

ABSTRACT

EVALUATION OF THE ALLOCHTHONOUS MODEL AND PROPOSAL OF AN
ALTERNATIVE GAS SEEP MODEL FOR THE FORMATION OF
MISSISSIPPIAN WAULSORTIAN MUD MOUNDS IN THE
SACRAMENTO MOUNTAINS, SOUTH-CENTRAL
NEW MEXICO.

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Syn-depositional deformation and facies distribution, controlled by differential compaction and methanogenic seepage and mud volcanism, are suggested here to be integral components in the buildup of Mississippian “Waulsortian mud mounds” in the Sacramento Mountains, NM. Recent detailed mapping of structural and stratigraphic characteristics of the entire Mississippian section has shown that such deformation is restricted to mound systems, where it is pervasive. Detailed mapping of mound facies show cores as chaotically bedded accumulations of

brecciated mudstone to grainstone, with early- cemented, little-compacted coarse-grained facies being most abundant. Angular unconformities and soft-sediment deformation such as slump folds and scars are commonly present. Microbial carbonate mud-filled injection dikes cut across these core facies. Stratal geometries of mound flank facies indicate syn-depositional topographic growth, displaying both thinning and onlapping of highly-compacted, late-cemented and coarse-grained beds as they approach the mound core, as well as stratal truncation and rotation patterns.

The documented style of deformation and facies architecture are inconsistent with the two end-member models (biohermal and allochthonous) previously proposed for the formation of these mounds. In the biohermal model, mound relief is generated by *in situ* biotic buildup and there is no associated syn-depositional deformation. In the allochthonous model mound relief is generated by sedimentologic and structural buildup by mass wasting processes and predicts the presence of a particular suite of deformational features. Such implied features have not been documented in the study area. It is concluded from the analysis that the mounds were built by a combination of biotic buildup and in-situ deformation possibly related to over-pressured mud/fluids and/or gases moving upward from beneath the mounds as seeps.