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Evolution of the Neoproterozoic Katangan Basin in the Kipushi Mine Area, Southern DRC and Northern Zambia: The Importance of Halokinesis, Global Glacial Events, and Tectonics

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The Neoproterozoic Katangan basin in the southern Democratic Republic of Congo (DRC) and northwestern Zambia is host to the Central African Copperbelt (CACB), a major source of copper and cobalt. Recent regional studies highlighted the impact of salt on base metal mineralisation through hydrological compartmentalisation, halokinetic traps, and its effects on deformation styles during the Lufilian orogeny. This study investigates district-scale basin development in the Kipushi mine area and identifies structures and unconformities associated with extension, salt evacuation, global glacial events, and inversion in sedimentary rocks of the Roan, overlying Nguba, and top Kundelungu groups. The study uses lithofacies analysis combined with stratigraphic and structural reconstructions to investigate basin controls around the diapiric Kipushi Anticline. Sediment thickness variations in the district display evidence of extensional normal faults with throws of ~600 m active during deposition of Mwale Formation glacially influenced diamictites at the base of the Nguba Group that resulted in the formation of a basement high at Kipushi. Halokinesis in the area appears to have been initiated during deposition of the Roan Group Mwashya Subgroup sediments and continued into the period of deposition of the lower Kundelungu Group sediments. Isolated minibasins between diapiric salt structures were developed during deposition of the Katete Formation. The minibasins widened and joined during deposition of the upper Monwezi Formation. Salt withdrawal continued through the Marinoan glaciation at the start of deposition of the Kundelungu Group sediments and appears to have waned during deposition of the Kanianga Formation. A salt canopy domain is interpreted, which could have contributed to early diapir collapse and welding along sub-basin margins, thus affecting hydraulic connectivity within the basin. The Lufilian inversion reactivated and reversed salt and suprasalt structures. The non-cylindrical folding style present in the area was likely related to original minibasin geometries.