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Subduction hints from the northeastern Mediterranean Sea

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The eastern Mediterranean is shaped by the interaction between the African, Arabian, and Eurasian plates resulting in a complex tectonic framework. The Hellenic subduction is well documented and studied but, the northeast corner of the eastern Mediterranean Sea remains enigmatic. It is a tectonically active region where different plate boundary conditions coexist (i.e., oceanic subduction, continental collision, extension, and strike-slip movements). An active and tsunamigenic system has been interpreted west and east of Cyprus by using deep seismic reflection lines. Vintage deep-penetrating seismic reflection profiles of the Mediterranean Sea project (MS project) - acquired during the '70 - were re-analyzed and merged with a synthesis of available subsurface data from the scientific literature. This study focuses on two transects (MS53 and MS56) that cross the major offshore structures (i.e., Florence Rise, Latakia Ridge, and Kyrenia Ridge) from north to south. The western transect (MS53) shows the Herodotus oceanic crust subducting northward beneath the Eurasian plate. The Florence Rise is the leading edge of the system, and the Antalya Basin is its forearc basin. Close to the Turkish coast, a buried block seems to act as a backstop for the offshore system, and north of it, some out-of-sequence thrusts have been interpreted. The strain is partitioned between the Florence Rise and the Taurides front. The eastern transect (MS56) crosses the Latakia Ridge, i.e., the northern boundary of the Levant Basin, where shortening is greater than in the western area. The seismic line continues northward into the Cyprus – Latakia Basin, crossing the Kyrenia Ridge, and reaching the Turkish coast. On the seismic section, we interpreted the Mesozoic subduction front now hindered by strike-slip movements on the Latakia Ridge. Another prominent transpressive structure is the Kyrenia Ridge, which is interpreted as an active structure with a well-imaged thrust system in front of it. The seismic sections were depth converted to provide a regional geologic model for the northeastern Mediterranean Sea. Active subduction fronts, which are only partially imaged, were structurally modeled and then crosschecked with previous studies to better constrain their geometry. In the northeastern Mediterranean Sea, a plate boundary is buried offshore with active subduction west of Cyprus and mainly transpressional tectonics to the east. A better understanding of its nature and kinematics would be useful to assess the tsunami hazard in this area.