



Proterozoic SCLM domains beneath Southern Patagonia

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Alkali basalt hosted mantle xenoliths from 3 different areas in South Patagonia were studied with regard to their petrography and chemical, as well as their Re-Os and Lu-Hf isotopic compositions.

The Pali Aike Volcanic Field (PAVF) located in the very south of Patagonia comprises sample localities Salsa, El Ruido and Potrok Aike. About 300 km north, in the western part of Patagonia, samples were collected at Tres Lagos and further north-east, within and at the edge of the Deseado massif, are sample localities Gobernador Gregores and Don Camilo, respectively.

The collected sample suite comprises sp-lherzolites, sp-harzburgites, one sp-dunite and exclusively within PAVF also sp-gt-lherzolites and sp-gt-harzburgites. Textures are mostly protogranular with very few samples showing weak foliation.

Whole rock Al_2O_3 and CaO contents range from 0.63 to 3.54 wt.% and 0.24 to 3.44 wt.%, respectively and exhibit a linear correlation with MgO ranging from 39.2 to 49 wt.%. The more refractory peridotites are represented by samples from the PAVF while samples from the Deseado massif are generally more fertile.

Indications for the formation age of SCLM domains can be provided using the Re-Os isotopic system. A suite of 24 modally unmetasomatised sp-lherzolites and sp-harzburgites analyzed for Re-Os isotopic composition reveals Neo- to Paleoproterozoic rhenium depletion ages. Don Camilo and Gobernador Gregores lherzolites indicate a SCLM formation in Mesoproterozoic times (0.9 to 1.3 Ga). Tres Lagos harzburgites reveal slightly older formation ages with a max. TRD of 1.7 Ga. Samples from within the PAVF vary more strongly in $^{187}\text{Os}/^{188}\text{Os}$ ratios with Neo- to late Paleoproterozoic TRDs. 3 refractory samples indicate an at least 2.4 Ga old formation age of the SCLM domain underneath PAVF.

Hf isotopic data combined with the information obtained from Os isotopic analyses provide new information on potential metasomatic overprints and their probable timing. Negative to low positive ε_{Hf} values (-7.7 to +6.6) for cpx separates from late Paleoproterozoic samples from PAVF indicate ancient Hf addition shortly after SCLM formation. PAVF samples with “younger” TRDs yield variable ε_{Hf} values between -17.1 and +23. Late Meso- to early Paleoproterozoic samples from Tres Lagos show slightly higher ε_{Hf} values between +15.2 and +52 and mantle xenoliths from within the Deseado massif yield ε_{Hf} between +5.8 and +41.5.

Hf isotope results reveal a metasomatic overprint of different degrees in the majority of the samples resulting in minor chemical alterations. This conclusion correlates with cpx laser ablation and whole rock trace element data illustrating an enrichment of LREE and/or MREE over HREE in most of the samples.