The St. George Unconformity, Ordovician, northern Appalachians: effects of lithosphere dynamics on the Sauk-Tippecanoe sequence boundary

I. Knight
Geological Survey, Department of Mines, Government of Newfoundland and Labrador
St. John's, Newfoundland A1C 5T7, Canada
T. Lane
Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X5, Canada
and
N.P. James
Department of Geological Sciences, Queen's University, Kingston, Ontario K7L 3N6, Canada

The Middle Ordovician St. George Unconformity in western Newfoundland is the Sauk/Tippecanoe sequence boundary and reflects the change from a passive to convergent, low latitude, continental margin during initial stages of the Taconic Orogeny. It is a karst unconformity to disconformity to paraconformity resulting from faulting and subsequent subaerial erosion.

Regional mapping and drillholes indicate that erosion was proceeded by gentle uplift accompanied by block faulting and folding of the shallow water platform carbonates. Erosion locally removed up to at least 50 m of stratigraphy. The time of exposure was short by North American standards lasting roughly 1 to 3 m, during the early part of the Whiterock Stage (*Orthidiella* Zone). Surface karst is reflected by surface solution sculpture, rubble breccias rich in chert clasts, solution-enlarged joints and faults, near-surface porosity and sets of reticulate, sediment-filled fissures.

Stratabound dolomitization followed by development of subsurface karst occurred while pre-unconformity peritidal sediments were still accumulating and gentle flexuring of the platform was occurring. Mixing zone diagenesis and solution caused by fluids migrating into the area and tectonic sagging resulting in the formation of broad, subsidence dolines that were infilled by contemporaneous sediments. Subsurface karst resulted in shallow tabular caves and stratiform to discordant rock matrix breccias. Stoping upwards of the breccias eventually created collapse dolines at the unconformity. Post-unconformity sediments are lags of chert-pebble conglomerate, non-marine to marine doline fills and widespread peritidal dolostones which onlapped and finally buried the karst paleotopography.

Detailed biostratigraphy and lithostratigraphy yields a remarkably detailed geohistory for the development of the unconformity. Conclusions from this analysis indicate that many aspects of the St. George Unconformity in particular and the Sauk/Tippecanoe sequence boundary in general can be explained just as easily by plate dynamics as by global eustasy. The alternative model also offers an explanation for pre-unconformity sedimentation.