Late Albian Blackleaf and Thermopolis-Muddy Sequence in Southwestern Montana and Correlation with Time-Equivalent Strata in West-Central Montana

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ABSTRACT

Late Albian strata in the southwestern Montana part of the Cretaceous Western Interior Basin contain stratigraphic intervals and surfaces that are interpreted in a sequence stratigraphic framework. Eight measured sections, from the Lima Peaks-Tendoy Mountains area in the west to the southern Bridger Range in the east, record a west-to-eaast transition from predominantly nonmarine facies to predominantly marine facies associated with the Skull Creek sea. At the westernmost measured sections, in the Lima Peaks area, Tendoy Mountains, and the eastern Pioneer Mountains, the start of the "Skull Creek transgression" is marked by the onlap of coastal deposits over alluvial plain deposits. The onlap is marked by an abrupt change from nodular reddish-brown mudstones of the lower and middle units of the Flood Member of the Blackleaf Formation to overlying dark-gray, burrowed, estuarine mudstones of the upper unit of the Flood Member. Upper Flood Member coastal-onlap deposits are truncated by a lowstand surface of erosion (LSE) recording the late Albian global sea-level drop. At the easternmost measured section at Rocky Creek in the Bridger Range, coastal-onlap deposits of the lower sandstone member of the Thermopolis Shale are scoured by a transgressive surface of erosion (TSE) and overlain by marine beds of the shale member, a Skull Creek equivalent. Highstand progradational strata at the top of the Thermopolis, represented by the Muddy Sandstone, are scoured by the late Albian LSE recorded to the west.

Regional stratigraphic correlations are supported by invertebrate fauna and geochronometry. These dating methods indicate that the Flood Member in southwestern Montana includes strata that are time-equivalent to the combined Flood and Taft Hill Members in west-central Montana. Based on 40Ar/39Ar laser fusion geochronometry of lithic-equivalent strata in northwest Wyoming and central Montana, the Thermopolis Shale-Muddy Sandstone interval ranges in age from about 105 to 100 Ma.

The Muddy Sandstone near Rocky Creek contains invertebrate fauna characteristic of the Taft Hill Member of the Blackleaf Formation in west-central Montana near Great Falls. The uppermost part of the underlying Flood Member of the Blackleaf at Great Falls contains the late Albian guide fossil *Inoceramus comancheanus,* which occurs near the top of the shale member of the Thermopolis Shale in the Gravelly Range in our area of study. Furthermore, *I. bellvuensis,* the time-equivalent of *I. commancheanus* occurs throughout the shale unit of the Thermopolis in the Madison Range.