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REE mineralization associated with Fe-Cu-(REE) deposits in the southwestern Yangtze Block, southern China and northern Vietnam

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Major Fe-Cu deposits are present in the southwestern part of the southwestern Yangtze Block where they form the Kangdian IOCG metallogenic province. These deposits are characterized by an association of Fe-oxides and Cu-sulfides with REE, Co, Ag and Au as common by-products. The ore deposits are hosted in variably metamorphosed, late Paleoproterozoic rocks (~1.65-1.7 Ga). Recent dating results indicate that the Fe-Cu deposits formed in multiple mineralization events. The mineralization styles of these deposits are comparable to IOCG deposits elsewhere. These Fe-Cu deposits contain Fe-oxides (magnetite and hematite) and/or Cu-sulfides (chalcopyrite and bornite) as major components with variable amounts of Au, Ag, Co, and REE. Fe-oxides have low TiO_2 and V_2O_5, suggesting a hydrothermal origin. In these deposits, ore mineralization is closely associated with brecciation, as is common in IOCG deposits elsewhere. The paragenetic sequence includes early Na alteration followed by mineralization of magnetite and magnetite-polymetallic sulfides that are overprinted by sulfide-quartz veins and finally by barren quartz-carbonate veins. Magnetite mineralization was associated with pervasive Na-Fe alteration that formed albite, chlorite and actinolite. Abundant Fe-Cu-Mo sulfides are intergrown with magnetite and minor titanite, allanite and REE minerals, and are associated with carbonate, quartz, fluorite and mica. On the basis of new fluid inclusion and mineralogical data, a new model is proposed to interpret the formation of these deposits in an evolving magmatic-hydrothermal system.

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