Modeling the Crust with Gravity and Magnetic Data on some seismic lines in Northern Aegean

by

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Abstract

The crustal structure beneath the Northern Aegean Sea has been studied by modelling gravity, magnetic and seismic data. The possibility of considering a four-layer crustal model comprising of sedimentary, crystalline metamorphics, granitic and basaltic lithology is discussed.

Résumé

La structure crustale de la partie Nord de la mer Egée a été étudiée par modelage des données sismique, gravimétrique et magnétique. La considération d'un modèle crustal de quatre couches - sédimentaire, cristalline métamorphique, granitique et basaltique - sera discutée.

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The crustal structure beneath the Aegean Sea has been the subject of investigation for several workers in the last decade. Works on reflection, refraction and earthquake seismology yield some implications concerning the variation in thickness of the crust and its structure. It is believed that the crustal thickness in the Aegean Sea has an average value of 30-32 km. (Makris, 1973). Crustal and isostatic studies show that the crust is getting thinner in the central part of the Aegean Sea.

It is known that the crust in the Aegean Sea is of a continental type. But in order to clear out some speculations, the structure of the crust needs to be studied in more detail. To serve this purpose, the crust in Northern Aegean is modelled based on gravity, magnetic and seismic data. The gravity and magnetic data have been obtained from the maps compiled by Allan and Morelli (1970). Quantitative gravity and magnetic in-

terpretations have been done on the seismic lines shot by the Seismic Explorations International S.A. (SEISA) in May 1972 and June 1974 (see the location map). Dotted lines show the seismic lines shot by SEISA on which gravity and magnetic interpretations took place. Data based, total main magnetic field direction with respect with respect to seismic lines is also seen on the location map.

Initial models representing the contact between the sedimentary and metamorphic lithology have been obtained from the seismic interpretations. Gravity and magnetic data interpretation help in delineating the basement contact where the seismic interpretation becomes vague. Some magnetic intrusive masses are included in the models where the computed anomalies differ from the observed ones. It is believed that relatively shallow magnetic anomalies can be used in figuring out the possible contact between the metamorphics and granitic crust.

The density of data is appropriate to make some deeper interpretations. Working with regional gravity and magnetic anomalies it is believed that we can see some implications of the possible contact between the granitic crust and basaltic crust. Deep crustal models based on both gravity and magnetic data show that the anomalous masses causing the gravity and magnetic anomalies are of the same origin.

References

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