Casten, U. [(1)] & Snopek, K. [(1)] :

Gravity anomalies of the Hellenic subduction zone: data base and interpretation.

The Hellenic subduction zone is clearly expressed in the arc-shaped distribution of earthquake epicenters and gravity anomalies, which connect the Peloponnesos with Crete and Anatolia. In this region, oceanic crust of the African plate collides northward with continental crust of the Aegean microplate, which itself is pushed apart to the south-west by the Anatolian plate and, at the same time, is characterised by crustal extension. The result is an overall collision rate of up to 4 cm/a and a retreating subduction process. Recent passive and active seismic studies on and around Crete gave first, but not in all details consistent, structural results useful for constraining gravity modelling. This was undertaken with the aim of presenting the first 3D density structure of the entire subduction zone.

Gravity interpretation was based on a Bouguer map, newly compiled using data from land, marine and satellite sources. The anomalies range from +170 mGal (Cretan Sea) to -10 mGal (Mediterranean Ridge). The modeled Bouguer map fits the low frequency part of the observed one, which is controlled by variations in Moho depth (15 km below the Cretan Sea and extending 30 km below Crete) and the extremely thick sedimentary cover (partly up to 18 km) of the Mediterranean Ridge.

The southernmost edge of the Eurasian plate, with its more triangular-shaped backstop area, was traced south of Crete. Only 50 to 100 km further to the south, the edge of the African continent was traced as well. In between these boundaries there is African oceanic crust, which has a clear arc-shaped detachment line situated at the Eurasian continental edge. The subduction arc is open towards the north, its slab separates hotter mantle material (lower density) below the updoming Moho of the Cretan Sea from colder one (higher density) in the south. Subjacent to the continental crust of Crete is a mantle wedge followed by the subducting oceanic crust. The depth of the oceanic Moho below Crete is 50 km. Equivalent density structures demonstrate a remaining uncertainty concerning the structure and nature of the lower crust and the upper mantle below Crete.

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