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Characterization and origin of granites from the Luoyang Fe deposit, southwestern Fujian Province, South China

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Abstract

The Luoyang Fe deposit, located in southwestern Fujian Province (South China), is one of the Makeng-type skarn Fe deposits (i.e., skarn Fe deposits related to granite) related to the late Yanshanian (i.e., Early Cretaceous) granite. To better understand different mineral assemblages in different deposits, geochemistry and isotopic systematics of the granite magma source of the Luoyang Fe deposit were compared with those of other Makeng-type skarn Fe deposits in southwestern Fujian Province. Laser ablation inductively coupled plasma mass spectrometry (LA–ICP–MS) zircon U–Pb dating of the nearby exposed Luoyang fine-grained granite and porphyritic granite yielded weighted mean $^{206}Pb/^{238}U$ ages of 139.6 ± 1.4 Ma and 137.2 ± 2.3 Ma, respectively. The Luoyang granite exhibits geochemical characteristics of highly fractionated I-type to A-type, consistent with the Pantian (PT) and Zhongjia (ZJ) granites in the Pantian and Zhongjia Fe deposits; whereas, the Dapai (DP) and Dayang–Juzhou (DJ) granites in the Dapai and Makeng Fe deposits show unfractionated I- and relatively typical A-type characteristics, respectively. It can be inferred from whole rock Sr−Nd−Pb and zircon Hf isotopes that the source magma of the Luoyang granite is coincident with other skarn Fe mineralization related granites of the Makeng-type deposits in southwestern Fujian Province. The magma was derived from partial melting of the Proterozoic metasedimentary Cathaysia basement rocks. Underplating of mafic magma in the depleted mantle and/or lower tholeiitic crust was also involved, which provided the heat source for partial melting. The change in tectonic environment and the different mafic sources involved caused significant differences in the Fe metallogenesis in southwestern Fujian Province.

Keywords: