they also made declination observations at a number of glaciological stations along the way. From the data supplied by them and applying the instrument correction later determined at Mawson, the declination values in Table 15 were derived.

Results from observatories and earlier regional surveys

The Mawson magnetic observatory commenced operation in 1955, and annual mean values of the components D, H, Z, and F obtained since then are listed in Table 17 and plotted in Plates 5 to 8.

During the summer work, the author had the opportunity to visit the USSR base at Molodezhnaya, where he was welcomed by the scientists during a stay of five hours. A magnetic observatory is maintained at Molodezhnaya, and the annual mean values for the period 1964-75 shown in Table 18 were provided by the observatory geophysicist.

Earlier field observations are sparse. Pinn (1960) outlined the field observations made between 1954 and 69, but his report does not provide detailed station descriptions.

Van der Linden & Parkinson (1963) provide results of magnetic observations made in 1961 at three places in Enderby Land (Mount Riiser-Larsen, Enderby Land 1, and Enderby Land 2). No further work was done in the area for many years.

J. Silic, the Mawson geophysicist, made H and D measurements near the emperor penguin rookery (Transverse Island) on 14 August 1972 (personal communication). His results were H = 18677 nT and D = $-59^{o}40'$ but lack of accurate time control for the sun observation puts the D value in doubt.

The results of field observations made during the 1974/75 Enderby Land expedition are recorded by Cameron (1974). However, those results contain errors, and corrected and more complete results are presented in Table 16.

Compilation of isomagnetic charts

The substantial amount of new data available (summarised in Table 19) as a result of the 1975/76 summer field work enabled the compilation of the first isomagnetic charts of the MacRobertson-Enderby Land area. All available data from as far back as 1954, including those of the magnetic observatories and field observations, were used in the compilation.

In addition to van der Linden's (1966) work, which covers all Australian Antarctic Territory, the following small-scale charts were used initially to establish the broad regional trends.

(i) 'The Polar Regions. Magnetic Variation 1975 and Annual Rates of change, reduced to the Epoch 1975.0.' Produced by the Geomagnetism Unit, Institute of Geological Sciences UK, and the Branch of Theoretical and Applied Geophysics, US Geological Survey. Published at Taunton on 5 September 1975.

(ii) 'Curves of Horizontal Magnetic Intensity, 1965. Reduced to Epoch 1965.0.'
Compiled at the Royal Greenwich Observatory in consultation with the United States Coast and Geodetic Survey and the Dominion Observatory, Ottawa, Canada. Published in London 28 May 1965.

(iii) 'Curves of Vertical Magnetic Intensity, 1965. Reduced to Epoch 1965.0.'
As (ii). Published in London 14 May 1965.

(iv) 'Curves of Total Magnetic Intensity, 1965. Reduced to Epoch 1965.0.'
As (iii). Published in London 4 June 1965.

When the regional trends had been worked out, smoothed contours to fit the field and observatory data (all reduced to epoch 1975.0) were drawn by hand.

The resulting isomagnetic charts of D, H, Z, and F (derived), together with their secular variations, are presented as Plates 9 to 12 respectively.

4. GRAVITY

Instruments

Two BMR LaCoste & Romberg gravity meters were provided for the Enderby Land work. The geophysicist (author) took charge of meter G101 for the regional gravity survey, and meter G20 was used by the glaciologists during their inland glaciological traverse. Accessory equipment included concave levelling discs, battery charger-eliminator units, nickel-cadmium batteries, and aneroid barometers (Precision, Mark 2).

Field procedure

The gravity meter generally travelled with the author. However, to allow a maximum number of stations to be read, the meter was at times sent out with one of the survey parties, and was read by a geologist, surveyor, or meteorologist. Because of the unavoidable changes in observer, as well as the relative inexperience of some of the recruited observers, some loss in accuracy is expected.

All readings but one (Mount Douglas fuel depot) were taken at survey stations, which means that the positions and elevations of the gravity stations are known precisely. Exact locations of the gravity observation points are described in the Appendix.

Unless a large number of dial turns was required as a result of an appreciable change in altitude from the last station, only a few minutes were required to complete a station gravity reading. While care had to be taken in making measurements on ice or snow (the levelling disc sometimes sank into the surface), no problems were encountered in gravity field work, except for the effects of strong winds. It was futile to attempt a meaningful measurement while exposed to winds of 20 knots or more, particularly if gusty.

Although the compact nickel-cadmium batteries were convenient for short helicopter trips, for general use 12 volt lead-acid Dynapak batteries were found very satisfactory. One of these, when fully charged, provided for at least three days' operation of the gravity meter (maintaining it at 50.6°C) even with both battery and meter left in the snow at sub-zero temperatures.

Field data reduction and results

Counter readings were converted to relative milligal values by first using the tables in the G101 gravity meter handbook and then applying a correction factor of 1.002665 (this value was supplied by the Regional Gravity Group, BMR). Tidal gravity corrections were made and relative gravity values were established by working out ties and adjusting loops in the network. Observed gravity values were then calculated, based on the Mawson BMR pendulum station (number 5615.900) value of 982,481.80 milligals. Values of normal gravity according to the formula adopted by the International Union of Geodesy and Geophysics in 1930 were taken from Tanner's (1962) tables. The station free-air anomalies could then be determined.

Because many of the gravity stations are on mountain tops, appreciable terrain corrections are often involved. The gravity effect of the topographic features (to the level of the surrounding land/ice surface) on which the gravity stations are positioned, was calculated in the following way. Cross-sections normal to the horizontal long axis of the topographic features were drawn as illustrated in Plate 13. The gravity effects (at the observation point) of two-dimensional bodies with these cross-sections and density 2.67 t/m^3 could then be computed with the help of a zone chart. Finally an end-correction factor of 0.9, which corresponds to y/p = 2.0 (see Nettleton, 1940 - page 117), was applied as an approximation for the finite length of the topographic features.

Bouguer corrections were calculated using standard densities of 2.67 t/m^3 for rock and 0.917 t/m^3 for ice. Applying these to the terrain-corrected free-air anomalies yielded the Bouguer anomalies.

The gravity results are abstracted in Table 20, and Plate 14 shows the route of gravity meter G101 during the course of the summer work - the gravity stations being annotated with the calculated terrain-corrected free-air anomalies (FA) and Bouguer anomalies (BA).

Australia-Mawson gravity tie

Immediately before departure for Antarctica and also on return to Australia, gravity meter G101 was read at standard BMR gravity stations so that the Australia-Mawson tie could be redetermined. On the way down there were problems with continuity of ship's power to the gravity meters, and consequently they cooled below their operating temperature on several occasions. There were no such problems on the return voyage, and gravity meter temperatures were maintained at their correct level.

December 1975:

Mawson (5615.900) - Melbourne (6592.0001) = 2500.46 mGal
It is known that Melbourne (6592.0001) - Canberra (6491.0304) = 363.98 mGal
Therefore, Mawson (5615.900) - Canberra (6491.0304) = 2864.44 mGal

February-March 1976:

Mawson (5616.900) - Canberra Airport (6893.0104) = 2859.44 mGal
It is known that Canberra Airport (6893.0104) - Canberra (6491.0304) = 4.64 mGal
Therefore, Mawson (5615.900) - Canberra (6491.0304) = 2864.08 mGal.

The Regional Gravity Group of BMR has available (under file 7607) the full record of field notes, observations, and subsequent computations relating to the summer 1975/76 Antarctic gravity work.

5. DISCUSSION OF RESULTS AND RECOMMENDATIONS

Magnetism

The magnetic observatories at Mawson and Molodezhnaya provide good secular variation control for the edges of the region; the secular variation from 1954 to 1976 of D, H, Z, and F at the observatories and at re-occupied field stations are shown in Plates 5 to 8 respectively.

The data show that between the two observatories the rate of secular change varies sufficiently to require determinations at intervening stations; and that the non-linearity of secular change necessitates measurements at intervals not exceeding four years if the magnetic field is to be charted reliably.

Re-occupation stations must be placed on exposed rock, and the measurements obtained over the Mawson-Molodezhnaya survey area indicate an anomalous field pattern exhibiting both local and regional distortions. Terrain effects and magnetic heterogeneity of the near-surface high-grade metamorphic country rock resulting from non-uniform distributions of magnetic minerals (mostly magnetite) are probably the cause of the local anomalies. The large-scale deviations presumably originate from major compositional or structural variations within the crust.

It is obvious that apart from verifying the trends, the earlier field stations cannot contribute accurately to the pattern of regional secular changes. This is partly because the time between successive occupations was too great and partly because of logistical constraints in earlier years: inability to make lengthy stays at field sites meant that stations could not always be properly marked or re-occupied exactly (as the local magnetic anomalies necessitate), nor could protracted series of measurements be made (as the noise level associated with the auroral zones necessitates). An exception is Observation Island, established by McGregor in 1956, at which several long series of measurements were made during an 8-day visit (McGregor, personal communication).

For the reasons given above, it is vital that periodic re-occupations of selected stations be carried out; stations recommended for re-occupation include: Fold Island, Alphard Island, Rippon Depot, Rayner Peak, Proclamation Island, Observation Island, Pinn Island.

In carrying out re-occupations it is essential that the observations be repeated as close to the original stations as possible if inconsistencies due to the magnetic gradients are to be avoided. With the aid of the station descriptions provided in this Record, re-location to within 1 m should present no difficulty at most stations (the exceptions being those situated on neve, namely Mount King Base and Lamykin Dome).

The primary features of the magnetic field over the region have been established. A greater density of stations is required, however, before the complexities of the field can be resolved, and until this has been adequately achieved no interpretations can be made with confidence. Aeromagnetic coverage would be of appreciable benefit in reducing nearsurface 'noise', thus clarifying the regional pattern.

Gravity

The Russians have made regional gravity observations over much of the Enderby Land area, both on land and offshore. The author's 1975-76 results supplement and are compatible with the data published by Koriakin, Stroev & Frolov (1970).

The Enderby Land 'promontory' region centred on the Napier Mountains is characterised by very high values of free-air anomalies. This could be attributed to incomplete isostatic equilibrium of the crust in this area, with a deficiency of compensating crustal mass penetrating the mantle. Another possible explanation would be that the crust is partly or completely compensated, but that relatively dense rock in the upper crust is the cause of the high gravity values. No widespread density variations in the surface geology are evident from the mapping done to date. Thus, if the latter explanation is correct, the high-density material would have to be located at depth within the upper crust.

There is a pronounced trend in the Bouguer anomaly pattern in the form of a general increase in values from inland towards the ocean. This behaviour is typical of continental margins where there is a topographic height decrease and crustal thinning towards the ocean.

6. ACKNOWLEDGEMENTS

The scientific success of the 1975/76 Enderby Land expedition is attributable to the combined efforts of the many people involved - the wintering expeditioners, the summer party and the supporting staff in Australia.

The willing assistance and co-operation of the Division of National Mapping surveyors in providing geodetic information vital to the geophysical work was much appreciated. In particular, the author wishes to thank C. McMaster for his help in this regard and also for his pleasant company during the many days of isolation in the field. In addition, thanks go to those expeditioners who assisted with the gravity observations.

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APPENDIX

Geophysical Station descriptions

General comments

The magnetic and gravity stations occupied in the 1975-76 summer generally were located near Division of National Mapping survey stations, for which geographical co-ordinates are available to the nearest second of arc (see Tables 1-14). This enables the stations to be pinpointed (very precisely) if an up -to-date large-scale map can be obtained. It should be noted that the 1:250 000 First Edition series is in error by as much as two kilometres in places.

As has been mentioned, magnetic stations were usually marked by building a rock cairn and attaching an identifying tag. Although a rock cairn was not always built (to mark the survey stations), it was standard practice for the surveyor to leave an aluminium survey station plate bearing the station number. From memory, the plates had dimensions of the order 120 mm x 60 mm x 2 mm. Also in most cases, a station was marked by four wide strips of plastic sheeting (black or white, to contrast with the surroundings) laid out in the form of a cross and weighed down with rocks or snow. This was done to indicate the station's position on aerial photographs. Although intended only as a temporary measure, some of the plastic may remain in place despite blizzards, and could be helpful in relocating a station.

Descriptions of the geophysical stations follow. The number shown against each location in the descriptions refers to the reference survey station.

Fold Island (magnetic and gravity), NM-S-190

The survey station is about 3.5 km NNW of the highest point of Fold Island, and is situated on a ridge at a local high point overlooking an area of sea-ice between Fold Island and Cape Wilkins island. A hastily erected rock cairn was found marking the survey station - this was built up to about 1 m. The magnetic observations were done 3 m south of the cairn and the gravity readings were taken at its base.

Alphard Island (magnetic and gravity), MN-S-70

The survey station is on a local high point slightly north of the centre of Alphard Island, and is marked by a 2 m high rock cairn - lying beside it is a Russian fuel drum which was part of the original cairn. The magnetic station, marked by a 1.2 m high rock cairn, is 13.2 m NW of the survey station. The magnetic observations were done beside this cairn, to the SW; the gravity readings were taken at the base of the survey station cairn.

Depot Island (magnetic)

This magnetic station is located near the top of Depot Island, 8 m SSE of its highest point, and is marked by a 1.0 m high rock cairn. The magnetic observations were done 1.5 m WNW of the cairn.

Rippon Depot (magnetic and gravity), NM-S-210

Situated on an elevated area between Rippon and Seaton Glaciers, this site was the principal refuelling station for aircraft travelling between Mawson and Mount King Base, and so is readily recognised by the large number of 44-gallon fuel drums.

The survey station is located at the top of the highest rock exposure in the immediate vicinity and is marked by a rock cairn. A 1.0 m high rock cairn was built 20.5 m SSW of this station in a shallow depression to mark the position of the magnetic station. The magnetic observations were done just to the NNW of this cairn, and the gravity readings were made at the base of the survey station cairn.

Rayner Peak (magnetic and gravity), NM-S-16

The survey station is on a local high point 1.7 km west of the summit of Rayner Peak and is marked by a rock cairn 1.5 m high surmounting a light coloured rock foundation. Though a prominent landmark when erected, this cairn may have since partly collapsed during winter blizzards owing to its tall, slender construction and exposed position. The magnetic station is marked by a 1.0 m high rock cairn 14.0 m west of the survey station; the magnetic observations were done 2 m NNE of the cairn. Gravity readings were taken at the base of the survey station cairn.

Mount Breckinridge (magnetic and gravity), NM-S-203 (RM)

The survey station is situated on the highest rock point of Mount Breckinridge, and apart from a piton and aluminium survey station plate the spot was not marked. 15 m SSW of the survey station at the edge of the eastern drop-off, a 0.7 m high rock cairn was constructed to mark the magnetic station. The magnetic observations were made 5.8 m west of the cairn, and the gravity readings were done at the survey station RM (piton) 10-15 m SSE of this cairn and located on a projection of the cliff 2 m in from its edge. Several old ration packs had been depoted next to the RM by the surveying party which visited the location in the previous summer; these were left untouched.

Proclamation Island (magnetic and gravity), NM-S-226

The survey station is situated on a local high point near the top of Proclamation Island, SE of Mawson's 1930 proclamation site (low pile of rocks, wooden plaque, cane, scroll in glass tube etc), and is marked only by a piton and aluminium survey station plate. The magnetic station is 19.4 m WNW of the survey station in a relatively sheltered depression and is marked by a 0.7 m high rock cairn; the magnetic observations were made about 2 m south of the cairn. Because of the strong winds blowing at the time, the gravity reading was not taken at the survey station but 5 m to the west (and about 1.0 m lower).

Mount King Base (magnetic and gravity), King Base (New)

The base camp was set up on an extensive neve plain about 4.5 km SSE of Mount King. The magnetic observations were done 20 m west of the NW corner of the mess parcol, and the gravity readings were usually made on the floor of this building. A survey station (King Base (New)) was later put in about 20 m NW of the magnetic station position.

Mount McMaster (magnetic and gravity), NM-S-223

Located just below and to the east of the highest rock point on Mount McMaster, the survey station is marked only by a piton and aluminium survey station plate. The magnetic station is 5.6 m north of the survey station and is marked by a 1.0 m high rock cairn. The magnetic observations were made to

the immediate SE of the cairn, and the gravity reading taken at the survey station.

Latham Peak (gravity), NM-S-225 (RM)

The highest point of Latham Peak consists of a 3 m high block of rock. The gravity reading was done 8 m NW of this block at a RM of the survey station (located on the snow dome nearby). The RM is marked by a piton.

Mount Riiser-Larsen (magnetic), NM-S-220

The survey station is situated 4-5 km ENE of the summit of Mount Riiser-Larsen, on the crest of a rocky ridge and right at the edge of a sheer cliff facing approximately north. A 1.5 m high rock cairn was erected at the station, but being in such a precarious position it may have toppled or disintegrated to some degree during winter blizzards. The magnetic station is located 31.1 m down the rocky slope from the survey station, in line with it and the summit of Mount Pardoe, and is marked by a 1.3 m high rock cairn. The magnetic observations were done just beside the cairn on the Mount Pardoe (i.e. SSW) side.

Observation Island (magnetic and gravity), NM-S-217

The magnetic and gravity observations were made right at the site of the station established in 1956. The new survey station was also made to coincide with the established station. It is situated relatively high on Observation Island, on a rocky shelf near the highest point of the island but on its northern side, 10 m from the edge of a 30 m vertical drop to the sea below. Beneath the small rock cairn marking the station, a brass bolt and plate inscribed 'ANARE MAGNETIC & ASTRO STATION 20 OCT 1956, was found. It had been necessary to dismantle the cairn to do the measurements, but on their completion an aluminium survey station plate was secured to the existing brass bolt and plate, and the cairn re-erected. Two sheets of white plastic were draped over the cairn in the form of a cross and held down by stones.

Sheelagh Island (gravity), NM-S-222

The gravity readings were made at the survey station which is located on the highest point of the NW part of Sheelagh Island and is marked only by a piton and aluminium survey station plate.

Mount Pardoe (magnetic and gravity), NM-S-208

The survey station is located near Mount Pardoe's summit (actually between it and the second highest peak which lies to the NW) and is only a few metres from the steep drop-off to the NE. It is marked by a piton and aluminium survey station plate (no cairn). 7.7 m along the edge of the cliff to the NW, a 1.0 m high rock cairn was constructed to mark the magnetic station; the magnetic observations were made 1 m north of this cairn. The gravity readings were taken at the survey station.

Mount Douglas Fuel Depot (gravity)

The depot, at which the gravity reading was made, is situated on blue ice about 9 km NNW of Mount Douglas and should be recognisable by the presence of a number of empty 44-gallon fuel drums (although they may have been scattered by wind).

Mount Douglas (gravity), NM-S-209

The gravity reading was made at the survey station located on the NE high point near the summit of Mount Douglas and marked by a 1.5 m high rock cairn.

Pinn Island (magnetic and gravity), NM-S-214

The survey station is situated high on Pinn Island, about one-third of the island's length from the eastern end, and about 12 m from the sharp drop-off on the southern side. The station is marked by a 1.0 m high rock cairn; there is also an eccentric mark 2.0 m to the east consisting of a piton and aluminium survey station plate. The magnetic station is 28 m down the slope to the north and is marked by a 1.0 m high rock cairn. The cairn was erected on the spot

where the magnetic observations were done. The gravity readings were made at the survey station cairn.

Lamykin Dome (magnetic and gravity), NM-S-211

The site is about 17 km east of Fluted Rock on the neve of Lamykin Dome. The gravity reading was taken at the survey station, and the magnetic observations were made 9.5 m to the NE. It was not possible to permanently mark the locations of the stations, and all signs of the occupation are probably now obliterated by snow.

Molodezhnaya (gravity), NM-S-212

At the Russian base of Molodezhnaya most of the gravity readings were taken at the survey station, which was set up between the supports of the tall observatory trig point structure. This structure is on the elevated rock area to the west of the main base, but not as far as the upper atmospheric rocket launching installation. The place is known to the Russians as 'Ozernii'.

A gravity reading was also taken at the East German gravity station, which has been tied to Potsdam. The station is located at the East German huts, several hundred metres ENE of the main base.

TABLE 1

Magnetic results FOLD ISLAND Dec 1975 Reference Survey Station NM-S-190

Lat: 67°15'52"S Long: 59°20'55"E El: 89 m

Date 1975	UT h m	H nT	D(w) o '	Z nT
Dec 30	0819		60 02.2	
	0842		00.2	
	0926			- 46 466
	1004	18590		
	1027	578		
	1142		60 04.8	
	1202		59 55.4	
	1242			- 46 460
	1308	18630		
	1331	661		
	1400	598		
	1648	614		
	1734			- 46 444
Dec 31	0411		60 10.9	
	0423		08.9	
	0454	18551		
	0510	563		
	0543			- 46 406

TABLE 2

Magnetic results ALPHARD ISLAND, Jan/Feb 1976 Reference Survey Station NM-S-70

Lat: 66°57'36"S Long: 57°28'39"E El: 142 m

Date 1976	UT h m	H nT	D(W) o '	Z nT
Jan 31	0539	18144	59 38.2	
	0620	373	25.0	
	0825	437	58.3	
	1115	476	51.4	
	1339	724	15.6	
	1424			-45619
	1536			860
	1708			887
	1817			859
	1839			903
Feb 1	0434	18368	59 18.0	
	0526	484	13.2	
	0730	476	02.0	
	0756			-46010
	0827			012
	0915			020
	1000			017
	1045			083
	1148			-45999

25

TABLE 3

Magnetic results DEPOT ISLAND Feb 1976

Lat: 66°56'24"S Long: 57°19'37"E El: 35 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Feb 1	2301	18045	59 43.0	
	2324	161	42.6	
	2353	167	46.6	
Feb 2	0015	168	44.4	
	0043			- 46255
	0054			282
	0108			245
	0124			227
	0146			321
	0155			321
	0214	18147	59 52.8	
	0233	080	57.4	

TABLE 4

Magnetic results RIPPON DEPOT Jan 1976 Reference Survey Station NM-S-210

Lat: 66°40'06"S Long: 56°28'41"E El: 193 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 2	0758		58 20.4	
	0812		16.0	
	0900			- 45741
	0934	18122		
	1016	116		
	1112	144		
	1150	135		
	1213			- 45764
	1352		58 11.2	
	1430		15.2	
	2007		16.2	
Jan 3	0535	18161	27.2	
	0628	127	25.0	
	0805	154	14.7	
	0925			- 45746
	0939			737

TABLE 5

Magnetic results RAYNER PEAK Jan 1976 Reference Survey Station NM-S-16

Lat: 67°24'33"S Long: 55°54'55"E El: 912 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 24	1421	18539	56 33.3	
	1641	603	32.1	
	1710	568	32.0	
	1842			- 45 055
	1905			109
	1934			135
Jan 25	0414	18448	56 49.0	
	0457	473	51.4	
	0554	505	50.3	
	0625			- 45 131
	0750			130
	0858			141
	0927			147
	1557			151
	1630			161
	1700	18567	56 40.2	
	1804	564	36.2	
Jan 26	1301	512	35.2	
	1620	516	35.5	
	1816	532	35.1	
Jan 27	0538			- 45 117
	0639			094
	0816			114
	1156			150
	1424			150
	1615			151
Jan 29	0856	18507	56 33.6	
	1000	517	32.7	
	1229	545	31.2	
	1843	517	34.6	

TABLE 6

Magnetic results MOUNT BRECKINRIDGE Jan 1976 Reference Survey Station NM-S-203

Lat: 66°37'30"S Long: 53°42'56"E El: 1840 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 22	0450	19031	54 04.6	
	0515	162	53 59.3	
	0553			- 44 982
	0620			- 45 037
	0633			029
	0707			073
	0725			060
	0747	198	53 44.4	
	0847	185	45.6	

TABLE 7

Magnetic results PROCLAMATION ISLAND Jan 1976 Reference Survey Station NM-S-226

Lat: 65°50'19"S Long: 53°41'09"E El: 268 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 21	0710	20366	53 08.4	
	0732	411	08.5	
	0815			- 48 390
	0831			358
	0843			388

TABLE 8

Magnetic results MOUNT KING BASE Jan 1976 Reference Survey Station King Base

(New)
Lat: 67°04'29"S Long: 52°52'57" El: 1116 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 22	1921			- 43 923
	1943			957
	2005			815
Jan 23	0456	19136	55 04.4	
	0516	208	54 55.6	
	0606	212	54 51.2	

TABLE 9

Magnetic results MT McMASTER Jan 1976 Reference Survey Station NM-S-223

Lat: 66°37'25"S Long: 51°12'11"S El: 861 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 16	1137	17345	55 33.5	
	1211	331	32.6	
	1311			- 44 405
	1440			437
	1627			445
	1720			408
Jan 17	0749	17322	55 38.6	
	0821	355	34.4	
	0941	339	31.4	
	1021			- 44 402
	1050			430
	1205			400
	1310			396
Jan 18	0645	17175	55 50.8	
	0719	297	36.0	
	1136	380	26.2	
	1214	375	28.0	
	1246			- 44 392
	1315			403
	1522			398
	1750			410

TABLE 10

Magnetic results MOUNT RIISER-LARSEN Jan 1976 Reference Survey Station NM-S-220

Lat: 66°46'14"S Long: 50°46'17"E El: 759 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 14	1559	18482	53 07.6	
	1621	448	08.2	
	1725			- 43 478
Jan 15	0734	392	14.3	
	0807	384	12.8	
	1006			- 43 465
	1056			478

TABLE 11

Magnetic results OBSERVATION ISLAND Jan 1976 Reference Survey Station NM-S-217

Lat: 67°00'10"S Long: 50°24'59"E El: 32 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 13	1920	18934	52 36.6	
	1946	978	35.7	
	2014	980	36.1	
	2044	972	37.1	
	2130			- 42 630
	2152			620
Jan 14	0326	18894	52 46.2	
	0351	944	45.8	
	0416	946	46.5	
	0501			- 42 672
	0540			689

TABLE 12

Magnetic results MOUNT PARDOE Jan 1976 Reference Survey Station NM-S-208

Lat: 67°08'21"S Long: 50°10'36"E El: 843 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 4	0756	18804	51 04.9	
	0829	808	04.7	
	1011			- 42 378
	1130			393
	1330	18844	51 02.9	
	1412	833	04.0	
	1546			- 42 404
Jan 5	1133	18861	51 01.8	
	1309	825	02.6	
	1440			- 42 424
	1552			423
	1645			405
	1758	18828	51 02.4	
Jan 6	0800	824	07.8	
	0855	810	06.0	
	1118			- 42 410
	1409			410
	1515			412
	1625			477
	2001	18837	50 54.9	

TABLE 13

Magnetic results PINN ISLAND Jan 1976 Reference Survey Station NM-S-214

Lat: 67°33'35"S Long: 47°54'22"E El: 116 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 13	0332	18251	51 47.0	
	0356	179	57.7	
	0424	148	54.0	
	0515			- 43 642
	0527			659
	0542			637

TABLE 14

Magnetic results LAMYKIN DOME Jan 1976 Reference Survey Station NM-S-211

Lat: 67°34'17"S Long: 46°44'07"E El: 445 m

Date 1976	UT h m	H nT	D(w) o '	Z nT
Jan 7	1406	18747	51 34.8	
	1445	772	33.8	
	1749	781	34.1	
	1844			- 42 362
Jan 8	1108	18753	51 34.3	
	1148	747	34.2	
	1607	782	32.8	
	1824	795	32.0	
	1908			- 42 383
Jan 9	0910			322
	1130			340
	1534			356
	1620			400
	1653	18752	51 34.2	
Jan 10	1304	810	24.5	
	1605	729	11.2	
Jan 11	1318			- 42 355
	1717			342

TABLE 15

DECLINATION VALUES, GLACIOLOGICAL TRAVERSE 1976

STATION	LATITUDE (S)	LONGITUDE (E)	DATE	UT	D
GE2	68°39'03"	61°58'13"	2-2-76	1625	-63°19'
GE3	68 39 06	60 32 54	31-1-76	1024	-61 36
GE4	68 36 29	59 21 34	29-1-76	1013	-60 33
GE5	68 31 03	57 52 28	26-1-76	1047	-59 44
GE6	68 23 50	56 29 53	23-1-76	1654	-58 24
GE8	68 00 39	53 52 05	15-1-76	1750	-58 03

TABLE 16

REVISED GEOMAGNETIC DATA, SUMMER 1974-75

STATION	DATE	UT	H	DATE	UT	D	DATE	UT	Z
Knuckey Peaks (NM-S-204)	16-1-75	1327	20988				13-1-75	0609	-45009
Latitude = 67°54.3'S, Longitude = 53°32.4'E	17-1-75	1558	20888				17-1-75	1632	-45221
Elevation = 2157 m							17-1-75	1640	-45235
Mount King (NM-S-202, RM3)	13-1-75	1219	18502	13-1-75	1219	-54°09'			
Latitude = 67°00.9'S, Longitude = 52°49.7'E									
Elevation = 1487 m									
E003							4-1-75	0732	-47411
Latitude = 68°39.4'S, Longitude = 62°03.0'E							4-1-75	0737	-47431
Elevation = 1850 m*									
E052							5-1-75	0809	-46672
Latitude = 68°38.7'S, Longitude = 60°04.5'E									
Elevation = 1900 m*									
E153							7-1-75	0844	-45114
Latitude = 68°23.0'S, Longitude = 56°38.0'E									
Elevation = 2050 m*									

*Approximate geographic co-ordinates and elevation

TABLE 17
MAWSON GEOMAGNETIC OBSERVATORY (Latitude 67°36'S, Longitude 62°53'E)
ANNUAL MEAN VALUES 1955-1975

Year	D ° '	H nT	Z nT	F nT
1955*	-58 38.1	18272	-49012	52307
1956	-58 53.2	18282	-49006	52305
1957	-59 08.7	18292	-48974	52279
1958	-59 25.6	18293	-48940	52247
1959	-59 42.6	18293	-48860	52172
1960	-59 59.6	18323	-48800	52127
1961	-60 14.6	18322	-48707	52039
1962	-60 30.1	18333	-48650	51990
1963	-60 45.2	18356	-48562	51915
1964	-60 59.2	18353	-48460	51819
1965	-61 12.6	18356	-48368	51734
1966	-61 24.0	18362	-48235	51612
1967	-61 34.4	18374	-48168	51553
1968	-61 43.8	18365	-48060	51449
1969	-61 53.0	18353	-47954	51346
1970	-62 00.5	18358	-47840	51241
1971	-62 05.3	18375	-47719	51135
1972	-62 11.4	18381	-47600	51026
1973	-62 17.6	18391	-47486	50923
1974	-62 24.8	18390	-47380	50824
1975	-62 31.4	18397	-47269	50723

*Regular observations commenced in May 1955

TABLE 18

MOLODEZHNAYA GEOMAGNETIC OBSERVATORY (Latitude = 67°40'S, Longitude = 45°51'E)

ANNUAL MEAN VALUES 1964-1975

Year	D ° '	H nT	Z nT	F nT
1964	-49 10.3	19000	-43336*	47318
1965	-49 04.3	18980	-43221*	47205
1966	-49 24.0	18969	-43040*	47035
1967	-49 31.8	18968	-42939*	46942
1968	-49 36.0	18981	-43109	47103
1969	-49 44.0	18994	-42982	46992
1970	-49 50.0	18997	-42833	46857
1971	-49 54.3	19009	-42699	46739
1972	-49 57.0	19020	-42580	46635
1973	-50 02.7	19022	-42451	46518
1974	-50 06.2	19030	-42329	46410
1975	-50 08.3	19013	-42194	46280

*Values suspect; should possibly be about 300 nT lower (and therefore corresponding F values 275 nT higher)

TABLE 19

SUMMARY OF SUMMER 1975-76 GEOMAGNETIC FIELD DATA

STATION	LATITUDE (S) o ' "	LONGITUDE (E) o ' "	PERIOD OVER WHICH OBSERVATIONS WERE MADE	MEAN H nT	MEAN D o '	MEAN Z nT
Fold Island	67 15 52	59 20 55	30.12.75-31.12.75	18598	-60 03.7	-46444
Alphard Island	66 57 36	57 28 39	31.1.76-1.2.76	18435	-59 12.7	-45939
Depot Island	66 56 24	57 19 37	1.2.76-2.2.76	18128	-59 47.8	-46275
Rippon Depot	66 40 06	56 28 41	2.1.76-3.1.76	18134	-58 18.2	-45747
Rayner Peak	67 24 33	55 54 55	24.1.76-29.1.76	18528	-56 37.5	-45129
Mount Breckinridge	66 37 30	53 42 56	22.1.76	19144	-53 53.5	-45036
Proclamation Island	65 50 19	53 41 09	21.1.76	20389	-53 08.5	-48379
Mount King Base	67 04 29	52 52 57	21.1.76-23.1.76	19185	-54 57.1	-43898
Mount McMaster	66 37 25	51 12 11	12.1.76-18.1.76	17324	-55 34.7	-44411
Mount Riiser-Larsen	66 46 14	50 46 17	14.1.76-15.1.76	18427	-53 10.7	-43474
Observation Island	67 00 10	50 24 59	13.1.76-14.1.76	18950	-52 40.6	-42648
Mount Pardoe	67 08 21	50 10 36	4.1.76-6.1.76	18827	-51 03.2	-42410
Pinn Island	67 33 35	47 54 22	13.1.76	18193	-51 52.9	-43646
Lamykin Dome	67 34 17	46 44 07	7.1.76-11.1.76	18767	-51 33.6	-42368

TABLE 20

GRAVITY DATA, MAWSON-MOLODEZHNAYA (SUMMER 1975-76)

Station	Latitude (S) o ' "	Longitude (E) o ' "	Elevation m	Normal Gravity	Observed Gravity (Based on Mawson Value)	Free-air Anomaly mGal	Terrain Corrn	Terrain Corrected Free-air Anomaly	Bouguer Corrn	Bouguer Anomaly
Mawson BMR Stn No 5615.900 (Sheet-Metal Store)	67 36 14	62 52 12	5	982,467.65	982,481.80	15.69	0	15.7	0	15.7
Fold Island NM-S-190	67 15 52	59 20 55	89	982,445.82	982,471.09	52.74	-5.1	47.6	0	47.6
Alphard Island NM-S-70	66 57 36	57 28 39	142	982,426.06	982,456.70	74.46	-9.6	64.8	0	64.8
Rippon Depot NM-S-210	66 40 06	56 28 41	193	982,406.94	982,348.63	1.25	-6.4	-5.2	10.0	-15.2
Rayner Peak NM-S-16	67 24 33	55 54 55	912	982,455.13	982,253.63	79.94	-19.4	60.5	72.5	-12.0
Mt Breckinridge NM-S-203 (RM)	66 37 30	53 42 56	1839	982,404.09	982,010.64	174.07	-4.5	169.6	187.5	-17.9
Proclamation Island NM-S-226	65 50 19	53 41 09	267	982,351.56	982,323.37	54.21	-11.9	42.3	0	42.3
Mt King Base NM-S-202 (Mess Parcol)	67 04 29	52 52 59	1116	982,433.53	982,153.45	64.32	0	64.3	109.9*	-45.6
Latham Peak NM-S-225 (RM)	66 22 28	51 47 02	998	982,387.50	982,192.90	113.38	-15.7	97.7	73.7	24.0
Mt McMaster NM-S-223	66 37 25	51 12 11	861	982,404.00	982,243.56	105.26	-6.7	98.5	78.1	20.4
Observation Island NM-S-217	67 00 10	50 24 59	32	982,428.85	982,415.38	-3.59	-0.8	-4.4	0	-4.4
Sheelagh Island NM-S-222	66 32 40	50 10 51	21	982,398.77	982,453.05	60.76	-0.6	60.1	0	60.1

TABLE 20 (Contd)

Station	Latitude (S) o ' "	Longitude (E) o ' "	Elevation m	Normal Gravity	Observed Gravity (Based on Mawson Value)	Free-air Anomaly mGal	Terrain Corrn	Terrain Corrected Free-air Anomaly	Bouguer Corrn	Bouguer Anomaly
Mt Pardoe NM-S-208	67 08 21	50 10 36	843	982,437.69	982,266.64	89.10	-41.2	47.9	0	47.9
Mt Douglas NM-S-209	67 39 18	50 04 12	1564	982,470.86	982,119.61	131.64	-32.2	99.4	111.6	-12.2
Mt Douglas Fuel Depot	67 34 00+	49 57 00+	785+	982,465.04	982,243.98	21.19	0	21.2	80.3**	-59.1
Pinn Island NM-S-214	67 33 35	47 54 22	116	982,464.78	982,430.16	1.18	-5.6	-4.4	0	-4.4
Lamykin Dome NM-S-211	67 34 17	46 44 07	445	982,465.52	982,355.34	27.15	0	27.2	42.3**	-15.2
Molodezhnaya NM-S-212	67 40 01	45 50 10	77	982,471.62	982,460.09	12.23	-6.1	6.1	0	6.1

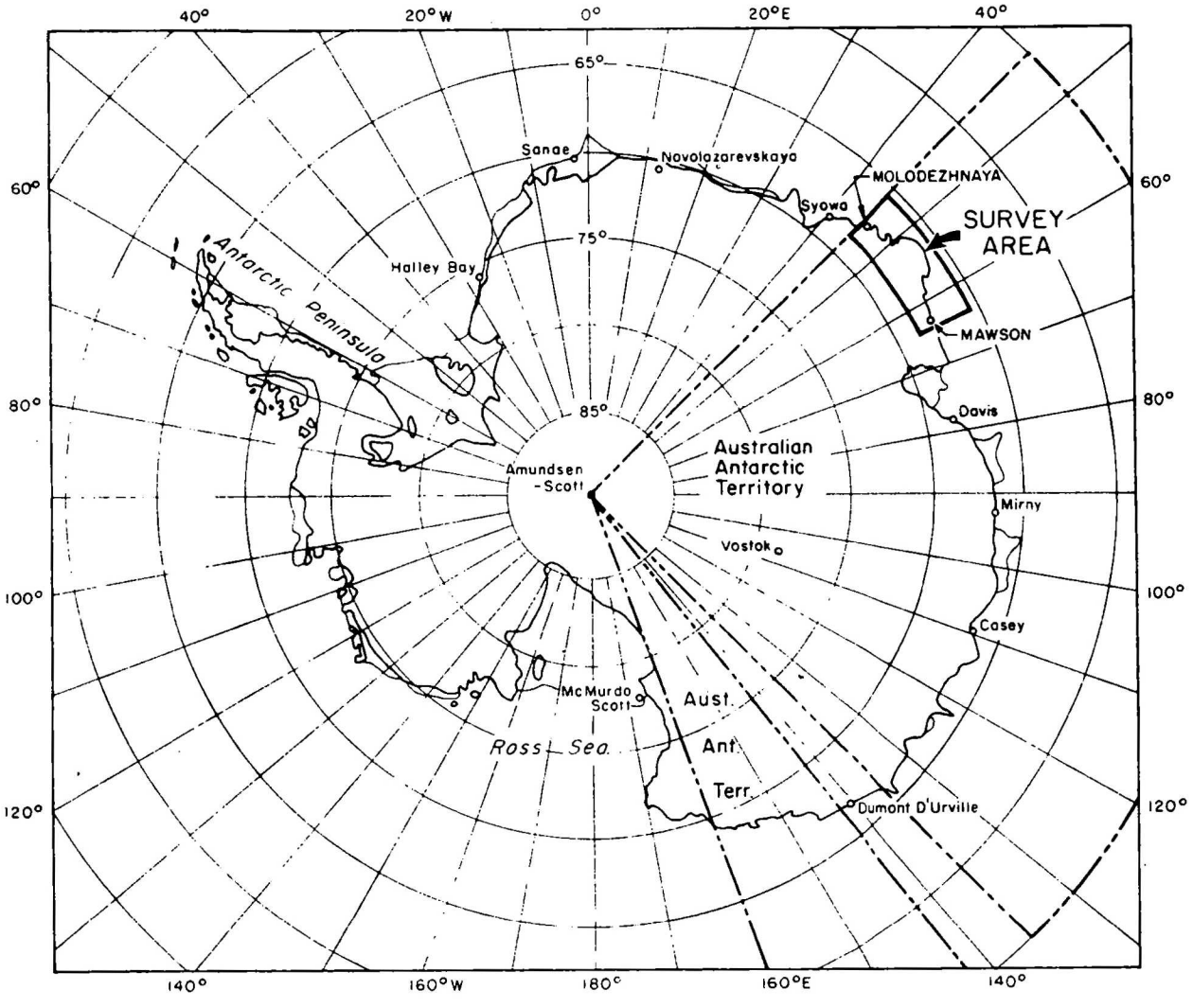
\+ Approximate values

* Assuming 200 m ice thickness

** " 100 m " "

Molodezhnaya (East German gravity station) - Molodezhnaya (NM-S-212) = 7.72 mGal

Mawson (5615.900) - Molodezhnaya (East German gravity station) = 13.99 mGal



LOCALITY MAP

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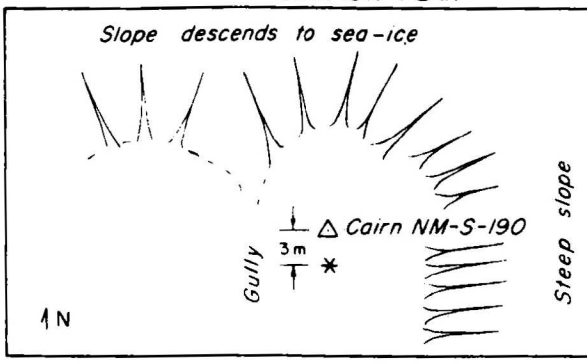
STATION PLAN SIGHTING TO MARK PLATE 2

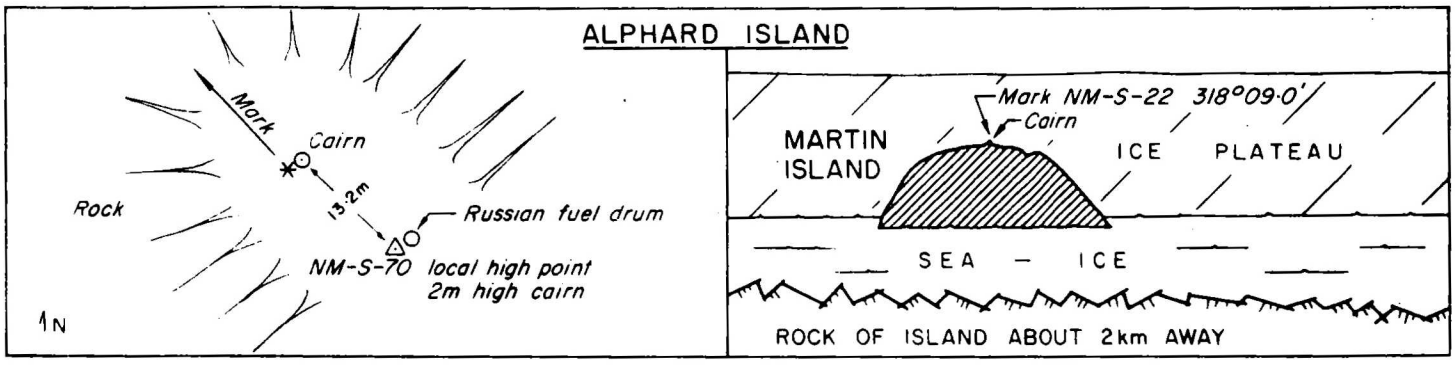
FOLD ISLAND



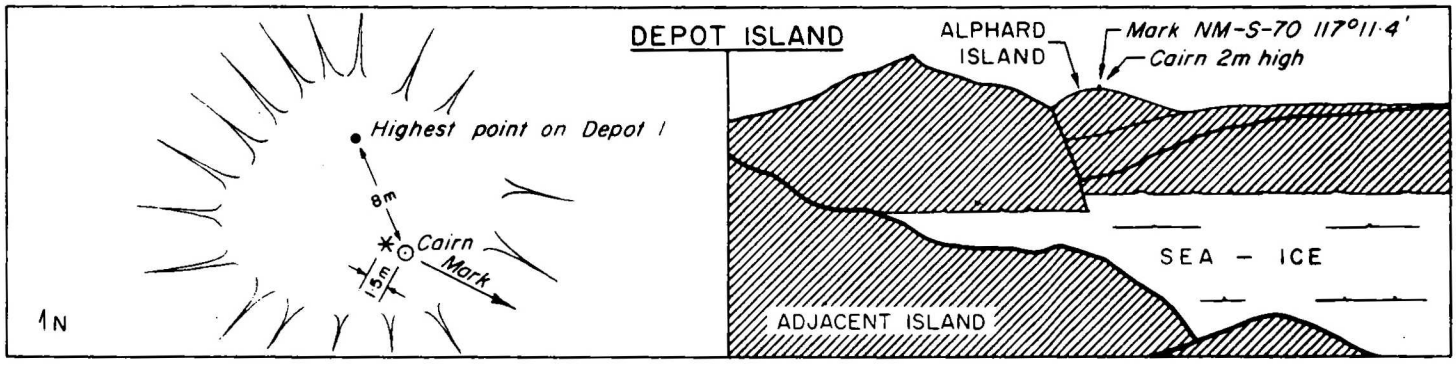
Compass theodolite sun observations were made.

Division of National Mapping survey stations on UFS Island or Haustein Island could be used as marks.

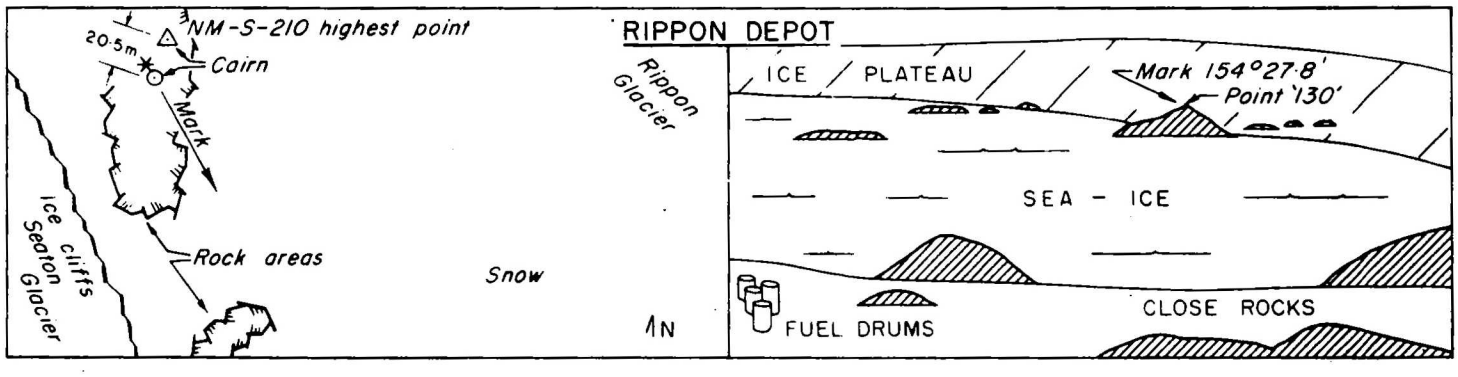
ALPHARD ISLAND



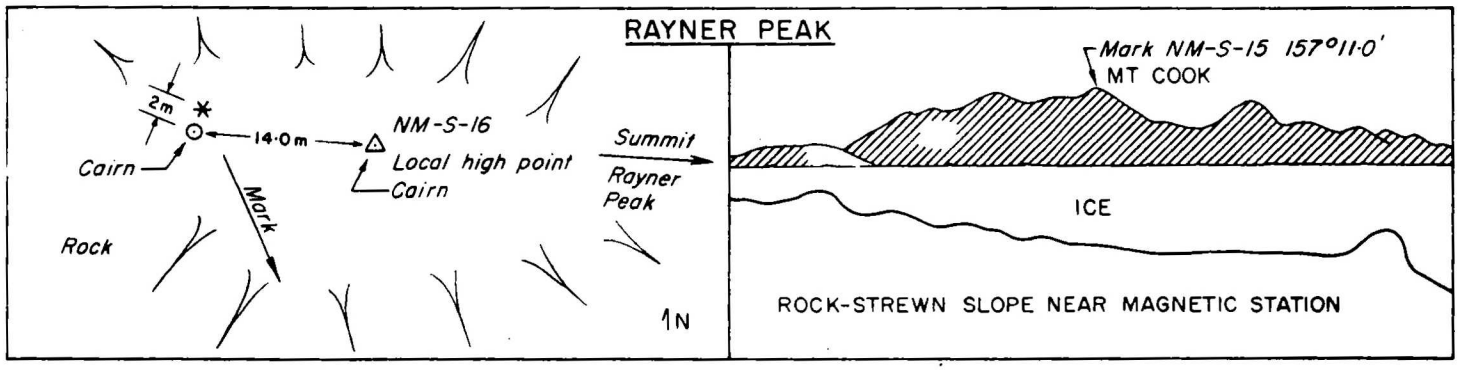
DEPOT ISLAND



RIPPON DEPOT



RAYNER PEAK



Legend

- ✱ *Location of magnetic observations*
- △ *Geodetic survey station*
- ○ *Cairn marking magnetic station*
- 1N *North (approx.)*

Record No. 1979/6

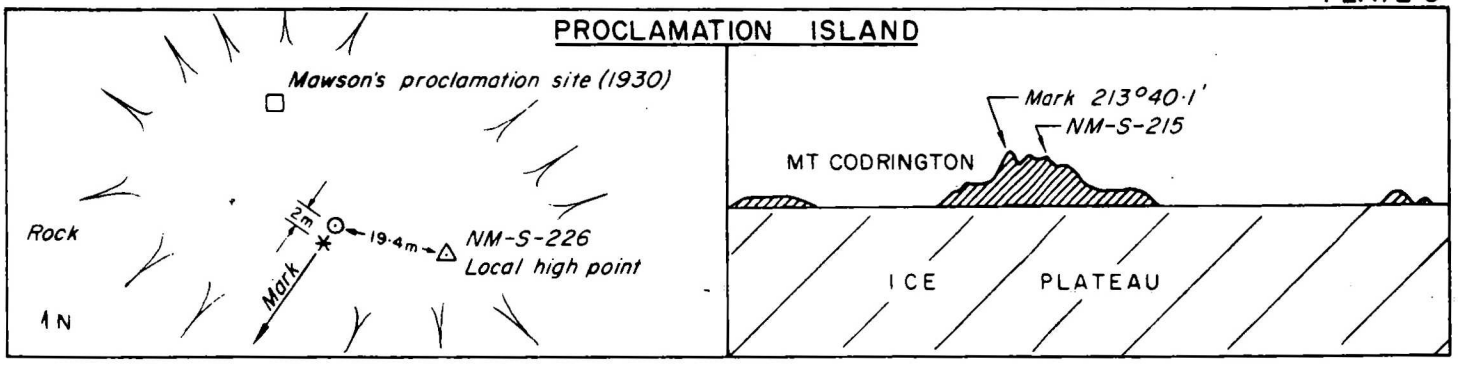
SKETCHED DETAILS OF MAGNETIC STATIONS
(Not to scale)

44

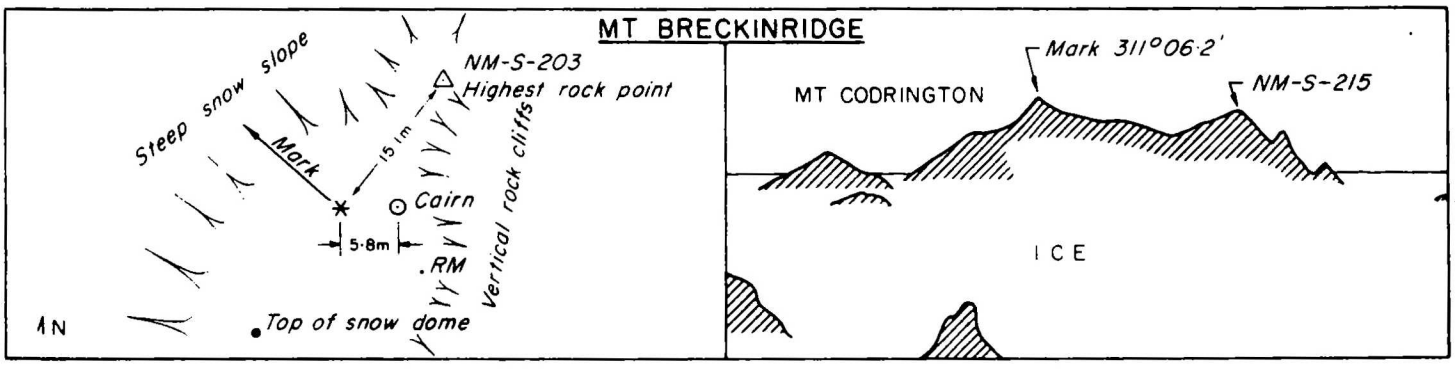
ANT/89-77A

STATION PLAN SIGHTING TO MARK PLATE 3

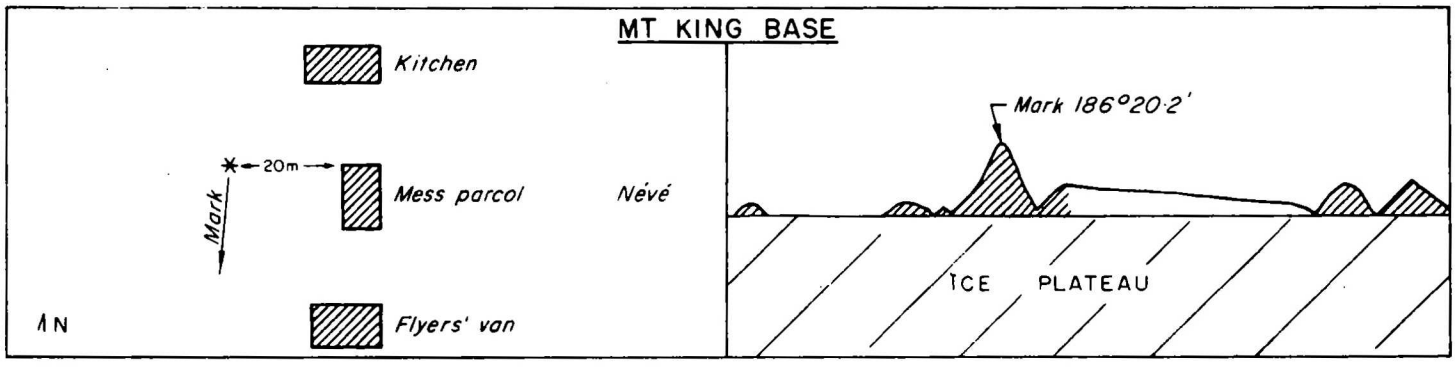
PROCLAMATION ISLAND



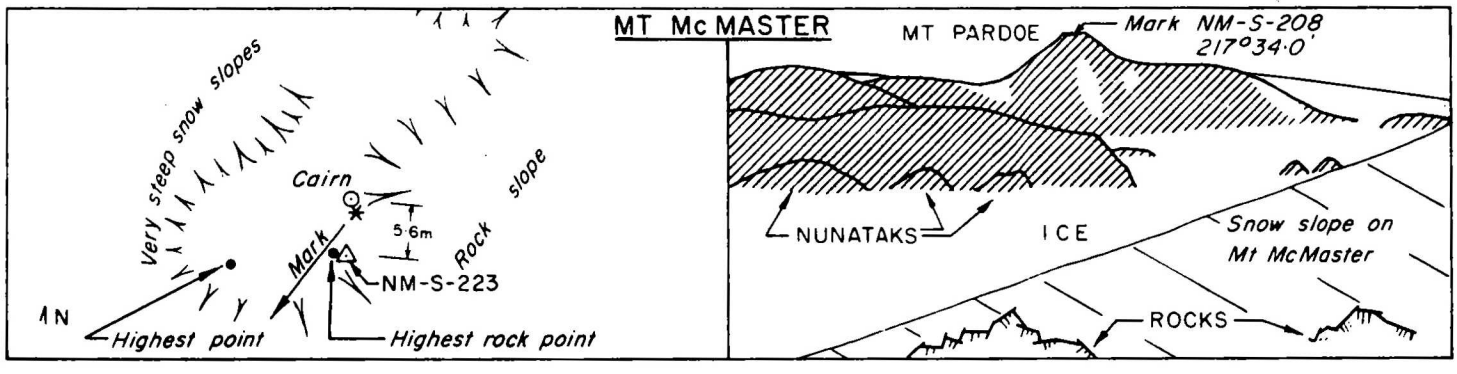
MT BRECKINRIDGE



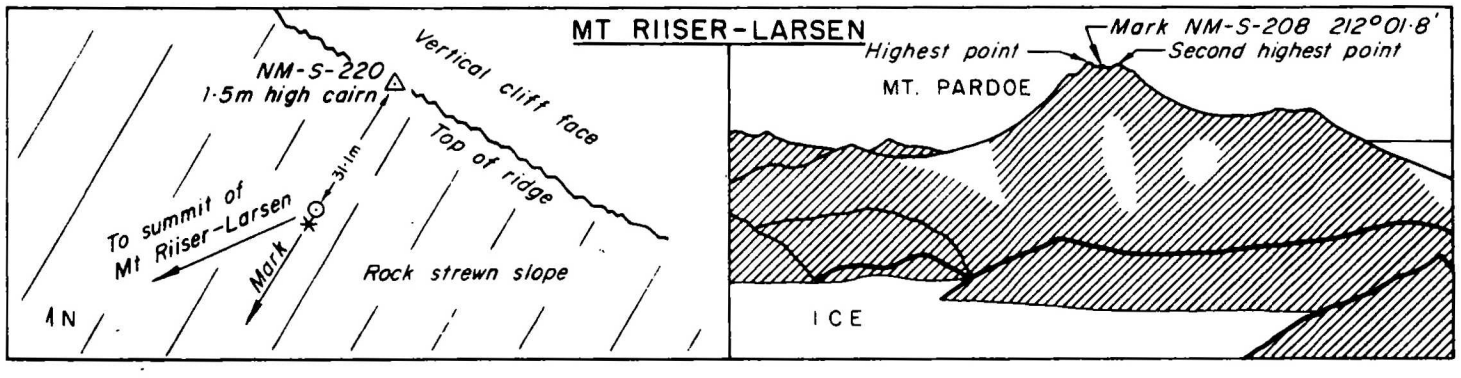
MT KING BASE



MT McMASTER



MT RIISER-LARSEN



Legend

- ✱ *Location of magnetic observations*
- △ *Geodetic survey station*
- ⊙ *Cairn marking magnetic station*
- 1N *North (approx.)*

Record No. 1979/6

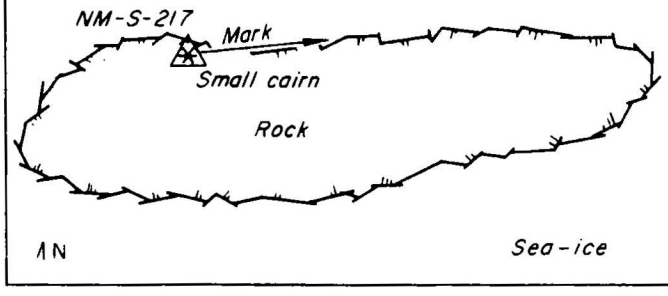
SKETCHED DETAILS OF MAGNETIC STATIONS
(Not to scale)

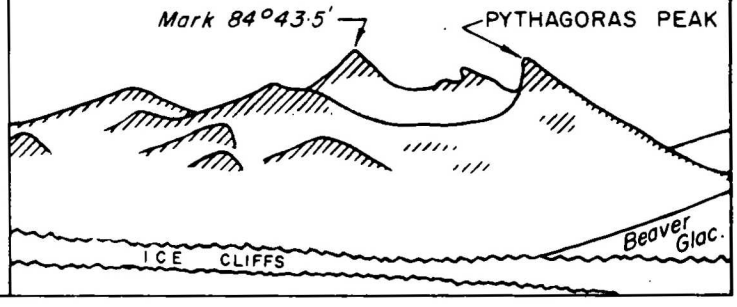
ANT/B9-78A

STATION PLAN

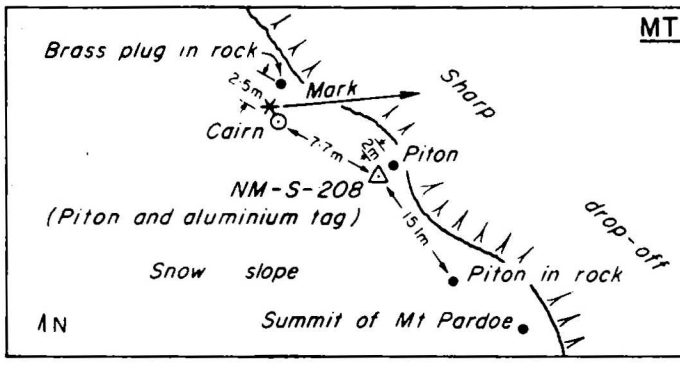
SIGHTING TO MARK

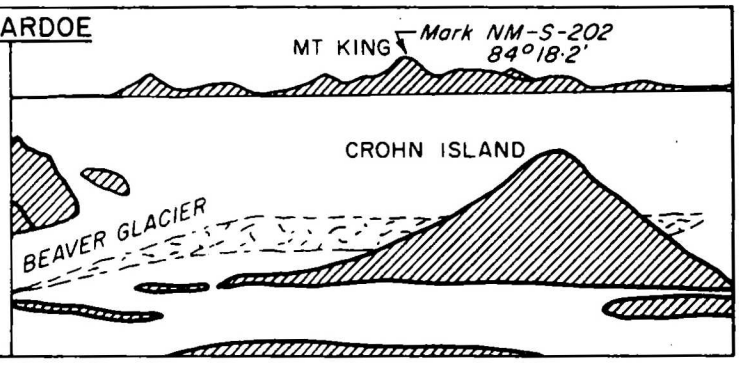
OBSERVATION ISLAND



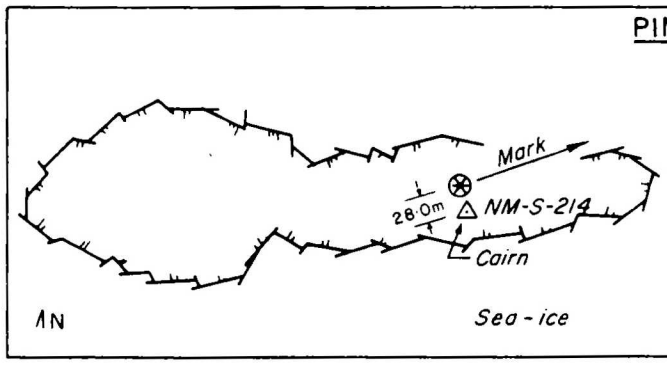


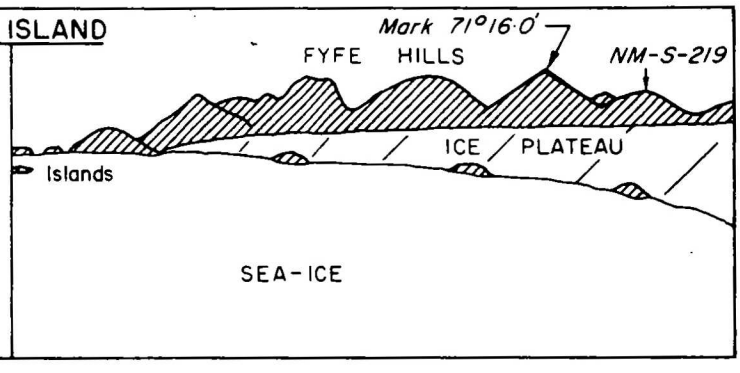
MT PARDOE



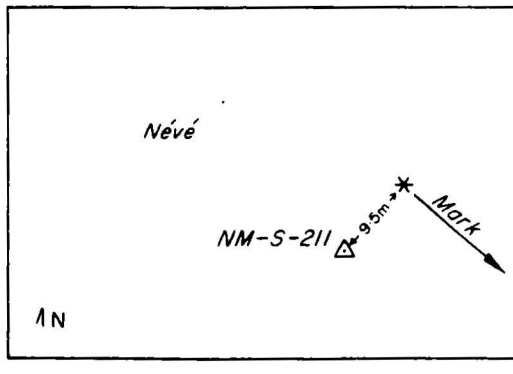


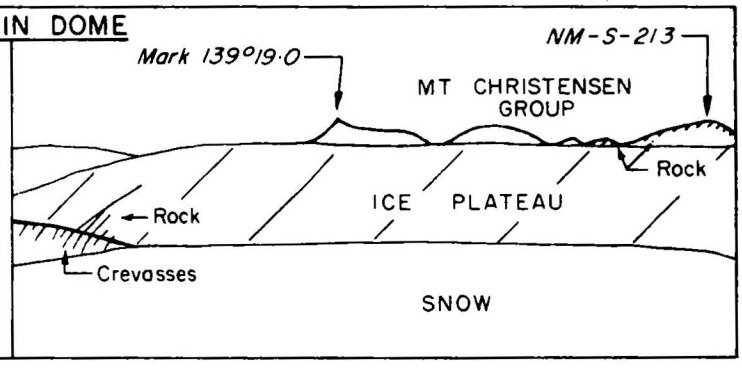
PINN ISLAND





LAMYKIN DOME





Legend

- ✳ *Location of magnetic observations*
- △ *Geodetic survey station*
- ⊙ *Cairn marking magnetic station*
- N *North (approx.)*

SKETCHED DETAILS OF MAGNETIC STATIONS
(Not to scale)

ANT/B9-79A

Record No. 1979/6

D SECULAR VARIATION, MAWSON-MOLODEZHNAYA

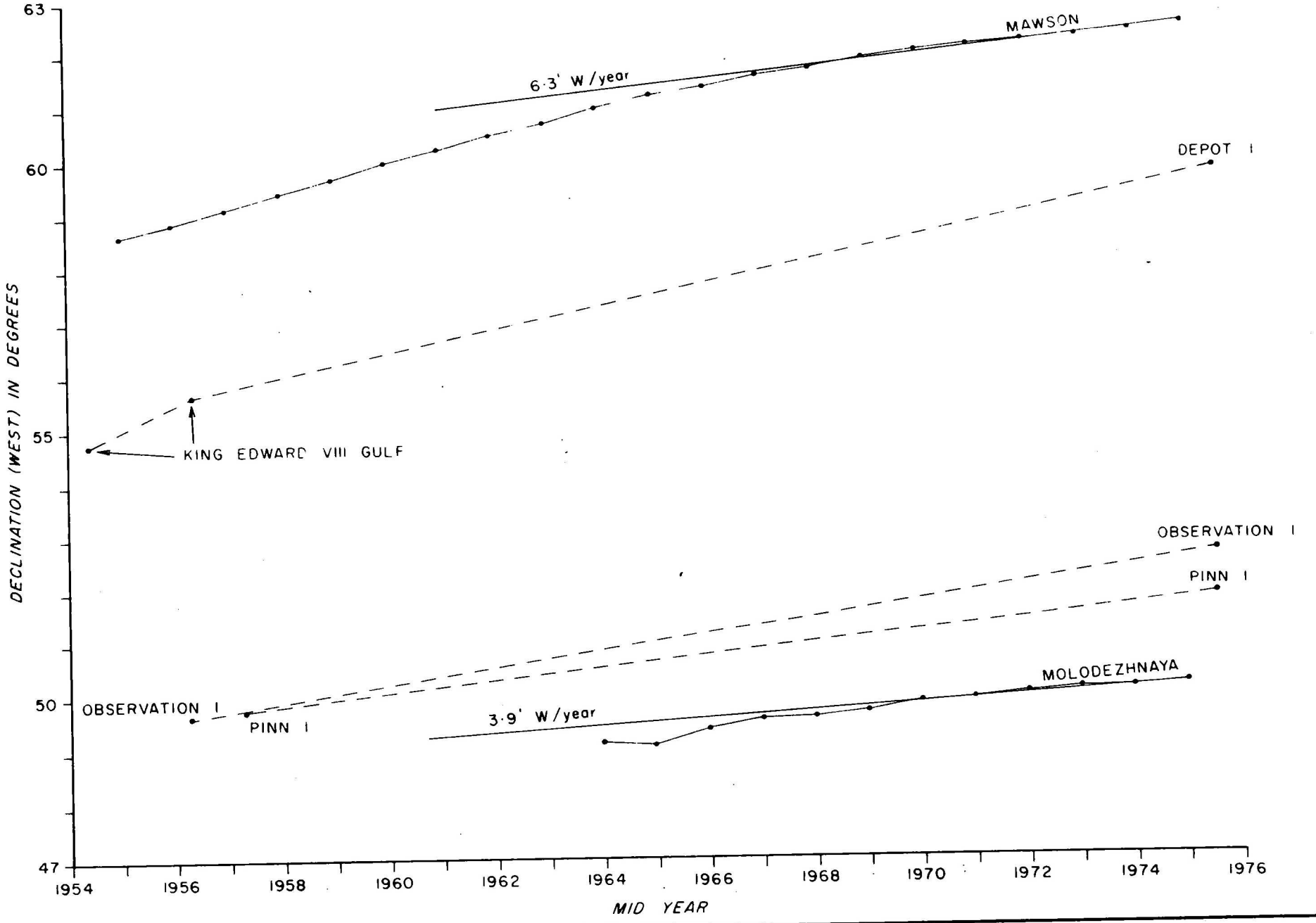
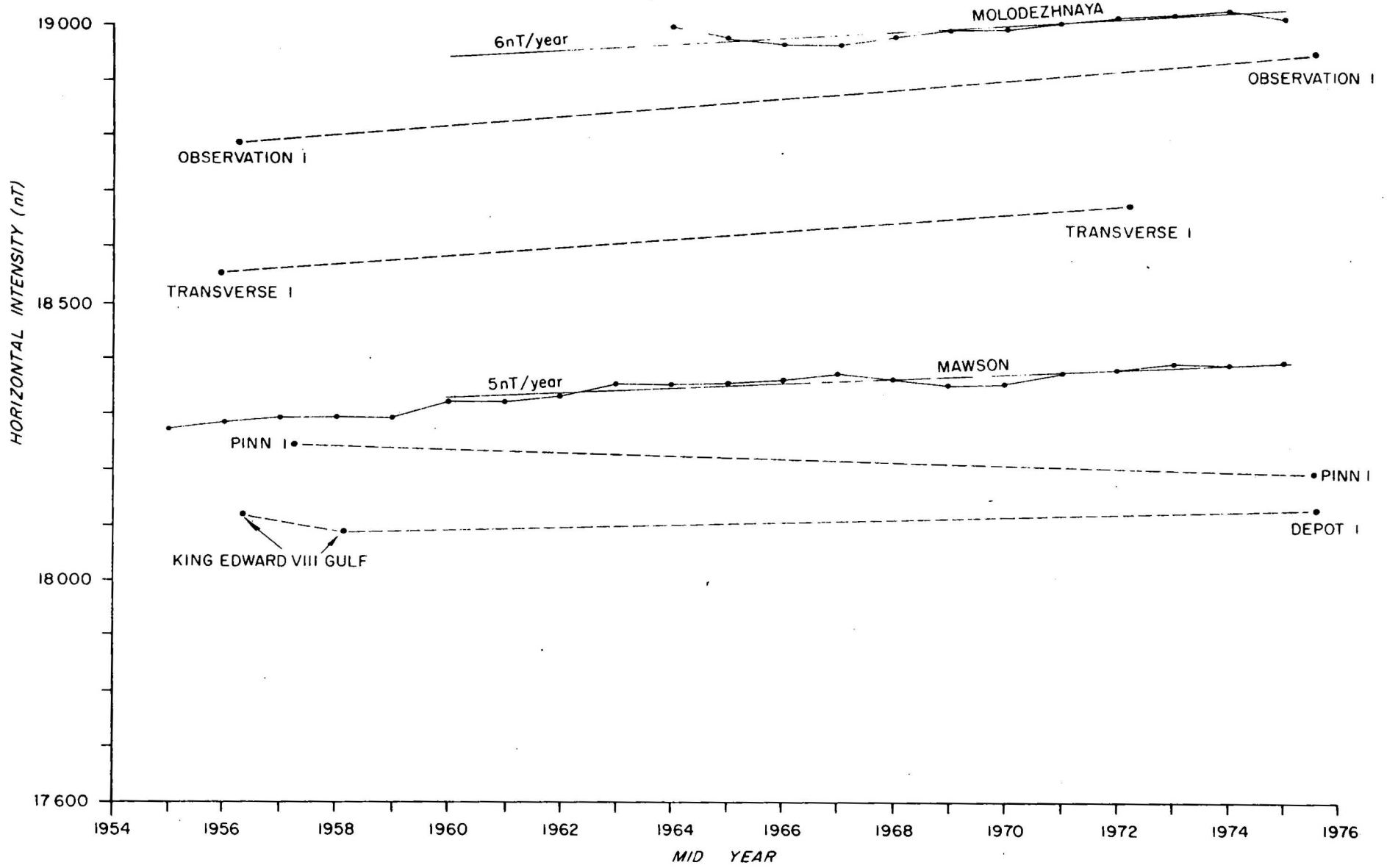


PLATE 5

ANT/89-81A

Record No. 1979/6

H SECULAR VARIATION, MAWSON - MOLODEZHNAYA

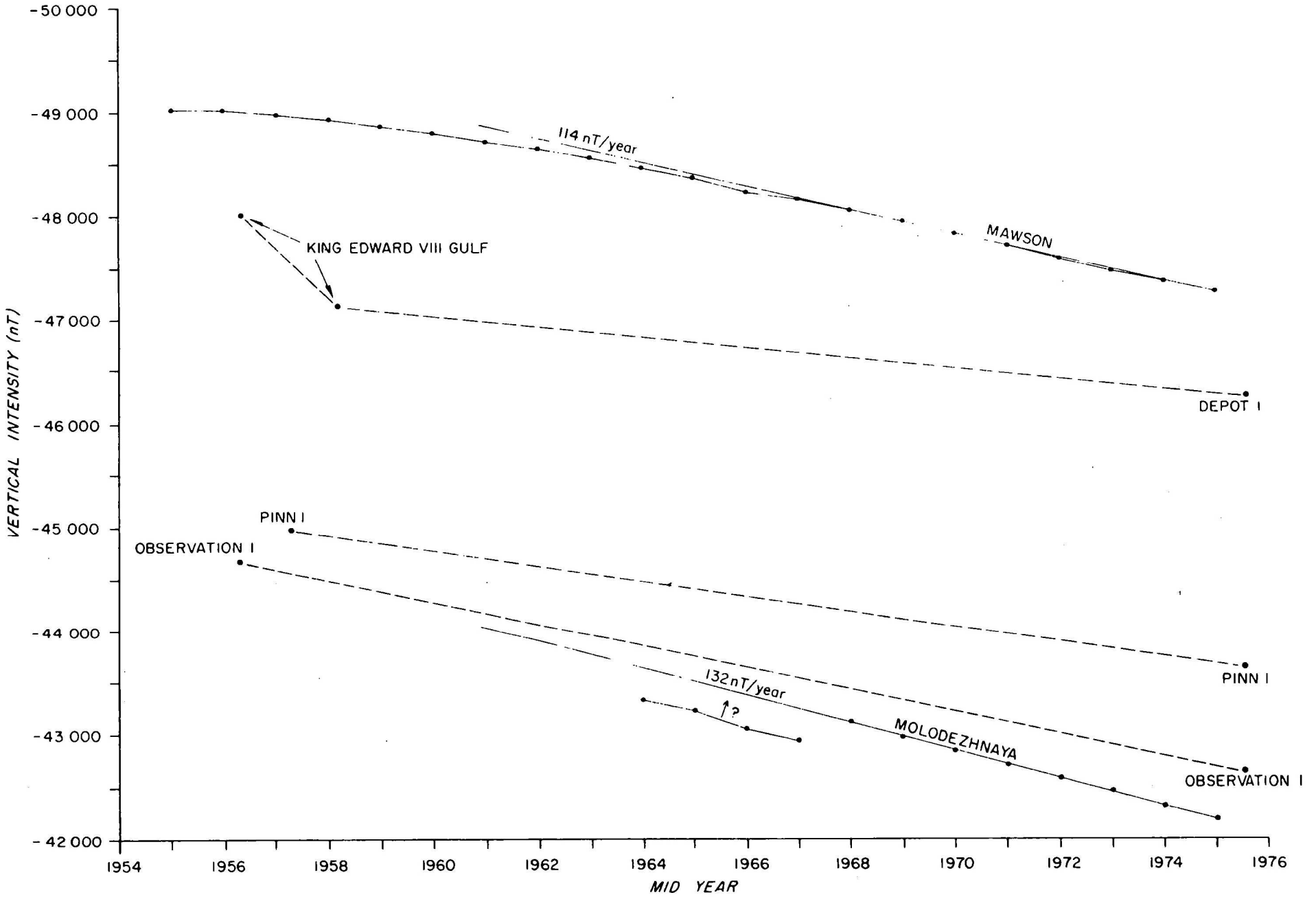


ANT/B9-83A

PLATE 6

Record No. 1979/6

Z SECULAR VARIATION, MAWSON - MOLODEZHNAYA

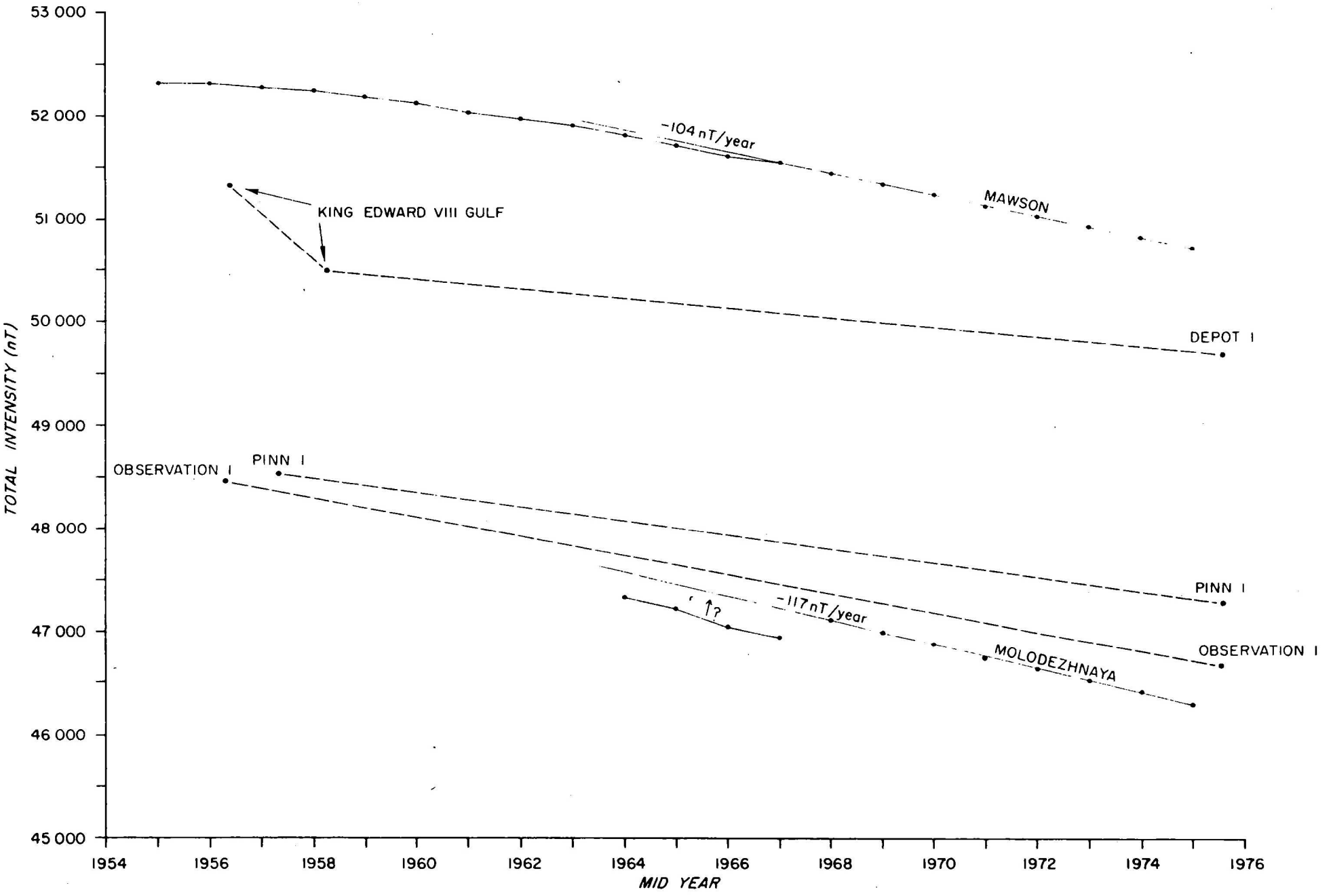


ANT/89-84A

PLATE 7

Record No. 1979/6

F SECULAR VARIATION, MAWSON-MOLODEZHNAYA



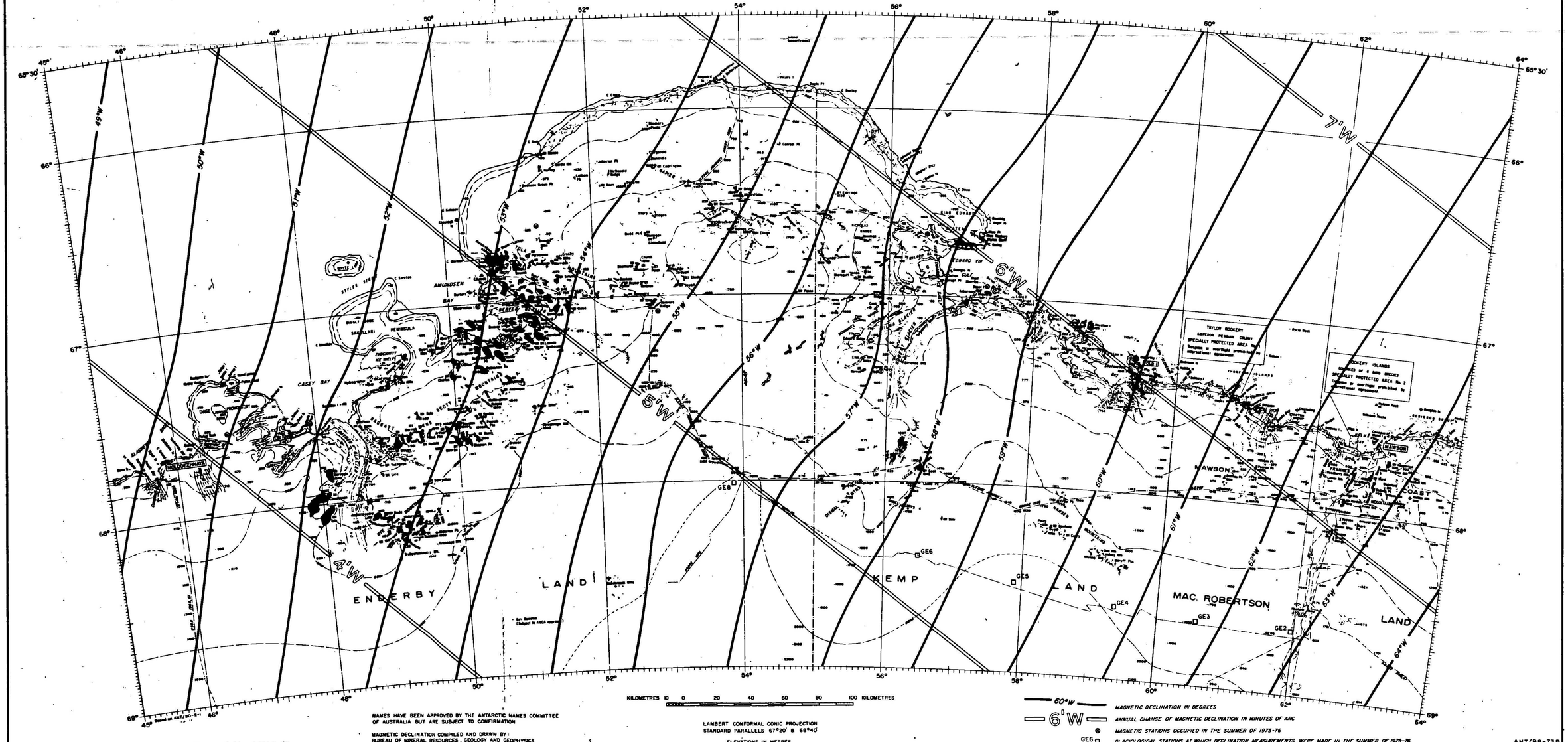
ANT/89-82A

PLATE 8

MAWSON–MOLODEZHNAYA

MAGNETIC DECLINATION OR VARIATION

EPOCH 1975·0



KILOMETRES 10 0 20 40 60 80 100 KILOMETRES

LAMBERT CONFORMAL CONIC PROJECTION
STANDARD PARALLELS 67°20' & 68°40'

ELEVATIONS IN METRES

60°W — MAGNETIC DECLINATION IN DEGREES

6'W — ANNUAL CHANGE OF MAGNETIC DECLINATION IN MINUTES OF ARC

⊗ MAGNETIC STATIONS OCCUPIED IN THE SUMMER OF 1975-76

GE6 □ GLACIOLOGICAL STATIONS AT WHICH DECLINATION MEASUREMENTS WERE MADE IN THE SUMMER OF 1975-76

NAMES HAVE BEEN APPROVED BY THE ANTARCTIC NAMES COMMITTEE OF AUSTRALIA BUT ARE SUBJECT TO CONFIRMATION

MAGNETIC DECLINATION COMPILED AND DRAWN BY:
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

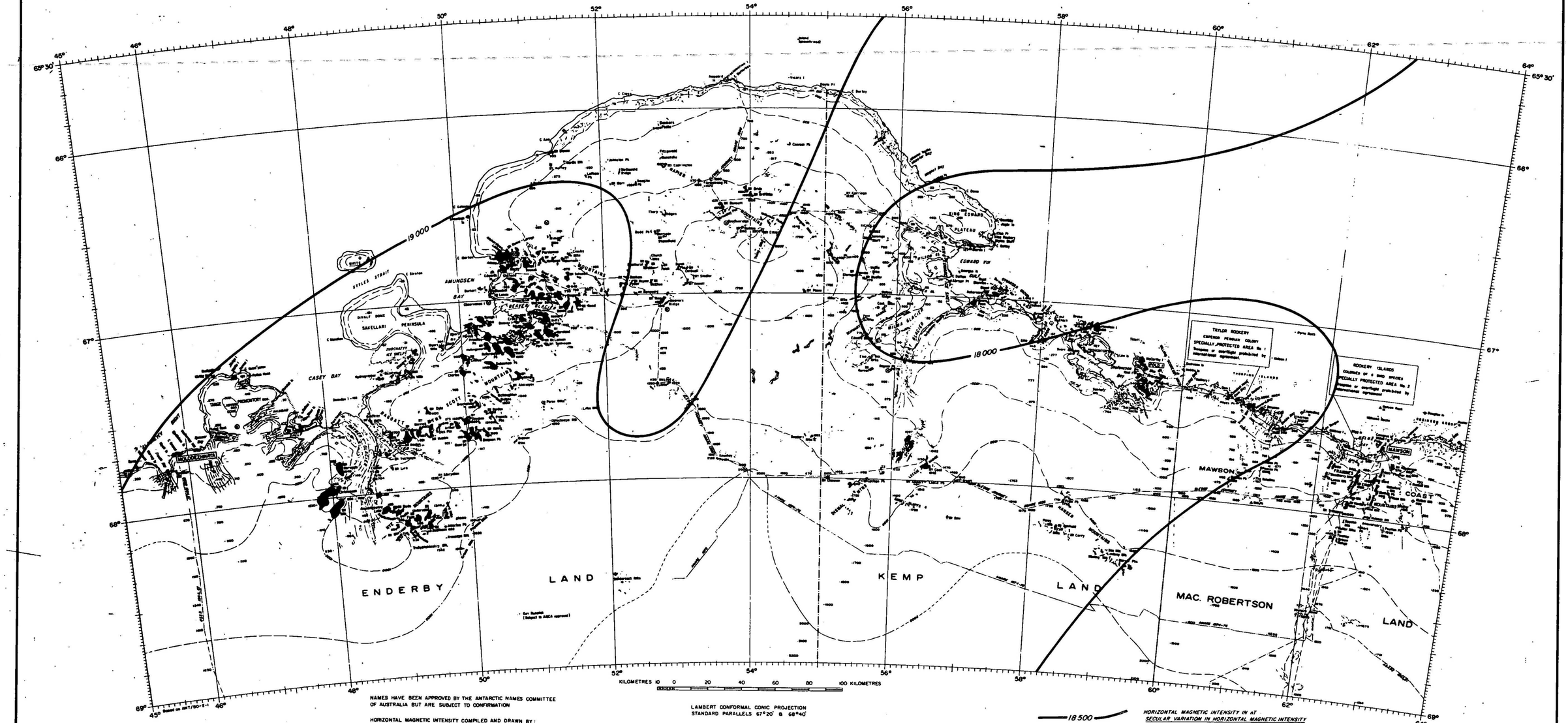
TOPOGRAPHIC BASE MAP PRODUCED BY:
DIVISION OF NATIONAL MAPPING, DEPARTMENT OF NATIONAL RESOURCES, SEPT. 1974

Record No. 1979/6

ANT/89-73R

PLATE 10

MAWSON-MOLODEZHNAYA
HORIZONTAL MAGNETIC INTENSITY
EPOCH 1975·0



NAMES HAVE BEEN APPROVED BY THE ANTARCTIC NAMES COMMITTEE OF AUSTRALIA BUT ARE SUBJECT TO CONFIRMATION

HORIZONTAL MAGNETIC INTENSITY COMPILED AND DRAWN BY: BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

LAMBERT CONFORMAL CONIC PROJECTION
STANDARD PARALLELS 67°20' & 68°40'

ELEVATIONS IN METRES

18500 HORIZONTAL MAGNETIC INTENSITY IN nT

SECULAR VARIATION IN HORIZONTAL MAGNETIC INTENSITY OVER THE REGION IS SMALL, APPROXIMATELY +5nT/YEAR

⊗ MAGNETIC STATIONS OCCUPIED IN THE SUMMER OF 1975-76

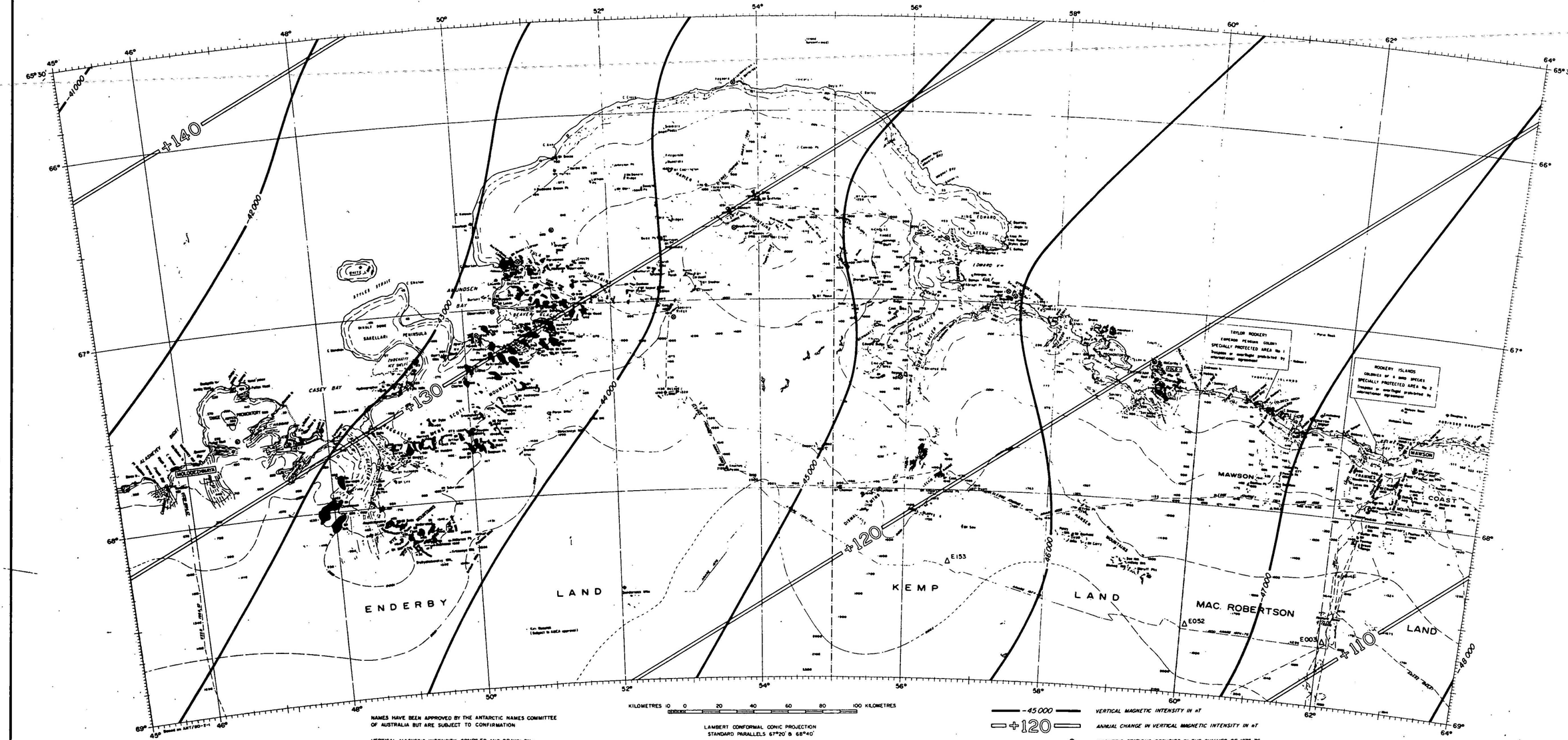
TOPOGRAPHIC BASE MAP PRODUCED BY: DIVISION OF NATIONAL MAPPING, DEPARTMENT OF NATIONAL RESOURCES, SEPT. 1974

Record No. 1979/6

ANT/89-74R

MAWSON - MOLODEZHNAYA
VERTICAL MAGNETIC INTENSITY
EPOCH 1975·0

PLATE II



KILOMETRES 10 0 20 40 60 80 100 KILOMETRES

LAMBERT CONFORMAL CONIC PROJECTION
STANDARD PARALLELS 67°20' & 68°40'

ELEVATIONS IN METRES

NAMES HAVE BEEN APPROVED BY THE ANTARCTIC NAMES COMMITTEE OF AUSTRALIA BUT ARE SUBJECT TO CONFIRMATION

VERTICAL MAGNETIC INTENSITY COMPILED AND DRAWN BY:
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TOPOGRAPHIC BASE MAP PRODUCED BY:
DIVISION OF NATIONAL MAPPING, DEPARTMENT OF NATIONAL RESOURCES, SEPT. 1974

-45000 — VERTICAL MAGNETIC INTENSITY IN nT

+120 — ANNUAL CHANGE IN VERTICAL MAGNETIC INTENSITY IN nT

⊗ MAGNETIC STATIONS OCCUPIED IN THE SUMMER OF 1975-76

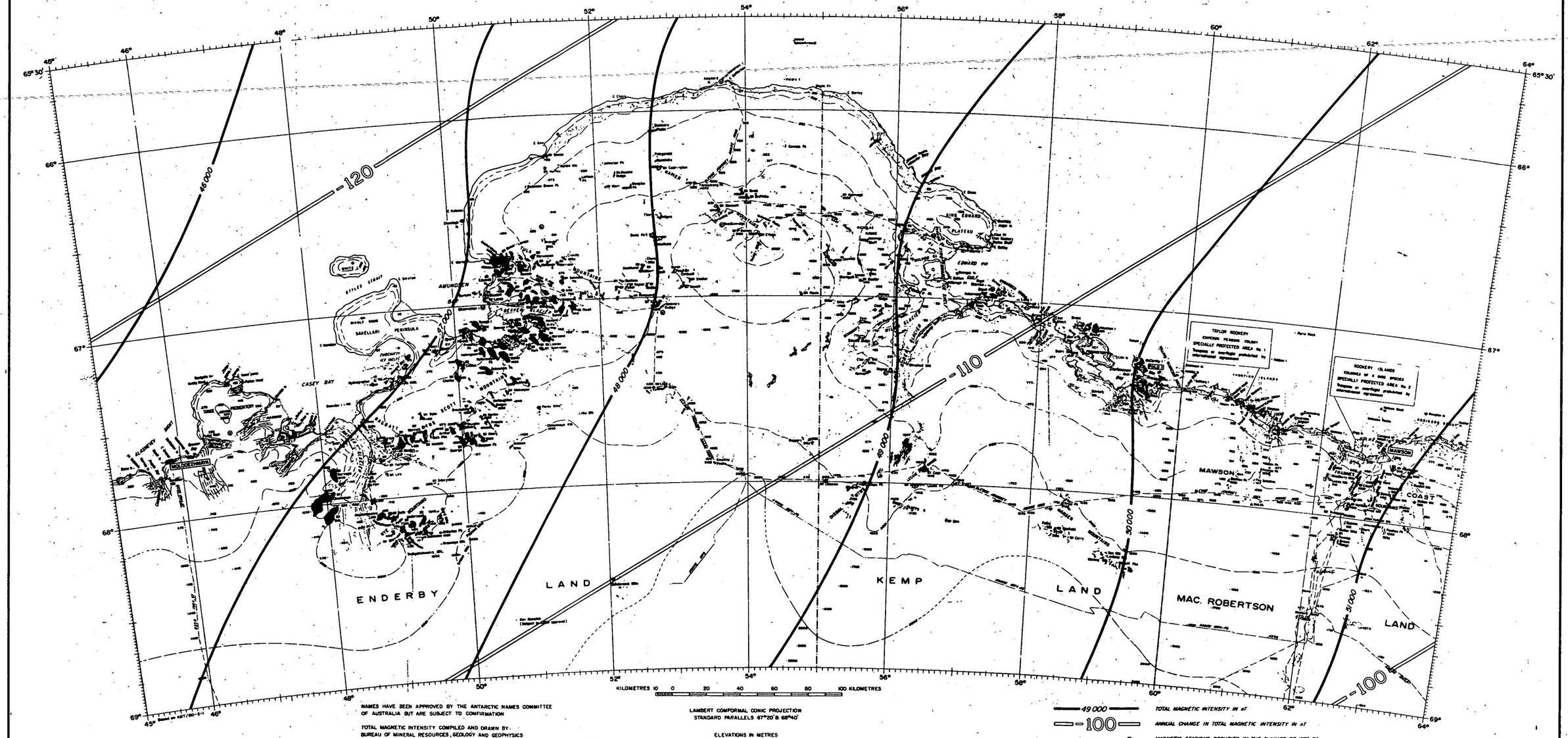
E003 Δ LOCATIONS AT WHICH VERTICAL MAGNETIC INTENSITY WAS MEASURED IN THE SUMMER OF 1974-75

Record No. 1979/6

ANT/89-75R

PLATE 12

MAWSON-MOLODEZHNAYA
TOTAL MAGNETIC INTENSITY
EPOCH 1975·0



NAMES HAVE BEEN APPROVED BY THE ANTARCTIC NAMES COMMITTEE OF AUSTRALIA BUT ARE SUBJECT TO CONFIRMATION

TOTAL MAGNETIC INTENSITY COMPILED AND DRAWN BY:
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

LAMBERT CONFORMAL CONIC PROJECTION
STANDARD PARALLELS 67°20'& 68°40'

ELEVATIONS IN METRES

49 000 — TOTAL MAGNETIC INTENSITY IN nT

-100 — ANNUAL CHANGE IN TOTAL MAGNETIC INTENSITY IN nT

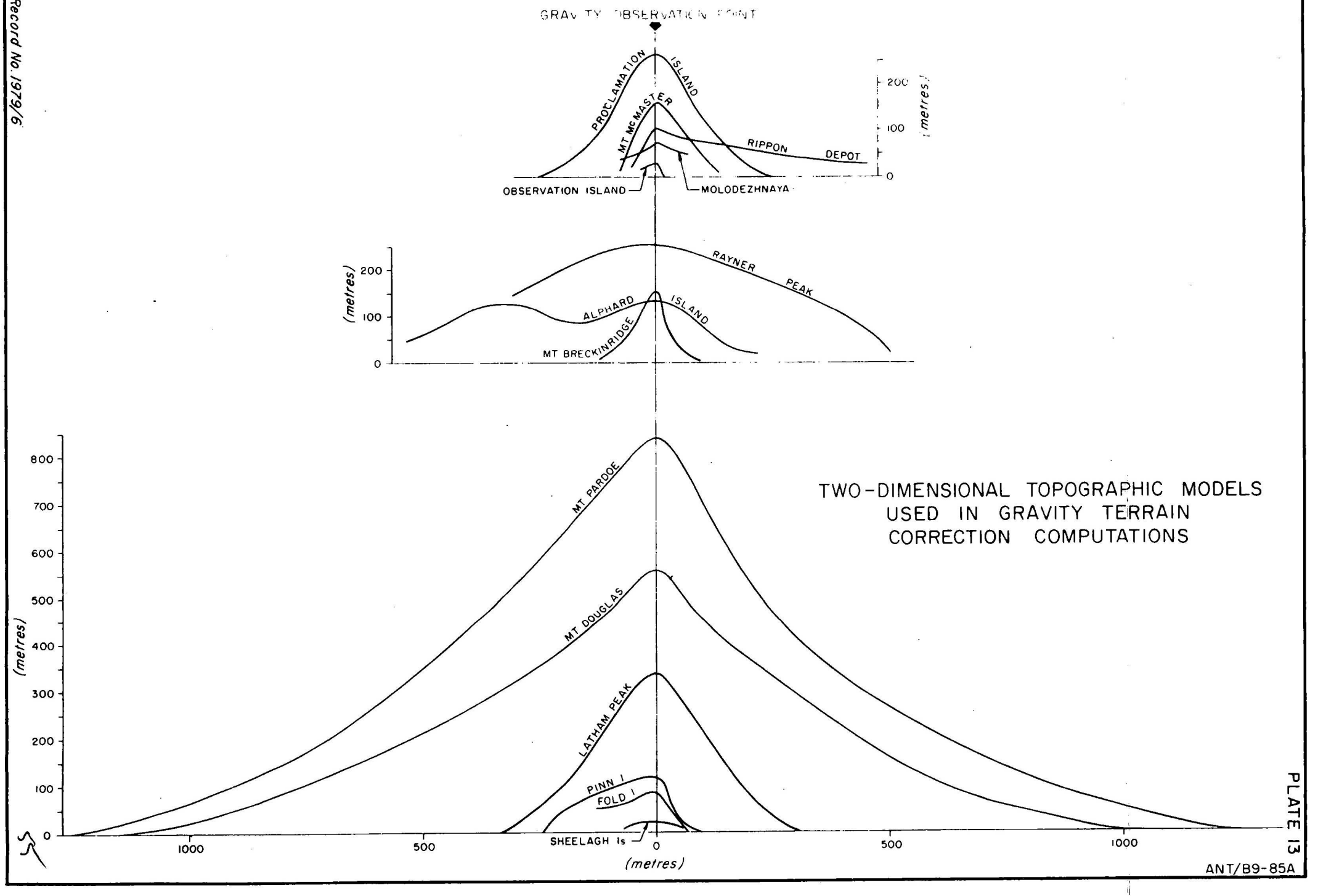
⊗ MAGNETIC STATIONS OCCUPIED IN THE SUMMER OF 1975-76

TOPOGRAPHIC BASE MAP PRODUCED BY
DIVISION OF NATIONAL MAPPING, DEPARTMENT OF NATIONAL RESOURCES, SEPT. 1976

Record No. 1979/6

ANT/B9-76R

Record No 1979/6



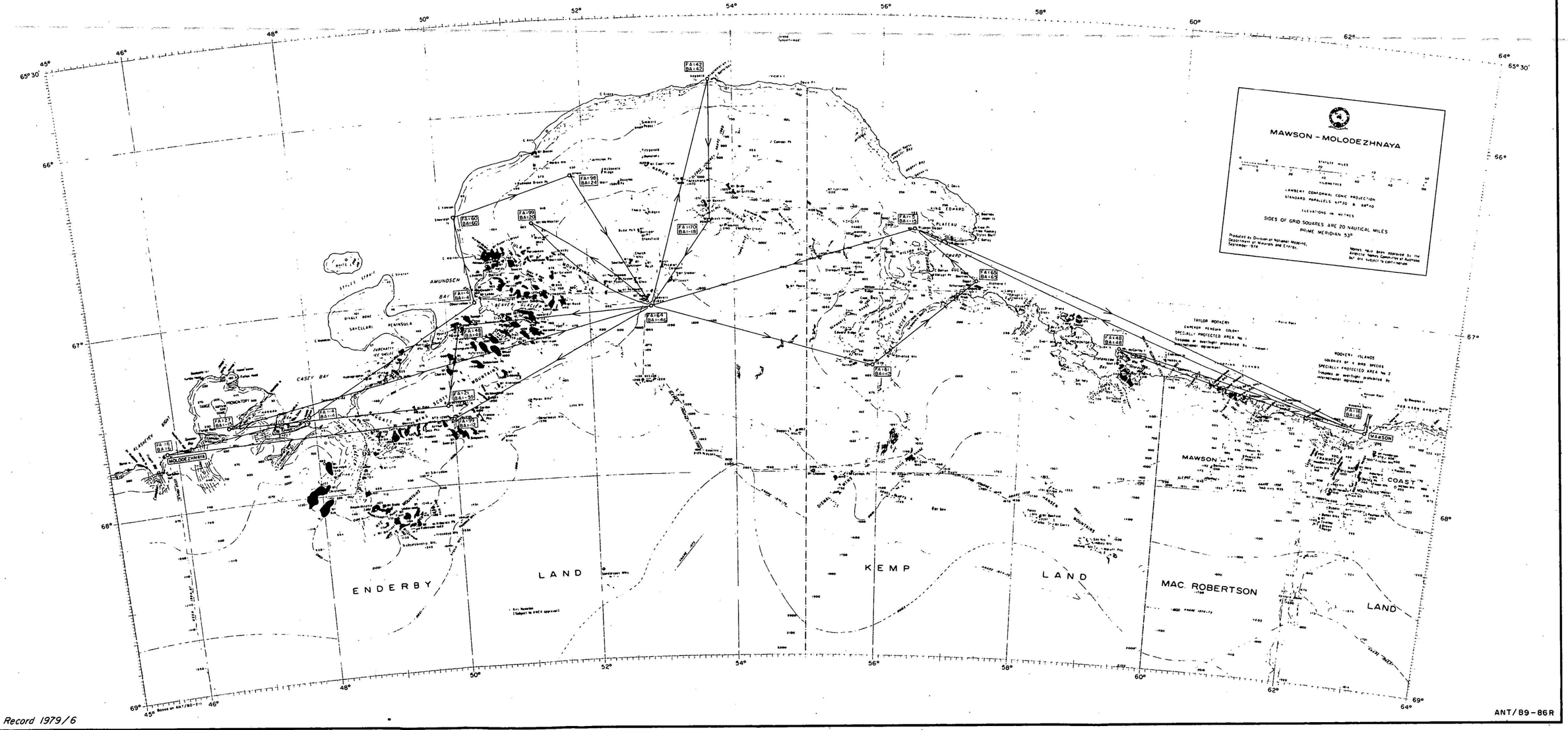
TWO-DIMENSIONAL TOPOGRAPHIC MODELS USED IN GRAVITY TERRAIN CORRECTION COMPUTATIONS

PLATE 13

ANT/B9-85A

PLATE 14

ROUTE OF GRAVITY METER GIOI ; REDUCED STATION GRAVITY VALUES



Record 1979/6

ANT/B9-86R