Trace-element behavior in UHP fluid inclusions: indicator of the petrological and geochemical evolution of the slab-released fluids

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The study of natural fluid inclusions trapped in ultra-high pressure (UHP) minerals is the direct way to characterize the fluids released during dehydration reactions of the subducting slab at sub-arc depths. The advances in analytical techniques allow accurate *in situ* measurements of trace elements in fluid inclusions, with consequent improvement of the knowledge 1) on nature and geochemical signature of UHP fluids and 2) on their geochemical role on the magmas generated at convergent margins. While major- and trace-elements transport capacity of UHP hydrous-silicate melts has been investigated, little is known about solute enrichment and fractionation in UHP (>3.5–4 GPa) solute-rich aqueous fluids released along colder geothermal gradients.

This contribution describes *in situ* LA-ICP-MS trace-element analyses on selected UHP prograde-to-peak fluid inclusions trapped in a kyanite-bearing quartzite from Sulu (China). The alkali-aluminosilicate-rich aqueous fluid released from the meta-sediments by dehydration reactions is enriched in LILE, U, Th, Sr, and REE. Inclusions trapped at increasing temperature (and pressure) preserve a gradual and selective trace-element enrichment resulting from the progressive dissolution of phengite and carbonate and the partial dissolution of allanite/monazite.

At the investigated P-T conditions, aqueous fluids generated by dissolution of volatile-bearing minerals fractionate trace-element distinctly from hydrous-silicate melts, regardless of the source lithology. Potassic-ultrapotassic magmatism can preserve evidence of the nature of the UHP agents that have fertilized the mantle wedge.