

# Os-Hf-Nd Isotope Constraints on Subcontinental Lithospheric Mantle Evolution, Slave Craton (Canada)

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The Slave Craton is an amalgamation of Meso- and Neoproterozoic terranes, which is underlain by strongly stratified subcontinental lithospheric mantle (SCLM) with a ultradepleted shallow (SL) and a less depleted deep layer (DL) (Griffin et al., 1999). We have analysed the <sup>187</sup>Os/<sup>188</sup>Os of peridotitic sulfide from the deep layer by LAM MC ICPMS and the <sup>176</sup>Hf/<sup>177</sup>Hf and <sup>143</sup>Nd/<sup>144</sup>Nd of garnet (gt) and clinopyroxene (cpx) from peridotitic kimberlite-derived xenoliths by solution MC ICPMS to obtain constraints on the origin and evolution of the SCLM.

<sup>187</sup>Os/<sup>188</sup>Os of DL-sulfide ranges from 0.1002 to 0.4732 ( $\gamma_{Os} = -21.1$  to  $+272$ ), giving  $T_{RD}$  up to 3.9 Ga. A subset of samples lies on an isochron with an age of  $3.27 \pm 0.24$  Ga. This is older than the 2.7 Ga overlying terrane but coincides with crustal ages in the neighbouring terrane, suggesting subcretion of older beneath younger mantle during collision.

Nd-Hf isotope data were obtained from 2 SL-harzburgites and 8 DL-lherzolites. The two SL-harzburgites were metasomatised by a carbonatite-like melt leading to low  $\epsilon_{Nd}$  (-54) in one sample (<sup>176</sup>Hf/<sup>177</sup>Hf not measurable) and moderate  $\epsilon_{Nd}$  (2.6) but high  $\epsilon_{Hf}$  in another sample (+181). Both samples are argued to be at least 3.2 Ga old, suggesting that the SL has been subducted beneath 2.7 Ga crust along with the DL. The age of metasomatism is more difficult to constrain, due to multiple modification of parent/daughter, but the minimum age for the oldest metasomatism (lowest  $\epsilon_{Nd}$ ) is 2.3 Ga. Cpx in a DL-lherzolite with low  $\epsilon_{Nd}$  (-14.4) but radiogenic Hf (+43) may record the same metasomatic event. However, for most of the DL this older metasomatism was obscured by a younger overprint involving a silicate melt, which led to both Nd and Hf addition, and  $\epsilon_{Hf}$  and  $\epsilon_{Nd}$  around 0. The age of the younger metasomatism is constrained to <350 Ma based on near-constant  $\epsilon_{Nd}$  at variable Sm/Nd.

## References

Griffin, W.L., Doyle, B.J., Ryan, C.G., Pearson, N.J., O'Reilly, S.Y., Davies, R., Kivi, K., van Acherbergh, E. and Natapov, L.M., (1999), *J. Petrol.* 40. 705-727