Water in xenoliths from the lithospheric mantle of the Carpathian-Pannonian region: Implications for a subduction imprint?

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The identification of “water” (i.e., OH^-, H^+, H_2O) as a trace element at defect sites in nominally anhydrous minerals (NAMs for short) has drastically changed the concept of “water” storage in the lithosphere. In the past decades our knowledge on the lithosphere beneath the Carpathian-Pannonian region (CPR) has been greatly improved by studies of xenoliths hosted in the Plio-Pleistocene alkaline basalts [1]. Studying “water” in xenoliths of the CPR could improve considerably our understanding on its distribution, substitution and effect on rheological properties in a well-known extensional setting. It prevented us from significant progress in the past that there was no quick and effective technique to analyse large number of NAMs from xenoliths for “water”. A new infrared technique [2, 3] utilizing unpolarized light enables water concentrations in NAMs to be determined from samples where the preparation of oriented specimens is not feasible, such as high-pressure experimental runs and fine-grained mantle xenoliths. Our preliminary comparative study using this method revealed that the concentration levels of “water” in NAMs in a marginal setting along the supposed subduction of the Eastern Carpathians [4] are higher relative to the Bakony-Balaton Highland situated in the central CPR [5]. This outcome may imply that the lithospheric mantle at the eastern margin of the CPR still bears a geochemical overprint of the recent Miocene subduction. Besides differences in “water” levels, significant variation in deformation fabrics was also recognized in the two study areas. Eastern Carpathian xenoliths display normal (010)[100] fabrics in olivine, whereas Bakony-Balaton Highland xenoliths are dominated by axial ‘b’ fabrics. To follow this up, we will present new data from other settings of the CPR that can clarify and explain the existence of such a relation.

[1] Szabó *et al*. (2004) *Tectonophys.* **393**, 119-137. [2] Sambridge *et al*. (2008) *Am. Min.* **93**, 751-764. [3] Kovács *et al.* (2008) *Am. Min.* **93**, 765-778. [4] Falus *et al*. (2008) *Earth Planet. Sci. Let.* **272**, *50-64.* [5] Hidas *et al.* (2007) *J. Geodyn.* **43**, 484-503.

Diverse melt inclusions in Weizhou Island, southern China – Implication for mantle metasomatism and chemical heterogeneity

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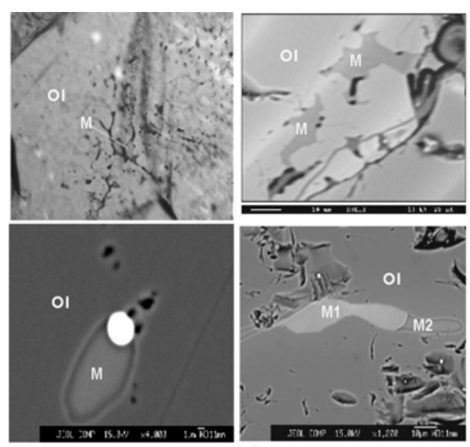
Peridotite xenoliths and enclosed melt inclusions (MIs) record information of geodynamic evolution of sub-continental lithospheric mantle. Small xenoliths, mainly spinel lherzolites in size of several mm, were discovered in the late Pleistocene basalts in Weizhou Island, Northern Bay. Mineral geochemistry indicates that the xenoliths are segments of the lithospheric mantle from 40-50 km depth. Two types of MIs, high-silicon MIs (64%~68%) and low-silicon (49%~57%) MIs, occur in the peridotites, and both types of the MIs are eventually rich in SiO_2, Al_2O_3, H_2O, CO_2 and other volatile (2-5%). Our research indicates that the origins of the MIs are different. High-silicon MIs are derived from the reaction of basaltic magma from upwelling asthenosphere with orthopyroxene, or partial melting of recycled lower crust into the upper mantle. Low-silicon MIs are derived from metasomatism, and the reaction can be described as, high-silicon melts +Olivine→Opx+low-silicon melts. This reaction consumes SiO_2 and olivine, produces orthopyroxene. The facts provide evidences of the occurrence and diversity of metasomatism -- reactions between fluid (melt) and peridotite in the subcontinental lithosphere, and also provide a new case of diversity of melt inclusions and result in the mantle heterogeneity.



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