Seismic reflection survey in the Eastern Mediterranean Sea

by

J.M. WOODSIDE

Department of Geophysics, University of Cambridge (England)

Preliminary results from the extensive seismic reflection surveying carried out by R.R.S. *Shackleton* east of 27° E in 1972 and 1974 suggest large variability in the Plio-Quaternary sediment thickness, different degrees of salt mobilization, and the presence of regions of vertical movements and crustal tilting along a belt extending from the Anaximander seamounts, south of Cyprus, to Syria.

The Plio-Quaternary cover is interpreted as the material lying above reflector 'A' of FINETTI and MORELLI. This cover thins substantially over the Mediterranean Ridge and over Eratosthenes seamount. It is thickest on the Nile cone and in the vicinity of the Herodotus Basin. Between Eratosthenes Seamount and the Herodotus basin there is a sudden westward thickening of Plio-Quaternary sediments along a north-south line near 30° 30' E. A growth fault may be situated along this line. Around the northwest, north, and northeast flanks of Eratosthenes Seamount are small basins containing relatively thick sections of Plio-Quaternary. These basins appear to be fault-bounded and the reflectors in them appear to dip away from the seamount.

The evaporites are observed on all profiles except large parts of those over the Mediterranean Ridge where seismic reflections tend to be chaotic, and over Eratosthenes seamount and the Anaximander Mountains. A thin section of evaporites may be present on the western flank of Eratosthenes (which appears to be a larger westward tilted block). East of Eratosthenes there is little salt mobilization, but to the west there occurs discrete doming. South of Erastothenes is a small region of salt produced blocky topography. Narrow collapse structures in this area are probably a result of salt dissolution after doming. In the Herodotus basin, to the west of the zone of thickening Plio-Quaternary sediments, there is a region of large scale undulations which are probably salt-controlled. The undulations may be linear and oriented roughly north northeast-south southwest in a direction parallel in that area to the broad western lobe of the Nile Cone. Justification for the supposed linearity is the larger amplitudes and shorter wavelengths of the undulations on east-west profiles than on north-south profiles; however, a more detailed survey would be required to confirm this speculation.

Recent tectonics in the region of the Anaximander Mountains and the south-western Antalya Basin are in some ways similar to that observed in the Strabo and Pliny Trench system. In fact, the Strabo trench appears to continue south of the Anaximander Mountains. The Anaximander Mountains are rising and causing recent sediments deposited to the north to be tilted toward Turkey. The basin south of Turkey into which the Anaximander block is tilted might be interpreted as forming the continuation of the Pliny trench. Further east, along the southwest side of the Antalya Basin, a distinctive deep pocket of sediments coincides with a sharp westward decrease in gravity of about 100 milligals. A major discontinuity in the crust is interpreted as the cause of this feature. Following the trends southeast to the Eratosthenes basin, north dipping reflectors and faulted boundaries suggest a continuation of this tectonic regime south of Cyprus.

Intervention

C.J. Mulder — What is your tectonic interpretation of the Eratosthenes high?

Réponse — (given at time of question). 'At present we have no definite interpretation but the problem might better be discussed after the other papers from Cambridge have been given.'

Rapp. Comm. int. Mer Médit., **23**, 4a, pp. 217-218 (1975).

As discussion after Dr. MATTHEWS' paper did not touch on this problem, the following extension to the answer is given : Eratosthenes seamount is probably a block of sedimentary material upfaulted in response to roughly east-west compressional motions observed along ancient northeast-southwest trending structures in the eastern Mediterranean Sea. The compression arises from the southwestward movement of the Turkish plate relative to the African plate acting on structural elements believed, on the basis of our marine geophysical data, to extend northeast from Egypt almost as far as Cyprus. Eratosthenes seamount has no major gravity anomaly associated with it (the free-air anomaly over it is chiefly an effect of topography), and the magnetic anomaly to the southeast could be explained by the vulcanism which occurred along northwest-southeast and northeast-southwest faults in the Oligocene and in the late Cretaceous. Eratosthenes is thus a result of the broad regional deformation arising from late stages of convergence between Africa and Eurasia.