

Evolution of the Mesoproterozoic Borden basin, Nunavut: sags, rifts, lakes, and forelands in a major zinc district

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Summary

The late Mesoproterozoic Borden basin (Baffin Island, NU) records a complex history that includes sag, rift, and foreland-basin-like depositional phases, as well as two dramatic unconformities. A thin, partly subaqueous, undated basal basalt is overlain by mature shallow-subaqueous quartzarenite (sag basin), and deepening-upward siltstone and shale. A rift-delineated lacustrine carbonate-shale succession includes fault-related deep-water carbonate seep mounds and high-TOC black shale. Several highly cyclic shallow-marine carbonate successions are punctuated by two unconformities that exhibit evidence of dramatic differential compressional uplift, tilting, and erosion. A flysch-molasse-like succession containing Grenville-aged detritus completes the preserved basin-fill. Geochronological data indicate that most or all sedimentation took place ca. 1050 – 1100 Ma. One of the carbonate intervals is the main host of regional Zn-Pb showings, including the past-producing Nanisivik ore-body. The Nanisivik ore-body formed penecontemporaneously with basin-filling from comparatively low-temperature fluids and was emplaced under very distinctive structural and stratigraphic controls. All of these events were approximately contemporaneous with Rodinia's formation, which may point to the importance of far-field effects of supercontinent assembly on intracratonic basin evolution and crustal fluid migration.