

Subduction fluids in the Cabo Ortegual Complex (NW-Spain) – a multiphase inclusion study

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Fluid inclusions in exhumed HP eclogites from the Cabo Ortegual Complex (COC, NW-Spain) provide direct record on fluid-related processes in a former subduction zone. Multiphase solid inclusions (MSI), trapped in garnet porphyroblasts, can represent supercritical silicate-rich aqueous fluids, which play an important role in subduction zones [1, 2].

The studied HP metamorphic assemblage is thought to represent a complex tectonothermal history as a result of subduction and exhumation [3]. Peak conditions of prograde metamorphism reached 1.6–1.8 GPa and 780–900 °C, which was followed by retrograde metamorphism under amphibolite and greenschist facies conditions [3]. Although the studied eclogites show textural evidences of retrograde metamorphism (e.g. amphiboles, zoisite, symplectites), migrating fluids/melts of greater depth, coexisting with garnet, have preserved as MSI in garnet. Petrography revealed that these MSI are primary and present in significant amounts in cores of garnets. They appear in variable sizes (from 5 to 40 µm in diameter) in polygonal or irregular shapes. At room temperature MSI consists of aggregates of several solid phases. Raman imaging of unexposed, together with SEM-EDS of exposed MSI revealed the presence and distribution of mainly micron-submicron sized Mg-calcite, siderite, ankerite, α-quartz, white mica, disordered carbonaceous material and apatite, and a residual fluid phase (CH₄ 52-58 mol. %, N₂ 23-28 mol. % and CO₂ 18-22 mol. %) between the aggregates of solids and around the wall of the inclusions. Our results support the idea that MS inclusions of eclogites in the COC might serve as direct records of a supercritical fluid preserved at subduction zone conditions.

[1] Manning (2004) *EPSL*, **223**, 1-16.

[2] Frezzotti & Ferrando (2015) *Am Miner* **100**, 352-377.

[3] Henry *et al.* (2017) *EPSL*, **472**, 174-185.