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High frequency sequence stratigraphy of Pennsylvanian– Lower Permian carbonate successions of the Robledo Mountains, New Mexico, and the Carnic Alps, Austria: A record of the acme and demise of the late Paleozoic ice age

Daniel Calvo Gonzalez
University of Calgary

Benoit Beauchamp
University of Calgary

Charles M. Henderson
University of Calgary

The Early Permian witnessed the end of the largest glaciation event of the Phanerozoic: the late Paleozoic ice age (LPIA) (Eyles, 1993; Fielding et al., 2008; Lopez-Gamundi and Buatois, 2010). The LPIA was a dynamic, multi-phase glacial epoch that started at the end of the Famennian and ended at the Asselian-Sakmarian boundary (Isbell et al., 2003, 2012; Fielding et al., 2008; Gulbranson et al., 2010; Limarino et al., 2014; Vesely et al., 2015; Fallgatter and Paim, 2017; Beauchamp et al., 2021). Near- and far-field sedimentological, geochemical, and biostratigraphic evidence have allowed us to reconstruct the glacial epoch and to determine the age of the onset of its various phases. However, the age of the demise of its main phase has remained a source of debate until recently.

A key element to the termination of the LPIA is the collapse of Gondwanan ice sheets and the subsequent end of high frequency and high amplitude sea level fluctuations. These fluctuations were the result of periodic shifts in the Earth's eccentricity cycle as described by Milutin Milankovitch, compounded by the effect of the waxing and waning of ice sheets during glaciation. These sea level fluctuations are widely interpreted to be the cause of the cyclothems that imprint Pennsylvanian to Lower Permian successions globally. The transition in the geological record from cyclic to non-cyclic deposits is generally agreed to represent the end of the main phase of the LPIA. Although this transition has been identified in sections worldwide, no agreement regarding its age has been reached until the work by Beauchamp et al. (2021), where the end of cyclicity recorded in the carbonate-dominated succession of the Sverdrup Basin, Arctic Canada, was assessed combining foraminifer and conodont biostratigraphy (293.52 Ma).

This project aims to provide further stratigraphic and biostratigraphic support to the stepped demise of cyclicity during the Asselian by revisiting the sequence stratigraphic framework and age diagnostic microfauna of two benchmark Lower Permian successions located at either side of Pangea: the Robledo Mountains of New Mexico and the Carnic Alps of Austria.