

High-Resolution Sequence Stratigraphy and Facies Architecture of Prograding Mississippian Carbonates, Southwestern Montana

By

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Recent work on the Mississippian Madison Group has focused on the sequence stratigraphy, facies architecture, and reservoir properties of the platform interior in Wyoming and south-central Montana. The purpose of this study is two-fold:

- 1) to extend the established high-resolution sequence stratigraphy across the Mississippian shelf margin of the Antler Foreland Basin to the west and to map the distribution of potential reservoir facies within this framework.
- 2) to provide a comprehensive description of prograding Mississippian carbonates that can serve as an analog for coeval subsurface strata in the Caspian Sea and elsewhere.

The Madison Group developed on a westward-thickening peri-cratonic ramp, approximately 1600 km long and 400 km wide. The ramp was bound to the west by the Antler Foreland basin and the North American craton to the east. Regional cross-sections of the Mississippian ramp show overall retrogradation, construction of a shelf margin with hundreds of meters of relief during the initial deepening of the foreland basin in the Early Mississippian. At that time, the basin was sediment starved and an organic-rich phosphatic limestone was deposited. In the Middle and Late Mississippian, the trend reversed and prograding carbonates from the east and siliciclastics from the west filled the foreland basin.

This study will focus on outcrops of the carbonate shelf margin in southwestern Montana. We will use detailed measured sections to develop a high-resolution sequence stratigraphic framework that can be tied to the regional sequence stratigraphic framework of the Madison ramp. The ramp-to-basin sequence stratigraphy will lend insight into the ramp's response to an actively evolving foreland basin, ramp-basin interaction and processes that control regional reservoir distribution.