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冀北哈叭沁超镁铁岩锆石年代学及Hf同位素: 对区域岩浆活动期次及源区的指示意义

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摘要:

冀北承德地区铁的成矿作用从新太古代一直延续到古生代, 呈现出成矿元素铁在这一地区不同地质历史时期反复聚集成矿的特点, 重要的铁矿资源都与镁铁-超镁铁岩体有关。本文对哈叭沁岩体中3件角闪岩样品进行了LA-ICP-MS锆石U-Pb测年和Hf同位素分析。原生岩浆锆石U-Pb测年结果获得 406 ± 2 Ma的成岩年龄, 表明承德地区古生代超镁铁岩岩浆活动发生于泥盆纪。前人及本文继承锆石的U-Pb测年结果表明, 承德地区镁铁-超镁铁岩浆活动期次主要有古-中元古代、泥盆纪、晚石炭世-早二叠世、晚三叠世4期, 且都与伸展构造背景紧密关联。承德地区不同时代铁矿围岩的原生岩浆锆石的Hf同位素的对比研究表明, 与成矿元素铁相关的地质体的源区为地幔物质或形成于2.9~2.7 Ga的基性下地壳物质, 而之后的地壳沉积物质部分熔融形成的地质体则缺乏成矿潜力。

英文摘要:

The Chengde area in Hebei Province is the most important magmatic iron ore-concentrated district in North China, with a proven resource reserve of ca. 1 billion tons. The iron mineralization in Chengde area has been lasted from Neoproterozoic to Paleozoic. The banded iron formations at Neoproterozoic, the Damiao-type iron deposits at Mesoproterozoic and the Habaqin iron deposit at Late Paleozoic are typical in general. All of them were products related with mafic-ultramafic complexes that formed at tectonic setting of regional extension, and thus providing good examples for metallogenetic pedigree study and further exploration. All of the iron-bearing mafic-ultramafic complexes form long linear arrays and occur along the E-W striking Hongshila-Damiao fault. LA-ICP-MS zircon U-Pb ages of three samples of hornblende in the Habaqin ultramafic complex show that the emplacement age of the ultramafic complex was 406 ± 2 Ma, which occurred at Devonian, implying that the geodynamic setting of the magmatism had occurred at post-collisional extensional setting after the arc-continent collision between the Bainaimiao arc belt and the northern margin of the North China Craton. As constrained by abundant inherited ages of this study as well as previous studies, the mafic-ultramafic magmatism along the Hongshila-Damiao fault were related to extensional setting and mainly occurred at Paleoproterozoic, Devonian, Late Carboniferous-Early Permian, and Late Triassic. As constrained from comparative study of Hf isotope data of zircons, all of the t_{DM2} ages of the zircons aged at Neoproterozoic, Mesoproterozoic and Paleozoic are concentrated within the range from 2.9 Ga to 2.7 Ga. A similar result has been identified in the $\epsilon_{Hf}(t)$ -age diagram, plots of the $\epsilon_{Hf}(t)$ and corresponding zircon U-Pb age values form long linear arrays which coincide with the evolution line at the range of 2.9~2.7 Ga. Therefore, the ore-forming materials of the mineralization of iron in Chengde were initially from a mantle source or mafic lower crust which formed at 2.9~2.7 Ga.

关键词: [铁矿床](#) [超镁铁岩](#) [幔源岩浆](#) [伸展背景](#) [冀北](#)

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