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The Origin of Stratabound Cobalt Mineralization Along the Mines-R.A.T. Contact at Kinsevere, DRC, Central African Copperbelt

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The global energy transition requires a variety of metals in ever increasing quantities. One such metal is cobalt, demand for which is increasing rapidly because of its use in electric vehicle batteries. The Central African Copperbelt (CACB), particularly the Democratic Republic of the Congo, supplies more than 70% of the world's cobalt from sediment-hosted Cu-Co deposits. Despite the importance of the CACB to the global cobalt supply, the source of cobalt enrichment is unconstrained, as are the controls on the relative enrichment in copper and cobalt.

In the southern Congolese Copperbelt, one of the largest Cu-Co resources is Kinsevere, which consists of three écaille-hosted deposits. There, the Cu-Co ore is distributed across the Mines Subgroup. This mineralization is Cu rich and is found in veins and, to a lesser extent, disseminated. At the "Central" deposit, a distinct style of Co-rich mineralization occurs within the "Lower Orebody," along the contact between the Mines Subgroup and the underlying Roches Argileuses Talqueses (R.A.T.) Subgroup. This stratabound orebody consists dominantly of disseminated carrollite, with lesser Cu(-Fe) sulfides.

The Co-rich orebody occurs within 10 m of the Mines-R.A.T. contact and, on average, is centered on this feature. The highest Co grades, however, may be found well above and well below the contact and, in both cases, are similar, suggesting that lithology does not exert a strong control on the distribution of the mineralization. Furthermore, preliminary electron microprobe analyses of major and minor elements in carrollite suggest that there may be symmetrical zoning of the mineral across the orebody. These data suggest that the Co-rich stratabound orebody formed as a result of the precipitation of the ore minerals from a hydrothermal fluid flowing along, rather than across, the Mines-R.A.T. contact. The study emphasizes the contribution of late/postdiagenetic processes to the metal endowment of the CACB.