New data on mantle metasomatism beneath the Devès, France

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Mantle xenoliths from the French Massif Central have been widely studied showing they are mainly spinel-bearing peridotites and display a large range of microstructures and chemical compositions giving evidence for important heterogeneities in the mantle corroborated at a larger scale by tomographic studies (heterogeneities due to mantle processes during the Hercynian orogeny?). The Tertiary Devès volcanic plateau is the richest volcanic district in volatile bearing mantle xenoliths in the Massif Central. These are interpreted as the result of fluid percolation and calculated equilibrium temperatures [1] between 790 to 1020°C (±50°C). The highest temperatures are obtained from the most amphibole-rich rocks. Trace-element compositions (LA-ICP-MS) for both cpx and amphiboles generally show a similar pattern depleted in LREE compared to HREE which could be explained by mutual equilibrium. However, some cpx show either depleted or enriched patterns within the same sample whereas amphiboles only show an enriched pattern which implies that the amphibole was formed by the last percolating fluid and the pre-existing cpx have not fully re-equilibrated chemically. $\delta^{18}O$ ratios (±0.3‰) for cpx and opx range between 6.4 to 6.7‰ and 6.9 to 7‰ vs SMOW respectively, calculated equilibrium temperatures [2] range between 530 to 700°C (±180°C). These 2-pyroxene temperatures are different from temperatures calculated using [1] suggesting their temperatures was perturbed during the last metasomatic event. By looking at the small scales of the heterogeneities, the enrichment of the mantle may reflect multiple overprinting fluid events. Ongoing O, Sr and Nd isotopic analysis on mineral phases should allow better characterisation of the different fluids.

References

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Long-distance transportation of contaminants from the Asian Continent in snow cover of central Japan high mountain region.

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The chemical and isotopic compositions has been measured in vertical snow samples collected at Mt.Nishi-Hodakadake (2,200 m a.s.l.), central Japan, to study long-distance transportation of contaminants from the Asian Continent in winter season.

The d-parameter ($d = \delta D - 8\delta^{18}O$) of the samples ranges from 13 to 39. There is a tendency that artificial contaminants ($nss\text{-}SO_4^{2-}$, NO_3^-) increased in the period of higher d-parameter (>35), suggested that the chemical materials transportation from the Asian Continent is active, and decreased in the period of lower d-parameter (< 20).

When the relationship between $nss\text{-}SO_4^{2-}$ and NO_3^- (Figure 1) was examined, the most of samples plotted between the line of Asian Continental value (4.8) and the domestic value (1.4). It is clear that there are transportations of the chemical materials from the Asian continent at high mountain region, in 70 km inland from the coastline of the Sea of Japan.

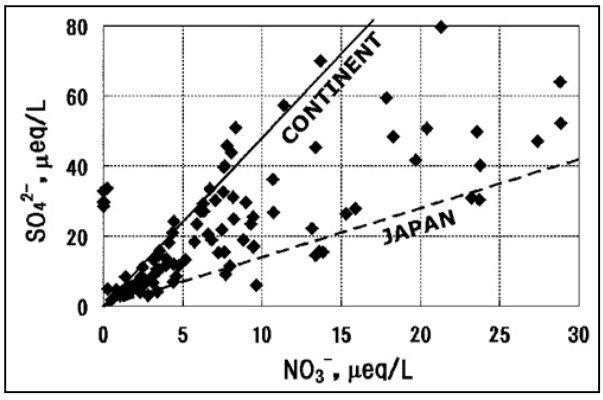

Figure 1: A plots of SO_4^{2-} vs. NO_3^- concentrations in snow cover at Mt.Nishi-Hodakadake. The solid line shows the ratio of Asian Continent, and the broken line shows Japan.