Geophysical Research Abstracts
Vol. 21, EGU2019-8997, 2019
EGU General Assembly 2019

Identification of two distinct OH infrared signatures in pyroxenes from pyroxenite xenoliths

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Water concentration in pyroxenes from mantle xenoliths is generally used to trace the water content of lithospheric mantle. However, the infrared OH signatures recorded by pyroxenes provides also important information on their previous equilibrium. We present results of infrared analyses of garnet pyroxenites xenoliths, two from the French Massif Central (Devès, FMC) and two from Cameroon (Youkou Maar, Adamaou, Africa). The FMC pyroxenites have low water content and present dominant OH bands at 3595, 3517 cm^{-1} and 3571, 3517 cm^{-1} for cpx and opx, respectively. The pyroxenites from Cameroon have high water content and have dominant bands at 3635, 3445 cm^{-1} and 3602, 3417 cm^{-1} for cpx and opx. Like for OH spectra from peridotite xenoliths from Nógrád-Gömör (Hungary), it was possible to isolate two distinct end-member spectra in pyroxenes (Patkó et al. 2019). Spectra signatures of cpx and opx are correlated, showing that they have both recorded the same events. The two end-members spectra clearly point out for two distinct spectral signatures related to distinct OH defects configurations.

The pyroxenites from FMC have crystallized at higher temperature than those of Cameroon (1050˚C versus 950˚C; France et al. 2015). These results suggest that the FMC pyroxenites have also crystallized in drier conditions than the ones from Cameroon or have experienced dry metasomatism after their crystallization.

References

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