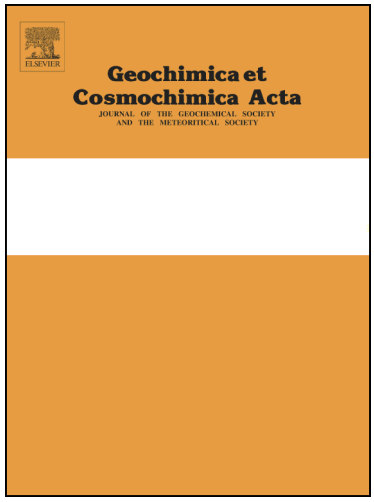

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The redox budget of crust-derived fluid phases at the slab-mantle interface

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Abstract

The redox processes taking place in the portion of the mantle on top of the subducting slab are poorly investigated and the redox potential of crust-derived fluid phases is still poorly constrained. A case study of supra-subduction mantle affected by metasomatism from crust-derived fluid phases is represented by garnet orthopyroxenites from the Maowu Ultramafic Complex (China) deriving from harzburgite precursors metasomatised at ~4 GPa, 750-800 °C by a silica- and incompatible trace element- rich fluid phase. This metasomatism produced poikilitic orthopyroxene and inclusion-rich garnet porphyroblasts. Solid multiphase primary micro-inclusions in garnet display negative crystal shapes and infilling minerals (spinel, ±orthopyroxene, amphiboles, chlorite, ±talc, ±mica) occur with constant modal proportions, indicating that they derive from trapped solute-rich aqueous fluids. FT-IR hyper spectral imaging analyses and F06D□□□□□Raman spectroscopy, together with X-Ray microtomography performed on single inclusions indicate that liquid water is still preserved at least in some inclusions (±spinel).

To investigate the redox budget of these fluid phases, we measured for the first time the Fe^{3+} concentration of the micron-sized precipitates of the multiphase inclusions using EELS on a