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Evidence for the Influence of the Sweetgrass Arch on Sedimentation of the Late Cretaceous Eagle Formation, Northern Montana, Based on a High-Resolution Allostratigraphic Framework

The Upper Cretaceous Eagle Formation in Montana is the first of a series of Late Cretaceous clastic wedges prograding into the Western Interior Seaway from the rising fold and thrust belt to the west. A high-resolution allostratigraphic framework reveals the Eagle progradation consists of three seaward-stepping Virgelle allomembers comprising dominantly storm-dominated shoreface sandstone. Following the Virgelle progradation is the deposition of deltaic sediments during three successively seaward-stepping Upper Eagle allomembers. The progradation of the Eagle Formation was terminated by the incursion of the Claggett sea at 81.0 Ma. The three Virgelle allomembers contain relatively simple, elongate shoreface sandbodies reminiscent of a shoreline dominated by strong storms. The Upper Eagle allomembers, however, show a complex sandstone isopach pattern, reflecting the progradation of a deltaic system.

Projection of isopach maps and coastline trends onto structural contours of the Sweetgrass Arch reveals active tectonic movement of the underlying arch during sedimentation. The Virgelle isopachs cut across the Kevin Sunburst Dome element of the Sweetgrass Arch while the Upper Eagle isopachs curve around the dome and parallel its structural contours. This suggests the Kevin Sunburst Dome was a positive structure during Upper Eagle time and a non-existent structure during Virgelle time. Additionally, the change from a storm-dominated to deltaic shoreline is coincident with the Uplift, where the Upper Eagle delta develops to the south of the structure. Documentation of sedimentation patterns around the Kevin Sunburst Dome shows the active tectonic nature of the basement underlying the Western Interior Basin.