8-8. - A GRAVITATIONAL STUDY OF THE EASTERN MEDITERRANEAN AND THE ANATOLIAN REGION

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The eastern Mediterranean gravity anomalies were studied for the first time by Rubinowitz and Ryan (1970). They studied the broad structures in the light of gravity anomalies, with the aid of shallow reflection seismics and heat flow measurements. They concluded that the gravity anomalies mainly result from variations in the thickness of sedimentary units. Woodside and Bowin (1970) also carried out crustal studies and concluded that the crustal thickness increases to the north. They further stated that the gravity anomalies of the region are due to the variation of depth to the Moho discontinuity. In our paper, we propose a third possible explanation of the gravity anomalies.

The gravity anomalies of the study area are very different than those found in the isostatically compensated areas. In the vicinity of Cyprus the isostatic anomalies reach an amplitude of +173 milligals. Another important area is in the north of Crete where the isostatic anomaly has a maximum amplitude of +150 milligals. However, apart from these two and few other local anomalies, the eastern Mediterranean region in general is characterized by negative isostatic anomalies.

One of the most important characteristics of the eastern Mediterranean is that the areas which are expected to subside under normal isostatic conditions continue to rise and vice versa. In addition to this, there is a reverse relationship between the gravity values and the elevation. This reverse relationship was first observed by Harrison (1955). Therefore, due to these peculiar gravitational characteristics of the region and the lack of seismic studies to determine the crustal thickness, it is quite feasible to propose a different explanation for the gravity anomalies than those suggested before. For this purpose, two gravity profiles were taken in the region of the Taurus Mountains. The result of statistical analyses of the relationship between gravity values and the elevation is that the reverse relationship observed first by Harrison continues into the Anatolian region. Further, the average Bouguer anomaly values were calculated from the plots of gravity values against elevation. A comparison of average Bouguer values with those found in isostatically compensated areas reveal that they are 100 milligals larger. Thus the Anatolian region is undercompensated and, therefore, should subside. This area, however, is rising according to the geological and geomorphological evidence. Thus, the Anatolian studies reveal that the gravitational characteristics of the eastern Mediterranean continue into the Anatolian region.

We can sum up what has been said so far in the following way: according to all evidence available, the eastern Mediterranean region is -100 milligals overcompensated and instead of rising, it is subsiding; the Anatolian region is +100 milligals undercompensated and instead of subsiding

it is rising. The fact that Anatolia is rising leads to the possibility that the causative forces are in the mantle and they bring about an upwarp of mantle and crust together. In the light of recent developments of mantle properties, this is quite feasible as phase changes in the mantle can produce such forces.

We conclude that the low velocity zone in the mantle is one explanation for the abnormal gravity anomalies and the tectonic developments of the eastern Mediterranean and the Anatolian region.

SCHUILING -
In a number of cases areas of positive gravity anomalies are rising and those of negative gravity anomalies are subsiding in Turkey. Can you subscribe to the possibility that this disequilibrium Bemaviour can be due to thermal processes ?

Reply : It is possible.

RYAN -
Did you study the gradients of the Gravity-Anomalies for depth-calculation ?

Reply : I based my paper on work which is preliminary at this stage.