Decoupling of the Sevier Foreland Basin from the Cretaceous Western Interior Seaway During Lowstand Events

Kamola, Diane L.[1]; Hoffmeister, Kathryn E.[1] (1) University of Kansas, Lawrence, KS.

The Cretaceous Western Interior Seaway (KWIS) and Sevier Foreland Basin (FLB) (situated on the western edge of the seaway) were major physiographic features in North America during Cretaceous time. Because the two are coupled, sedimentation along the western margin of the seaway is influenced by both features, making the eastern boundary of the FLB occasionally indistinguishable from the main portion of the KWIS. This is especially significant during highstand events when shorelines were wave dominated and prograded to the east/southeast. The wide extent of the sea resulted in large fetch length creating large, strong waves, as evidenced in the thick hummocky cross stratification that occurs commonly in highstand shoreface deposits.

During lowstand events, the geometry of the FLB may have been the dominant influence on sediment distribution along the western margin of the KWIS. In extreme lowstand events, the FLB and the KWIS may have been decoupled. Sediment dispersal and drainage patterns of lowstand deposits along the western margin of the KWIS show a north-south trend, indicating a shift in transport direction from west-to-east, to transport parallel to the axis of the FLB. Incised valley fill strata within the Castlegate, Sussex, and Shannon Sandstones may record such events, and have southward trending paleocurrent indicators. Paleocurrent indicators in some Mancos B deposits, thought to be lowstand deposits, also record south-directed flow. A decoupling of the FLB from the KWIS would have resulted in a much restricted fetch length (i.e. lower wave energy) and deposition of shoreline sands lacking the strong wave influence present in the highstand deposits. The lack of wave energy allowed river-dominated deltas to form (e.g., Ferron Sandstone, Panther Tongue); deltas show south-directed flow, suggesting the transport direction shifted to basin-axis parallel (i.e., N-S), rather than a west to east transport direction that dominated when the FLB and KWIS were coupled. Deposition of river-dominated deltas is difficult to explain without reduction in fetch length associated with decoupling of the FLB from the KWIS. South-directed (axis-parallel) transport direction during lowstands may also help explain the lack of lowstand deposits east (offshore) of the highstand shorelines. Although many highstand shorelines are punctuated with sequence boundaries, the time-equivalent lowstands have not yet been identified basinward (to the east).