

22. Gravity profile, Cape Sorell to Trial Harbour

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A gravity survey was undertaken along the length of Ocean Beach, Strahan in order to assess the scale of the Tertiary basin and examine whether the Heemskirk granite has any concealed southward extensions. The survey was not tied to State gravity datum since only reconnaissance regional surveys have been undertaken to date in western Tasmania and any such profile survey is fragmental.

RESULTS AND INTERPRETATION

Figure 31 presents the total Bouguer anomaly, assuming a density of 2670 kg/m^3 , and a possible residual Bouguer anomaly. Two profiles are presented, one the length of Ocean Beach and another along Aerodrome Road and the main road to Queenstown. A major regional gradient is apparent from an examination of the profiles. The tendency for the anomalies to dip northward in the case of the main section and for the sign of the anomaly over the basin to be reversed and eastward in the shorter section when the anomaly should reduce westward represent the regional gradient. The gradients sketched in Figure 31 are estimates based on feature trends and could well contain several milligals of variation. This is especially true of the beach profile at its northern end. Assuming the gradient shown, a residual anomaly has been calculated. The regional field implied has a strike of 150° and a dip of 1 mgal/km .

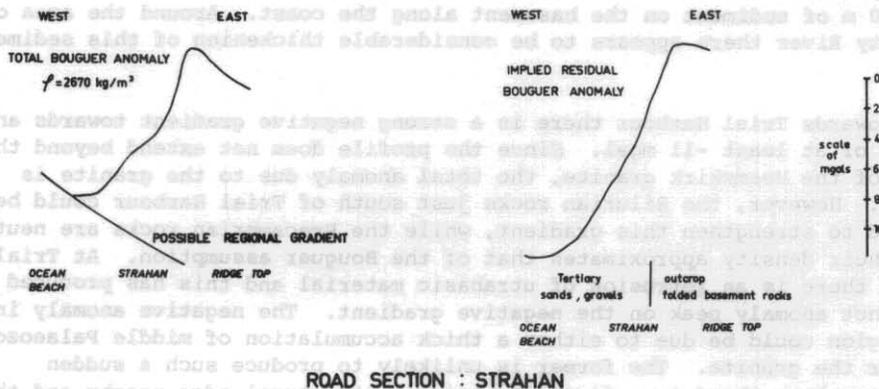
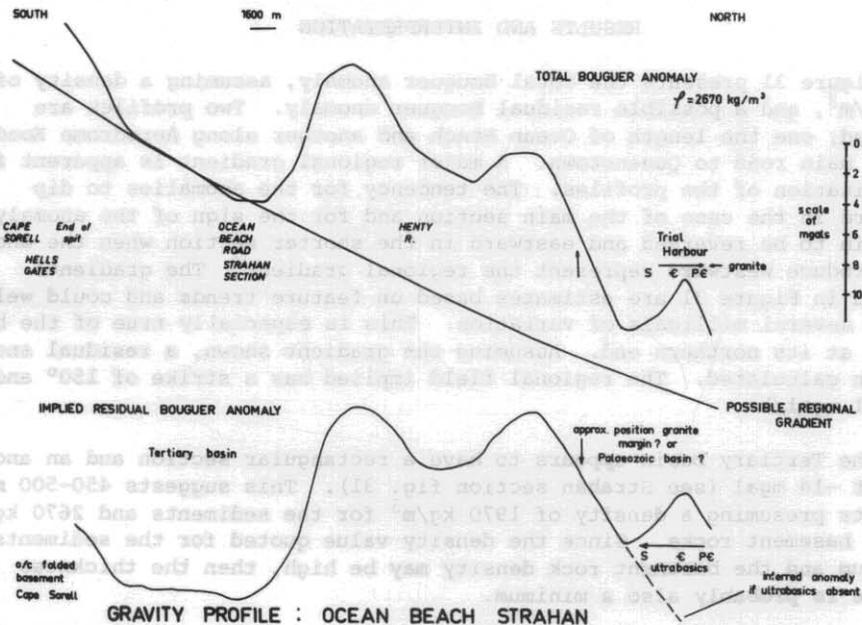
The Tertiary basin appears to have a rectangular section and an anomaly of about -14 mgal (see Strahan section fig. 31). This suggests $450\text{-}500 \text{ m}$ of sediments presuming a density of 1970 kg/m^3 for the sediments and 2670 kg/m^3 for the basement rocks. Since the density value quoted for the sediments is a minimum and the basement rock density may be high, then the thickness estimate is probably also a minimum.

In the region of the Henty River the gravity field is more intense suggesting that the basement rocks are closer to the surface. Assuming that the regional-residual reduction is valid and that the basement rocks do have a density of 2670 kg/m^3 then comparison of the two profiles shows a discrepancy of 2 mgal for basement outcrop or near outcrop with respect to a common point in the Tertiary basin. This suggests that there is a cover of up to 80 m of sediment on the basement along the coast. Around the area of the Henty River there appears to be considerable thickening of this sediment cover.

Towards Trial Harbour there is a strong negative gradient towards an anomaly of at least -11 mgal . Since the profile does not extend beyond the margin of the Heemskirk granite, the total anomaly due to the granite is unknown. However, the Silurian rocks just south of Trial Harbour could be expected to strengthen this gradient, while the Precambrian rocks are neutral since their density approximates that of the Bouguer assumption. At Trial Harbour there is an intrusion of ultrabasic material and this has produced a distinct anomaly peak on the negative gradient. The negative anomaly in this region could be due to either a thick accumulation of middle Palaeozoic rocks or the granite. The former is unlikely to produce such a sudden gradient unless there is a distinct basin or structural edge nearby and the inferred thickness of such rocks would be 1800 m assuming a density contrast of -200 kg/m^3 . Since there is a positive contribution of an estimated 9 mgal due to the ultrabasics, the negative anomaly is a minimum of $16\text{-}18 \text{ mgal}$ which implies 2700 m of rocks equivalent to the Eldon Group. Other units would probably be denser or nearly as dense as the Bouguer assumption. The

estimates given are very approximate since the form of the structures involved are irregular and the density information sketchy.

The strong gradient and large negative anomaly is more likely related to the granite and this material must extend at least 10-15 km into the crust if this is so. Further, the edge of the granite mass lies about 6 km south of the main outcrop.



5 cm

Figure 31. Gravity profiles, Ocean Beach and Strahan.