

论文

青海共和一花石峡三叠纪碎屑沉积岩的地球化学特征与锆石U-Pb年龄及地质意义

- 1 中国地质大学(北京) 地球科学与资源学院, 北京 100083
- 2 内蒙古地质调查院, 内蒙古 呼和浩特 010010

摘要:

通过对青海共和一花石峡出露的三叠纪碎屑沉积岩系统的岩石学、地球化学与锆石U-Pb年龄的系统研究,揭示这些碎屑沉积岩主要为岩屑砂岩、长石砂岩,源区岩石是在岛弧构造环境与随后的碰撞过程中被抬升到地表后接受剥蚀的镁铁质及其变质深熔产物、古老基底物质及其深熔产物及花岗岩类。Nd亏损地幔模式年龄平均为1.75 Ga,与祁连、柴达木、东昆仑基底平均的Nd亏损地幔模式年龄是一致的,均类似于扬子克拉通,说明它们具有共同的块体构造属性,均从冈瓦纳大陆裂解后拼合到欧亚大陆。碎屑锆石U-Pb年龄存在于400~500 Ma、250~300 Ma两个主要峰与次要的750~1 000 Ma新元古代峰,反映了祁连、柴达木、东昆仑古生代与早中生代及新元古代重要的构造岩浆作用期,还测得一些>1 000 Ma到2 700 Ma的反映祁连、柴达木、东昆仑基底形成年龄。锆石Hf同位素揭示源地壳增生主要发生于1.7~2.5 Ga、2.8~3.6 Ga、1.0~1.7 Ga三个年龄范围,大部分锆石可能是古老基底与新元古代增生地壳变质深熔混合产物,而晚古生代一早中生代的锆石含有更多的古生代增生地壳组分。西秦岭与共和盆地的三叠系在物源上并没有沟通,三叠纪时西秦岭相对于祁连、柴达木、东昆仑应处于相对较低的地形条件,但仍阻挡两个沉积盆地的贯通。

关键词: 共和盆地; 三叠纪; 碎屑沉积岩; 沉积物源; 构造属性

Zircon U-Pb dating and geochemistry of clastic sedimentary rocks in the Gonghe Huashixia Area, Qinghai Province and their geological implications

- 1 School of Earth Sciences and Resources, China University of Geosciences(Beijing), Beijing 100083, China
- 2 Geological Survey of Inner Mongolia Autonomous Region, Huhhot 010010, China

Abstract:

The Triassic clastic sedimentary rocks in the Gonghe Huashixia Area, Qinghai Province are classified as greywacke and arkose based on petrochemistry. Provenance rocks formed in arc setting during the Paleozoic and were exhumed to surface by subsequent collision, which are mafic or its partial melting product, metamorphosed basement and/or its anatexis magma, as well as granites. Averaged Nd depleted mantle model age is 1.75 Ga, which is consistent with those of basements of the Qilian Mountains, the Qaidam, the Eastern Kunlun Orogens and the Yangtze Craton. The Nd depleted model age suggests that the blocks share common tectonic affinity to the Gondwana. The histogram and probability density distribution of zircon U-Pb ages show significant peaks of 400/500 Ma, 250/300 Ma plus a secondary peak of 750/1 000 Ma, which indicate key tectonomagmatism episodes of the Paleozoic, the Early Mesozoic, and the Neoproterozoic in the Qaidam, the Eastern Kunlun, and the Qilian Mountains.

The ages of greater than 1 000 to 2 700 Ma represent basement formation of the Qilian, the Qaidam and the Eastern Kunlun Orogens. Hf isotopic compositions of zircons show three dominant age ranges of 1.72-2.5 Ga, 2.83-3.6 Ga and 1.01-1.7 Ga for accretion of provenance crust. The majority of zircons are mixing products of anatexis melts derived from Neoproterozoic Paleozoic mafic rocks and basement rocks of the Qilian Mountains, the Qaidam, and the Eastern Kunlun Mountains. The Late Paleozoic Early Mesozoic zircons originated mainly from anatexis melts of Paleozoic juvenile crust. Contrasting histogram to that of Triassic clastic sedimentary rocks in the western Qinling Mountain suggests that their provenance material were not communicated owing to the barrier of the western Qinling Mountain. In contrast to high reliefs of the Qaidam, the Qilian Mountains, and the Eastern Kunlun, the western Qinling Mountain was in low relief with little contribution to the Gonghe Basin during the Triassic period.

Keywords:

Gonghe Basin; Triassic; clastic sedimentary rocks; provenance; tectonic affinity

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通讯作者:

作者简介: 陈岳龙 (1962—), 男, 教授, 博士生导师, 主要从事区域地球化学与环境地球化学研究。E-mail: chyl@cugb.edu.cn

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