

OUTCROP ANALYSIS OF AN ALLOCHTHONOUS SALT CANOPY AND SALT SYSTEM,
EASTERN WILLOURAN RANGES, SOUTH

ABSTRACT

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Stratigraphic geometries and sedimentary facies in Neoproterozoic strata subjacent to a former allochthonous salt canopy in the Willouran Ranges, South Australia are used to test models of allochthonous salt emplacement. Folding during the Cambrian Delamerian orogeny resulted in cross-sectional exposure of salt structures in map view and provides a rare opportunity to examine subsalt stratal relations. The Neoproterozoic Callanna Group evaporite became diapiric immediately after its deposition, forming accommodation space for a minibasin. At the top of the basin, strata that record allochthonous salt movement contain growth folds overlain by large clasts of Callanna Group that record the former presence of a salt sheet. The growth folds were formed at the base of an advancing salt sheet and are in turn overlain by remnant Callanna Group clasts or equivalent welds, which are overlain in turn by supra-salt minibasins. Detailed field mapping of the remnant salt canopy salt and contact zone with adjacent strata indicates that in addition to folds, the base of the remnant salt canopy consists of a thrust fault, which splays into adjacent sub-canopy strata. In the Willouran Ranges the allochthonous Callanna Group advanced by basal faulting during the development of growth folds in front of the advancing Callanna Group sheet. Synthetic dipmeter logs based on structural measurements and geologic mapping of the sub-remnant canopy stratigraphy compare favorably with dipmeter data from sub-salt strata in similar systems in the northern Gulf of Mexico. Fieldwork in the Willouran Ranges supports an interpretation of subsalt “gumbo zones” or “rubble zones” as halokinetic folding and faulting along the salt base, rather than pervasive post-depositional shearing of strata beneath allochthonous salt.