Lithium and boron isotope systematics during subduction and exhumation of UHP metamorphic rocks from Sulu, East China

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We use Li and B isotope systematics and bulk trace elements of ultrahigh-pressure metamorphic rocks from Sulu (East China) to investigate the role of fluids during subduction, material exchange between rocks representing the subducted slab and the mantle wedge, and exhumation. Our data reveal that there is significant Li and/or B isotope fractionation between different rock types that are in close contact during various metamorphic stages. Samples representing prograde dehydrated relics and hydrated areas have δ^7Li of -6.9 and -0.4‰, respectively, which are different from that of their likely protolith (2-5‰), implying significant Li isotope fractionation during prograde dehydration. Garnet peridotite is enriched in B (4.5 ppm) and isotopically heavier (δ^{11}B = +11.7‰) than the close contacting eclogite which represents subducted rocks (0.9 ppm B; δ^{11}B = 0.1‰), indicating that the mantle rocks were metasomatised by fluids released from the subducted slab. Significant Li and B isotope fractionations of about 7‰ in close contact unaltered eclogite and retrograded amphibolite suggest an addition of retrograde fluids during exhumation. Li and B isotopic compositions combined with other geochemical tracers demonstrate that: (1) the UHP rocks have been severely dehydrated during subduction; besides Li- and B-loss and Li-B isotopic fractionation during progressive dehydration, in retrogression of the rocks there is an addition of fluids with isotopically heavier Li and B; (2) the slab released fluids may be transferred to form hydroxyl-bearing minerals-enriched (amphibole, phengite…) 'veins' rather than to produce large scale arc-magmatism as is usually observed in oceanic crust subduction zones; (3) on a limited scale mantle-derived rocks may be significantly metasomatized by fluids derived from the subducted slab; and (4) Li and B isotope fractionation may or may not behave coherently in the same system during slab subduction and subsequent exhumation of high-pressure and ultrahigh-pressure metamorphic rocks.

Zircon SHRIMP U-Pb dating of volcanic rocks of the Jinniu Basin in the southeastern Hubei, MLYB, Eastern China

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The southeastern Hubei, MLYB is one of the most important Cu, Fe and Au mineralization districts in eastern China[1]. Late Mesozoic granitoids and volcanic rocks were dominantly genetically associated with lithospheric thinning induced to extension[2], the temporal relation of these magma has not been well constrained.

The Jinniu Basin showing an approximate S-N strike comprises the Majiashan Formation, the Lingxiang Formation and Dasi Formation upward. The volcanic rocks of the Majiashan and Lingxiang Formation are dominated by rhyolite and basalt, respectively. As the volumetrically dominant in the basin the Dasi volcanism can be divided into four subcyles, and are basalt and basaltic trachy-andesite and andesite and dacite and rhyolite[3].The detailed analytical procedure were undertaken on SHRIMP II at the Beijing Ion Probe Center, CAGS.

The SHRIMP zircon U-Pb method of rhyolite and basalt from the Majiashan Formation and Lingxiang Formation was undertaken, respectively, and the weight average $^{206}Pb/^{238}U$ ages of 130 ± 2Ma (n=13, MSWD=1.3) and 128 ± 1Ma (n=13, MSWD=1.2) were acquired, respectively, which are considered to represent the eruption age of the Majiashan Formation and the Lingxiang Formation, respectively. The timing of the Dasi Formation remains to be further studied. This result indicates that these volcanic rocks emplaced during the early Cretaceous period, which was latter than or simultaneously with these granitoids in southeastern Hubei, MLYB, Eastern China.

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