

Water content in the Kerguelen mantle plume

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Water can significantly influence the physical and chemical properties of mantle rocks. To estimate water contents in mantle plumes is of great importance for understanding the generation, evolution and effect of individual plumes. Water content in the Kerguelen mantle plume has been estimated from submarine basaltic glasses sampled in the Northern Kerguelen Plateau (NKP) [1]. However, other geochemical signatures indicated that materials stemming from the Southeast Indian Ridge (SEIR) MORB source mantle had contributed more or less during the formation of the NKP [2]. Thus, to precisely assess water content of Kerguelen plume, basalts originally related to the Kerguelen plume, but not contaminated by the SEIR MORB source mantle, should be studied.

Picrites and high-MgO basalts, emplaced in the southeastern Kerguelen Archipelago with the age of 22-24 Ma, have been proposed to represent the direct partial melting products of the enriched Kerguelen plume endmember. Large amounts of clinopyroxene phenocrysts from these picrites and basalts were analyzed for water contents to retrieve the water contents in their primary melts according to the protocol proposed by Xia *et al.* [3]. Estimated primary water content is 2.0 ± 0.3 wt. %, remarkably higher than the estimation for NKP melts (0.25-0.69 wt. %) [2]. The model shows that water contents in the geochemically transitional glasses from the NKP fall in the mixing trend of our estimated primary melt and MORB. Based on the melting models, the Kerguelen plume source should contain water as high as 1000 ppm.

[1] Wallace (2002) *J. Petrol.* 43, 1311-1326. [2] Weis and Frey (2002) *J. Petrol.* 43, 1287-1309. [3] Xia *et al.* (2013) *Earth Planet. Sci. Lett.* 361, 85-97.