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扬子地块西南缘大红山群老厂河组变质火山岩的锆石U-Pb定年及其地质意义

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摘要：

大红山群是扬子地台西缘相对较老的地层单元,普遍经历了绿片岩相-低角闪岩相变质作用。其中部的曼岗河组、红山组已获得古元古代晚期~1.68Ga的成岩年龄,其底部的老厂河组却未有相关年龄的报道。大红山群的变质时代目前也无精确的年龄结果。本文以老厂河组厚层变质沉积岩中的薄层变质火山岩样品为研究对象,在岩相学研究的基础上,运用LA-ICP-MS方法对变质火山岩锆石进行原位U-Pb同位素定年及相关的微量、稀土元素测试,获得变质火山岩的原岩年龄和变质年龄:(1)老厂河组变质中酸性岩和变质基性岩中岩浆锆石微区的$^{207}Pb/^{206}Pb$加权平均年龄分别为1711±4Ma和1686±4Ma,限定老厂河组的形成年龄范围为1711~1686Ma;(2)变质基性岩(石榴斜长角闪岩)中变质锆石的$^{206}Pb/^{238}U$年龄为849±12Ma。本文结果表明,大红山群的形成时代可提早至1711±4Ma,又一次证明了扬子地台西缘古老结晶基底的存在;大红山群在~850Ma经历了一期新元古代变质事件,这期变质可能是与扬子地台西缘新元古代岩浆事件有关的区域变质事件。

英文摘要：

Dahongshan Group is one of the oldest stratigraphic units in western Yangtze Block, which experienced metamorphism of greenschist-lower amphibolite facies. Depositional ages (~1.68Ga, the Late Paleoproterozoic) of the Manganghe and Hongshan formations in the middle of this group have already been achieved, while that of the Laochanghe Formation at the bottom of the group has not been reported until now. Compared to its depositional ages, no accurate statistics have been reached for the metamorphic ages. This study works on the metavolcanites as thin layers in the thick metasedimentary rocks of the Laochanghe Formation. Petrography, in situ LA-ICP-MS zircon U-Pb dating and the related trace element and REE analyses provided insights into the protolith and metamorphic ages of the rocks. Results are as follows. (1) Magmatic zircon domains of the meta-intermediate-acid and metabasic rocks in the Laochanghe Formation have the weighted average $^{207}Pb/^{206}Pb$ ages of 1711±4Ma and 1686±4Ma respectively, and zircon ages constrain the timing of the Laochanghe to the range from 1711Ma to 1686Ma; (2) Metamorphic zircon domains in a metabasic rock (garnet amphibolite) has $^{206}Pb/^{238}U$ zircon age of 849±12Ma. The results show that the starting age of the Dahongshan Group is advanced to 1711±4Ma which confirms again the existence of the old crystalline basement in western Yangtze Block, and that there was a metamorphic event around~850Ma in the Neoproterozoic which must be a regional metamorphism related to the Neoproterozoic magmatism.

关键词：LA-ICP-MS 锆石U-Pb定年 老厂河组 大红山群 扬子地块

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