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Synthesis of the evolution of the late Miocene evaporites in the Levant region (Eastern Mediterranean): new insights from 3D seismic data

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Recently acquired 3D seismic data, integrated with 2D seismic and well data, provide new insights into the evolution of the late Miocene (Messinian) evaporites in the Eastern Mediterranean. The study area is located in the Levant region, where a prominent wedge of evaporites (up to 2km-thick) is recorded. The interaction between deep structural highs (Syrian Arc system) and a system of Oligo-Miocene submarine canyons (Afiq, El Arish and Ashdod Canyons) deeply influenced the architecture of the evaporitic wedge in the region. Seismic analysis of the evaporitic system has evidenced a series of evolutionary steps that are critical to unravel the geological processes leading to the formation of this salt giant. These are:

- Erosional features and submarine clastic deposits discovered at the base of the late Miocene evaporites reveal that the Afiq, El Arish and Ashdod Canyons acted as sediment pathways at this time. Their activity is possibly linked to the basinwide sea-level drop that led to the deposition of the evaporites.

- The accommodation created by the canyons and the structural highs of the Syrian Arc was filled during evaporite deposition thus, controlling the overall thickness variations of the evaporites.

- The evaporitic wedge is internally composed of a cyclic alternation of stratified and transparent seismic facies. The evaporites correlate laterally with a prominent landward erosional surface, mostly subaerial in origin.

- Detailed seismic stratigraphic analysis of the evaporitic unit reveals that the top of the Messinian evaporites represents an erosional truncation surface. This documents

the occurrence of a regional erosional event at the end of evaporite deposition.

- Finally, the onlap and downlap reflection terminations of a Pliocene basin floor fan and clinoform bottomsets over the the top of the Messinian evaporites record the restoration of normal marine conditions after the Messinian Salinity Crisis.

Our research also reveals the architectural differences of the Messinian evaporitic unit compared to other areas in the Mediterranean Basin and to worldwide giant evaporitic systems. Thus, we ultimately aim to contribute to the knowledge of the erosional and depositional processes acting during evaporite deposition in an area that is crucially located for the interpretation of the processes acting within the Mediterranean-wide Messinian Salinity Crisis.