Water of the Canadian Cordillera and Slave craton lithospheric mantle

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Water, or trace H incorporated in mantle mineral defects, could be a key player in the evolution of continental lithosphere because of its influence on melting and deformation of the mantle [1]. Minerals from peridotite xenoliths are being analyzed for water by FTIR and for major elements by electron microprobe. The Alligator Lake xenoliths, representing mantle beneath the Phanerozoic belt of Western Canada, comprise lherzolites and harzburgites with contrasting trace element patterns, and are found in alkali basalts [2-3-]. Their orthopyroxene (opx) and clinopyroxenes (cpx) contain 27-150 and 46-361 ppm wt H_2O respectively. These concentrations are at the low end of the worldwide range of off-craton peridotite xenoliths [4]. Slave craton peridotite xenoliths, representing deeper mantle lithosphere beneath an Archean craton, ascended in kimberlites [5]. The cpx of the Lac de Gras suite from central Slave craton have similar water contents to those of Alligator Lake but those of the opx extend to 225 ppm H_2O [6]. Olivine water contents are low (< 5 ppm H_2O) at Alligator Lake which may be due to H loss during xenolith ascent, while olivines at Lac de Gras contain 30-85 ppm wt H_2O. Xenoliths from Jericho kimberlites in the northern Slave craton will also be analyzed to assess the role of water in cratonic roots and surrounding belts in cratonic root longevity.

[1] Peslier *et al*. 2010 *Nature* **467**, 78-81. [2] Francis 1987 *JP* **28**, 569-97. [3] Eiche *et al*. 1987 *CMP* **95**, 191-201. [3] Shi *et al*. 1997 *CMP* **131**, 39-53.[4] Peslier *et al*. 2015 *GGG* **154**, 98-117. [5] Kopylova *et al*. 2004 *JP* **45**,1045-1067 [6] Peslier *et al*. 2014 *Fall AGU*