

## **Hydrodynamic Interpretation of High Energy Wave-dominated Shoreface Successions, Cretaceous Mount Garfield/Illes Fm, Colorado**

Jesse Thompson and Diane Kamola  
Geology, University of Kansas, Lawrence, KS.

Modern and ancient shoreline successions have been well documented, however, the hydrodynamics of these successions need further study. Comparison of modern studies of the hydrodynamics of shorefaces lead to a better understanding of depositional conditions, such as differences in the day-to-day wave and tide climate, size and frequency of storms, and grain-size effects on the type and scale of bedforms preserved along the shoreface. These data, along with information on progradation rates can help predict the width of facies tracts. Most studies of ancient shoreface successions are lacking in details of their hydrodynamic conditions. Detailed hydrodynamic interpretations provide insight on wave fetch, shoreline geometry and storm frequency during the time of deposition, as well as possibly the scale or geometry of the marine water bodies (eg Cretaceous Western Interior Seaway - KWIS) which existed at the time of deposition.

The Rollins Sandstone Mbr (Campanian) is the youngest Mbr of the Mount Garfield Formation. This, and its time equivalent marine units represent the last pulse of fully marine sedimentation into the Colorado segment of KWIS. The youngest parasequence within the Rollins Sandstone Mbr contains a well developed progradational marine shoreface succession. This marine shoreface succession is relatively thick (25-40 meters thick) and contains some variability from the "normal" wave-dominated shoreface facies successions of younger strata. A well developed middle shoreface interval within this parasequence indicates this shoreline was a barred shoreface, and that this bar was a constant (not an ephemeral) feature of the shoreline. Bar related deposits contain a high concentration of large-scale, thick-walled Ophiomorpha, indicating a high-energy setting. The scale of cross-stratification within the upper shoreface (individual beds up to 25 cm in thickness), and thickness of upper shoreface facies indicate day-to-day wave heights of 1-2 (plus) meters at the time of deposition, indicating a very high energy coastline. The high energy of this coastline raises questions about the depth and geometry of this Late Cretaceous Seaway. This study suggests shorelines were straighter and water depths more moderate than previous estimates.