



The Mt. Ochi melange (South Evvia Island, Greece): a case study for HP metamorphism and syn-convergent exhumation.

Eleni Moustaka (1), Konstantinos Soukis (1), Benjamin Huet (2), Stylianos Lozios (1), and Andreas Magganas (1)

(1) Faculty of Geology and Geoenvironment, National and Kapodistrian University of Athens, Athens, Greece, (2)

Department for Geodynamics and Sedimentology, University of Vienna, Vienna, Austria

The Attic-Cycladic complex (central Aegean Sea, Greece) experienced profound extension since at least the Oligo-Miocene boundary during which the previously thickened crust was reworked by a series of detachments forming the NE directed North Cycladic Detachment System (NCDS) and the SSW directed West Cycladic Detachment System (WCDS). South Evvia Island is located at the northwestern part of the Attic Cycladic complex linking the highly thinned and polymetamorphosed central part of the complex with mainland Greece. Furthermore, greenschists-facies retrograde metamorphism has only partially overprinted the HP mineral assemblages. Consequently, it is an ideal area to study tectonic processes associated with subduction, HP metamorphism and subsequent exhumation from eclogitic depths to the surface.

Geological mapping in 1:2:000 scale revealed that the tectonostratigraphy of Mt. Ochi includes three distinct units all metamorphosed in HP conditions followed by greenschist facies overprint. These units are from top to bottom a) the Ochi Unit, a thick metavolcanosedimentary sequence with some intensely folded cipoline marble intercalations and isolated occurrences of metabasic rocks b) the ophiolitic mélange (metagabbros, metawherlites, peridotites, metabasites within a metasedimentary+serpentinite matrix) and c) the lowermost Styra Unit, a cipoline marble-dominated unit with thin mica schists and rare quartzitic layers often boudinaged. The thrust fault that was responsible for the juxtaposition of these three units acted in an early stage during HP metamorphism and it was isoclinally folded and sheared by the following syn-metamorphic deformation events.

Detailed structural study in meso- and microscopic scale combined with petrological and geochemical analyses of the Mt Ochi rocks led to the distinction of at least three syn-metamorphic and two post-metamorphic deformation episodes that affected all units. The oldest structure identified is a relic foliation formed by the mineral assemblage Na-amphibole + lawsonite seen as inclusion in epidote porphyroblasts within the mélange. It could represent a structure of the prograde path but it could also have formed during the peak HP event. This is followed by successive folding episodes that are related to axial plane foliations and a ~E-W intersection/stretching lineation formed by typical blueschist- to epidote-blueschist facies mineral assemblages. The main foliation that can be observed in all three units is a greenschist-facies axial plane foliation accompanied by a ~ENE-WSW stretching lineation. The shear sense during the prograde path is constantly towards the WSW. In the greenschists-facies an unambiguous top-to ENE can be observed mostly in mylonitic rocks. The following deformation episodes include semi-brittle to brittle structures (shear bands brittle open folds, crenulation cleavage, and faults with increasingly higher-angle) that are not as penetrative and record the passage of the units through the brittle-ductile transitions and to higher structural levels. The kinematics of these late episodes is also towards the NE.

Based on the above, the Mt Ochi HP units exhibit a common tectonometamorphic evolution since at least the early stages of the prograde path. The Ochi Unit/Styra Unit contact is a structure that formed prior to or during peak HP metamorphism and therefore it couldn't have served as the normal fault to an extrusion wedge.