A new Miocene detachment from Antiparos Island (Cyclades, Greece)

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Numerous studies throughout the world have focused on the structure and evolution of metamorphic core complexes and the exhumation of subducted rocks in back-arc areas of orogenic belts. The Cycladic Islands (central Aegean Sea, Greece) are key areas for studying mechanisms of high-pressure rock exhumation. In that domain, the highly attenuated upper plate is preserved only as sparse extensional allochthons in the hanging wall of crustal-scale detachments. Several detachment systems have been identified on a number of islands indicating overall bivergent extension during the late Oligocene–Miocene. The island of Antiparos is situated at the center of the Cyclades, SW of the larger Paros Island where the top-to-N Paros-Naxos Detachment has exhumed pre-Alpine basement and metamorphosed Permian-Mesozoic rocks of the Cycladic Blueschist Unit (CBU). The tectonostratigraphic relationship of an enigmatic element, the Dryos Unit, remains unclear.

Detailed mapping in Antiparos revealed the existence of a sub-horizontal normal fault along the eastern coast of the island. This fault juxtaposes CBU in the footwall against the Dryos Unit and scarce (?)late Miocene clastic sediments in the hanging wall.

The CBU occupies most of the island and consists of marble alternating with schists and gneiss layers. The earlier HP assemblages are totally overprinted by mainly amphibolite facies metamorphism. An axial plane foliation to NE-SW isoclinal folds is accompanied by NE-SW stretching lineation. As indicated by recrystallization of feldspars and high-grade deformation mechanisms these structures formed under amphibolite facies conditions. Towards the detachment the foliation is reworked by a brittle-ductile mylonitic foliation and a brittle-ductile S-C’ fabric can be observed.

Numerous kinematic indicators such as σ- and δ-clasts, Riedel shears, flanking structures S-C’ fabric, observed within the ultramylonitic rocks of the footwall and the mylonites/cataclasites of the hanging wall indicate top-to-NE sense of shear, comparable to the sense of shear in the Paros-Naxos detachment.

The Dryos Unit is observed only along the central eastern coast of Antiparos, above the low-angle
detachment and comprises lower grade (greenschist facies) metabasite, calc-phyllite and pink marble. Deformation in the structurally upper part is characterized by intense refolding and a steep axial plane foliation. At the structurally lower part a strong mylonitic foliation prevails, overprinted by intense cataclastic deformation. The stretching lineation is mostly NW-SE but in the lower part and towards the detachment it rotates to NE-SW. The late Miocene sediments are found adjacent to the Dryos rocks in two localities, comprising mainly sandstone, mudstone and conglomerate in which, large blueschist clasts are abundant.

The new data presented in this study combined with existing data from Paros Island substantially add to the continuation and structure of the complex Paros-Naxos detachment system, domed at an island scale. Furthermore, it suggests that most probably the Dryos Unit is not an upper part of the Cycladic Blueschist Unit but belongs to a different unit, possibly of Pelagonian origin.