

High-Pressure Metamorphism, Retrogression, and Shearing in the Cycladic Blueschist Belt, Greece: The Rb-Sr Record

Glodny, Johannes¹ Ring, Uwe² Will, Thomas³

¹GFZ Potsdam, Telegrafenberg, D-14473 Potsdam ²Dept. of Geological Sciences, University of Canterbury, Christchurch, New Zealand ³Lehrstuhl für Geodynamik, Universität Würzburg, Am Hubland, D-Würzburg

The Cycladic high-pressure (HP) rocks form a remarkably broad belt of eclogites, blueschists, and their retrogressed equivalents. The timing of HP metamorphism is controversially discussed, with published ages roughly between 80 and 30 Ma. The blueschist belt is commonly considered as an internally largely continuous unit. Consequently, some authors invoked near-contemporaneous HP metamorphism all over, with various degrees of later blueschist or greenschist facies overprints. Alternatively, regional discrepancies in ages for HP rocks have been attributed to the variable efficiency of distinct metamorphic mineral growth events, with dominance of different events in different tectonometamorphic slices.

Field observations show that most eclogites experienced post-eclogitic overprints extending over different scales. Incipient blueschist or greenschist facies retrogression along grain boundaries and cracks is abundant. In places, static conversion of eclogites to blueschists is observed, related to fluid influx. Elsewhere, shear zones cut eclogites and show blueschist facies assemblages. Similar field relations are evident for static and dynamic conversion of both eclogites and blueschists to greenschists. Nearly complete conversion of high-pressure rocks to greenschists was achieved regionally, like in the southeastern parts of the island of Sifnos, whereas in other places, like northern Syros, greenschist facies metamorphism is restricted to m-wide domains in shear zones and fluid pathways.

The Rb-Sr system of white mica is thermally stable up to temperatures in excess of 550°C, whereas it may be fully reset even at lower greenschist facies conditions by dynamic or fluid-induced recrystallization. A metamorphic event that has led to full isotopic equilibration in a white-mica-bearing assemblage can thus be directly dated utilizing Rb-Sr multimineral isochrons, given that no later recrystallization-inducing overprints occurred.

Combining careful structural, petrological and microtextural investigations with Rb-Sr multimineral data, we aim at deciphering the metamorphic and deformation history of HP rocks on the islands of Syros, Sifnos, Tinos and Naxos. In northern Syros, eclogite facies metamorphism is dated at ~50 Ma, in concordance with published U-Pb and Lu-Hf data. First signals for greenschist facies overprint occur at ~40 Ma. In contrast, in parts of Sifnos peak pressure was reached at ~40 Ma, with greenschist facies conditions following at ~30 Ma. These first results indicate that subduction was continuing during exhumation and partial retrogression of earlier-subducted HP nappes, a process that kept suprasubduction zone thermal gradients low and facilitated preservation of large volumes of HP rocks. We propose a tectonic model of a southward migrating convergent margin underthrusting and exhumation system, which generated the Cycladic blueschist belt as a series of nappes, and persisted at least from the Early Eocene to the Late Oligocene.

Abs. No. **438**
Meeting: **DMG 2008**
submitted by: **Glodny, Johannes**
email: **glodnyj@gfz-potsdam.de**
date: **2008-06-01**
Req. presentation: **Poster**
Req. session: **S07**