

DEEP SUBDUCTION OF MANTLE-DERIVED GARNET PERIDOTITES FROM SU-LU UHPM TERRANE IN CHINA

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Garnet peridotites from the Chinese Su-Lu ultrahigh-pressure metamorphic terrane contain garnets with aligned inclusions comprising a low P-T mineral assemblage (chlorite, hornblende, gedrite, sodium phlogopite, talc, spinel, and pyrite). Orthopyroxene and clinopyroxene show exsolution lamellae from each other. Matrix pyroxenes and garnets crystallized at the expense of olivine, as a result of metasomatism by SiO₂-rich melt. The Mg/(Mg+Fe) ratios of garnets decrease from core to rim, while compositions of pyroxenes are similar in terms of Ca-Mg-Fe. The Mg-rich cores of garnets and reconstructed pyroxenes record high T-P (~1000 °C, 5.1 GPa), whereas the matrix minerals record much lower T-P (~760 °C, ~4.2 GPa). Sm-Nd data give ages of ~380 Ma, which are meaningless because isotopic disequilibrium between garnet cores and the rest of the rocks was caused by melt/fluids from crustal materials. The Rb-Sr systems of phlogopite and clinopyroxene reached equilibrium and record cooling ages of ~205 Ma. It is suggested that the garnet peridotites were originally emplaced into a shallow level prior to the ~220 Ma continental collision, during which they were subducted together with crustal rocks to mantle depth. An important corollary is that at least some of the coevally subducted crustal rocks have been subjected to metamorphism at P-T much higher than presently estimated (2.7 GPa, 800 °C).