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Short Communications

Crustal Structure of the Aegean Sea and the Hellenides Obtained from Geophysical Surveys

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Key words: Crust of Earth – Gravity Anomalies – Refraction Seismics – Greece – Aegean Sea – Hellenides.

In the period 1971 to 1974 the territory of Greece has been geophysically investigated by Greek and German Institutions. Gravity and magnetic stations have been distributed at a spacing of one station per 25 km^2. Five deep seismic sounding cross-sections have been fired and recorded along the lines: Ionian Sea – Peloponnese, Amorgos – Mikonos – Evia, Crete: East-West, Cretan Sea: North-South, Cretan Sea: East-West.

The results of the seismic programms revealed a pure continental structure of variable thickness. The most attenuated area is that of the Cretan Sea, with only 22 km depth to the Moho-Discontinuity at the Bouguer gravity maximum of +175 mgal. The very unevenly distributed sedimentary cover of the Cretan Sea is composed mainly of Neogene Sediments with thickness of 3 – 3,5 km in local basins (Jonsma *et al.*, 1975). The Greek mainland along the Pindos Chains has minimum Bouguer anomalies of – 120 to – 140 mgal and Moho-Depths between 42–46 km. The Aegean Area builds a large dome and incorporates also a large part of the Taurides, Western Turkey (Makris, 1975).

Combining the seismic results of "Meteor" Cruises Nr. 17 and 21, from the Ionian Sea (Weigel, 1974; Hinz, 1974) with gravity and seismic data of the Hellenides (Makris, 1973; Makris *et al.*, 1973), a 2-D density model was computed (fig. 1), for the area between Turkey and the Malta Shelf. The model exhibits large lateral density variations between the deep Ionian Basin and the adjacent continental areas. These variations are not only restricted to the crust but extend also in to the Upper Mantle. A "Lithothermal" plume of low velocity and density rises from the asthenosphere into the lithosphere transporting thermal energy and causing the present tectonic activity of the Hellenides. The upward movement of the hot plume has most probably been initiated by the subduction of oceanic crust below the Hellenides. The existance of deep sitted earthquake foci (Galanopoulos, 1974, personal communication), strongly supports this supposition, though their very unequal distribution indicates that active subduction might have ceased. The mass deficiency below the Aegean Region explains approximately 100 mgal of the gravity difference of nearly 450 mgal

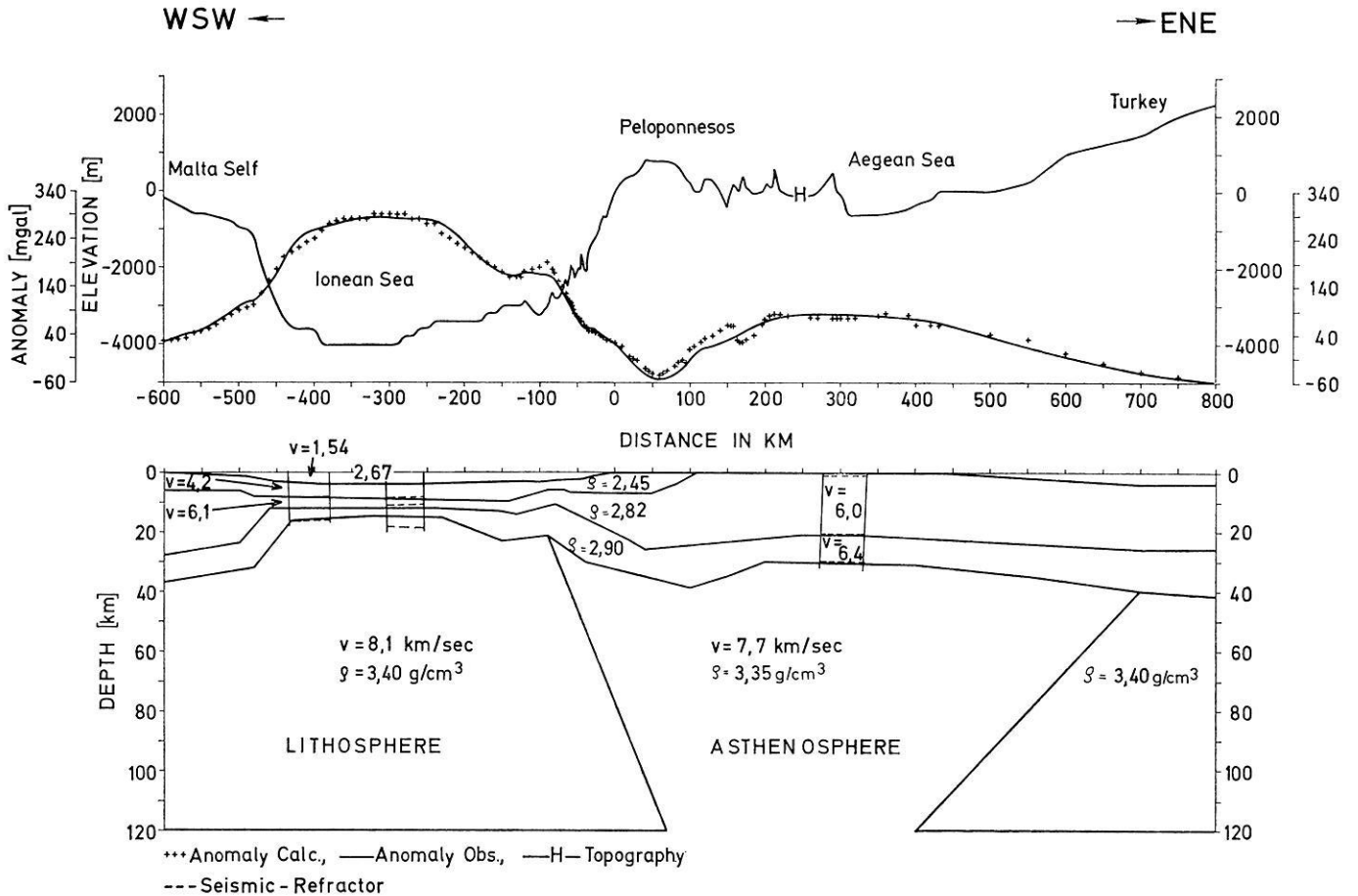

Fig. 1. 2-D crustal model between the Malta Shelf and Turkey. Seismic data in the Jonian Sea and Greece, see text. Gravity values give Bouguer anomalies

between the Hellenides and the deep Ionian Basin. The rest can be explained by the sediments and also the strong crustal attenuation of the Ionian Sea. The type of the crust in this region has not been explained satisfactorely. It seems to be of a transition type between continental and oceanic crust. More deep seismic soundings are required.

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