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Submarine salt flows in the central Red Sea

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The central Red Sea, an oceanic basin floored by Miocene evaporites reaching kilometres in thickness in places, is at an early stage of development, where seafloor spreading has geologically only recently replaced continental rifting. Surveying with a high-resolution multibeam echo-sounder around Thetis Deep, a new spreading centre, has revealed a remarkable series of structures resembling viscous gravity flows, which are here interpreted as originating from flowage of the evaporites laterally unloaded by axial rifting and other processes developing the relief of the deep. The flow margins are marked by stream-wise lineaments and some apparently rotated markers. Their fronts in the floor of the deep are rounded in plan view and profile. Their surfaces contain small closely spaced features resembling extensional faults. In one area below declining gradients, the surface contains along-slope ridges and valleys typical of compression folds (ogives). Flow-parallel lineaments and extensional faults lie, respectively, parallel and orthogonal to the direction of maximum seabed gradient. Movement is apparently heterogeneous, at least in part by varied blocking by relief of underlying basement observed protruding between flows. Flowage is currently transporting materials into the floor of the deep where it has the potential to become incorporated into the young oceanic crust by repeated eruption of axial lavas over them. In the light of these new data, we re-examine the possibility and implications of flowage in the South Atlantic marginal evaporites, in particular whether flowage contaminated early oceanic crust in such areas.