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Transport of Allochthonous Carbonate Sediment and Its Influence on Mud Mound Growth Histories, Mississippian Lake Valley Formation, New Mexico: Autocyclic Influences Driven by Relative Sea-Level Change

Carbonate mud mounds in the Mississippian Lake Valley Formation, New Mexico, grew during a complete third-order accommodation cycle (Alamogordo-Nunn-Tierra Blanca interval; ~3-6 Myr duration). Nearly all of the mounds were established during the transgressive phase of the cycle when outer parts of the ramp were relatively sediment starved. During the regressive phase of the accommodation cycle, however, coarse-grained carbonate gravity-flows constructed broad (km-scale), low-relief (tens of meters thick) sand lobes that interacted in complex ways with the mounds that were previously constructed along the ramp. Updip mounds are comparatively small and lenticular in cross section, and were buried and erosionally modified by the high-density carbonate gravity-flows. Farther downdip along the ramp profile, mound size increases and their internal stratal patterns show how the complex dispersal and accumulation patterns of the gravity-flow deposits influenced mound growth. For example, the upcurrent sides of some mounds were buried by onlapping gravity-flow deposits, while downcurrent sides accreted for greater distances, resulting in different stratal geometries on opposing sides of the same mound. In other cases, accumulation of sediment gravity-flow deposits actually helped mound cores to accrete laterally by providing suitable substrates. The largest mounds are located farthest downdip and have steep flanks with abrupt lateral facies transitions. The most downdip mounds were not greatly affected by the prograding sand bodies because of their distal location. Thus, although regional stratigraphic relationships were driven by relative sea-level change, the growth histories and stratal geometries of individual mounds are strongly related to ''autocyclic'' factors such as the dispersal patterns of the allochthonous sand, mound location along the ramp profile, the erosive power of gravity flows, and the relative accumulation rates between the mounds and skeletal-sand facies.