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Tectonic evolution of blueschist-facies rocks within the Phyllite-Quartzite Unit of the External Hellenides (Mani, Greece)

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The Phyllite-Quartzite Unit (PQU) of the southern Peloponnese (Mani, Greece) experienced HP-LT metamorphism as result of eastward-directed subduction of the Adriatic plate beneath the Eurasian plate during the Late Oligocene to Early Miocene. On the basis of macro-, micro-scale and LPO textures the PQU experienced four deformation stages: D1 – uniaxial stretching, D2 – rotational shearing and folding, D3 – folding and D4 – extension. Superposition of D2 related shear folds F2 and subsequent open-spaced folds F3 (D3) indicate a large-scale F2/F3 fold interference pattern including relics of earliest F1 constriction folds. Microstructures of blueschist-facies micaschists contain chloritoid 1 porphyroblasts including an earliest foliation S1 which was overprinted by SSW directed shearing (D2). Blueschists show syngenetic chloritoid 1 and glaucophane, both rotated parallel to the dominant foliation S2 consisting of mica and graphite. Fluid inclusions microthermometry was performed using foliation-parallel shear band boudins (Qtz1) as well as late stage D4 extensional quartz boudin necks (Qtz2). Fluid data combined with rheological characteristics has been used to constrain conditions for deformation stages along a published P-T path representative for the southern Peloponnese. Fluid density isochores related to Qtz1 indicate density loss from peak conditions down to ca. 6 kbars along non-isochoric exhumation (isothermal decompression between 450-500°C) and deformation stages D1-D3. Conditions <6 kbar and 400°C for deformation stage D4 has been derived by primary fluid inclusions in Qtz2 subsequent to isobaric cooling.