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Gravimetric measurements on three N-S profiles through the East Alps - observational results and preliminary modelling

1. Introduction

We describe gravity and vertical gradient measurements on two north-south profiles through the alpine foreland und the east Alps, together with preliminary interpretive model calculations.

The lines of the profiles are

Profile I: Landshut - Wasserburg- Reit i.Winkl - Kitzbühel - Mittersill - Lienz - Plöckenpaß

Profile II: Altötting - Zell a.See - Großglockner - Lienz

Profile III: Freistadt - Linz - Steyer - Liezen - Judenburg - Klagenfurt

2. Field Measurements

On three profiles the measurements are spaced

- at about 3 km in the alpine foreland
- at about 2.5 km in the alpine margins
- at 1.5 - 2.0 km in the central Alps

Our field results are presented as

- Bouguer anomaly profiles
- profiles of modified Bouguer anomalies

The techniques are as described by Ehrismann et al. in (1973) for gravity measurements in mountaineous terrain. Terrain corrections for the innermost zone were made by the method developed by Schöler (1976). Götze et al. (1976) describe the procedure for measuring the vertical gradient, with special emphasis on the reproductivity of readings.

Remarks

- (1) The terrain correction for the most distant zones is made by the method of Ehrismann et al. (1966, 1971).

- (2) The accuracy of the gravity anomalies is about ± 0.5 mgal. This error is larger than in flat lands owing to the difficulties of levelling and of estimating the terrain corrections in rough terrain. The standard density of $2.67/\text{gr}/\text{cm}^3$ is used in the Bouguer slab and terrain corrections.

3. Model calculations

Model calculations in connection with the results of earlier field measurements are in progress. Three of these models appropriate for the profiles I, II, III are shown in slides. The structures of these two-dimensional models are based on the following publications:

in geophysics: Closs (1957), Harcke (1972), Angenheister et al. (1972)

in geology: Geologische Karte von Österreich nach Exner (1964), Tollmann (1963)

The gravity profiles computed using the method of Talwani (1959), and the densities shown in the models are given too. They are in good agreement with the modified Bouguer anomaly profiles.

In contrast with earlier work the models contain much detail in the crustal structure down to 10 km. - Further conclusions will be possible when the model calculations, now in progress for the adjacent areas, have been completed. This is especially true for the deeper structure between 10 and 50 km.

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