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Water contents on peridotite xenoliths from Southwest China

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Major and trace element and the water contents of clinopyroxene (cpx), orthopyroxene (opx), and olivine (ol) in peridotite xenoliths hosted by the Cenozoic basalts of Bazai in the junction of the Yangtze block, the South China block and the Ailaoshan fold belt were evaluated using electron microprobe, laser-ablation ICP-MS and Micro Fourier transform infrared spectroscopy, respectively. The correlations among the major elements of the minerals define a melting trend. Orthopyroxene is enstatitic with Mg# (Mg / (Mg + Fe)) between 0.89 and 0.91 and Al2O3 from 3.4 to 4.7 wt. %. Mg# of all minerals are negative correlation with Al contents and Ti, but positive to Cr. The value of Cr# in the spinel indicates that the degree of partial melting ranges from 2% to 15%. Mantle re-equilibration temperatures around 1000 °C implies that, after melt extraction and before exhumation to the ocean floor, the rocks experienced significant cooling in the spinel peridotite facies. Most samples (23 out of 30) show depleted chondrite-normalized rare earth element patterns and a degree of partial melting < 6%. The H2O contents (weight in ppm) of cpx, opx and ol are 141- 600 ppm, 95 - 174 ppm and 2 - 7 ppm, respectively. Based on the mineral modes, the calculated whole-rock H2O contents range from 37 to 115 ppm, similar to that of the MORB source (50 - 250 ppm). When combined with previously reported data for peridotites hosted by Cenozoic basalts at other localities of the South China Block (SCB) and the North China Craton (NCC), the Cenozoic lithospheric mantle of the NCC is dominated by much lower water content compared to the SCB and this junction (average 100 ppm vs. 20 ppm for whole rock H_2O contents), where lithospheric thinning occurred during the Mesozoic. In conclusion, the block junction undergo different lithospheric action or that the mechanism of the lithospheric thinning was different.

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