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湘东新元古代沉积岩的地球化学和碎屑锆石年代学特征及其构造意义

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摘要:

本文对湘东湘乡-醴陵地区和湘东南桂阳地区的新元古代浅变质沉积岩进行了岩石地球化学研究和锆石U-Pb定年及锆石Lu-Hf同位素分析。研究显示两个地区的碎屑沉积岩具有相似的中等的成分成熟度,但大的 K_2O/Na_2O 变化指示不同沉积岩经历了不同程度的风化淋滤作用。两个地区多数样品的稀土分配模式与澳大利亚后太古代页岩(PAAS)的稀土分配模式相似,但总体具有更高的含量,尤其是重稀土。湘东地区板溪群沉积岩含有更高的相容元素(如Sc, Cr, Ni),说明源区具有更多的中基性组分,而湘东南震旦纪沉积岩主要由再循环物质组成。碎屑锆石U-Pb定年结果表明湘东新元古代沉积岩中含有大量850~800Ma的碎屑锆石,而缺少1000Ma左右的碎屑锆石,显示了与扬子地块的亲缘性。而湘东南新元古代沉积岩中含有丰富的Grenville期和一定数量的~2.5Ga的碎屑锆石,相似于华夏地块物质组成。表明扬子地块和华夏地块在西南地区的分界线很可能就从湘东的湘乡-醴陵地区和湘东南的桂阳地区之间通过。前人对华南早古生代沉积岩中碎屑锆石的年代学研究显示湘东和湘东南地区的早古生代沉积岩的物质组成均相似于华夏地块,指示它们的源区是东南的华夏地块。因此,从新元古代到早古生代,湘东地区的沉积物源区发生了重大改变,暗示在新元古代晚期(震旦纪)与早古生代(中寒武世)之间发生过一次构造运动,使华夏地块逐渐隆起或使湘东-湘西盆地进一步沉陷,从而使湘乡-醴陵地区从早古生代开始接受了来自华夏地块的碎屑物质。这期构造运动可能与泛非构造事件相关。

英文摘要:

This study presents new geochemical and zircon U-Pb and Lu-Hf isotopic data for Neoproterozoic meta-sedimentary rocks in the Xiangxiang-Liling area, eastern Hunan Province and Guiyang area, southeastern Hunan Province. Geochemical data show that the sedimentary rocks from these two areas have similar and moderate composition maturity. However, large K_2O/Na_2O variations suggest that these sedimentary rocks experienced different degree of the eluviation. Rare earth element (REE) patterns of these sedimentary rocks from two areas are similar to those of post-Archean Australian shales (PAAS) with slightly high concentrations, especially for heavy REEs. The sedimentary rocks of the Banxi Group in the eastern Hunan Province have higher compatible elements (e.g. Sc, Cr, Ni) than the Sinian sedimentary rocks in the southeastern Province, implying that provenance of the former has more intermediate to mafic rocks than the later. U-Pb dating results of detrital zircons from two sedimentary rocks indicate that a Neoproterozoic sedimentary rock in eastern Hunan Province has abundant 850~800Ma detritus without ~1000Ma ones, suggesting its affinity with the Yangtze Block. However, a Neoproterozoic sedimentary rock in southeastern Hunan Province contains many Grenvillian detrital zircons and less ~2.5Ga ones without ~800Ma clastic materials, similar to those in the Cathaysia Block. This difference suggests that the boundary between the Yangtze and Cathaysia blocks probably pass between the Xiangxiang-Liling area, eastern Hunan Province and Guiyang area, southeastern Hunan Province. Previous study (Wang *et al.*, 2010a) has indicated that Early Paleozoic sedimentary rocks in these two areas have detritus similar to the Cathaysia Block, suggesting that their provenances are in the Cathaysia Block. Consequently, the sediments in the eastern Hunan Province change significantly from Late Neoproterozoic (Sinian) to Early Paleozoic time (Middle Cambrian), suggesting a tectonic event occurring between them. It is this event that probably bright about the uplift of Cathaysia Block or subside of the Yangtze Block, leading to that the Xiangxiang-Liling area, eastern Hunan Province receive the clastic materials from the Cathaysia Block in Early Paleozoic time. This event is probably related to the Pan-

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