



## **Tectonic evolution of the western boundary of the Attico-Cycladic complex (Lavrio, Greece)**

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The Lavrio peninsula, South East of Athens, is located along the western boundary of the Attic-Cycladic Metamorphic Complex in the internal zone of the Hellenic orogenic belt, at the intersection between thrusts and detachments. It is thus a perfect target to decipher the tectonic evolution of an orogenic wedge from tectonic accretion to gravitational collapse. The nappe stack is overlain by a non-metamorphic limestone and is made, from top to bottom by (i) an ophiolitic melange, (ii) the Lavrio tectonic unit dominated by schists and displaying mineral paragenesis typical of blueschist facies, (iii) the Kamariza tectonic unit dominated by marbles and affected by pervasive greenschist facies metamorphism. The Lavrio and Kamariza tectonic units are juxtaposed by a low-angle mylonitic to cataclastic detachment. A more detailed investigation of the relationships between mineral paragenesis and microstructures indicates that the transition from the Lavrio to the Kamariza tectonic units, across the low-angle detachment, is marked by progressive transposition of the blueschist facies fabric coeval with retrogression under greenschist facies conditions. Indeed, the Kamariza unit is characterized by a relatively steep foliation associated with isoclinal folds of weakly organized axial orientation that is partially to totally transposed into a shallow dipping foliation bearing a N-S trending lineation. The degree of transposition increases from top to bottom and is particularly marked at the transition from the Lavrio to the Kamariza unit across the low-angle detachment. The blueschist facies foliation of the Lavrio schists is underlined by glaucophane and HP phengite intergrown with chlorite crystals. The Kamariza tectonic unit is dominated by LP phengite intergrown with chlorite but contains relics of the blueschist mineral paragenesis. Detailed microprobe mapping of the composition of the phengite and chlorite crystals reveal distinct variations of the PT conditions recorded as a function of structural level and microstructural position. The Lavrio tectonic unit is characterized by a large range of metamorphic pressure (12 to 7 kbar) associated with a temperature ranging between 250 and 320 °C. In contrast, the Kamariza unit has preserved a first set of HP/LT conditions (10 kbar, 300 °C) partially to totally transposed-retrogressed into a mineral assemblage characteristic of lower pressure (~7 kbar) and a slight but significant increase in temperature (350 °C).

This combination of structural, petrologic and thermobarometric data documents a first phase of tectonic accretion of the Hellenic orogenic wedge characterized by successive burial at blueschist facies conditions and exhumation without thermal relaxation that is preferentially preserved at high structural level in the Ophiolitic mélangé and in the Lavrio schists. The destruction of the Hellenic wedge is marked by gravitational collapse and final exhumation after thermal relaxation of the orogenic root preferentially expressed by transposition-retrogression of the blueschist facies mineral assemblage in a shallowly-dipping greenschist facies foliation associated with an increase in temperature.