Re-Os isotopic variation in melt/rock interaction: Implication for the Re-Os age of lithospheric mantle beneath the North China craton

HONG-FU ZHANG

Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China

More attention has been paid to Re-Os isotopic system as this system behaves as an important method to probe the formation age of the lithospheric mantle. However, if the Re-Os system is affected by the low-temperature alteration and mantle metasomatism or melt/rock interaction is still not very clear. Based on the intergration of the studies on the typical orogenic peridotite massif and mantle peridotite xenoliths in the world, it is found that peridotite Re-Os system is generally unaffected by the low-temperature alteration. However, melt/rock interaction could change the peridotite Re-Os system, i.e. the introduction of the Re and/or Os. Peridititе-melt interaction at the low melt/rock ratios (< 1) could result in an obvious increase in peridotite Re abundance and a limited increase in radiogenic Os. The peridotite-melt interaction at the high melt/rock (>> 1) could result in a marked increase in radiogenic Os. At the same time, positive correlations between the Re abundance of the peridotite and moderately incompatible major and trace elements such as Al, Ti, Yb have been interpreted by two stage model of evolution, namely as a result of early stage partial melting and later peridotite-melt interaction. The positive correlation between the Re abundance and the Cr observed in the peridotite further argue for such a suggestion. This result has an important implication for the evolution of the lithospheric mantle beneath the eastern North China craton. Archean lithospheric mantle indeed occurred in the Paleozoic in the eastern North China Craton. However, mantle peridotite xenoliths entrained in the Cenozoic basalts ubiquitously have Proterozoic rather than Archean Re-Os ages. This fact suggests that peridotite-melt interaction indeed exist extensively in the lithospheric mantle beneath the eastern North China craton, leading to the lithospheric mantle becoming younger. Therefore, Re-Os isotopic ages of the Cenozoic mantle xenoliths are not the formation age of the lithospheric mantle, but the result of the peridotite and melt mixing. Re abundance of the Hannuoba peridotites and Sr-Nd isotopes have shown a mixing trend of the peridotites and multiple melts. The negative correlation between their whole-rock Al_2O_3 contents and olivine Fo can also be interpreted by this peridotite-melt interaction.

Timing of Jinchang porphyry gold deposit, eastern Heilongjiang province, Northeast China

HUAFENG ZHANG*, S. LI AND Z. LI

School of Earth Sciences and Resources, China University of Geosciences, Beijing 100083, PR China
(*correspondence: nighty@cugb.edu.cn)

Introduction

The Jinchang giant gold deposit, located at the easternmost of the Hunchun block which belongs to the easternmost portion of the eastern Chinese extension of the Central- Asian Orogenic Belt (CAOB), has been discovered and explored since 1990's [1]. But the timing of gold mineralization of the deposit still remained very poorly constrained. Therefore, we provide new geochronological data of gold-related sericite and pyrite Rb-Sr dating.

Discussion of Results

Sericite extracted from two samples of granodiorite and porphyry granite, yield ages of 107 ± 5 Ma (MSWD=0.91) and 110 ± 4 Ma (MSWD=1.04), with initial Sr of 0.7063 ± 0.0047 and 0.7072 ± 0.0034, respectively. Meanwhile, their sericite + pyrite grains yield two well Rb-Sr isochron ages of 104 ± 6 Ma (MSWD=0.18) and 110 ± 3 Ma (MSWD=0.14), with initial Sr of 0.7063±0.0033 and 0.7052 ± 0.0026 , respectively. The sericite and pyrite herein extracted from samples of porphyry granite and granodiorite yield similar isochron ages around 110 Ma with similar initial Sr, suggestive of homogenous Rb-Sr isotope compositions between sericite and pyrite minerals in each sample. These results indicate that the gold-forming time is cretaceous of around 110 Ma.

[1] Chen *et al*. (2000) unpublished internal communicated report in Chinese.