The University of Adelaide

Department of Geology and Geophysics

Interpretation of Gravity Data Over Central Jawa, Indonesia

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Master of Science.

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Statement

This thesis contains no material which has been accepted for any other degree or diploma in any university and, to the best of my knowledge, no material previously published or written by another person, except where due reference is made in the text.

I consent to the thesis being made available for photocopying and loan where applicable if accepted for the award of the degree.

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Abstract

Central Jawa, Indonesia, is a complex region resulting from the collision of the south eastern margin of Eurasia and the northward drift of the Australian continent, together with the westward drift of the Pacific plate.

The Bouguer anomaly contour map used in this study is the most detailed gravity map of central Jawa yet to be interpreted. This contour map was produced on the basis of the Bouguer reduction density value of 2.67 gr/cm^3. However, the result of the Parasnis straight line method for Bouguer reduction density of the northern part of Purwokerto indicates that the density value of 2.25 gr/cm^3 is more suitable. The interpretation of this gravity study is restricted by certain limitations, for example, the actual gravity observations were not available and there was very limited geophysical control from other methods. However, the results provide the starting point for further gravity study over central Jawa.

The gravity map shows a major boundary which strikes in a roughly east-west direction; in the Kebumen (Karangsambung) area this boundary coincides with the outcrop of a major fault which separates the Eocene basement in the south from younger sediment in the north. This boundary is displaced by a north-west trending structure.

The major volcanoes in central Jawa such as the Slamet, Merbabu, Merapi, Ungaran and Rogojembangan volcanoes are along an east-west line which is parallel to the major fault described in the above paragraph but displaced 30 km north of it.

The map shows that there are two types of major volcanoes, those which produce a strong gravity anomaly and those which do not. At the Ungaran volcano, a circular feature gravity anomaly with positive values reflect a dense body whose density contrast is 0.5 gr/cm^3 higher than surrounding rocks. This body has a diameter of 7 km and extends for a depth of 2 km to 10 km.

On the basis of the results of computer processing, modelling and analysis of gravity data, the effective interpretation of those anomalies provide us with better understanding of the major structural elements of island arcs.