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Seismic indicators of focused fluid flow and cross-evaporitic seepage in the Eastern Mediterranean

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ABSTRACT

We present for the first time a synthesis of the evidence of focused fluid flow in the Eastern Mediterranean, providing an updated record that includes recent and past occurrences through the last ca. 6 My of evolution of the basin. We do this by adding the interpretation of a previously unpublished regional 2D seismic dataset to the existing occurrences of focused fluid flow reported in the literature. Our interpretation shows a high number (141) of focused fluid flow features, which span the stratigraphic interval from late Miocene to Recent. Of these features, (82) are at the seabed, and (59) are buried. The previous published record is more difficult to quantify, but in comparison shows an overwhelming majority of seabed features, with only rare examples of buried features.

The spectrum of the buried and seabed features covers pockmarks, pipes, mud volcanoes, clastic intrusions and collapse structures. Clustering of the fluid flow features is observed at different times in specific areas, including the Nile Cone, and the Levant, Herodotus, Cyprus and Latakia basins. With the buried record, we are able to highlight the evolution of the leakage points through time. Focused fluid flow venting has been occurring since the onset of the Messinian Salinity Crisis and the start of basinwide deposition of evaporites. We focus in particular on seismic indicators of leakage through evaporites, and of sub-evaporitic source for fluids and remobilized sediments. We also discuss the role of the evaporites as a seal to ascending fluids, and in which circumstances they can be breached.

Fluids (and associated remobilised sediments) are sourced from different intervals, from the sub- and supra-evaporitic section, and possibly within the evaporites. Only a minor

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