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Control of Quaternary sea-level changes on fluid flow and shallow gas reservoirs in the Levant margin

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Seepage activity at continental margins is a relatively widespread phenomenon, emphasized in particular by the increase in available high-resolution 3D subsurface datasets and technological advances in the last decade. Over forty domed-like buried features were identified on industrial 3D seismic data at the distal part of the continental shelf off central Israel. The pinnacle-shaped features mostly occur at depths of >120 msec and emerge from the buried Pleistocene Kurkar Formation. Interestingly, these features are aligned NE-SW, parallel to the 120 m water depth contour and concentrated on a specific area over an anticlinal structure formed by the top Messinian unconformity. Based on morphological comparison with similar structures identified elsewhere, we propose that these morphologies may represent paleo-seepage structures cemented by methane-derived authigenic carbonates. We argue that one of the main driving mechanisms responsible for their formation is the variation in hydrostatic pressure driven by relative sea level changes. Furthermore, we suggest a flowing mechanism of the gas, vertically and sub-horizontally, from sources beneath the top Messinian unconformity and into the continental shelf.