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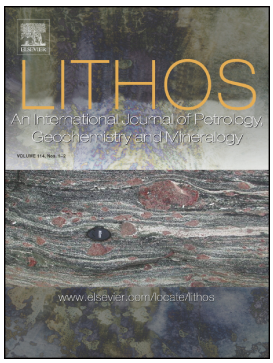

Geochronology and petrogenesis of the Qibaoshan Cu-polymetallic deposit, northeastern Hunan Province: Implications for the metal source and metallogenic evolution of the intracontinental Qinhang Cu-polymetallic belt, South China

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Abstract

The recently recognized Qinhang metallogenic belt (QHMB) is an economically important intracontinental Mesozoic porphyry-skarn Cu-polymetallic metallogenic belt in South China. However, the origin of the ore-bearing magma and the major factors controlling the different metal assemblages in the QHMB are still unclear. The Qibaoshan deposit is a large Cu–Au–Pb–Zn–Ag–Fe deposit located at the juncture between the northern and central parts of the QHMB. In this study, new zircon U–Pb ages, Hf–O isotopic data, molybdenite Re–Os ages, and whole-rock geochemical data are combined to constrain the timing of the mineralization and the origin and petrogenesis of the ore-bearing porphyry in the Qibaoshan deposit. The ages obtained from both zircon U–Pb and molybdenite Re–Os dating fall in the Late Jurassic (between 152.7 and 148.3 Ma), revealing that this deposit is significantly younger than previously estimates (227–184 Ma). The Qibaoshan ore-bearing quartz porphyry shows variable negative zircon $\varepsilon_{Hf}(t)$ values (-14.8 to -5.5), high $\delta^{18}O$ values (8.4 to 10.8‰), and high $Mg^{\#}$ values (69.1 to 73.0), indicating that it formed via the partial