A Study on Metallogenic Temperature Field of The Dulong Sn-Zn Polymetallic Deposit

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Abstract: The Dulong Sn-Zn polymetallic deposit is closely related to the Late Yanshannian granite body concealed in depth of the deposit. The intrusion of the hidden granite magma in deposit area had resulted in the temperature disturbance of the normal surrounding rocks, the abnormal temperature field in the deposit area, and the activity of fluids and the migration, precipitation, and enrichment of metallogenic elements. Therefore, the restoration of the temperature field caused by the intrusion of Late Yanshannian granite magma could let us deeply understand the metallogenesis of the deposit and guide the exploration in depth and its periphery of the deposit. In this paper, the restoration of the temperature field has been carried out by using a finite element simulation software platform named Comsol Multiphysics and the chlorite geothermometer. The studies of the numerical simulation show that the isotherm is zonally distributed around the hidden granite body. The durations of thermal disturbance of the early stage granite, the middle stage granite, and the late stage granite are about 10 Ma, 5 Ma, and 50 ka, respectively, with the thermal disturbance distances of 2.5 km, 1.5 km, and 500 m, respectively, from the granite body. Chlorites in the Dulong Sn -Zn polymetallic deposit are mainly Fe-rich chlorites including prochlorite, brunsvigite and a small amount of pycnochlorite, with forming temperature of 209-277 ℃, corresponding to the range of low-to-moderate temperature hydrothermal alteration. The temperatures of sampling locations obtained through the chalorite geothermometry are consistent with temperature ranges of the simulated temperature field.The above research indicates that the sites about 600 m away from the middle stage granite body and/or about 300 m away from the late stage granite body could be the most advantageous positions for mineral exploration in the area.

Keywords: the Late Yanshannian granite; temperature field; Comsol Multiphysics; numerical simulation; chlorite geothermometer; The Dulong Sn-Zn polymetallic deposit