



Lithospheric architecture of the Levant Basin (Eastern Mediterranean region): A 2D modeling approach

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One of the major uncertainties regarding the Levant Basin, known to be the site of rifting in the Late Paleozoic and Early Mesozoic, concerns its deep crustal configuration despite numerous old and recent geophysical studies in this region. The aim of this study is to deduce the deep structure of the lithosphere underlying the easternmost Mediterranean region, in particular the Levant Basin and its margins, where the nature of the crust, continental versus oceanic, remains debated and has major implications on understanding the regional tectonic and thermal evolution, and on constraining potential petroleum systems. The algorithm used is a trial and error method that delivers the crustal thickness and the depth of the lithosphere-asthenosphere boundary (LAB) as well as the crustal density distribution by integrating surface heat flow data, free-air gravity anomaly, Geoid and topography data. Moho depth and crustal thickness were locally constrained by refraction data where available. The models representing two EW sections show a progressively attenuated crystalline crust in an EW direction (35 to 8 km). The SN section represents a 12 km thick crust to the south, thins to 9-7 km towards the Lebanese coast and reaches 20 km in the north. The crystalline crust is best interpreted as a strongly thinned continental crust under the Levant Basin, represented by two distinct components, an upper and a lower crust. Nevertheless, the Herodotus Basin shows a thin crust, likely oceanic, with a thickness between 6 and 10 kms. West of the Eratosthenes Seamount, a local crustal anomaly is interpreted to be the result of an underlying continental crust with a thickness of 13 kms. The Moho under the Arabian plate is 35-40 km deep and becomes shallower towards the Mediterranean coast. Within the Levant Basin, the Moho appears to be situated between 20 and 23 km, reaching 26 km in the Herodotus Basin. While depth to LAB is around 110 km under the Arabian and the Eurasian plates, it is about 150 km under the Levant Basin and plunges finally to 180 km under the Herodotus Basin.