

**GARNET-SPINEL METAPERIDOTITES AND SPINEL-GARNET PYROXENITES  
FROM ORGANI-KIMI AREA IN THE EASTERN RHODOPE ULTRAHIGH-  
PRESSURE METAMORPHIC TERRANE (N.E. GREECE): IMPLICATION FOR  
MANTLE PROCESSES IN CONVERGING PLATE SETTING**

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In East Rhodope, UHP metamorphism is recorded in crustal rocks of the uppermost Kimi Complex, with peak P-T conditions of ~ 6 GPa and ~ 1150 °C (Mposkos et al., this volume). Boudins of garnet-spinel metaperidotites containing spinel-garnet pyroxenites occur within the UHP crustal rocks near the Kimi and Organi villages. The metaperidotite has the mineral assemblage: Ol + Opx + Cpx + Spl + Grt + Hbl. Grt (Grs<sub>13-17</sub>Prp<sub>58-62</sub>Alm<sub>22-24</sub>Sps<sub>1-2</sub>Uv<sub>1.6-2.3</sub>) is rarely preserved as inclusions in olivine, orthopyroxene, spinel and hornblende. Two pyroxene and three spinel generations record successive decompression and cooling of the former garnet peridotite. Opx-1 and Cpx-1 contain exsolution lamellae of spinel and clino- and orthopyroxene, respectively. Opx-2 and Cpx-2 are exsolution free. Spl-1 with Cr# [Cr/(Cr+Al)] 0.27 - 0.48 forms replacing garnet. Spl-2 (Cr# 0.12 - 0.19) grows around Spl-1, interstitially between Px-2 and as exsolution lamellae in Cpx-1 and Opx-1. Spl-3 (Cr# 0.03 - 0.05) forms symplectites with enstatite + diopside / or hornblende. Spl-Grt clinopyroxenites occur as mm to cm thin layers within the peridotites. They are interpreted as HP cumulates crystallized in the garnet pyroxenite stability field and subsequently deformed and recrystallized at high temperatures and pressures. Pyroxenites contain Grt + Cpx + Spl ± Ol + Hbl + Ilm. Two clinopyroxene generations record post-magmatic recrystallization processes. Cpx-1 shows zoning with decreasing Al<sub>2</sub>O<sub>3</sub> from 3.5 wt% in the core to 2.5 wt% in the rim. Garnet lamellae and garnet + spinel lamellae are exsolved from the core of Cpx-1 at two successive stages of cooling and decompression. Cpx-2 is homogeneous and exsolution-free. Cpx2 is similar in composition with the exsolution free Cpx-1 rims.

Due to the continuous change of the chemical composition of the primary minerals during ascent and cooling, the record of maximum P-T conditions of the original garnet peridotite is largely erased. Recalculated Cpx-1 and Opx-1 compositions from metaperidotite yielded temperatures and pressures of 1060 °C and 2.2 - 2.5 GPa, respectively. The gradual decrease of Cr# in Spl-1 toward the rim from 0.45 to 0.15, the continuous decrease of the Cr# in the matrix Spl-2, the formation of Cpx and Opx and Spl-2 exsolution lamellae in Opx-1 and Cpx-1 of the metaperidotite and the garnet exsolutions in Cpx-1 of the pyroxenite, indicate successive cooling, and possible decompression within the enlarged garnet-Cr bearing spinel peridotite stability field. Indicators for a possible subduction path are not present in the metaperidotite and pyroxenites. The Grt-Spl metaperidotites and the associated Grt-pyroxenites represent mantle fragments intruded into the crustal rocks during/or after peak pressure conditions during ascent.