Helium Isotopic Compositions of Ore-Forming Fluid from the Xintianling Tungsten Deposit and the Furong Tin Deposit, the Nanling Range: Implications for the origin and evolution of the ore-forming fluid of the Qitianling pluton

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The Furong deposit, located in the southern Qitianling pluton, is a giant tin deposit. The Xintianling tungsten deposit located in northern Qitianling pluton. They are genetically associated with the granite of Qitianling pluton. Direct Re-Os dating on molybdenites collected from the skarn type ore in the Xintianling deposit have been carried4 out, the result shows that the Re-Os dating of six molybdenite samples collected from skarn type ore yields a 187Re-187Os model age of 162.9±1.9Ma(MSWD=0.21). It is suggested that the mineralization of the Xintianling tungsten deposit is spatially and temporally related to the early stage hornblende-biotite monzonitic granite of Qitianling pluton.While based on previous studies,the Furong tin deposit may be closely related to the late stage biotite monzonitic granite. Therefore, we analyzed the helium and argon isotopic compositions of fluid inclusions in pyrites and arsenopyrites collected from these two deposits. It is shown that, 3He/4He ratios of fluid inclusions in pyrites and arsenopyrites collected from Furong deposit fall in the range of 0.09-0.50 Ra and 1.35-3.91Ra, respectively, obviously higher than that of the crust,but lower than that of the mantle, indicating that the ore-forming fluid in this deposit is a mixture of mantle- and crustal-derived fluids. The 3He /4He ratios of fluid inclusions in pyrites collected from Xintianling deposit fall in the range of 6.90-10.94 Ra, obviously higher than that of the mantle,indicating that the ore-forming fluid in this deposit is mantle-derived fluids. According to the results. The emplacement of the Qitianling A-type granite and associated tungsten-tin polymetallic mineralization is a continuous evolution process, which are the products of large-scale mineralization of the Nanling in Middle-Late Jurassic. Tungsten deposit and tin deposit are associated with mantle-derived fluids and a mixture of mantle- and crustal-derived fluids, respectively.