Evolution of an Allochthonous Salt System, Southern Mars-Ursa Minibasin, Northern Gulf of Mexico

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ABSTRACT

Seismic data from TGS and well log data and biostratigraphic markers from Shell Offshore Inc. provide constraints on sediment accumulation, fault history, and salt movement in the southern Mars-Ursa minibasin, northern Gulf of Mexico, from late Miocene to middle Pliocene time. External geometries of tectonostratigraphic packages are identified and combined with analyses of brittle deformation to track salt evacuation in the study area. External geometries identified in the study area include: wedge, layer and trough. Fifty-nine faults are mapped in basin and suprasalt strata and four separate phases of brittle deformation are documented. Eight evolutionary stages are identified from late Miocene to middle Pliocene time. The southern Mars-Ursa minibasin has previously been classified as part of a counterregional salt system. This study shows that the minibasin has experienced phases of stepped counterregional development, quiescence and a phase of roho-style development. Thus, a single end-member salt system model does not accurately account for all phases of salt evacuation in the minibasin. These results indicate that salt has evacuated in multiple directions through time with a dominate phase of westward-directed salt evacuation. The salt system around the Mars-Ursa minibasin should be modeled in three dimensions. Suprasalt faults that extend to the sediment-ocean interface indicate that the area is presently undergoing tectonic activity as the Champlain Salt and Venus Salt undergoes reactive and active diapirism, respectively.