

RA Grade  
Nov 73

A GRAVITY SURVEY ACROSS THE MT LOFTY RANGES  
SOUTH AUSTRALIA

M. P. Middleton, B.Sc.

A thesis submitted as part of the  
requirements of the Honours Degree  
of Bachelor of Science (Geophysics)

Adelaide

October 1973

## ABSTRACT

A gravity survey across the central Mt. Lofty Ranges produced a detailed profile linking the Adelaide Plains with the Murray Basin. The profile is incorporated in a new Bouguer Anomaly Map for the Adelaide-Mannum area.

Indirect density measurements were obtained from the gravity data, and these were used in establishing a table of surface-rock densities for major units encountered in the survey.

Analyses of the regional gravity picture tend to suggest that the crust thickens asymmetrically eastward under the Ranges.

Computer modelling revealed the probable attitudes of the Palmer and Eden Faults, the western Archaean/Proterozoic boundary, and also the position and attitude of the eastern truncation of the Palmer Granites.

## CONTENTS

Abstract	
Acknowledgements	
Introduction	2
I Survey Procedure	4
II Preliminaries	7
III Density Determinations	9
IV Regional-Residual Separation	14
V Regional Analysis	17
VI Residual Analysis	20
Conclusions	26
References	28

## APPENDICES

A Effect of the Pipeline	
B Data Accuracy	
C Depth to the Moho	
D Selected Data Tables	
E Base Stations	

## FIGURES AND PLATES

### Figures

- 1 Locality Map
- 2 Regional Geological and Bouguer Anomaly Maps of the Adelaide-Mannum Area
- 3 Three Profiles across the central Mt. Lofty Ranges
- 4 Comparison of topography, Free Air Anomaly, observed gravity, and Bouguer Anomaly.
- 5 Indirect density determinations for the traverse taken as a whole
- 6 Indirect density determinations for the Kanmantoo Group, before and after regional removal
- 7 Indirect density determinations for the Proterozoic
- 8 Indirect density determinations for the Kanmantoo and Proterozoic combined
- 9 A regional model of crustal thickening
- 10 Anomaly B compared with 2 theoretical anomalies
- 11 Anomaly F compared with a theoretical anomaly

### Plates

- I Density Profiles
- II Regional-Residual Separation
- III Density Profiles for Residuals

### Tables

- I Adopted Densities