



The origin and evolution of Jonah high in the Middle of the Levant Basin and its Significance to the History of Rifting

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Large gas fields such as Tamar, Dalit and Leviathan, were discovered during the last few years within the thick (>15 km) sedimentary section of the Levant basin (Eastern Mediterranean). These new discoveries attract the attention of the industry, the academy, and the general community to deeply buried structural highs striving to understand the origin of such structures, their relations to the tectonic history of the basin, and their evolution through time. Here we focus on the Jonah high, which is one of the largest structures in the basin and is particularly enigmatic in its geometry, dimensions and location compared to nearby structures. It is buried under more than 3 km of Late Tertiary sediments, and is associated with one of the largest magnetic anomalies in the basin, though no significant gravity anomaly is observed. Previous studies raised several possibilities explaining its origin: an ancient horst related to the early stage of basin formation (Late Paleozoic or early Mesozoic); a Syrian Arc fold (Late Cretaceous to Neogene); a giant volcanic seamount; and an intrusive magmatic body.

A reconstruction of the evolution of this structure is proposed here based on newly produced pre-stack depth migration of five selected seismic reflection lines crossing the Jonah high combined with a basin-wide interpretation of more than 500 2-D time-migrated lines. We suggest that the Jonah high is a horst bounded by grabens, most probably formed during continental breakup related to the Neo-Tethys formation. However, unlike other extensional structures that were reactivated and inverted during the Syrian Arc deformation, the Jonah high was never reactivated. Rather, it formed a prominent seamount that persisted for 120-140 million years until the Early Miocene, when it was finally buried. In a wider perspective the Jonah horst is similar to the Eratosthenes seamount, a fragment of continental crust between the Levant and Herodotus basins.