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# Obliquity of the Eastern Mediterranean Sea rifted margins: Reconciling structures and kinematic models.

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Orthogonal, oblique and transform rifted margins are defined by the comparison of the structural trend of the margin versus the orientation of the oceanic spreading ridge marked by marine magnetic anomalies. However, when neither transform fault nor marine magnetic anomalies can be identified in the oceanic domain, the determination of the obliquity of extension is delicate and deduced from the architecture of the rifted margins. This setting is illustrated by the Eastern Mediterranean Sea, which is a relic of an oceanic domain, now partly subducted northward underneath Anatolian, Aegean and Calabrian domains. Although the Southern and Eastern margins, from Malta to Lebanon, escaped compressional reactivation during Late Cretaceous and Cenozoic, their potential orthogonal, oblique or transform components have been the subject of extensive debates. Multiple geodynamic scenarios implying different ages and directions of oceanic opening have been proposed suggesting that either the southern or the eastern margins had a transform motion (or highly oblique).

In this contribution, we investigate the architecture of the different margin segments using 2D and 3D seismic data combined with available stratigraphic records and potential field maps. Based on these observations, we identified and mapped the different rift domains of the Eastern Mediterranean margins, adapting the terminology developed for hyper-extended rifted margins. The Eastern Mediterranean rifted margins are characterized by Mesozoic thick post-rift carbonate platforms developed over moderately thinned continental crust. Distal domains are dominated by thick sedimentary basins (>10 km) where the top basement is barely visible on reflection seismic data. Between the carbonate platform and the distal basin, the transition is always sharp (<30km in width) and marked by large normal faults. The resulting rift domain map highlights different structural trends, which are not coherent with a simple pair orthogonal-transform margins. Moreover, we reconstructed the extensional evolution of the former Northern and Western conjugate margins, which are now integrated in the Alps, Balkanides, Hellenides and Taurides by compiling boreholes and onshore geological data. These fossil margins recorded evidence for different tectonic extensional phases from Permian to Cretaceous.

Our preliminary conclusion suggests that poly-phased and poly-directional extension led to distinct breakup ages in the Herodotus and northern Levant Basins. It results in the superposition of extensional structures of different orientations and ages, which inhibit the clear determination

of orthogonal, oblique or transform margins. We tentatively explain this architectural complexity by the close position of the East Mediterranean Sea to the migrating rotation pole between Africa and Eurasia during the Mesozoic in relation with the Central Atlantic spreading to the West and the multiple subduction systems of the Neo-Tethys to the North.