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Gravimetric and seismic constraints on the petrology of the Aegean lithosphere in the forearc of the Hellenic subduction zone.

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In the Hellenic subduction zone the African lithospheric plate is subducting beneath the Eurasian one. The interface between the two plates is located at a depth of about 55 km below Crete. Crustal velocities down to the interface are found by receiver functions and surface wave studies underneath western Crete. A 35 km thick continental crust was indicated by the same studies underneath central Crete. Serpentinized mantle, basal accretion of sediments and return flow of metamorphic rocks in a subduction channel have been suggested to explain the properties of the lower Aegean lithosphere of the forearc.

Additional information about densities can help to constrain the petrology of the forearc. A new lithospheric density model of the Aegean region was constructed. By means of searching on a grid we explored the model space for the part of the model below Crete. We calculated the gravity effect of a structure divided into a lower crust and a mantle. The calculations were repeated for every combination of Moho depth and crustal density. The applied method allowed to define the range of possible densities of the lower crust and the Moho depth.

Based on the results of the grid search analysis we propose a model of the lower Aegean lithosphere beneath Crete which is consistent with both seismological and gravity observations. Below central Crete the model consists of a lower continental crust of a density $2.85\,g/cm^3$ and a mantle wedge of density $3.3\,g/cm^3$. Below western Crete the model consists only of a lower continental crust of an increased density $2.95\,g/cm^3$. The densities of the lower crust correlate very well with S velocities from the interpretation of surface waves: $3.5\,km/s$ for central Crete and $3.72\,km/s$

for western Crete.

The presented model shows that the parameters (velocities and densities) of the crust below Crete have values characteristic for metamorphic rocks of a lower crust. The density of the mantle wedge below central Crete is the same as the density of the mantle north of the island and is characteristic for a hot and slow continental mantle. Our interpretation does not support the hypotheses of a serpentinized mantle in the forearc or subducted sediments.