

# Using the Leithsville Formation to Infer Laurentia's Early Cambrian Paleoclimate and Latitude

Nathan R. Gostey<sup>1</sup>, Philip C. LaPorta<sup>2</sup>, Margaret B. LaPorta<sup>2</sup>

<sup>1</sup>Youngstown State University, <sup>2</sup>Lamont Doherty Earth Observatory of Columbia University

The paleogeographic position of Laurentia during the Neoproterozoic to Middle Cambrian remains debated, with some reconstructions suggesting a subpolar setting and others placing it in tropical latitudes (Kiessling et al., 2003; McCausland & Hodych, 1998; Hodych et al., 2004) . The Cambrian-aged Leithsville Formation, its subdivisions (Califon, Hamburg, and Wallkill members), and the underlying Hardyston Formation, all offer insight into this period of tectonic transition. This study uses detailed stratigraphic, sedimentologic, and future paleomagnetic analysis to evaluate Laurentia's Early Cambrian latitudinal position and the depositional history of these formations. Fieldwork included creation of detailed stratigraphic sections, documentation of lithologic and structural features, collecting samples for petrographic analysis and testing the paleomagnetic viability of the formation. Preliminary results from the Leithsville Formation reveal diverse sedimentary features—including oncoids, pisoids, stromatolites, thrombolites, *Skolithos*, graptolites, ripple marks, cut-and-fill channels, and more—alongside diagenetic features such as chert-replacement, dolomitization, and stylolites. The presence of *Archaeocyathus* in both the Califon and Hamburg members supports a Lower Cambrian age. Environmental interpretation suggests a range of depositional settings: the Califon Member represents a shallow, open carbonate platform with thrombolites and rubble zones; the Hamburg Member reflects episodic transgressions and regressions, with arid sabkha and tidal-flat conditions; and the Wallkill Member records high-energy tidal to peritidal conditions marked by pisoidal shoals and stromatolitic mats. These features collectively suggest that Laurentia was located in a low-latitude, arid, tropical to subtropical environment during the Early to Middle Cambrian. Ongoing analysis of slabs, thin sections, and paleomagnetic data will help further constrain the continent's paleolatitude during this critical interval in Earth's history, allowing for an overall better understanding of Earth's climate in deep time.