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# Geochemistry of basic magmatism of Western Antarctic Rift: implications for volatiles storage and recycling in the mantle

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The petrologic study of olivine-hosted melt inclusions (MIs) from alkaline primary Cenozoic basalts of Northern Victoria Land (Antarctica) provide new insights on the role of volatiles in the onset of rift-related magmatism. The concentration of volatile species ($H_2O$, $CO_2$, F, Cl) have been determined by Secondary Ion Mass Spectrometry (SIMS) on a selection of MIs which have been previously re-homogenized at high pressure and temperature conditions in order to avoid any heterogeneity and reducing the H diffusion. The least differentiated MIs vary in composition from basanitic to alkaline basalts, analogously to what is found in McMurdo volcanics, while their volatile concentrations reach up to 2.64 wt% $H_2O$, 3900 ppm $CO_2$, 1377 ppm F and 1336 Cl. Taking into account the most undegassed MIs a $H_2O/(H_2O+CO_2)$ ratio equal to 0.88 was determined, which in turn brings the $CO_2$ content in the basanitic melt with the highest water content up to 8800 ppm.

Major and trace element melting modelling indicate that basanite and alkali basalt composition can be reproduced by 3 and 7% of partial melting of an amphibole-bearing spinel lherzolite respectively. Assuming a perfect incompatible behavior for $H_2O$ and $CO_2$ these melting proportions allow to constrain the water and $CO_2$ contents in the mantle source in the range 780-840 and 264-273 ppm respectively. The resulting $CO_2$/Nb, $CO_2$/Ba and $H_2O$/Ce ratio are lower than those estimated for Depleted MORB Mantle (DMM), suggesting that the NVL Cenozoic alkaline magmatism could be originated by an enriched mantle source composed by a range from 70% to 60% of Enriched Mantle (EM) and from 30% to 40% of Depleted Morb Mantle (DMM).

A global comparison of fluid-related, highly incompatible and immobile/low incompatible elements such as Li, K, Cl, Ba, Nb, Dy and Yb allow to put forward that the prolonged (~500 to 100 Ma) Ross subduction event played a fundamental role in providing the volatile budget into the lithospheric mantle before the onset of the Cenozoic continental rifting.