Gravity anomalies in the Eastern Mediterranean and their implications

by

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The eastern Mediterranean Sea east of 27° E has been gravity surveyed with a similar line spacing to the ALLAN and MORELLI survey south of Crete in order to complete this type of coverage for the Mediterranean sea as a whole. Previous data in the area were from random tracks of different ships using poorer navigational aids than the satellite navigator which was used on the *Shackleton* cruises. Preliminary results from the 1972 and 1974 combined surveys have been compiled in a Free-Air anomaly chart. Further work will produce a Bouguer anomaly chart and a more detailed interpretation of the gravity field.

The new survey has better defined gradients, trends, and other anomalies which were not as evident before. New anomalies have also been discovered where there were no data previously. Southeast of Eratosthenes, for example, a positive northeast trend is observed near the location of a positive magnetic anomaly. This positive trend and a parallel positive from the Nile Delta to Eratosthenes probably reflect deep-seated structure in the crust.

The positive anomaly over the Nile Cone appears to be much larger in extent than had been believed before. There is a northward extension of the Nile Cone positive west of Eratosthenes. A relative high continues north into the Gulf of Antalya as defined by a separation of the contours west of Cyprus where there is a large westward negative gradient. In the Antalya basin, the relative high broadens and it is the western edge of the high which corresponds to the suspected major crustal discontinuity referred to in our earlier communication concerning the seismic reflection survey results.

Crossing the distinctive north-south anomaly is what now appears as a much wider and better observed arcuate low extending from south of the Anaximander Mountains, between Eratosthenes Seamount and Cyprus, and eastward into Syria. This arcuate low is pinched slightly between Eratosthenes and Cyprus and also follows the east and west flanks of Eratosthenes over the fault-bounded basin referred to in my previous communication on seismic reflection results.

In general terms then, the main features of the new map are its negative character, the arcuate axis of the low, and the north-south trend and the northeast-southwest trends.

Previous compilations of gravity data for the larger eastern Mediterranean region have been restricted by a lack of data for Turkey. A small amount of data from Turkey was published by OZELCI in the form of a general contour map. A further 130 stations have been added by Cambridge in order to determine the regional field in central and western Turkey. The new stations were made at about 18 kilometers intervals between the Black Sea and the eastern Mediterranean sea and west to the Aegean Sea through central Turkey. Preliminary work on these data confirm the anomalous isostatic relationships present — Turkey is under-compensated (or has a greater elevation than would be expected from the gravity data) and the eastern Mediterranean is over-compensated (or is deeper than would be expected from the low gravity values). A profile south from the sea of Marmara through western Turkey shows a more normal relationship between gravity and elevation; however, to the west the Aegean exhibits under-compensation similar to west central Turkey. The crust of the Aegean also appears to be domed upward in the simple model that was constructed to explain the gravity. The anomalous relationships observed could be explained in several ways including lateral variations of density in the upper mantle or tectonic forces acting to depress the eastern Mediterranean basin and elevate Turkey, Cyprus and the Aegean Sea; however, there is poor crustal structural and geological control to facilitate proper computer modelling of the anomalies as yet. With the results described by WRIGHT in the previous communication, a good start is now being made on crustal models.

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