Platform Evolution, Facies Patterns, and Cyclicity Across the Late Devonian Frasnian/Famennian Boundary – Barnett Spring Platform, Canning Basin, Western Australia

Frost, Ned[1], Phillip Playford[2], Charles Kerans[1] (1) The University of Texas at Austin, Austin, TX (2) Geological Survey of Western Australia, East Perth, Western Austrlia, Australia

Significant changes in platform architecture and cyclicity are observed in the Canning Basin across the Frasnian/Famennian (F/F) extinction boundary. These variations have largely been attributed to the F/F faunal turnover. However, based on mapping, lidar, and measured section data from Barnett Spring, the argument can be made that long-term decreases in accommodation space also played a major role in shaping Famennian platform architecture. Barnett Spring's continuous outcrop exposures provide an excellent opportunity to document the relative importance of accommodation

vs. biotic change in platform evolution.

The Barnett Spring platform developed as a progradational, slender (3.5 x 1km) promontory with a steep escarpment margin. This morphology was controlled by antecedent topography created by a late Frasnian–early Famennian ridge-like stromatolite-sponge bioherm complex, along which Famennian shallow-water carbonates were able to nucleate and prograde.

The Famennian platform interior is characterized as accommodation limited, consisting of a complex mosaic of high-energy grainstone shoals, tepee-pisolite complexes, and fenestral laminites. Tepee complexes up to 13.5m thick, and stacked ooid grainstones replace the mud-dominated facies of the Frasnian platform interior, with a similar shift to grain-dominated facies reflected in the Famennian slope. Average high-frequency cycle thickness decreases from 3.50 m in the Frasnian to 1.25 m in the Famennian with supratidal-capped cycles (e.g. fenestral laminites, tepees, beachrock).

While it is clear that a fundamental change in faunal composition of Canning Basin's carbonate platforms occurred across the F/F boundary, the accommodation-driven shift to high-energy shoal-water systems is equally significant and appears to have a corresponding global signature.