



Dynamic versus flexural controls of Late Cretaceous Western Interior Basin, USA

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The United States Cretaceous Western Interior Basin has long been considered a foreland basin, driven by the Sevier thrust and associated basin sediment loads. However, flexural studies demonstrate that this effect exists only within a narrow band in front of the thrust belt. Most of the basin appears to be due to mantle flow-induced dynamic subsidence associated with Farallon plate subduction. Here we show how the components of evolving long-wavelength dynamic subsidence and flexural subsidence created the accommodation space and controlled the stratigraphy across the western United States, based on a correlated stratigraphic section across central Utah and Colorado. These backstripped subsidence data reveal the dynamic-topography driven nature of the Western Interior Basin. The results seem to support the hypothesis that the depocenters track the trough of dynamic subsidence with ca. 18 Myr cycles through time and space and the stratigraphic patterns of large-scale progradation, eastward migration of depocenter, and regional clinofold-like downlap are related with the dynamic subsidence. Interpretation of these data also provides more insights into the repeated, ca. 2 to 6 Myr cycles of thrust-induced subsidence in front of the thrust belt, which control the local eastward progradation of the sand bodies from the thrust belt. The dynamic, flexural subsidence and eustatic sea level changes interacted and controlled the timing and distribution of unconformities. Our work shows how the stratigraphy precisely records the timing, patterns and position of dynamic versus flexural subsidences, and that combination of such data leads to important geophysical discoveries and supplies strict constraints for geodynamic modeling.