

## Mantle reservoirs of Karoo flood basalts: New constraints from the Luenha picrites, Mozambique

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Mantle sources of Karoo flood basalts (~190–180 Ma) have been discussed for decades. Study of picritic lavas discovered by the Luenha River, central Mozambique, adds new constraints for these reservoirs. Luenha picrites can be associated with the extensive flood basalt plateau that was emplaced outside the developing Africa-Antarctica rift zone. They are characterised by high MgO (7–28 wt. %), low TiO<sub>2</sub> (0.3–1.0 wt. %) and notably high  $\Delta\text{Nb}$  values (0.4–0.6; representing enrichment of Nb relative to Zr and Y). Their generally flat REE patterns range from mildly LREE-depleted to LREE-enriched, and the initial Sr and Nd isotopic compositions from chondritic to enriched. Within-series geochemical variation indicates a general AFC evolution of the magma system. The least contaminated picrite sample represents the most Mg-rich and primitive composition described from the plateau-assemblage basalts of the Karoo province.

High positive  $\Delta\text{Nb}$  values observed in Luenha picrites cannot be generated by crustal or lamproitic contamination and are very likely to be inherited from the mantle source. Widespread Karoo plateau basalts also have positive  $\Delta\text{Nb}$ , whereas the Karoo rift-zone volcanics, including the uncontaminated DM-sourced ferropicrites, exhibit negative  $\Delta\text{Nb}$  values. Division of Karoo flood basalts into distinctive positive  $\Delta\text{Nb}$  and negative  $\Delta\text{Nb}$  subgroups resembles the dichotomy observed in the global MORB dataset and indicates different mantle sources for the rift-zone and plateau magmatism. The process that caused the relative Nb enrichment of the plateau reservoir remains unknown. Given the positive  $\Delta\text{Nb}$  character of the Karoo plateau-assemblage flood basalts, we suggest that an isotopically bulk Earth-like, Nb-undepleted, shallow reservoir of the Luenha picrites was a significant mantle source of the Karoo flood basalt magmatism outside the central rift-zone.