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The Shapes of Salt Extrusions

Measurements that show a single salt mountain extruding at >1m/y suggest that salt extrusion may have accelerated the recycling of many former salt sequences into the world´s oceans. Such extrusions are those where gravity +/- lateral forces drive salt out of a vent faster than it is degraded or buried to inactivity. The geometry of such extrusions is governed by the rate of salt extrusion (E) from the vent and its rate of gravity spreading (S). When E > S, salt fountains form with a dynamic bulge above their vent. In contrast, when E < or=S, a dynamic bulge does not form. Instead a pseudroplet forms with a profile close to parabolic.

Recent studies on nearly axisymmetric extrusions in Iran show that young domes soon reach steady heights and assume the profiles of viscous fountains with E>S, with dynamic bulges maintained by almost steady downslope gravity spreading of aprons or flows of allochthonous salt. These in turn mature to viscous droplets, E < S or E=0, that eventually degrade to breccia pipes beneath heaps of insoluble cap soils. Such welds after salt may still trap oil.

Analogue models of ductile extrusions neglecting degradation but varying the rates of extrusion and clastic sedimentation are producing a large range of other profiles. Sediments that onlap the salt can be turned back into collars and overridden by later extrusions. Gentle extrusions with the profiles of pseudodroplets can spread over and beyond collars and develop pseudofountains or stepped profiles.