Tectonically-linked Unconformities and Maximum Flooding Surfaces in the Sverdrup Basin, Canadian Arctic

Benoit Beauchamp
Geological Survey of Canada, Calgary
bbeaucha@NRCan.gc.ca

When viewed as a whole, the Carboniferous and Permian succession of the Sverdrup Basin displays nine major sequence-bounding unconformities (SB) and nine major maximum flooding surfaces (MFS). These surfaces are associated with major shifts in facies belts and form the bounding surfaces of transgressive (TST) and regressive (RST) systems tracts. Some of these surfaces are clearly more significant than others and were undoubtedly associated with larger base level shifts. There exists no direct measure of paleo base level shifts, but a relative ranking of SBs and MFSs can be achieved using indirect measures and a variety of proxies. This analysis led to an interesting result: there is a perfect correlation between the rank of a major unconformity and the rank of the immediately succeeding maximum flooding surface. For instance, the most significant unconformity in terms of estimated base level shift is the latest Permian unconformity, which is followed by the most significant MFS just below the P-T boundary. The second largest unconformity (sub Late Carboniferous) is followed by the second largest MFS (early Moscovian), and so. This relationship suggests that a given unconformity and the succeeding maximum flooding surface are genetically linked. Evidence of tilting, flexuring and faulting within the TSTs, and their absence within the RSTs, indicate that the link is tectonic, not eustatic. This further supports the idea that the major sequences of the Sverdrup Basin, and the base level shifts associated with each of them, were caused by the episodic buildup and release of teconic stress.