6. STRUCTURAL TEXTURE NEAR MT PARIS

Various image presentations of the magnetic survey indicate intersecting trends in the region of Mt Paris. Some forms indicate a chevron character but, as shown in Figure 30, the character is derived from two sets of features; one trending ENE and the other approximately NW. These features intersect in the region of Mt Paris and south of Mt Paris at about 570 000 mE, 5435 000 mN. No explanatory sources for these trends have been regionally mapped by Brown *et al* (1977) or McClenaghan *et al* (1993).

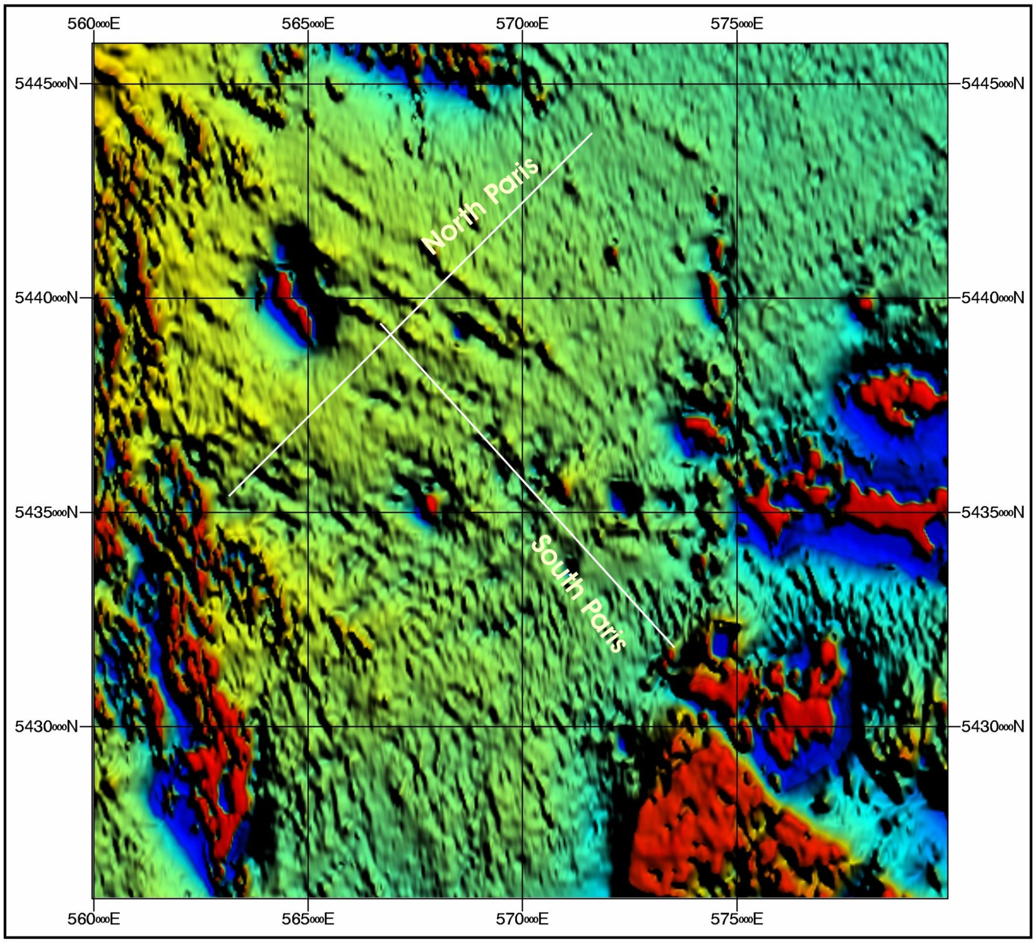


Figure 30. Image of Total Magnetic Field Intensity in the region centred on Mt Paris.

It may be observed that several elements of the drainage across the Mt Paris Pluton drains northwest but there is no obvious control for this, and no suggestion of a consistent, regional ENE pattern. It has been shown elsewhere in NE Tasmania that such trends are often, perhaps always, associated with dolerite dykes of uncertain age and relationship to the granitoids (previous sections of this report) and examination of these features was requested in order to test the possibility in this region. It should also be noted that many of the features are much muted compared to those observed in the Blue Tier area further east. Most strongly magnetic responses in Figure 30 are related to Tertiary volcanics and granodiorites in the southeast of the imaged area contribute much of the variation in the magnetic field.
Two profiles across the trends have been modelled in order to assess likely sources and contrasts. These are located, with base mapping, in Figure 31.

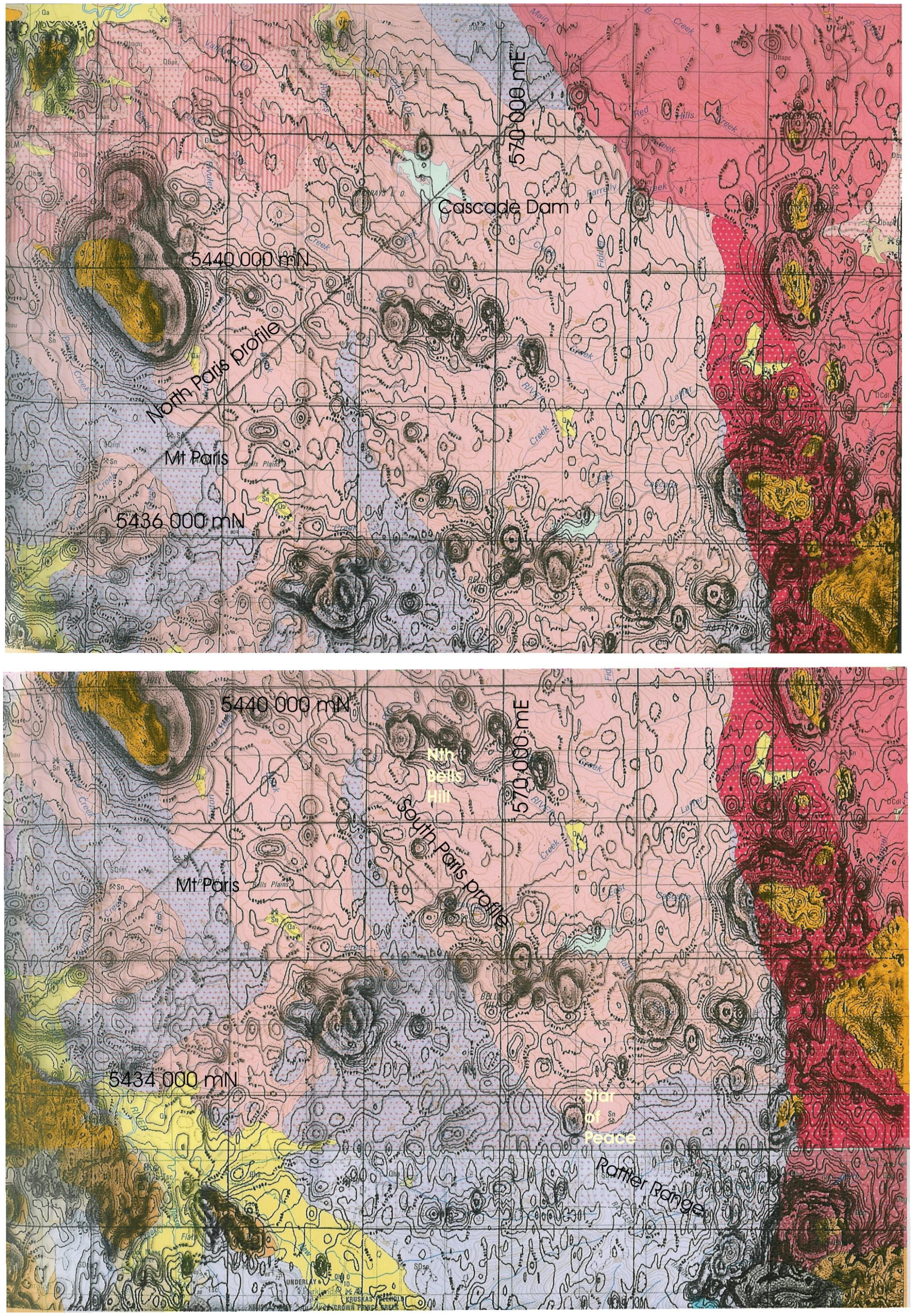


Figure 31. Location of modelled profiles in the Mt Paris region.
Line ParisN extends NE-SW in order to sample one set of structures, and line ParisS trends NW-SE in order to sample the opposing set. Both are evident in the contours but are not as readily recognised as in the image presentation. None of the features is obviously continuous across the pluton or the surrounding region.

The results of modelling the two test profiles are shown in Figure 32.

The sources represented are relatively trivial in terms of total field variations and in the context of regional magnetic fields. Inspection of the complete compilation of the survey (Figure 1, Introduction) shows that the Mt Paris region lies toward the eastern margin of a very large underlying effect. Previous work, and Webster this volume, has indicated the existence of large thrust structures which have incorporated ultramafics. Fragments of this pattern were noted in interpretations for Scamander, Blue Tier and Ben Lomond above.
Consequently, a regional assessment of the large base anomaly has been undertaken prior to detailed review of local features. This has been completed only to the level required to account for the general regional field and not to provide a detailed structural assessment of source distributions. The broad swale of anomaly evident in Figure 32 (north section) and the gross trend (south section) represent the effect of the underlying ultramafics at considerable depth.

In the northern (upper) section the principal anomalous deviations are due to a few narrow zones within the granite with low to very low magnetic contrasts (0.00065, 0.006, 0.0058 SI respectively from west to east). These are extremely subtle changes and the sources extend virtually to the land surface (certainly within 10 to 30 metres of it). Dolerite, or mafic, dykes of any sort are most unlikely to be the source of these effects: slightly oxidised alteration within the granite is much more likely.

Other alteration anomalies are evident along the western contact of the Mt Paris Pluton within the altered Mathinna Beds and some of these effects are the result of variable and sometimes negative magnetisation. The typical contrast is about 0.0013 SI and this value may be compared with the inferences about the alteration within the granite itself.

The southern (lower) section is essentially similar but with fewer intersections of intra-granite alteration zones. The implied contrast is 0.005 and 0.0065 SI respectively: comparable to determinations made for features trending normal to those intersected by this section. Both alteration zones in this section are reversely magnetised.
The granodiorite at the eastern end of the section has a normal magnetisation of about 0.0022 SI.
The altered Mathinna Beds near granitoid contacts is both normally and reversely magnetised (NW and SE end of line) with a contrast of about 0.0013 SI.

Groves (1977) and Union Corporation (1982) have described greisens in the Mt Paris Granite. Mapping and definition has been limited but the NW trend evident in the magnetics has been recognised and crudely displayed in exploration maps. Groves also noted that an ENE trend also existed in the greisens. The diffuse character of such material, and any associated fracturing and other alteration, coupled with no clear sense of magnetic contrast, the origin of magnetic properties, or width of zones, indicates that the values inferred in this report are probably maxima in terms of contrast and minima in terms of scale of source.

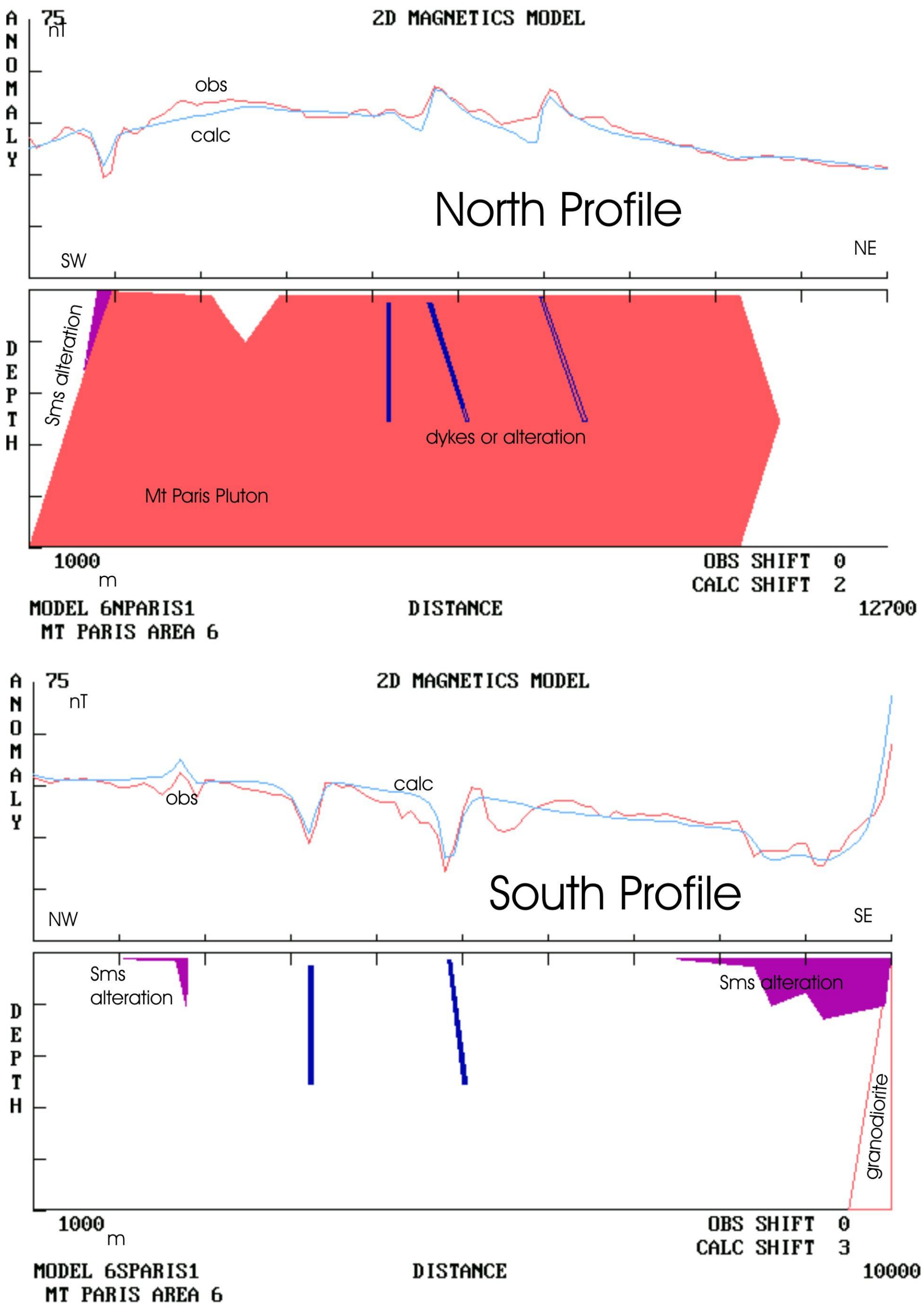


Figure 32. Interpretation of structural trends within the Mt Paris Pluton. For location of profiles see Figure 31.
Terminal coordinates of the profiles are:
North profile – 563 000 mE, 5435 000 mN to 572 000 mE, 5444 000 mN
South profile – 567 000 mE, 5439 000 mN to 574 000 mE, 5432 000 mN

7. DYKES(?) AT LONG ISLAND

Marked dyke-like character has been observed across the area around Long Island off the northwest coast of Cape Barren Island, south of Flinders Island. The nature of the features is well displayed in the image (Figure 33). The island, and the nearby coast of Cape Barren Island, possesses the same orientation as the magnetic features. Although tempting to explain all these features as dolerite or comparable dykes, few have been observed in the region and the exposure is such, at least along the coast, that such elements should have been noted if present. Cocker (1982) does note the presence of at least two dykes but does not describe their dimensions.

Analysis has been directed toward an assessment of scale, geometry, possible magnetic contrasts, and thus likely cause.

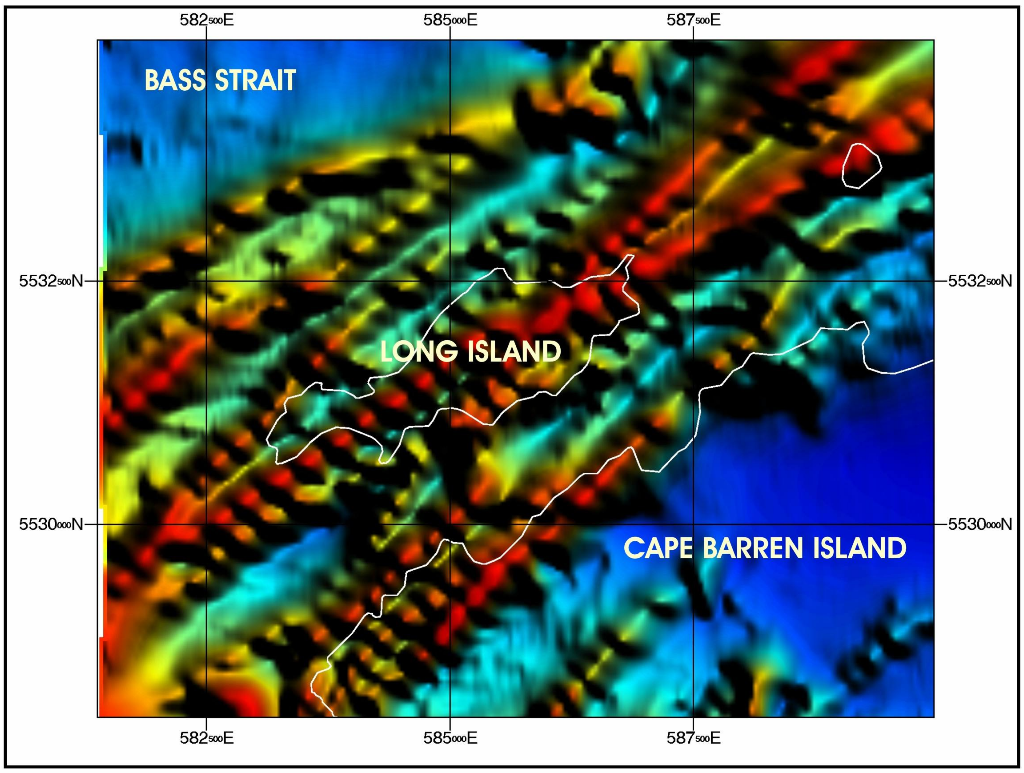


Figure 33. Image of Total Magnetic Field Intensity in the region of Long Island.

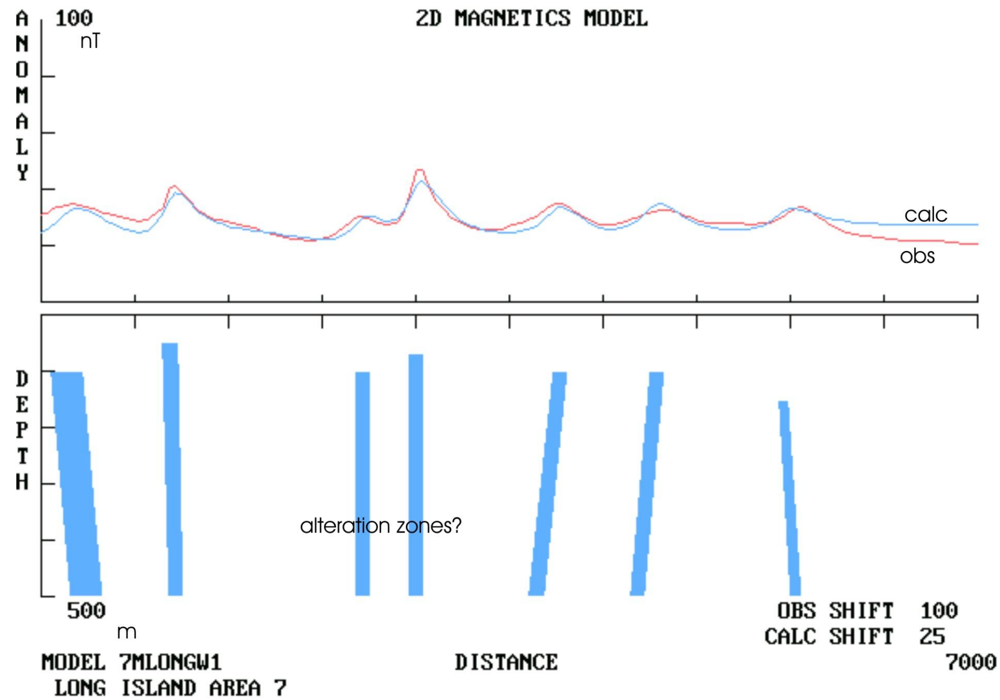
Because of the ENE to NE orientation of the structures tie line profiles have been used as the basis for interpretation (583 890 mE from 5528 to 5535 000 mN and 587 900 mE from 5531 to 5535 000 mN). Interpretations are shown in Figures 34 and 35.

The sources appear in the form of wide dykes but, as shown in Figure 34, any magnetic contrasts inferred on this basis do not support the view that the dykes are dolerite or basalt regardless of assumptions about depth to upper surface – which is clearly variable along strike.

The sources in the longer western section have width and contrasts as follows, from south to north: 230 m, 0.0013 SI; 100, 0.0026; 100, 0.0026; 100, 0.0039; 100, 0.0026;

100, 0.0026; and 70, 0.0039. The most magnetic part of the sources begins within 50 to 100 m of the surface.

Similar results apply for the shorter eastern section: 80 m, 0.0032 SI; 80, 0.0013; 300, 0.0026 and 170, 0.0026. The sources are slightly deeper in the east.



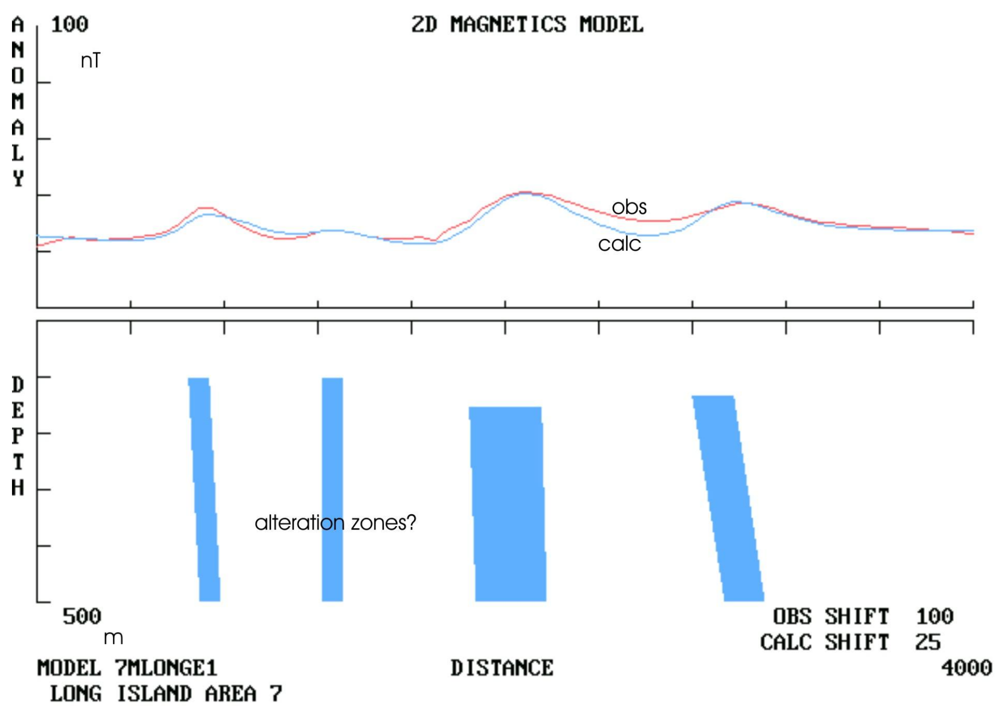


Figure 34. Interpretation of north-south profiles at 583900 and 587900 mE across Long Island.

Figure 35 presents an alternative interpretation which examines the effect of changes in depth range, width and property contrasts. The structures varied have been thinned to less than 50 m, and their depth range doubled while retaining the upper surface at the same depth. This has required an increase in contrast of about 250% to 0.0065 (from 0.0026) and 0.01 SI (from 0.0039) for the western line and 0.0054 SI (from 0.0026) for the eastern line.

All values, even those within range adjusted models, are consistent with lamprophyres rather than dolerites.
The survey, and the interpretation, indicates that there are many more of these structures than previously suspected. Some ground inspection is required to confirm the inferred properties and composition. If some of these intrusives can be located and traced and sampled, and their thickness observed, then it will be possible to revise the present interpretation and offer finer constraints on depth range and other structures which may not be exposed.

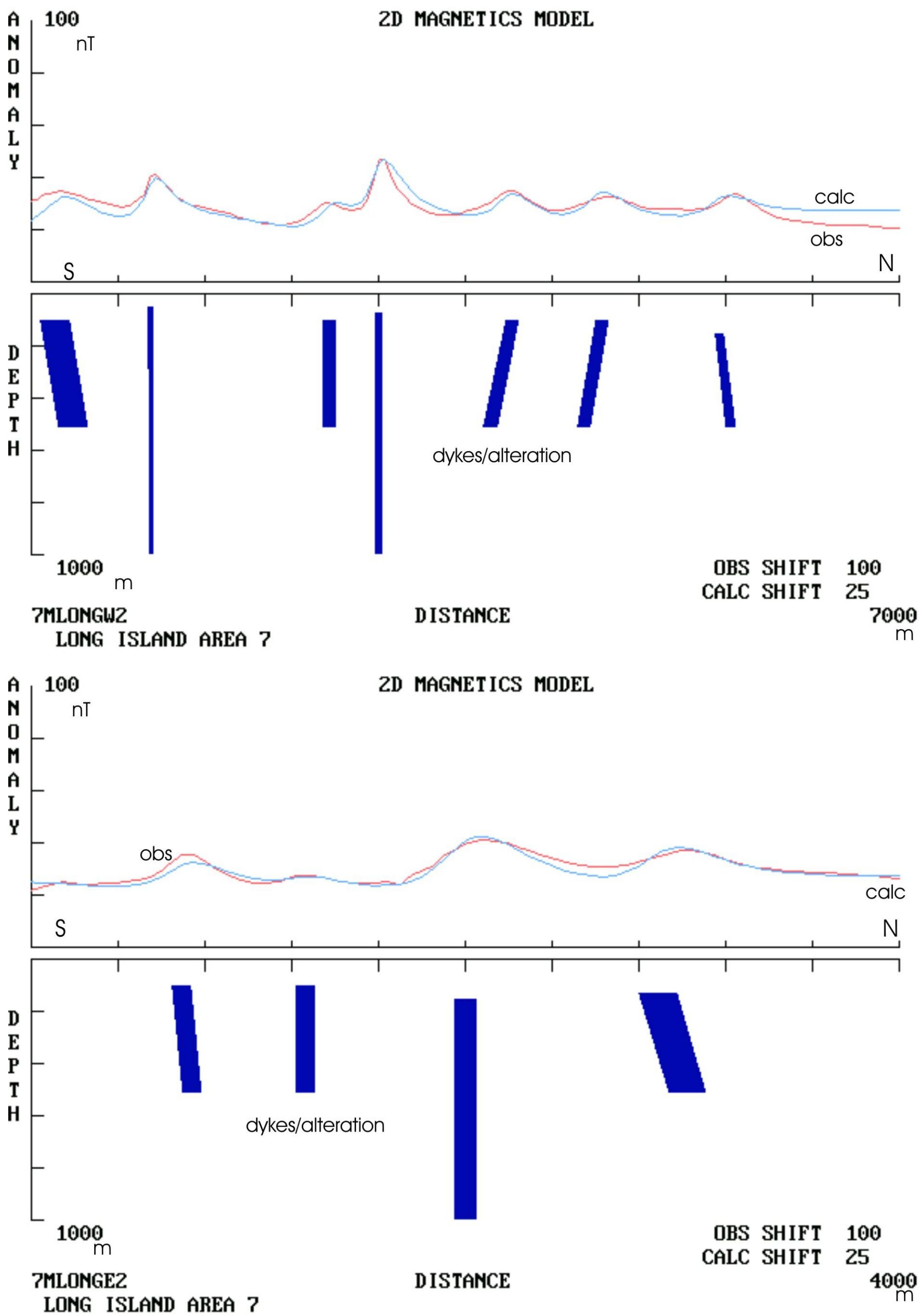


Figure 35: Interpretation of north-south profiles at 583900 and 587900 mE across Long Island.
An alternate model which allows comparison (with Figure 34) of the effect of changes in depth range, contrast and width. Only some bodies in the model have been changed in order to stress the ambiguities likely.

8. EAST-WEST ANOMALY NEAR LADY BARRON, FLINDERS ISLAND

The magnetic field is extremely variable north and east of Lady Barron and highly subdued in character across the granites of Strzelecki – as might be expected. Between these two patterns, west of the township of Lady Barron, is a strong east-west anomaly with several kilometres of easterly extension but very smooth, large or deep source character (see image, Figure 36). An examination of possible origins has been undertaken.

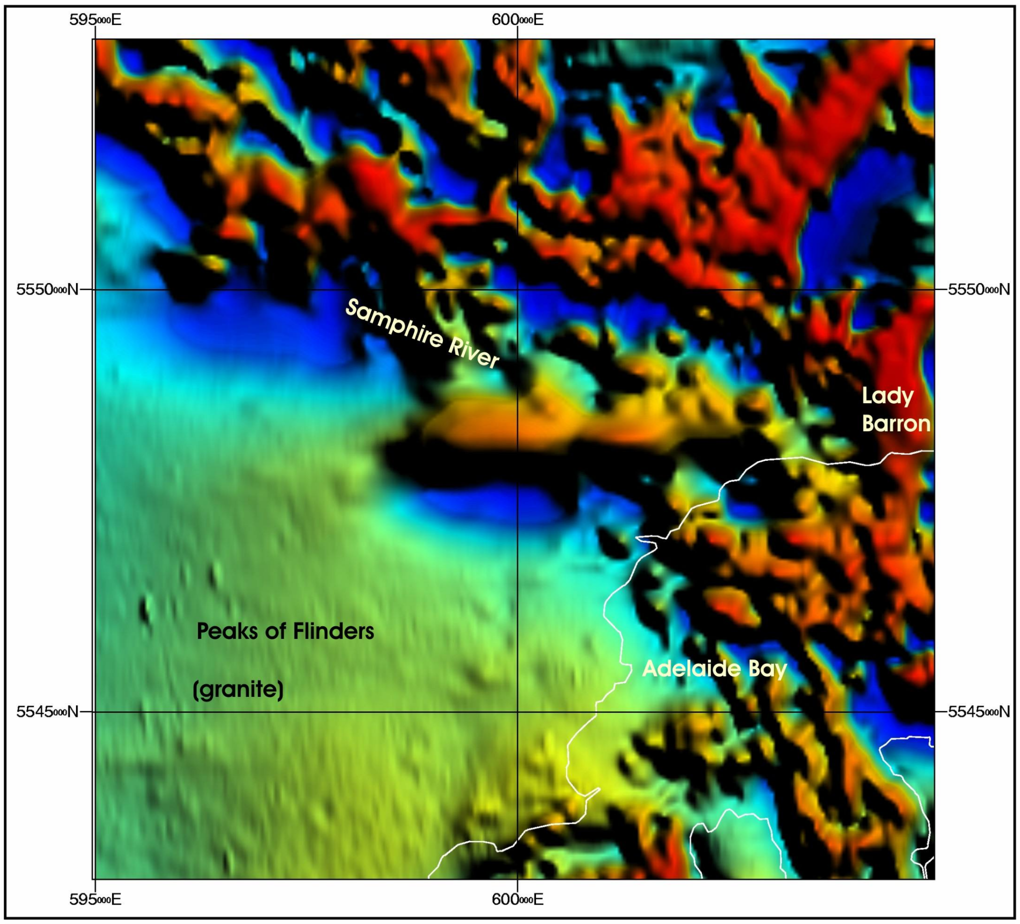


Figure 36. Image of Total Magnetic Field Intensity in the region of Lady Barron, Flinders Island. Note the contrast between the field across exposed Mathinna Beds and granite (to the west), and the effect of basalts within Tertiary sequences, often concealed by Quaternary cover. The E-W feature in the centre of the image is clearly anomalous in any of these contexts.

Available geological mapping on Flinders Island (Jennings *et al*, 1978) is of a most regional nature generally and no clear correlations can be made between mapped units and the anomalous feature. It lies very near to a cover boundary between Quaternary units and Mathinna Beds immediately east of the principal granite contact.

Three models are offered in Figure 37 which account for many of the characteristics of this anomaly. All involve basalt at shallow depth. It was determined that no deep or steeply dipping narrow source can account for the features observed.
The profile is located on tie line 190150 at 599 880 mE between 5545 000 and 5550 000 mN. Elevation variations range from 85 to 135 m (typically 95 m clearance).

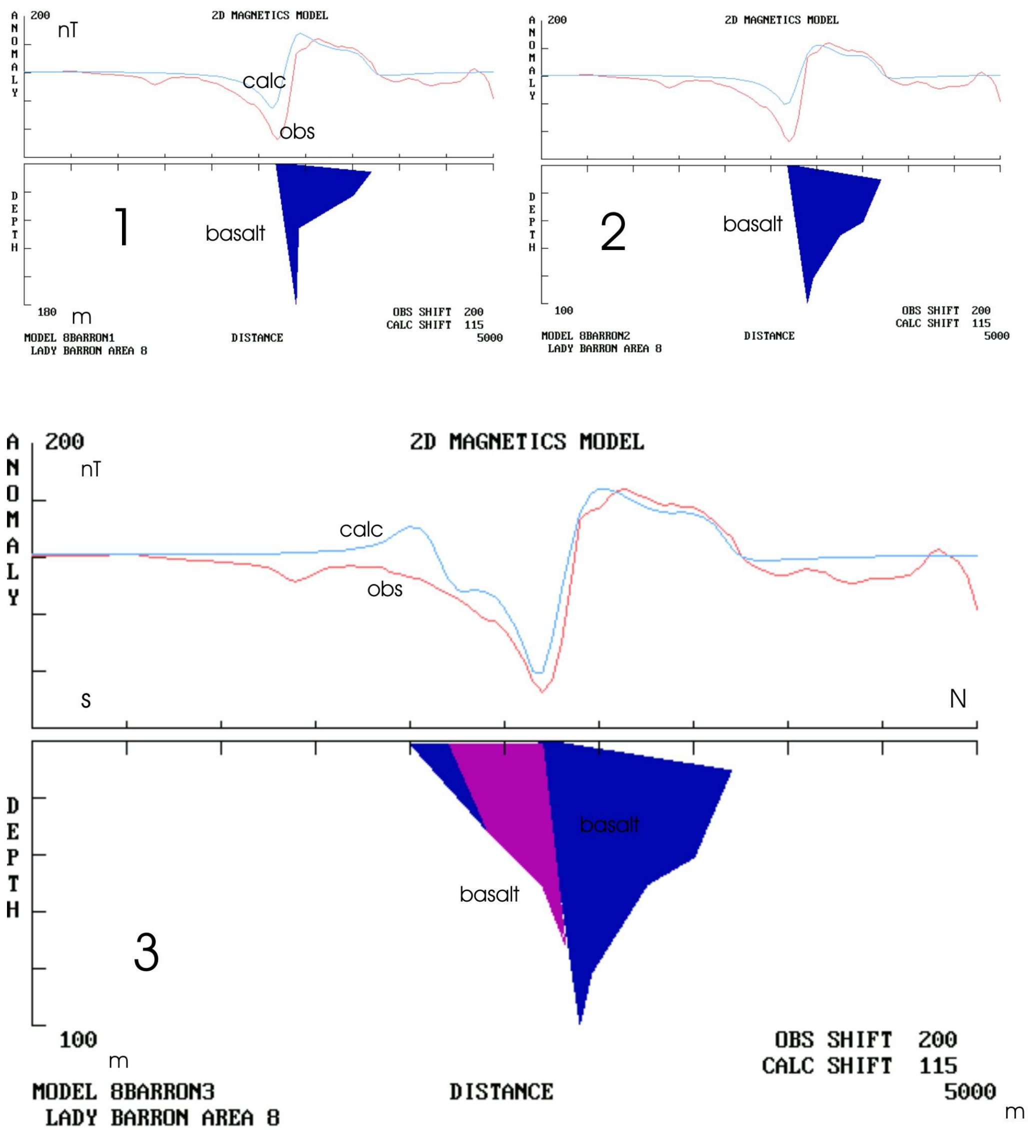


Figure 37. Interpretation of the Lady Barron anomaly.

Model 1 provides a basic outline of a basalt-filled valley (contrast 0.013 SI) and maximum thickness of about 180 metres. This solution accounts for the northern part of the anomaly but not the southern section.

Model 2 suggests some possible variations in valley profile to improve the explanation with a more credible maximum depth of 100 metres. The southern section of the anomaly is, again, not well accounted.

Model 3 provides for more reality by assuming that the basalt is magnetically variable and more extensive than either models 1 and 2 – or the present geological map – would suggest, and provides a comprehensive explanation. Part of the basalt fill appears to be reversely magnetised (-0.013 SI). Further, the model suggests that the southern limit of the fill has a normally magnetised skin. Note that these variations provide for a better general fit but create a more lumpy profile which was not observed – at this easting. Examination of the eastern section of the greater anomaly pattern, however, shows that irregular features were observed along strike at the required northing.

The anomaly is due to a thick valley fill of Tertiary basalt.