The Early Cretaceous Yanbei volcanic-intrusive complex and related porphyry-Sn deposit in Jiangxi Province, South China

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The Yanbei volcanic-intrusive complex is located in Jiangxi Province, South China. It is a F-rich complex and mainly consists of dacitic-rhyolitic volcanic rocks, granite porphyry and diabase dikes. The granite porphyry intruded into the volcanic rocks, and both were crosscut by the late-stage diabase dikes. The main orebody of related porphyry-Sn deposit formed along the contact zone between granite and volcanic rocks.

LA-ICP-MS U-Pb dating of zircon and cassiterite from the magmatic rocks and Sn-mineralization revealed that three magmatic activities happened during 143-128 Ma at Early Cretaceous. The magmatic rocks are metaluminous to peraluminous with C/CNK values mostly in range of 0.9-1.2, commonly alkaline rich with high-K calcalkaline and shoshonitic features. Distinctive trace elements and Sr-Nd-Hf isotopic characteristics of the Yanbei complex demonstrated that these magmatic rocks were not derived from the same magma source. The volcanic rocks may be derived from partial melting of continental crust, whereas the diabase dikes were from enriched metasomatised lithospheric mantle. It is more likely that the granite porphyry was originated by the strong interaction between crust and mantle. Thus, we propose that the Yanbei complex probably formed at an extensional tectonic regime during Early Cretaceous triggered by rollback and/or subsequent breakoff of the west-striking subducting paleo-Pacific plate. The granite porphyry has a close temporal relationship with Sn-mineralization, and probably is the parental rock for tin deposit. The granite porphyry is a typical tin-bearing granite with similar geochemical features to those ones in South China. Fractional crystallization process may be responsible for the preconcentration of F and Sn at residual melt and subsequent Sn precipitation at magmatic-hydrothermal stage.