

RECONNAISSANCE GRAVITY SURVEY OF THE FALLIÈRES AND LOUBET COASTS, ANTARCTIC PENINSULA

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THE gravity survey of the Falkland Islands Dependencies and British Antarctic Territory was initiated in the summer of 1959–60 and the results of the survey up to the end of the 1962–63 summer season have been described by Griffiths and others (1964). The gravity field in the northern part of the Antarctic Peninsula and the South Shetland Islands is shown in fig. 19 of that report. In the winter of 1963 geophysical work was started at the British station at Stonington Island, and a reconnaissance gravity survey was carried out in the northern part of Marguerite Bay (Fig. 1). Fig. 1 includes stations in the Loubet Coast and Adelaide Island areas which are also listed by Griffiths and others (1964, table III) but not shown on their map.

THE GRAVITY SURVEY

Worden gravity meter No. 556 was used for both sections of the survey. Whilst on the ship constant instrument temperature was maintained by the thermostatically controlled heater but this was not used whilst sledging because of the difficulty of re-charging the power supply in the field.

The calibration factor for the instrument was determined in June 1962 at the United Kingdom Geological Survey's base line in Derbyshire. The resulting figure (0.22940 mgal/dial division) only applies to an instrument temperature of 80°F (26.7°C). At other temperatures the calibration factor was obtained from a graph of instrument temperature against calibration factor supplied by the manufacturers.

The gravity survey was connected to existing base stations at Stonington, Detaille and Adelaide Islands, all of which had previously been connected to Deception Island and thence to the South American network via Buenos Aires (Griffiths and others, 1964, fig. 2). New gravity base stations were established at the unoccupied Argentine station "General San Martín" in the Debenham Islands and at the unoccupied British station on Horseshoe Island (Table I; Figs. 2a and b). The new base stations were set up by the system of "looping",

TABLE I. GRAVITY BASE STATION VALUES

<i>Locality</i>	<i>Latitude (S.)</i>	<i>Longitude (W.)</i>	<i>Height (m.)</i>	<i>British Antarctic Survey Value of Absolute Gravity (cm. sec.⁻²)</i>	<i>Argentine Value of Absolute Gravity (cm. sec.⁻²)</i>
"General San Martín"	68°08·0'	67°07·0'	2	982·5121	982·5004
Horseshoe Island	67°48·5'	67°18·0'	8	982·5060	—

extracting the instrumental drift for the period intervening between the outward and home-ward readings at each station. Local stations were tied in to these base stations and thus into the main network.

The measurement at the "General San Martín" base station was made at the same site as an earlier Argentine gravity measurement, the value for which is known. The discrepancy between the two readings was 11.7 mgal, which is the same as that noted at other points in British Antarctic Territory where British and Argentine gravity stations coincide (Griffiths and others, 1964, table IIA).

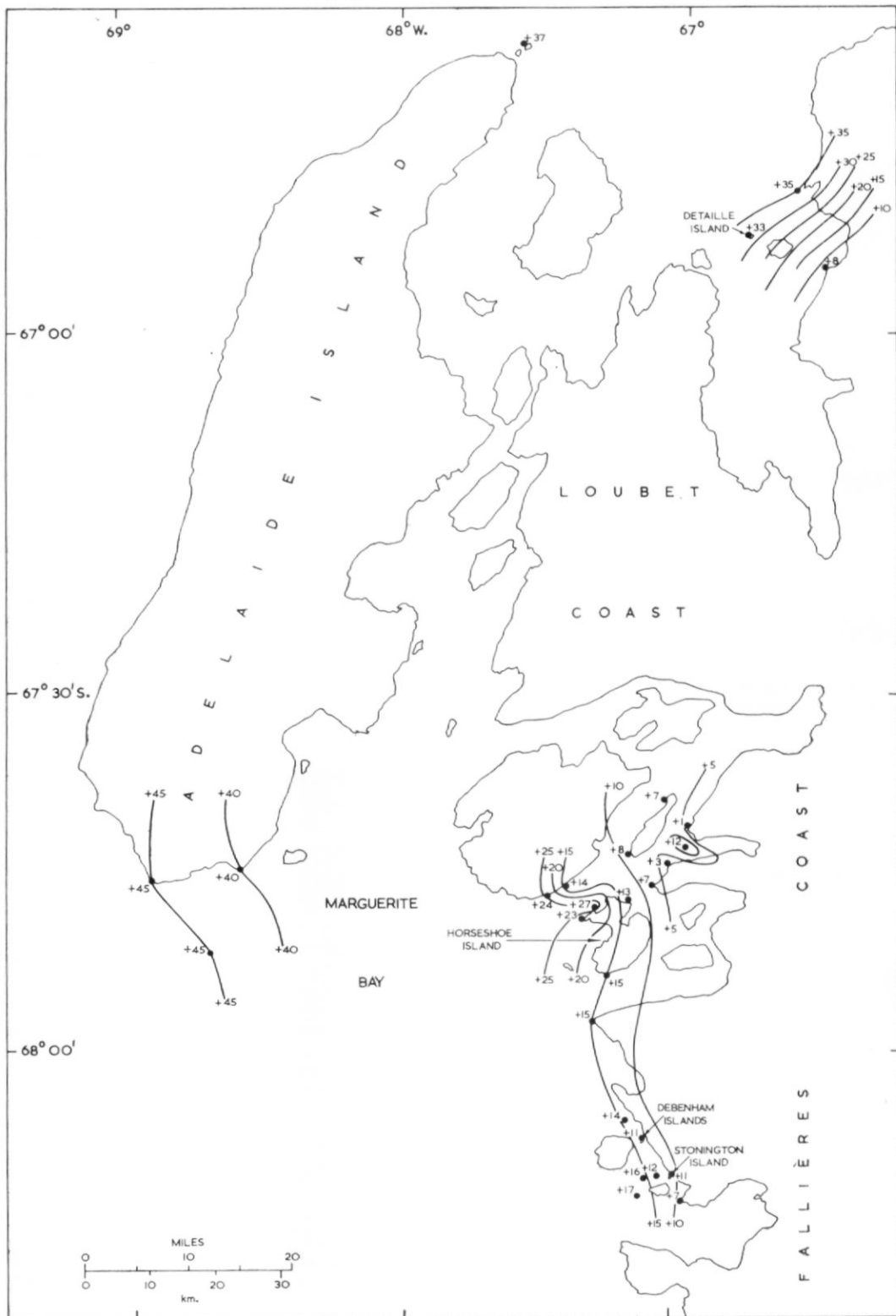


Fig. 1. Map of the Fallières and Loubet Coasts giving the Bouguer anomalies. The contour interval is 5 mgal.

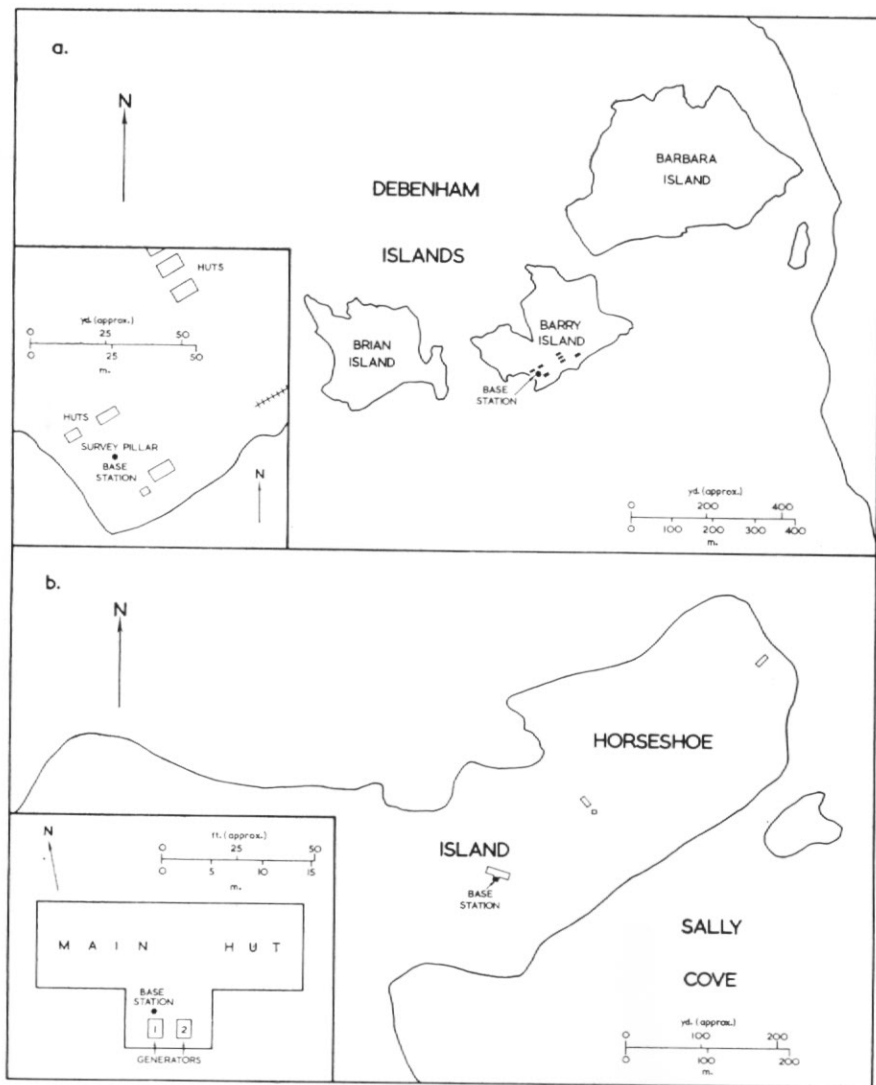


Fig. 2. Sketch plans of gravity base stations.

a. Argentine station, "General San Martín", Debenham Islands, Marguerite Bay. The station is on top of the low survey pillar in front of the small huts on the south-west coast.

b. Horseshoe Island. The station is on the concrete floor in front of the No. 1 generator at the unoccupied British scientific station.

The drift rate throughout the survey was very uniform. Most "legs" of the survey were of only a few hours duration, so errors in the drift correction are likely to be insignificant. Relative values of stations are thus accurate to within a few tenths of a milligal. The absolute values may all be consistently in error by up to a few milligals, owing to the tenuous nature of the link between the Antarctic and the South American network.

Station latitudes were taken from the 1 : 200,000 sheets with the latest amendments by P. Forster, and the latitude corrections were obtained from tables calculated from the International Gravity Formula. The maximum error arising from position error of stations is estimated to be ± 0.2 mgal.

All stations were made on rock sites, most of which were within a few feet of sea-level. Where applicable, a combined Bouguer and free-air correction was made, assuming a constant rock density of 2.67 g. cm.^{-3} . Uncertainty in station heights could give rise to a maximum error of $\pm 0.2 \text{ mgal}$. No terrain corrections have yet been made.

The Bouguer anomalies are shown in Fig. 1. In general, the trend is similar to that in the northern part of the Antarctic Peninsula. The anomalies are positive throughout the area but there is a steady decrease in an easterly direction as the mainland is approached. The regional gradient of the gravity field appears to be low; the local diversity in the Horseshoe Island area is probably a reflection of the much more varied geology of the vicinity. A great deal more work remains to be done before further comment is warranted.

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REFERENCE

- GRIFFITHS, D. H., RIDDHOUGH, R. P., CAMERON, H. A. D. and P. KENNETT. 1964. Geophysical Investigation of the Scotia Arc. *British Antarctic Survey Scientific Reports*, No. 46, 43 pp.