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Synchronous Modification of Upper Ordovician Facies Gradients Along Two Shelf-to-Basin Ramps: Influences of Taconic Tectonism on Eustatic Cycles

Five Upper Ordovician Black River (Turinian) and Trenton Group (Chatfieldian) depositional sequences were compared along two ramp-to-basin transects in eastern Laurentia. These oppositely-oriented transects are located in widely separated regions: a NW-SE cross-section of the carbonate bank to Taconic foredeep in central New York State, and a S-N cross-section from the Lexington Platform into the Sebree intracratonic trough in Kentucky and Ohio. Correlation of major K-bentonite beds (e.g. the Deicke, Millbrig), and distinctive marker horizons provides a high-resolution stratigraphic framework.

Initial comparisons suggest very similar patterns in facies development, sequence stratigraphic architectures, and timing of basin subsidence in both areas. Depositional sequences and small-scale cycles in both the upper Black River and Trenton Groups are widely correlatable. Given systems tracts and parasequences show similar synchronous water depth histories regardless of transect location. This indicates that eustasy provided a major control on cyclic patterns throughout this time. However, Turinian-Rocklandian (=early Chatfieldian) cycles show gradual lateral changes in thickness of peritidal to shallow shelf carbonate facies along both transects. Conversely, those of the mid to late Chatfieldian record abrupt lateral changes from shallow, peritidal carbonates into deeper water shelf-to-ramp nodular carbonates and shales. These contrasts demonstrate rather dramatic differences in seafloor topography before and after the onset of late Taconic tectonism. Perhaps the most striking similarity between the two transects is the apparent simultaneous collapse of the Sebree Trough, and the Taconic Foreland Basin. Similarities in the evolution of foreland and intracratonic basins thus reflect both eustatic fluctuations and pervasive tectonic effects.