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湘南王仙岭花岗岩体的锆石U-Pb年代学、地球化学、锆石Hf同位素特征及其地质意义

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摘要:

湘南王仙岭岩体由主体电气石黑云母花岗岩和侵入其内部的黑云母二长花岗岩组成,LA-MC-ICP MS锆石U-Pb定年显示电气石黑云母花岗岩形成于印支期($235.0 \pm 1.3\text{Ma}$),黑云母二长花岗岩形成于燕山期($155.9 \pm 1.0\text{Ma}$),表明该岩体是两期岩浆活动的产物。这两期岩石均为高钾钙碱性系列,A/CNK值为1.07~1.66,属过铝-强过铝质花岗岩类。稀土元素显示LREE富集,HREE亏损,Eu负异常明显(0.01~0.38)的特征。早期电气石黑云母花岗岩和晚期黑云母二长花岗岩的 $\epsilon_{\text{Hf}}(t)$ 值分别为-7.92~+4.61和-10.66~-5.35;两阶段Hf模式年龄(t_{DM2})分别为1758~967Ma和1875~1538Ma。两期花岗岩均来自于古中元古代地壳物质重熔,其中早期电气石黑云母花岗岩在侵位上升过程中捕获了部分幔源老锆石,成岩过程中有少量地幔物质参与,且其源区具有高 $\epsilon_{\text{Hf}}(t)$ 值的特点。综合前人研究成果,本文认为华南中生代印支期和燕山期均有钨锡矿化作用,印支期花岗岩岩浆形成于碰撞挤压作用间隙伸展环境,而燕山期花岗岩岩浆可能形成于大陆边缘弧后伸展环境。

英文摘要:

The Wangxianling intrusion in South Hunan Province consists of two granitoids, the main tourmaline biotite granites and the biotite monzonite granites invading into the former. LA-MC-ICP MS zircon U-Pb dating shows that tourmaline biotite granites formed in Indosinian ($235.0 \pm 1.3\text{Ma}$) while the biotite monzonite granites formed in Yanshanian ($155.9 \pm 1.0\text{Ma}$), indicating that Wangxianling intrusion is the product of two-time magmatic activities. The compositions of these two period granites fall into the calc-alkaline category, with an A/CNK ratio of 1.07~1.66, which are peraluminous to strongly peraluminous granites. Their whole rock rare earth elements demonstrate total LREE enrichment and HREE deficit with significant negative Eu anomalies(0.01~0.38). The $\epsilon_{\text{Hf}}(t)$ values and two-staged Hf model ages of tourmaline biotite granites and biotite monzonite granites are -7.92~+4.61, 1758~967Ma and -10.66~-5.35, 1875~1538Ma, respectively. In this paper we suggest that both the tourmaline biotite granite and biotite monzonite granite are originated from the Paleo-and Mesoproterozoic crustal remelting, and the earlier tourmaline biotite granites captured a large number of mantle-derived zircons and there were high- $\epsilon_{\text{Hf}}(t)$ materials in its source region. Combined with previous research results, we infer that the both Indosinian and Yanshanian periods in South China have tungsten and tin mineralization, the Indosinian granitic magma formed in interval lithosphere extensional environment during the collision compression while the Yanshanian granitic magma formed in the extensional environment of the back arc continental margin.

关键词: [LA-MC-ICP MS锆石U-Pb年龄](#) [岩石地球化学](#) [锆石Hf同位素](#) [王仙岭岩体](#) [华南](#)

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