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A Potential Mafic-Ultramafic Magmatic Phase of the Kunene Complex in Angola and Namibia and Its Ni-Cu-PGE Fertility

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New discoveries of magmatic Ni-Cu-PGE sulfide deposits are critical to meet the growing demand for these metals. Voisey's Bay, hosted in a troctolite intrusion of the Nain Plutonic Suite (NPS) of eastern Canada, is a world class example of a magmatic nickel sulfide deposit. The NPS is an anorthosite-mangerite-charnockite-granite (AMCG) suite that formed between 1350 and 1290 Ma. Voisey's Bay formed early in the evolution of the NPS at 1333 Ma. The Kunene AMCG Complex (KC) in Angola and Namibia is the largest suite of its kind and formed between 1500 and 1375 Ma at the southwestern margins of the Congo Craton. The KC is also spatially associated with a subordinate mafic-ultramafic phase that is partly exposed along its western and southwestern margins, and which has the potential to host magmatic Ni-Cu-PGE sulfide deposits. This mafic-ultramafic phase comprises a range of lithologies (dunite to gabbrodiorite) with typical coarse-grained cumulate textures hosted in relatively small-sized intrusions (~10 km^2 surface extent), typical of conduit or chonolith-like magmatic plumbing systems which are known to host some of the globally significant magmatic sulphide deposits. The mafic-ultramafic phase is locally sulfide mineralised which has led to past exploration in the region by Anglo American, African Nickel, and Gevale. Field evidence, along with strontium-neodymium and sulfur isotopic data, show that these intrusions underwent crustal contamination, highlighting the possibility that external crustal sulfur was added to the parent magmas during their emplacement in the crust. Geochronological and isotopic research to fingerprint the timing and potential genetic connection between the mafic-ultramafic phase and the KC is ongoing. However, the geological setting of the mafic-ultramafic phase, its lithological makeup, and styles of mineralisation, are broadly reminiscent of that described at Voisey's Bay, highlighting the Ni-Cu-PGE fertility of the KC and its potential as a future metallogenic province in Africa.