

# GRAVITY AND AEROMAGNETIC EVIDENCE FOR THE CRUSTAL STRUCTURE OF GEORGE VI SOUND, ANTARCTIC PENINSULA

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**ABSTRACT.** Gravity and aeromagnetic data are presented with a view to understanding the structure of George VI Sound, a major curvilinear channel on the west coast of southern Antarctic Peninsula. The geophysical evidence is in agreement with geological evidence which indicates that it is primarily a tectonic rather than a glacial feature. Northern and southern George VI Sound have quite different topographic, gravity and magnetic characteristics. The northern part is a deep ( $>800$  m) elongated trough, which trends north-south and exhibits low Bouguer gravity and a quiet residual magnetic field. The southern part is a deeper ( $>1000$  m) and broader trough, which trends east-west, with higher Bouguer gravity and a long wavelength (50 km), positive (300 nT) magnetic anomaly. The results suggest that George VI Sound is floored by a thick sequence of non-magnetic rock, and in the south is underlain by a magnetic body at an estimated depth of 8–13 km. In contrast to the north, southern George VI Sound exhibits local anomalies indicating variable shallow structure, which may include significant amounts of low-density sediments.

George VI Sound is considered as a Tertiary transtensional feature which reactivated an older tectonic boundary and was subsequently modified by glacial processes. The trend of gravity and magnetic anomalies over it is similar to that of anomalies over the Antarctic Peninsula imaging the arcuate regional structure. If the geophysical features are related to crustal extension, then the evidence suggests that this was more pronounced in the south than in the north. One consistent and simple model involves north-west directed movement of Alexander Island in a dextral transtensional tectonic regime producing predominantly strike-slip motion in the north and extension in the south. The relative influence, however, of convergent margin processes or margin-independent processes remains difficult to assess and in the absence of better age and structural constraints, a more complicated history cannot be excluded.

## INTRODUCTION

George VI Sound is a curvilinear channel along the west coast of southern Antarctic Peninsula (Fig. 1). Geological evidence indicates that it is primarily tectonic rather than glacial in origin. It is the site of a major tectonic divide (Crabtree and others, 1985) between the Mesozoic fore-arc region of Alexander Island (Tranter, 1987; Butterworth and Macdonald, in press) and the arc massif of Palmer Land (Piercy and Harrison, in press). The present configuration, however, is considered to be closely associated with (?) Tertiary intra-arc extension (Storey and Garrett, 1985; Garrett and Storey, 1987). Tertiary arc-magmatism representing a westward migration of the magmatic arc (Saunders and others, 1982), is recognized in northern Alexander Island (Care, 1983) and Rothschild Island (Care, 1980). George VI Sound has been interpreted as a rift (Crabtree and others, 1985) but geomorphological evidence which might support this (King, 1964) is inconclusive and geological mapping (British Antarctic Survey, 1981) is incomplete. Direct age evidence for the 'opening' has not been found, there is little information concerning crustal structure

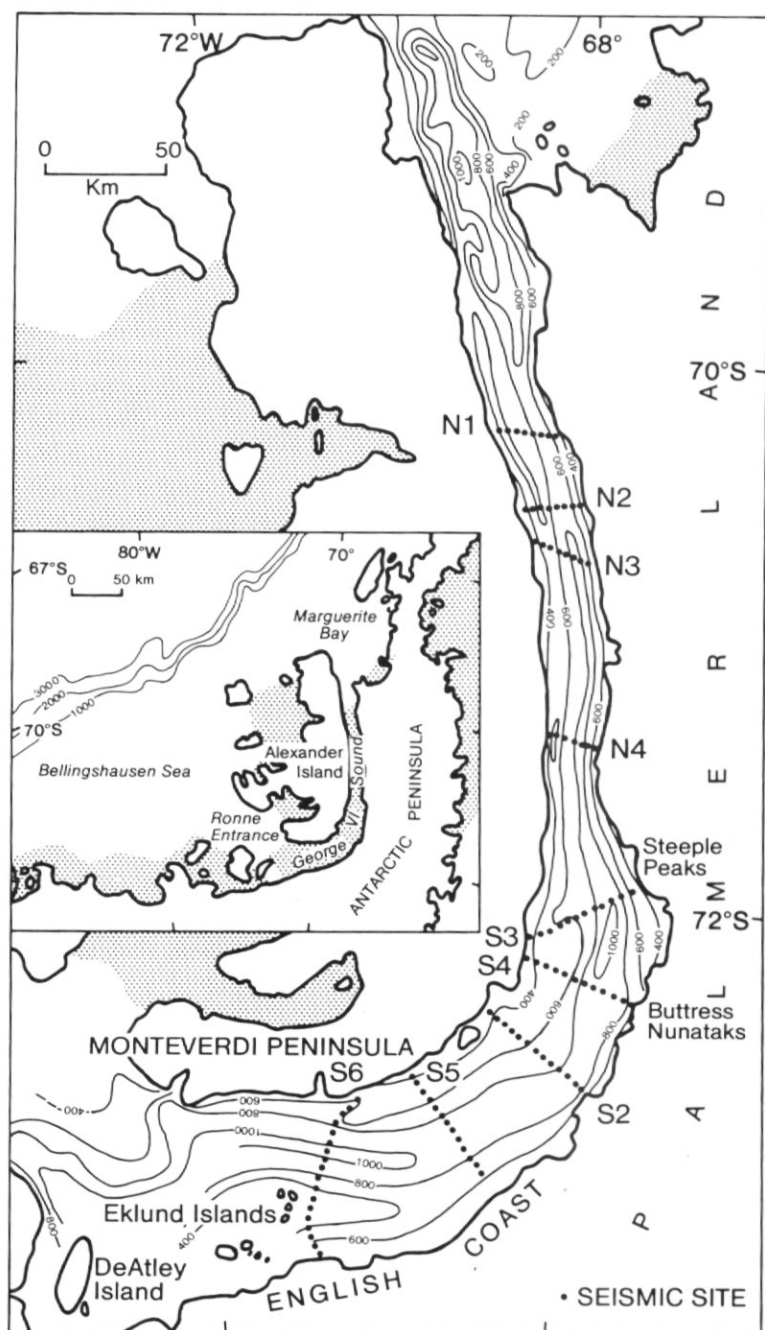


Fig. 1. Location map and contour map of the bedrock topography (contour interval 200 m), George VI Sound. Ice shelves are shown shaded, except in George VI Sound. Numbered dotted lines are gravity/seismic profiles.

and the relationship and history of faulting at its margins are as yet undetermined. In comparison to many continental rifts, George VI Sound is small and occupies a relatively marginal position. Alkali volcanic rocks occur in small and scattered outcrops distant from it and voluminous flood basalts (characteristically associated with some rifts) are apparently absent. The origin of George VI Sound and the influence of pre-existing sutures on it remain uncertain and the suggestion that it is a continental rift has still to be conclusively demonstrated. In this paper, geophysical data acquired in the vicinity are described with a view to defining the bedrock and underlying structure.

#### GEOPHYSICAL SURVEYS

##### *Bedrock topography*

Between 70° and 73° S George VI Sound is covered with permanent shelf ice. Depths to bedrock beneath the ice shelf (Fig. 1) have been calculated from travel times of radio-echo and seismic reflections (Maslanyj, 1987). Its topography is characterized by a deep, steep-sided, elongated trough trending 170° in the north, and 270° in the south, with bedrock depths exceeding 800 and 1000 m respectively. It curves parallel to the arcuate topographic axis of the Antarctic Peninsula and is oblique to the Pacific continental margin. The change in trend occurs between 71° 30' and 72° 30' S where George VI Sound widens from 30 to 70 km (Fig. 1).

In Marguerite Bay, a deep (1350 m) trough with precipitous flanks forms the northern continuation of George VI Sound (Kennedy and Anderson, in press). Further north a 500-m channel continues and converges with the continental slope at 66° 30' S. In Ronne Entrance at the southern end of the sound, depths exceeding 1100 m have been measured to the north of DeAtley Island (Maslanyj, 1987) but it is unknown whether deep water continues west as far as the continental slope.

##### *Gravity anomalies*

Two hundred and ten gravity stations were established on the ice shelf during the 1983–84 and 1984–85 field seasons. Gravity measurements were made with a Worden gravimeter (No. 866) linked into primary stations at Rothera, Fossil Bluff and the Eklund Islands (Renner, 1982). In Antarctica, logistical difficulties often prevent the use of an ideal base-station network. For this reason secondary stations were established by air (during depot laying) to improve survey accuracy. Instrumental drift was monitored by linking into these stations during completion of traverses, but loops of short duration were impractical and closures often extended over several days. The gravity values, therefore are weighted and adjusted according to the quality of the ties and drift corrections are distributed linearly over the network. Typical drift rates were  $+0.03 \text{ gu h}^{-1}$  ( $\text{gu} = \text{gravity unit} = 1 \mu\text{m s}^{-2}$ ) although over shorter periods during travel, rates as high as  $0.5 \text{ gu h}^{-1}$  were measured. Relative errors between adjacent stations are estimated to be less than 3 gu whilst the overall network is considered to be internally consistent to within 10 gu.

Seismic depth-to-bedrock measurements were made at every third station in the north (station spacing 1 km) and at every second station in the south (station spacing 2 km). Radio-echo reflections provided ice-thickness control at each station. Absolute heights were derived from the ice-shelf thickness assuming hydrostatic equilibrium (Maslanyj, 1987) and are accurate to within 5–10 m. Diurnal height changes due to tidal oscillation are equivalent to a heighting error of  $\pm 2 \text{ m}$ . Over grounded ice, Wallace and Tiernan barometric altimeters were used. Values from adjacent on-rock

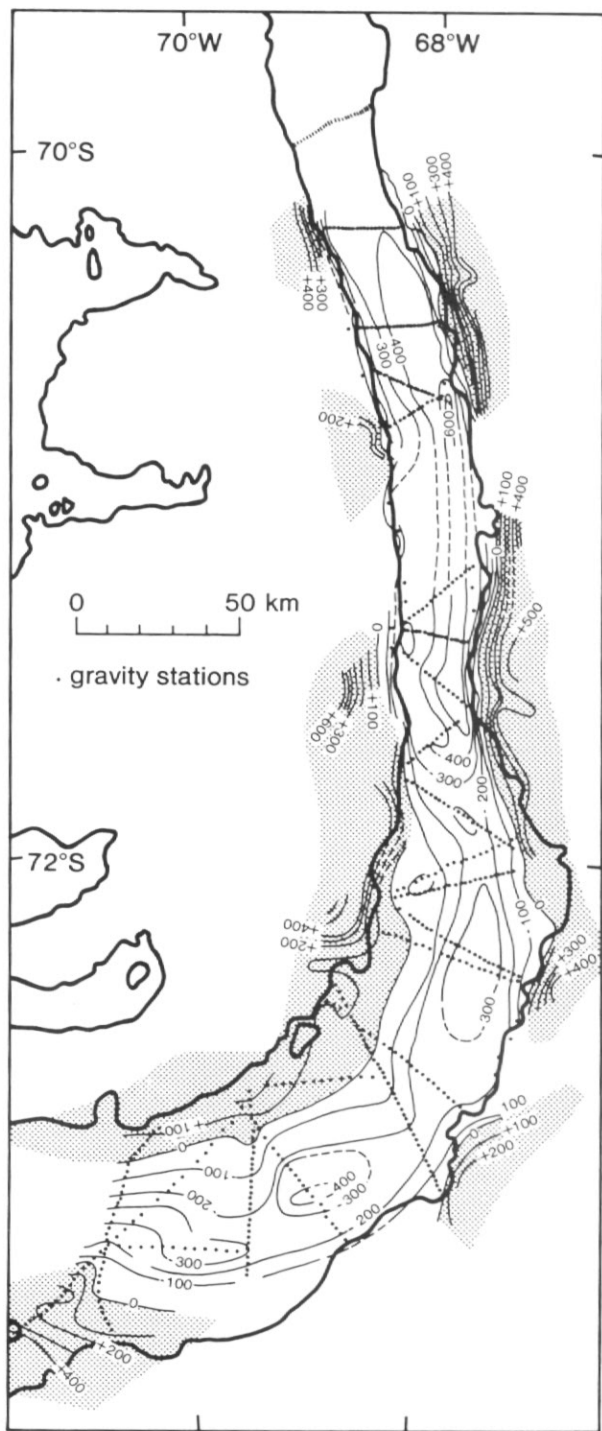


Fig. 2. Free-air gravity anomaly map of George VI Sound; contour interval is 100 gu; shaded areas represent positive anomalies.

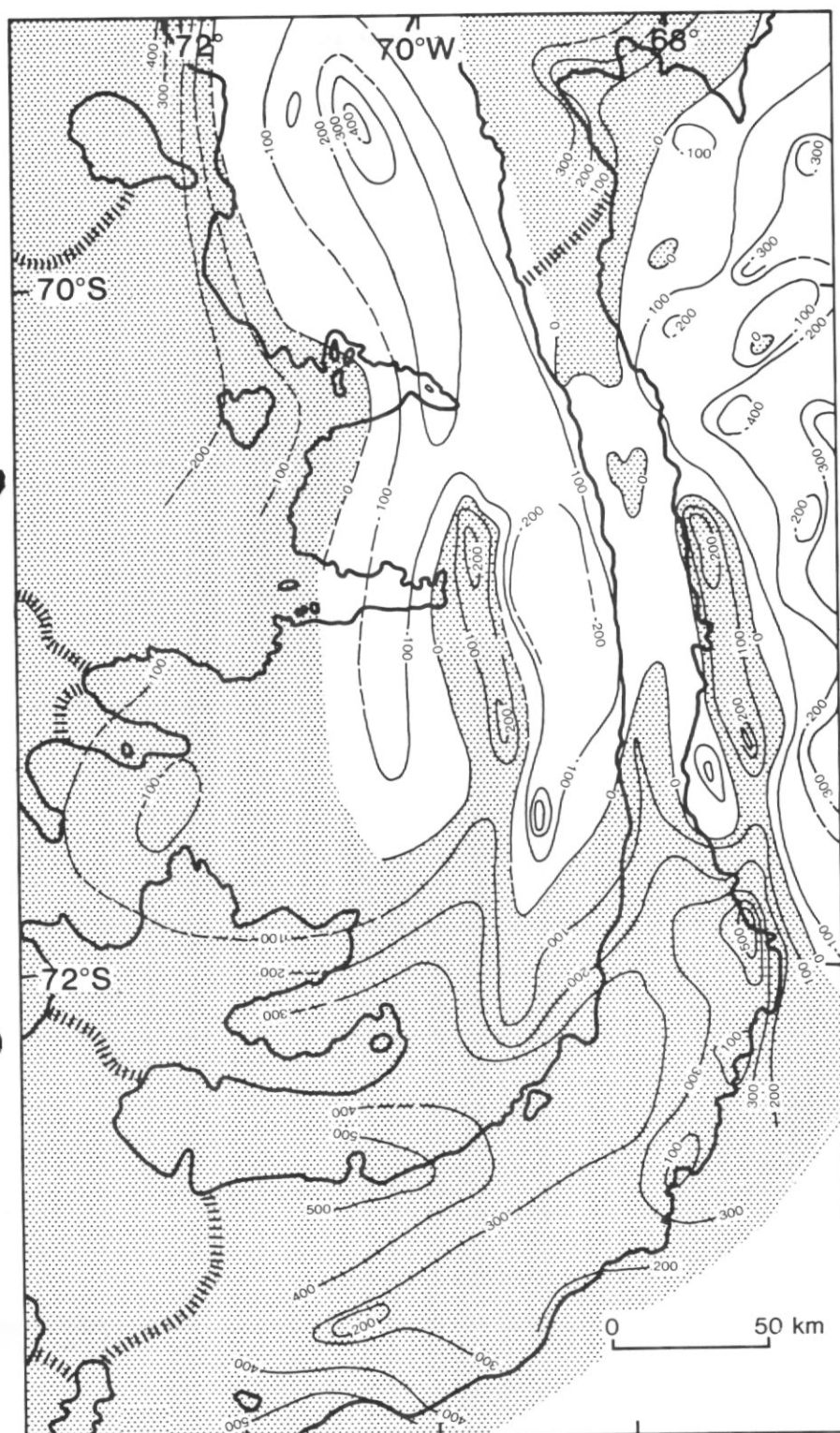


Fig. 3. Bouguer gravity anomaly map of George VI Sound area; contour interval is 100 gu, shaded areas represent positive anomalies.

gravity stations (Renner and others, 1985) have been incorporated in the contour maps.

The free-air gravity contour map (Fig. 2) includes additional ice shelf stations occupied by F. M. Burns (pers. comm.). Inaccuracies in surface elevation lead to maximum free-air gravity errors of  $\pm 20$  gu. Bedrock topography is clearly the dominant influence on free-air gravity anomalies, and the bedrock trends are confirmed. In the north, steep free-air gradients are observed over coastlines, emphasizing the steep flanking walls. Positive anomalies of 500–600 gu coincide with elevated topography (over 500 m above sea level). Under the northern part of the ice shelf, the rugged bedrock is V-shaped but asymmetrical in section (Maslanyj, 1987), with a shallow western side and more open, deeper eastern side, and this is also reflected in the free-air anomalies. Negative anomalies of  $-600$  gu coincide with areas where bedrock depths exceed 800 m. The deeper topography of southern George VI Sound, however, coincides with free-air gravity values of only  $-400$  gu. On-rock gravity stations are less numerous in southern areas; nevertheless, where observed, steep gravity gradients are again prominent over coastlines.

The contour map of Fig. 3 shows Bouguer gravity anomalies calculated using crustal density of  $2.67 \text{ Mg m}^{-3}$ , consistent with the map of Renner and others (1985). The total error in ice shelf Bouguer anomalies, including errors accumulated in heighting, ice thickness and bedrock depth measurements (Maslanyj, 1987) is estimated at  $\pm 30$  gu in addition to the standard error of  $\pm 14$  gu for the absolute gravity value of base stations (Griffiths and others, 1964). The overall standard error for absolute Bouguer anomalies calculated from on-rock stations in the vicinity is  $+35$  to  $-95$  gu (Renner and others, 1985). Terrain corrections have not been included in the map. Using a Hammer chart, local topographic corrections (significant for marginal stations in the north) are calculated to be less than 4 gu. Using two-dimensional modelling methods, the correction due to the contribution of unknown local sub-ice topography is estimated to be less than 20 gu.

Bouguer gravity contours tend to be parallel to topographic trends. Over northern George VI Sound anomalies are close to zero except in the extreme north where positive anomalies are observed over Marguerite Bay (Renner and others, 1985). There is a gradual increase in Bouguer gravity from north to south, reaching almost  $+500$  gu in the south. Short wavelength anomalies of local extent are superimposed on the higher overall Bouguer gravity over the southern part of the study area. Positive anomalies of 400–500 gu are observed over the ice shelf near Steeple Peaks and Buttress Nunataks (Fig. 1). Positive gravity anomalies of unknown extent occur over the southern edge of Monteverdi Peninsula and near the Eklund Islands. Except over the Alexander Island coast, steep Bouguer gravity gradients generally coincide with the coastlines of George VI Sound.

A series of smoothed Bouguer anomaly profiles constructed across George VI Sound and the adjacent region are presented in Fig. 4. The dominant features are listed below.

- (1) The long wavelength negative anomaly ( $-1000$  gu) over Palmer Land (Renner and others, 1985), profiles AA'–HH'.
- (2) The long wavelength anomaly ( $-200$  gu) over northern and central Alexander Island (Burns, 1974), profiles AA', BB'.
- (3) Two short wavelength anomalies ( $> 300$  gu), one in central Alexander Island (Butler, 1975) and one in Palmer Land (Butler and McArthur, 1983), profiles CC', DD'.



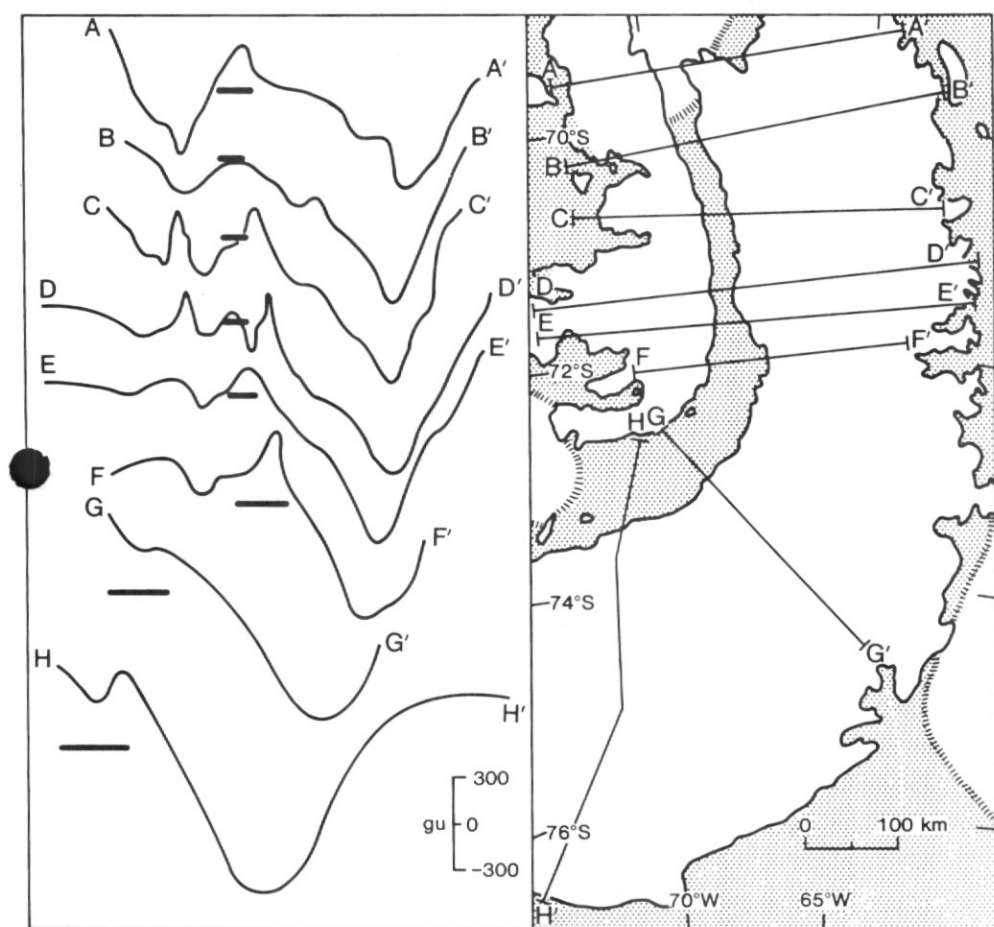


Fig. 4. Smoothed Bouguer gravity anomaly profiles across George VI Sound and adjacent region. An arbitrary Bouguer gravity zero is marked at the site of George VI Sound on each profile.

#### *Aeromagnetic anomalies*

The aeromagnetic anomaly contour map (Fig. 5) is compiled from data of Renner and others (1985) and Jones and Maslanyj (in press). Over George VI Sound north of lat.  $72^{\circ}30'S$ , long wavelength magnetic anomalies are observed. These are similar to those over large parts of Alexander Island, but contrast with the high amplitude (200–600 nT) and moderate wavelength (20 km) anomalies of Palmer Land (depth solutions 1–5 km). The boundary between these two magnetic terranes is marked by a major linear magnetic discontinuity related to an extensive positive magnetic anomaly known as the West Coast Magnetic Anomaly (WCMA) (Renner and others, 1985), and coincident with the west coast of Palmer Land in the north. The negative anomaly over the northern ice shelf is related to this and removed during reduction to pole.

A smooth, broad (50 km), linear (>300 km) magnetic anomaly of 200–300 nT amplitude, extends east–west over southern George VI Sound. Its southern limit is

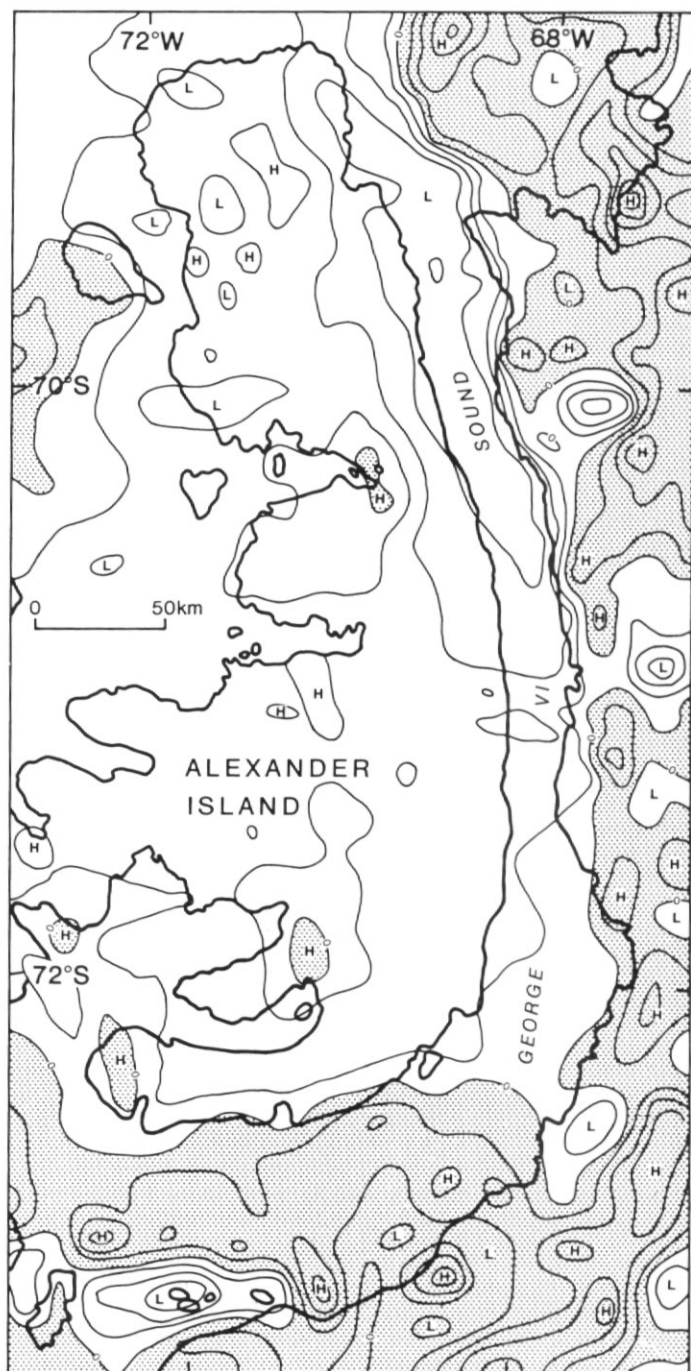


Fig. 5. Aeromagnetic anomaly map of George VI Sound area; contour interval is 100 nT, shaded areas correspond to positive anomalies.



marked by a linear magnetic break (less prominent than in the north). This diverges on to the ice shelf parallel to the English Coast and extends north of the Eklund Islands, the site of a negative magnetic anomaly, into Ronne Entrance. Several short wavelength and localized magnetic anomalies extend over the southern ice shelf.

#### GEOLOGICAL INTERPRETATION

No seismic reflection or refraction information is available to constrain crustal structure beneath George VI Sound, and in the following discussion the anomalies can only be considered with the attendant uncertainties of unaided potential field data interpretation.

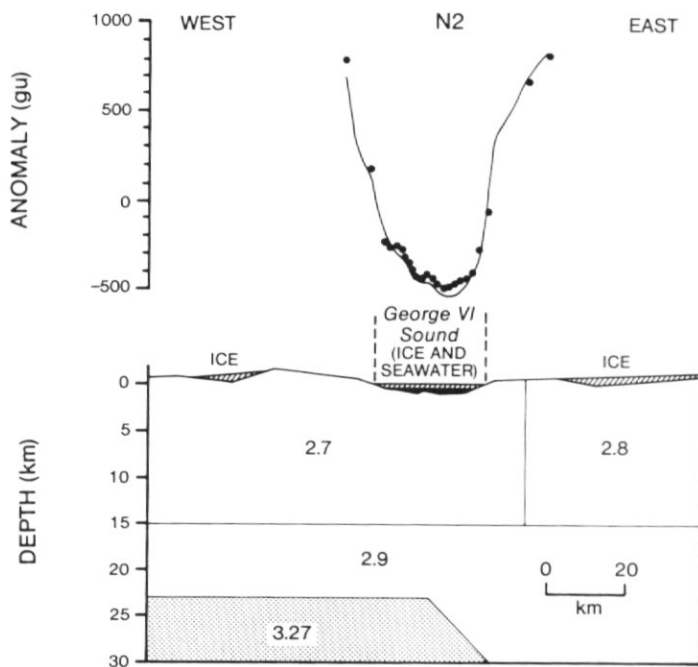
The local structure (beneath the ice shelf) is investigated using a non-linear optimization modelling programme written by G. K. Westbrook (University of Birmingham). The gravity effect of two-layer models comprising ice shelf and seawater, using known ice-shelf thickness and bedrock depth constraints are calculated, firstly relative to a bedrock density of  $2.2 \text{ Mg m}^{-3}$  representing low density sediment (Model 1), and secondly a bedrock density of  $2.67 \text{ Mg m}^{-3}$  representing typical crustal material (Model 2). Table I compares the observed and calculated free-air anomalies from all profiles. The correlation coefficient and standard error provide measures of the 'closeness of fit'. The background level (presented for model 2) is allowed to vary freely and as expected, closely mirrors the rise in overall Bouguer gravity observed over the length of George VI Sound (Fig. 3).

To investigate the regional structure, two representative models of the free-air gravity (incorporating depth-to-bedrock and ice-thickness measurements) maintaining consistency with magnetic data are presented for profiles N2 and S6 (Fig. 1) in Fig. 6. Fig. 3 shows that the Bouguer anomalies are linear, and a two-dimensional approximation is justified. The profiles are extended to include additional gravity stations of Renner and others (1985) and McGibbon and Smith (in press). Two-dimensional topographic corrections for the high relief of the Antarctic Peninsula and Alexander Island are included. An initial 30-km crustal column consisting of an upper layer (15 km) with a density of  $2.7 \text{ Mg m}^{-3}$  and a lower layer (15 km) with a density of  $2.9 \text{ Mg m}^{-3}$  is selected. A dense body ( $2.8\text{--}2.9 \text{ Mg m}^{-3}$ ), related to the WCMA (Garrett and Storey, 1987), and extending to 15 km depth is included beneath the Antarctic Peninsula. The near-surface densities incorporated in the models are in agreement with those available at outcrop. Average densities of  $1.028$  and  $0.88 \text{ Mg m}^{-3}$  are used for seawater and ice shelf respectively.

#### *Shallow structure*

The high correlation coefficients and small standard errors between calculated and observed free-air gravity profiles from northern George VI Sound (Table I) indicates little discernible structural variation beneath the northern ice shelf. It is possible that the deep bedrock topography of George VI Sound was produced by glacial overdeepening. The sound was almost certainly completely filled by ice at glacial maxima (Clapperton and Sugden, 1982), although the extent of glacial modification is unknown. Beneath the ice shelf, local variation in bedrock topography (Maslanyj, 1987) could reflect glacial modification. Low-density deposits, probably of glacial origin, have been described in extension-related structures such as the Lambert Glacier area (Fedorov and others, 1982). In many broad basins, the gravity effect of low-density sediments can be cancelled by the effect of a deeper higher density body (Fig. 7a) (Simpson and others, 1986). Simple models (Fig. 7b) indicate that in a

a)



b)

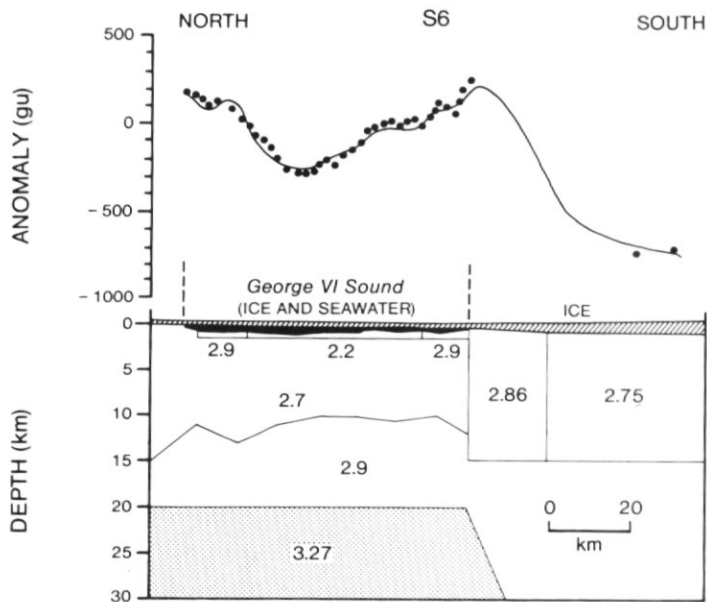


Fig. 6. Two-dimensional models calculated to fit free-air gravity anomalies; (a) Profile N2, northern George VI Sound; (b) Profile S6, southern George VI Sound, cf. Fig. 1.

Table I. Comparison of the observed and calculated free-air gravity anomalies from all profiles

Profile	Model 1 (Density = $2.2 \text{ Mg m}^{-3}$ )		Model 2 (Density = $2.67 \text{ Mg m}^{-3}$ )		Background level (gu)
	Correlation coefficient	Standard error (gu)	Correlation coefficient	Standard error (gu)	
N1	0.9547	12.36	0.9384	15.11	27.4
N2	0.9818	30.93	0.9949	16.17	0.0
N3	0.9978	39.65	0.9978	9.37	0.3
N4	0.9735	50.29	0.9801	23.04	27.2
S3	0.7153	97.65	0.9830	26.18	264.4
S4	0.9840	82.66	0.9880	31.18	381.4
S2	0.9881	33.62	0.9910	15.02	373.7
S5	0.9258	108.35	0.9409	80.14	374.2
S6	0.8565	96.81	0.8587	78.76	477.8

narrow feature such as northern George VI Sound, low-density sediment fill would produce a negative anomaly despite deep compensation. The Bouguer gravity (Fig. 3) and free-air gravity model N2 (Fig. 6a) from northern George VI Sound, indicates that unlike many 'grabens', it is not extensively floored by thick low-density sediments, unless a mass excess exists at shallow depths to mask the sediment fill. This is also demonstrated by the consistently better fit (except N1) of model 2 over model 1 curves (Table I). Absence of sediments may imply significant glacial erosion during a glacial episode. Maximum deviations from the model (Fig. 6a) of  $-50 \text{ gu}$  suggest that only up to 250 m of sediment (density  $2.2 \text{ Mg m}^{-3}$ ) occur locally. Kennedy and Anderson (in press) noted the absence of pelagic sediments in the George VI trough at  $68^{\circ} 20' \text{ S}$  and the near-total absence of sediment cover in Marguerite Bay attributing this to glacial erosion.

In contrast, gravity anomalies of local areal extent in southern George VI Sound indicate variable shallow structure. The lower correlation coefficients and larger standard errors between calculated and observed free-air gravity from southern profiles (e.g. S5, S6, Table I) indicates that the simple two-layer model no longer holds. Negative deviations (Figs 3, 6b) would be produced by up to 1 km of unconsolidated sediment (density  $2.2 \text{ Mg m}^{-3}$ ). Consequently, the true bedrock may well be significantly deeper than seismic depth measurements indicate. Dense near-surface bodies beneath the ice shelf on profile S6 (Fig. 6b) are most likely volcanic rocks and/or minor intrusions. Similar bodies are required on the eastern margins of profiles N1, S3 and S4 (Fig. 1) but coincide with the development of magnetic anomalies, possibly related to the WCMA.

#### Deep structure

The generally quiet magnetic field over Alexander Island is due to the thick, non-magnetic mainly sedimentary sequences of the LeMay Group and Fossil Bluff Formation (Renner and others, 1982). Continuity and similar grain of the magnetic and gravity fields over northern George VI Sound suggest the presence of a thick sequence of similar material, which is cut out against a major fault along the eastern coastline of the sound. The aeromagnetic anomaly over southern George VI Sound indicates that it is underlain by a large magnetic body at depths of 8–13 km below sea level (Jones and Maslanyj, in press) with a minimum cover of 7 km of non-magnetic rock (Fig. 6b).

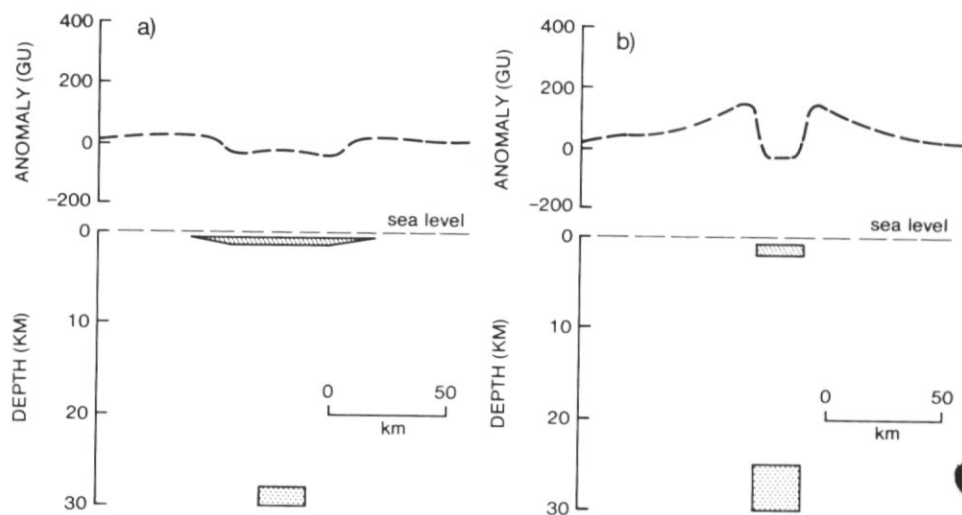


Fig. 7. Simple two-dimensional models showing the gravity effect of compensating bodies (stippled areas, density contrast is  $+0.4 \text{ Mg m}^{-3}$ ) in (a) broad and (b) narrow sediment-filled basins (hatched areas, density contrast is  $-0.4 \text{ Mg m}^{-3}$ ).

Assuming they can be directly related, the long wavelength Bouguer gravity anomalies can be used to postulate relative changes in crustal thickness. The major anomalies observed on the smoothed composite profiles of Fig. 4 have wavelengths of 10–100 km and must be caused by mass distributions at depth and not by near-surface geological features. The negative anomaly over the Palmer Land plateau region is considered to be related to thicker crust (Renner and others, 1985). In the models of Fig. 6 it has been necessary to introduce denser material beneath George VI Sound and adjacent Alexander Island to maintain the observed gravity anomaly symmetry. Although the depth and distribution of the mass excess remains unknown, this may indicate a rise in Moho beneath George VI Sound. This is represented in the models of Fig. 6 by a crustal thickness of 23 km in the north and 20 km in the south. Whether or not the Bouguer gravity anomaly over northern George VI Sound (Fig. 4) is significantly higher than that over Alexander Island (implying thinner crust relative to the latter) remains uncertain. Renner and others (1985) interpreted geophysical data in the vicinity in terms of rifting and crustal thinning. There is also some evidence based on gravity (Burns, 1974) (Fig. 4, profile AA') and isostatic considerations (Garrett, in press) to suggest that northern Alexander Island is underlain by thicker crust. The data, however are not yet adequate to enable thorough analysis of the regional pattern and it is not possible to say whether thinner crust exists locally or is regionally distributed. The higher Bouguer gravity over the southern region could be related to crustal attenuation, which would be consistent with simple isostatic assumptions. It is also likely to be related to the magnetic body described earlier.

It is emphasized that several different models employing modest density changes can be constructed to fit observed profiles without any need to change overall crustal thickness.

*Regional structure and tectonic setting*

The gravity and magnetic anomalies confirm that George VI Sound is a tectonic rather than purely a glacial feature.

Northern and southern George VI Sound are quite different in geophysical character. The structural significance of the southern part has not been recognized previously due to the more subdued topography and less outcrop geology in adjoining areas. If the formation of the sound is related to crustal extension, then the evidence summarized below suggests that extension was more pronounced in the south than in the north: (1) its southern part is significantly wider and deeper; (2) unlike the north, the southern part may contain significant amounts of sediments and volcanic rocks and/or minor intrusions; (3) the gravity data can be interpreted in terms of crust up to 3 km thinner in the south than in the north, and (4) the large magnetic body restricted to southern George VI Sound could represent an extension-related axial intrusion or a subsided component of the WCMA.

In the north the rugged V-shaped bedrock topography most likely represents glacial erosion of a tectonic structure, but rift-like flanks are absent. Here the well-developed north-south magnetic discontinuity over the Palmer Land coast indicates a prominent structural boundary. The eastern coastline of Alexander Island on the other hand, is not a major geophysical boundary and, if faulted, either juxtaposes rock of similar density and magnetic properties by vertical movement, or involves predominantly strike-slip movement.

The trend of the sub-ice topography, gravity and magnetic anomalies is similar to that of anomalies over the Antarctic Peninsula, best exemplified by the WCMA, and considered to image the arcuate regional structure. This geophysical configuration can be explained in terms of a transtensional tectonic regime in which Alexander Island moves normal to the Pacific margin, in a north-westerly direction relative to the Antarctic Peninsula (Fig. 8). Without better structural control the exact movement cannot be defined, but this simple one-motion model would require predominantly strike slip in the north and extension in the south. Rifting commonly occurs along or near lines of old sutures that continue to be zones of weakness and the extension most likely reactivated on older tectonic boundary, representing that between the Mesozoic fore-arc and magmatic arc (Crabtree and others, 1985). This probably exhibited the arcuate curvature observed in southern Antarctic Peninsula today, which is believed to be older than 100 Ma (Watts and others, 1984).

Although the youngest rocks shown to be displaced by George VI Sound are of Albian age (113–97 Ma) it may be related to Tertiary extension for which there is the following indirect evidence.

(1) The youthful topography (King, 1964) suggests an age < 50 Ma.

(2) A camptonite dyke is dated at 15 Ma on Alexander Island (Garrett and Storey, 1987).

(3) In northern Alexander Island Tertiary (60–40 Ma) calc-alkaline volcanic rocks are bounded by north-south trending faults which pre-date alkaline volcanics dated at 7–5 Ma (British Antarctic Survey, 1981).

(4) The accretionary and fore-arc sequences in Alexander Island are believed to have been affected by a long history of dextral, strike-slip deformation. The present geometry of George VI Sound is parallel to transtensional features in the Fossil Bluff Formation which are the most recent (?Cenozoic) of these movements (Nell and Storey, in press).

The sea-floor magnetic records (Barker, 1982) and on-land geology (Care, 1983) provide evidence for the east-directed subduction of proto-Pacific oceanic lithosphere

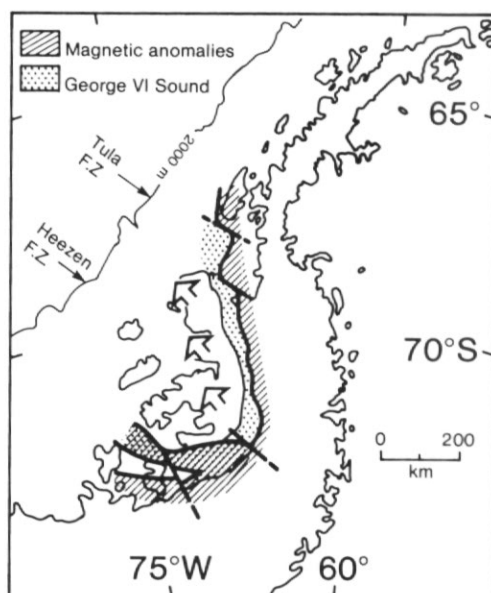


Fig. 8. The formation of George VI Sound by a process of dextral transtension, moving Alexander Island in a north-westerly direction relative to the Antarctic Peninsula.

beneath this part of the continental margin during the Tertiary and there is geological evidence (Storey and Garrett, 1985) to suggest that this was the case for much of the Mesozoic. The development of George VI Sound, however, in relation to the evolution of the Mesozoic–Cenozoic arc is uncertain and the Tertiary extension could have been produced by a variety of mechanisms related to either subduction of oceanic crust or a thermal regime independent of the margin (Garrett and Storey, 1987). The pre-Cenozoic sea-floor configuration is very poorly known (Barker, 1982) but early strike-slip deformation in the accretionary complex could have been caused by oblique subduction (Nell and Storey, *in press*); known plate vectors up to 100 Ma ago shows that oblique subduction was likely to have occurred along segments of the Antarctic Peninsula margin. That George VI Sound was produced by a similar process is unlikely because Tertiary subduction was more or less normal to the margin (Barker, 1982). Furthermore the ‘opening’ proposed, as in the case of the late transtensional deformation in Alexander Island is difficult to relate to the known subduction direction, hence suggesting margin independent control (Storey and Nell, *in press*). Extension following ridge crest–trench collisions (Garrett and Storey, 1987), however, cannot be excluded, in which case a complicated history may be envisaged with a collision at 50–40 Ma at the southern margin and 20 Ma in the north.

The relative importance of convergent margin dependent or independent processes remains difficult to assess on present constraints; both may have influenced the development of George VI Sound during the Tertiary.

#### SUMMARY

Although affected by glacial processes, George VI Sound is considered to be a Tertiary transtensional feature which reactivated an older tectonic boundary. The geophysical evidence can be interpreted in terms of general lithospheric thinning and

regional subsidence related to continental extension. This was more pronounced in the south where quantities of partial melt were erupted or intruded through the underlying crust. The data do not provide a unique solution but are in agreement with structural data which emphasizes the importance of oblique-slip tectonics during the late stages of fore-arc development. In the absence of better age and structural constraints there is still ambiguity concerning the origin of George VI Sound. All the same, a new perspective has been placed; one which is at variance with the original north-south rift hypothesis (King, 1964).

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