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胶北地体地壳演化: 玲珑黑云母花岗岩继承锆石U-Pb年龄、微量元素和Hf同位素证据

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摘要:

胶北地体晚侏罗世下地壳重熔的玲珑黑云母花岗岩大面积出露, 其中残留有大量继承锆石, 记录了多期热事件, 为复杂的地壳演化过程提供了重要线索。论文通过分析玲珑黑云母花岗岩中继承锆石的U-Pb年龄、微量元素和Hf同位素组成, 探讨了胶北地体的地壳演化历史。结果显示胶北地体前寒武纪经历了~2.9Ga和~2.7Ga两期主要的地壳生长事件, ~2.5Ga和2.2~1.8Ga两期地壳重熔改造事件, ~2.5Ga和1.95~1.8Ga两期变质事件。~2.9Ga的岩浆作用形成于岛弧环境, ~2.7Ga岩浆活动与下地壳基性物质的部分熔融有关, ~2.5Ga发生的岩浆和变质事件与地幔柱底侵作用有关, 并有同时期的表壳岩组合-胶东岩群形成。~2.1Ga地壳处于拉张状态, 伴有与裂谷活动有关的双峰式岩浆作用, 荆山群和粉子山群开始沉积, 而后1.95~1.8Ga发生碰撞造山运动, 胶北所有早前寒武纪岩石单元卷入此次事件, 并发生变质作用。自此之后, 直至二叠纪末, 胶北处于岩浆活动的沉寂期, 但于~1.7Ga和~1.0Ga发生沉积作用, 形成芝罘群和蓬莱群。二叠纪末扬子板块向北俯冲于华北克拉通之下, 并于三叠纪与华北克拉通发生陆陆碰撞作用, 致使扬子板块北缘新元古代花岗岩发生超高压变质, 形成苏鲁超高压变质带, 之后超高压变质岩发生折返。玲珑黑云母花岗岩复杂的继承锆石组成可能表征了前寒武纪岩石卷入陆-陆碰撞事件而发生再循环作用。

英文摘要:

The Late Jurassic Linglong biotite granite exposed widely in the Jiaobei terrane, was derived by partial melting of the lower crust, with a lot of inherited zircons witnessed multiple thermal events. These inherited zircon grains can provide important clues for the complex crust evolution. Inherited zircons in the Linglong biotite granite are selected for U-Pb dating, trace element and Hf isotopic compositions analysis to explore the crust evolution of the Jiaobei terrane. We recognize that two period of the crustal growth events took place at ~2.9Ga and ~2.7Ga, and two episodic crust reworking occurred at ~2.5Ga and 2.2~1.8Ga, and two distinctively metamorphic events occurred at ~2.5Ga and 1.95~1.8Ga, respectively. The ~2.9Ga magmatism was likely generated in an island-arc system, the ~2.7Ga magmatic activity was related to partial melting of the lower crustal mafic rocks, and the ~2.5Ga magmatic and metamorphic events were linked to the underplating of mantle plumes, contemporaneously, the supracrustal sequence of the Jiaodong Group were deposited. The bimodal magmatism formed at ~2.1Ga, suggested a crustal extension event and might be related to rifting, and consequently, the Paleoproterozoic sedimentary rocks of the Jingshan Group and the Fenzishan Group formed. All the Early Precambrian lithological units in the Jiaobei terrain were metamorphosed during 1.95~1.8Ga. Since then, there was no tectothermal event until the Permian, but sedimentation occurred at ~1.7Ga and ~1.0Ga, corresponding to the formation of the Zhifu Group and the Penglai Group, respectively. At the end of the Permian, the Yangtze Block subducted northward beneath the North China Craton. The Triassic continent-continent collision between the North China Craton and the Yangtze Block led the Neoproterozoic granites in the northern margin of the Yangtze Block to experience the ultra-high pressure metamorphism, formed the Sulu UHP metamorphic belt, and then the exhumation of UHP metamorphic rocks occurred. The complex composition of inherited zircons from the Linglong biotite granite may indicate that the Precambrian rocks were involved in the continental collision events and were recycled.

关键词: [继承锆石](#) [U-Pb年龄](#) [Hf同位素](#) [岩石再循环](#) [胶北地体](#)

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