Water content variations in basalts from geochemically heterogeneous Crozet hotspot

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The heterogeneity of mantle source compositions directly induces the chemical variations of basalts. The geochemical variability of basalts can be regarded as the expression of the heterogeneity of the deep mantle, after excluding the effects of late evolutional processes. Recently reported Sr-Nd-Pb-He isotopic data revealed that basalts from the Crozet hotspot can be divided into two groups: East and Possession lavas and Penguins lavas [1]. The Penguins lavas have more radiogenic Pb and Nd isotopic ratios and more primitive R/R_a (13.4 ± 0.5), but less radiogenic Sr isotopic ratios than the East and Possession lavas (8.2 ± 1.2) [1]. Breton et al. [1] have attributed this observation as a result of the variable contribution of three mantle components in the source of Crozet hotspot.

Clinopyroxene phenocrysts in basalts from different lava groups of Crozet hotspot were applied to retrieve water contents in primary melts based on the protocol proposed by Xia et al. [2]. The results show that East and Possession lavas have significantly lower water contents in their primary melts than Penguins lavas. Taking estimated melting degrees into consideration, the mantle sources of different lava groups have distinct water contents and H_2O/Ce ratios, indicating different formation processes for mantle sources. As Crozet hotspot has been proposed to cause the melting anomaly of the Southwest Indian Ridge between the Indomed and Gallieni Transform faults, the high water contents, as well as the high mantle temperature, provided by the materials related to Penguins lavas, should have played the role.

[1] Breton et al. (2013) *EPSL* **376**, 126-136. [2] Xia et al. (2013) *EPSL* **361**, 85-97.