Quantifying Rifting History of the Proterozoic Mt Isa Superbasin and Its Relationship to Base Metal Mineralisation

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A series of world-class sediment-hosted mineral systems are located in the Carpentaria Zinc Belt of northern Australia. Despite over a century of mining, the first-order geodynamic setting of these Proterozoic basins remains highly debated and hampers efforts to expand exploration into frontier regions, particularly those areas overlain by younger cover. Here, we combine field observations, seismic reflection profiles, and borehole data to reconstruct the depocenter of Mt Isa superbasin stratigraphy in the vicinity of the Lawn Hill Platform. We perform backstripping analysis to extract its subsidence history and undertake rift modelling to constrain the timing and intensity of extension. Our results support a link between active extension and formation of sediment-hosted mineral systems, while IOCG emplacement post-dates rifting events. The analysis provides a novel framework for assessing prospective time periods for mineralisation in frontier basins by using their respective subsidence histories.