



Exhumation of HP-LT metamorphic rocks in the Cyclades. What do Pressure-Temperature-time-strain paths tell us ?

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High Pressure – Low Temperature (HP-LT) rocks testify for burying and exhumation of crustal material in subduction zones. Their complete exhumation is the result of processes acting during (syn-orogenic) and after (post-orogenic) subduction is active, the latter partly obliterating the first. In the Aegean domain, the Attic-Cycladic Blueschist unit (ACBU) is a HP-LT unit exhumed in metamorphic core complexes (MCCs) in the back-arc domain of the Hellenic subduction zone. This study is an attempt to distinguish features related to syn-orogenic exhumation processes responsible for the first stages of exhumation

This syn-orogenic “message” has to be read through the post-convergence structural and thermal overprint that accompanied the formation of the MCCs. Particularly, the geometry, the timing and the amount of the syn-orogenic exhumation has to be determined. We investigate these features with coupled field, metamorphic petrology and radiochronology studies

First, based on observations on Ios (southern Cyclades), it has recently been proposed that syn-orogenic exhumation of the ACBU was accommodated by a basal thrust over the Cycladic Basement (CB) [Huet, et al., 2009]. The peak conditions, deduced from pseudosections calculation for the Ios main lithologies, are 500 °C-19 kbar for the ACBU and 550 °C-16 kbar for the CB. Exhumation until 400 °C-8 kbar is considered as syn-orogenic. Second, phengites populations, single grains and in situ ⁴⁰Ar-³⁹Ar geochronology has been carried out on samples from Tinos and Andros (northern Cyclades), Syros (central Cyclades) and Ios. The results gather in several clusters: 50-55 Ma, 40-45 Ma, 30-35 Ma, and 22-26 Ma.

Based on these new P-T-t data and a synthesis of published data, we are able to refine the geometry and the timing of the exhumation of the ACBU. Data from the whole Cyclades exhibit little differences in ages and P-T conditions for the successive stages of exhumation. The peak of pressure (500±50 °C-18±1 kbar) has been reached at 50-55 Ma from Tinos to Ios. The onset of the exhumation occurred at 40-45 Ma in blueschist facies conditions, between a thrust at their bottom and a detachment at their top. The following decompression was accompanied by cooling until 30-35 Ma (400±50 °C-8±1 kbar). At that time, the boundary conditions switched to extension.

Finally, we propose a model for the exhumation of HP-LT units accounting for these data. We also consider the rheological implications of the syn-orogenic structuration of the Aegean wedge on the post-orogenic evolution.

B. Huet, L. Labrousse, and L. Jolivet [2009] Thrust or detachment? Exhumation processes in the Aegean: Insight from a field study on Ios (Cyclades, Greece), *Tectonics*, 28, 3, doi:10.1029/2008TC002397.