

# **Expected, and unexpected subsidence patterns across a foreland basin: Cenomanian-Turonian Kaskapau Formation, NW Alberta and NE British Columbia**

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## **ABSTRACT**

The lower part of the Kaskapau Fm. between the K1 unconformity and a regional bentonite marker that approximates the base of the Second White Speckled Shale (SWSS), shows overall a strongly wedge-shaped geometry thinning from 170 to 40 m from W to E over 250 km. This geometry is predicted by flexural models. Nine allomembers, defined by flooding surfaces, are recognized in this interval. In the west, allomembers 1-8 show overall upward-shallowing and are capped by a thin chert conglomerate which mantles a subtle, down-to-the east erosion surface. Allomember 9 also thins eastwards, pinching out against the base of the SWSS. Isopach maps for most allomembers show eastward thinning, some of which is due to down-to-the-east erosion. Allomember 5 however, thickens towards the NE and pinches out to the SW. In the west (Foothills), marine nearshore sandstones are highly aggradational and prograded only about 50 km eastward. In the east (Rge. 1W6), three sandstone units are recognized, all of which thin westward.

The facies distributions and isopach patterns indicate generally high accommodation rate and trapping of sandy sediment near the western basin margin. However, a thin conglomerate-veneered erosion surface indicates a period of subtle uplift. In the east, most sandstones suggest derivation from a rising forebulge, however, one sandstone thickens over the forebulge, suggesting short-lived subsidence of this region. Our observations show that on a  $10^6$  yr timescale, the accommodation pattern reflects model predictions for a foreland basin. However, on short (approx  $10^5$  yr) timescales, subsidence patterns could abruptly reverse.