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华北深部岩石圈存在弱的新元古代热活动的同位素年代学信息：证据及意义

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摘要：

人们普遍认为华北区别于华南的主要特征在于缺少广泛的新元古代岩浆活动,但原因是什么还不清楚。本文汇总了华北四个地区深源岩石包体中有这样同位素年龄的结果,并就它们所反映的华北当时在Rodinia超大陆裂解中心的位置和可能的岩石圈厚度进行了讨论。这些深源岩石包体分别是辽宁复县古生代金伯利岩中的基性麻粒岩、河北涉县碳酸岩化金伯利岩中石榴石辉石岩、河南信阳中生代火山岩中的橄榄岩及河北汉诺坝新生代玄武岩中橄榄岩。所记录的新元古代年龄信息包括:复县基性麻粒岩锆石0.61Ga的下交点年龄,涉县石榴石辉石岩全岩-单矿物的0.76Ga Sm-Nd内部等时年龄、信阳橄榄岩锆石的新元古代(>0.64Ga)年龄以及汉诺坝橄榄岩硫化物0.9~0.6Ga的Re-Os年龄。与华南广泛发育新元古代岩浆活动不同,华北有限的新元古代年龄信息(包括地表出现的)可能反映着它们当时在Rodinia超大陆的位置有所不同,即华南更靠近于超大陆裂解的中心、而华北可能远离该中心(如边缘)。位置的差别也预示着当时华南岩石圈的可能比较薄、而华北具巨厚的岩石圈。因此,我们认为弱的热事件和巨厚的岩石圈可能是造成华北新元古代热活动不明显的原因。

英文摘要：

It is generally accepted that the North China Block (NCB) different from the South China Block (SCB) are mainly characterized by the lack of widespread Neoproterozoic magmatic activity. However, what is the reason is unclear. We summarize the isotopic ages of the deep-seated xenoliths from four localities in the NCB. The possible position of the NCB in Rodinia supercontinent and its thickness of the lithosphere are also discussed. The deep-seated xenoliths include mafic granulites from the Fuxian Paleozoic kimberlites, garnet pyroxenites from the carbonatite kimberlite in Shexian, Hebei Provience, peridotites from the Xinyang Mesozoic volcanic rocks and Hannuoba Cenozoic basalt. The recorded ages include: the zircon lower intercepted age of 0.61Ga from the Fuxian mafic granulites, the Sm-Nd internal isochron age of 0.76Ga from the whole-rock and minerals of Shexian garnet pyroxenites, the zircon Neoproterozoic ages (>0.64Ga) from the Xinyang peridotite and the Re-Os ages of 0.9~0.6Ga from the sulfides in Hannuoba peridotites. Different from the extensively developed Neoproterozoic magmatic activity in SCB, the limited Neoproterozoic records (including the surface) in NCB might reflect their distinct location in the Rodinia supercontinent. That means the SCB is closer to the center of the supercontinent, while the NCB is far away from the center (might at the edge). The difference of the situation demonstrates that the SCB has a thin lithosphere; however the NCB shows a thickness one. We thus speculate that the weakly thermal events and thickness lithosphere may result in the inconspicuous Neoproterozoic thermal records in NCB.

关键词：深源岩石包体 同位素年龄 新元古代 华北

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