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# 1987/39. Interpretation of a gravity survey in the Smithton area, north-western Tasmania

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***Abstract***

An interpretation of a gravity survey conducted in the Smithon-Forest area of north-western Tasmania indicates that the late Precambrian to Cambrian Smithton Basin contains a basal siliceous clastic dolomite succession (density = 2.79 t/m$^3$), followed by a volcanosedimentary succession (2.70 t/m$^3$), a second dolomite succession (2.79 t/m$^3$), and a fossiliferous Cambrian succession (2.67 t/m$^3$).

## INTRODUCTION

The Smithton area has been covered by a number of geophysical surveys. The first comprehensive coverage was the 1973 Bureau of Mineral Resources gravity survey with a survey density of one station per 49 square kilometres. At the request of A. V. Brown, a survey at a station density of one per square kilometre was undertaken in 1984/85 over the area shown in Figure 1. In 1984 the B.M.R. flew a combined aeromagnetic and radiometric survey over north-west Tasmania using a 500 m line spacing.

## INTERPRETATION

Within the area of interest the radiometric data show the Cowrie Siltstone to be an area of high total counts, the Cambrian volcanic rocks to be an area of low total counts, and the fossiliferous Cambrian rocks to be an area of high counts. Much of the upper dolomite has a much rougher radiometric topography than the lower dolomite.

A full discussion of, and a set of processed images for, the north-west Tasmania aeromagnetic survey is presented in Bishop (1987). Within the Smithton and Woolnorth Quadrangles the main magnetic anomalies are related to the Cambrian volcanic rocks, with a lesser effect from the Tertiary basalts. Steeply-dipping Cambrian volcanic rocks mark the eastern side of the Smithton Trough with a strong magnetic anomaly, but the more gently dipping western margin is marked by only a weak anomaly. The interpreted depth of burial and thickness of the Cambrian volcanic rocks (fig. 2) is such that the continuity of the volcanic rocks across the trough cannot be proven either magnetically or gravimetrically. The edges of other synclines on the two sheets also show magnetically, implying the presence of Cambrian volcanic rocks.

The detailed gravity survey (fig. 1) shows strong gradients at the eastern edge of the Smithton Trough and at the margin of the small syncline immediately to the east of the main trough. These gradients join approximately five kilometres south of Irishtown and continue to the south as one gradient. A positive ridge running north towards Circular Head marks an area of thick Cambrian volcanic rocks. A profile along grid line 5480 km N between the west coast and grid line 360 km E was interpreted by two-dimensional modelling of the residual field after removal of a linear

regional. The final model (fig. 2) had drill control at 353 km E and used the following densities:

| | |
|---|---|
| Fossiliferous Cambrian rocks | 2.67 t/m$^3$ |
| Dolomite/conglomerate | 2.79 t/m$^3$ |
| Cambrian volcanic rocks | 2.70 t/m$^3$ |
| Precambrian basement | 2.67 t/m$^3$ |

The model shows the central trough to be up to 3.9 km thick with approximately 1.6 km of fossiliferous Cambrian rocks. A second profile along grid line 5465 km N was not modelled because of the low station density but showed the synclines to have decreased in depth to the south. A small anticline has developed on the western limb of the main trough.

REFERENCE

BISHOP, J. R. 1986. Interpretation of the north-west Tasmania aeromagnetic survey. *Unpubl. Rep. Dep. Mines Tasm. Mt Read Volcanics Project*

[26 August 1987]

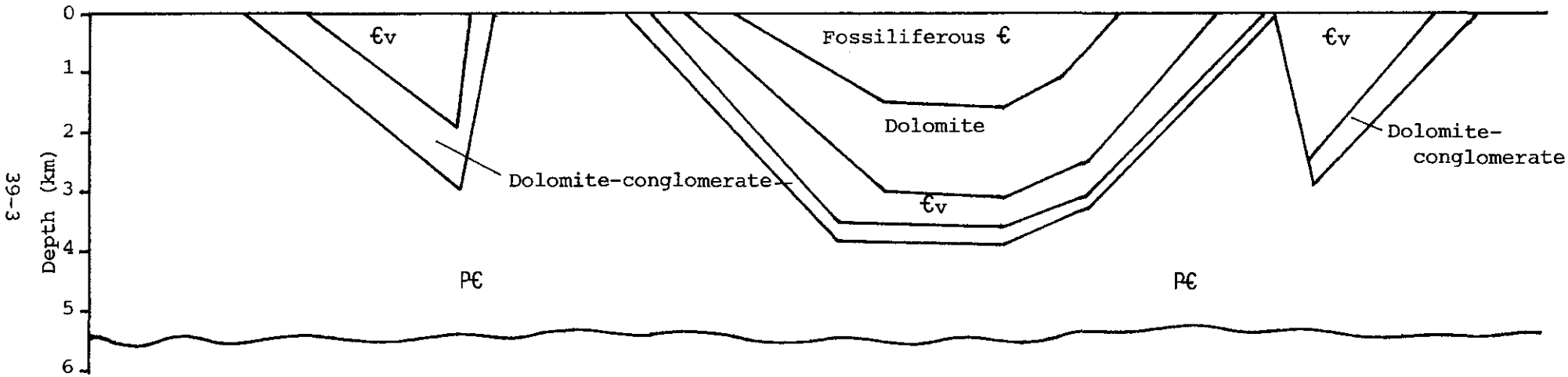


Figure 2. *Interpretive cross-section of gravity data along line* 480 000 *m North between* 300 000 *and* 360 000 *m East.*

*Density: Precambrian basement 2.67 t/m$^3$; dolomite-conglomerate succession 2.79 t/m$^3$; Volcano-sedimentary succession 2.70 t/m$^3$; upper dolomite succession 2.79 t/m$^3$; fossiliferous siltstone-mudstone succession 2.67 t/m$^3$*

5 cm

4/4

GRAVITY MAP OF SMITHTON - FOREST AREA

Contour interval 1 m/gal
Correction density 2.67 t/m$^3$
Nominal station density one station per square kilometre

See Smithton 1:50 000 map for surface geology

FIGURE 1.

5 cm