Pyroxenites in peridotites from External Liguride ophiolites (Italy): Insights on small scale heterogeneities in MORB mantle

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The occurrence of mafic layers in peridotites constitutes an important compositional heterogeneity in the mantle, and their role in mantle melting and basalt generation is currently debated. We present field, chemical and isotopic data on pyroxenites and host peridotites from the western peridotite massifs of the External Liguride ophiolitic Units (Northern Apennines, Italy). Pyroxenites (mostly spinel-websterites) occur as cm-thick bands (up to 12 cm) parallel to the tectonite mantle foliation, and ,together with the peridotites, they are partially recrystallized at plagioclase-facies conditions. Whole-rock and mineral compositions are extremely heterogeneous, covering almost the entire compositional range of worldwide lithospheric pyroxenites (Mg# = 74-88, Al_2O_3 = 10-17 wt%, CaO = 7-20 wt%). The pyroxenite chemistry reflects high-pressure magma segregation of tholeiitic melts dominated by clinopyroxene crystallization. A multi-step, sequential leaching procedure on clinopyroxene separates enables us to remove partial contamination and provides reliable Sr isotope data. The Sr and Nd compositions of clinopyroxenes from pyroxenites and peridotites fall in the typical range of normal MORB ($^{87}Sr/^{86}Sr$ =0.7023-0.7029; $^{143}Nd/^{144}Nd$ =0.5134-0.5128). Internal Sm-Nd isochrons on plagioclase-clinopyroxene pairs from two pyroxenites yield ages of 183±14 Ma and 177±12 Ma for the low-P mantle exhumation. On a slightly larger spatial scale, chemical and isotopic profiles through the pyroxenite-peridotite boundaries indicate cm-scale modification of the wall-rock peridotite, presumably related to emplacement of the pyroxenites. This suggests that deep melt intrusion can locally modify the host peridotites and introduce small scale compositional heterogeneity in a MORB mantle.

Heating organoclays: Does it affect their potential to interact with organic compounds in aqueous environment?

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By replacing inorganic exchangeable cations in clay minerals with organic cations, hydrophilic mineral/water interfaces may be converted to organoclay interfaces of variable and controlled lipophilicity. This paper summarizes the data on aqueous sorption of a series of organic compounds on organoclays preheated at different temperatures [1]. Sorptive properties of thermally treated organoclays are of interest since: (1) they can shed light on mechanisms of organic compound - organoclay interactions; (2) the thermal treatment is considered as a tool to regenerate organoclays after their use in different environmental applications; (3) thermally treated organoclays can provide a model for examining such important environmental issue, as fire-affected soils. Thus, organoclays were (*i*) prepared from the Na-montmorillonite rich bentonite with a series of quaternary ammonium salts and freeze-dried, (*ii*) heated during two hours in air at different temperatures, from 150 ^{0}C to 420 ^{0}C, and (*iii*) characterized by C/N, FTIR, XRD, TG-DTG and surface area analyses. Mild preheating of organoclays at 150 ^{0}C was not associated with chemical changes in the sorbent structure but was able to enhance interactions with organic compounds present in water. The extent of this enhancement reflected the different abilities of organic sorbates to compete with water molecules for sorption sites on organoclays. This observation supported the earlier idea that the partial, incomplete hydration of preheated organoclays can be a reason of increased organic sorbate – organoclay interactions [2,3]. Yet, there is no clear understanding why this rehydration of preheated organoclays is partial. When organoclays were heated at higher temperatures, the significant changes in the organoclay chemistry did not result in the remarkable loss of the organoclay sorptive potential towards organic compounds present in aqueous solution.

[1] Borisover *et al.* (2011) *Appl. Clay Sci.* (in submission).
[2] Borisover *et al.* (2010) *Appl. Surf. Sci.* **256**, 5539-5544.
[3] Borisover *et al.* (2010) *Adsorption* **16**, 223–232.