

Late Ordovician Epeiric Sea Circulation of Laurentia

By

Achim D. Herrmann

The Pennsylvania State University, Department of Geosciences, University Park,
PA, U.S.A. (adh152@yahoo.com)

Although Laurentia was situated in tropical to subtropical latitudes during the Late Ordovician, lithological evidence indicates that part of this time period was characterized by deposition under cool-water conditions: Turinian deposition was dominated by warm-water carbonates, while the Early Chatfieldian marks a shift to cool-water carbonates and an increase in siliciclastic influx and phosphatic sediments.

The purpose of my Ph.D. research project is to use a coupled numerical atmosphere-ocean circulation model to test the hypothesis that observed rapid shifts in environmental conditions during the Late Ordovician of Laurentia were caused by changes in bathymetry, paleogeography, precipitation and ocean circulation associated with Taconic orogenesis. Numerical models have the advantage over conceptual models in that certain variables can be held constant while the relative importance of other variables is explored. I will produce detailed paleogeographic and paleobathymetric maps necessary for the circulation study based on detailed field description of key outcrops and supplemented by a compilation of the stratigraphic literature.

I will conduct fieldwork to correlate and investigate Late Turinian rocks in eastern United States and Southern Canada. Since the facies interpretations will be used for a depositional facies model in order to create paleobathymetric maps for the ocean model, they must be very consistent over wide regions. Fieldwork will consist of measuring key sections in detail, describing the main lithofacies and macrofossils, and interpreting the depositional environments. Abundant Late Ordovician K-bentonites will facilitate high-resolution correlation of the different sections.