

Lateral Salt Emplacement at the Christmas Tree Diapir, Pinda Springs, South Australia

Hearon IV, Thomas E.¹; Rowan, Mark G.²; Kernan, Rachelle A.³; Trudgill, Bruce¹ (1) Dept of Geology and Geological Engineering, Colorado School of Mines, Golden, CO. (2) Rowan Consulting, Inc, Boulder, CO. (3) Dept of Geological Sciences, New Mexico State University, Las Cruces, NM.

Neoproterozoic salt bodies (~900 Ma) and associated deformed stratigraphy in sub- and suprasalt minibasins are exposed in cross section at Pinda Springs in the northern Flinders Ranges, South Australia. The Callanna Group is the source for diapiric salt at Pinda Springs and comprises an assemblage of highly brecciated rocks originally interbedded with evaporites that are now absent. Passive diapirism began during the Late Neoproterozoic and continued through the Early Cambrian. An elongate body of Callanna Group breccia extends 6 km away from the Pinda diapir into the flanking Bunyeroo Formation. An overturned fold in the Bunyeroo Formation at the interface between the Pinda diapir and the elongate salt body is the only sub-salt deformation observed. Subsalt truncations and overlapping suprasalt strata are present in the Bunyeroo and Wonoka Formations. Halokinetic folding is also present in the suprasalt Bunyeroo and Wonoka Formations along the flank of the Pinda diapir and locally along the trace of the salt body.

On the basis of new mapping (1:10000) on high resolution satellite imagery, we present several hypotheses for the emplacement of this elongate salt body: (1) salt cusp; (2) debris flow (3) salt wing; and (4) allochthonous salt tongue. A salt cusp forms at the tip of salt by slip at the halokinetic sequence unconformity, which is clearly not present at the tip of the elongate salt body. Callanna Group rocks present in the elongate salt body contain abundant salt hoppers and randomly oriented blocks within a blue-green, carbonate-rich matrix, supporting an interpretation of residual salt rather than a debris flow deposit. Scale is the principal difference between a salt wing and an allochthonous salt tongue. A salt wing is a localized extrusion of allochthonous salt, whereas a salt tongue is much larger and can extend for tens of kilometers from the source. Both features can have associated subsalt truncations and overlapping suprasalt strata and folding at the ramp to flat transition with an absence of deformation beneath the flat.

Field analogs of similar salt geometries exist elsewhere within the Flinders and Willouran Ranges. The elongate salt body at Pinda Springs is likely allochthonous salt, but because of the 2-dimensional exposure, the true extent away from the diapir is unknown. Our field data suggest lateral salt emplacement into the adjacent minibasin but with minimal or no subsalt deformation such as shearing or imbricate thrusting.