



## **NW termination of the West Cycladic Detachment System on the Lavrion Peninsula, Greece: results from mica $40\text{Ar}/39\text{Ar}$ geochronology**

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The West Cycladic Detachment System (WCDS) has been mapped from the western Cycladic islands to the Lavrion peninsula, where several top-to-SSW low-angle normal faults at different structural levels are observed. The dominant detachment juxtaposes lower plate schistose to mylonitic rocks of the Kamariza Unit against the upper plate Lavrion Unit. The Kamariza Unit exhibits a NNE-SSW stretching lineation whereas the main foliation in the Lavrion Unit is a compressional crenulation cleavage with ENE-WSW to NE-SW stretching and intersection lineations. Kinematic indicators reveal top-to-SSW sense of shear, and along the detachment both units are overprinted by cataclastic deformation and high-temperature metallic ore mineralization. White mica-bearing schists and marbles were collected for microstructural and  $40\text{Ar}/39\text{Ar}$  geochronology. Quartz crystals in all samples show subgrain rotation and bulging of grains, indicated by lobate grain boundaries. These same rocks contain interconnected elongated mica crystals, which are kinked or internally deformed by C'-type shear zones. White mica is rarely prismatic, and chemical mapping highlights the chemical zonation of the muscovite. Calcite, when present, exhibits curved and tapered twins. Glaucofanite and chlorite pseudomorphs of glaucophane are preserved in the Lavrion Unit. New single-crystal  $40\text{Ar}/39\text{Ar}$  geochronology on muscovite from the upper plate Lavrion Unit of the peninsula yields ages between 35-28 Ma, and together with published zircon (U-Th)/He dates of 16-12 Ma and preservation of glaucophane suggests these rocks did not witness the dominant Miocene greenschist facies deformation that characterizes the WCDS. One muscovite sample along the west coast at Thimari yielded an  $40\text{Ar}/39\text{Ar}$  age of c. 175 Ma (duplicate analyses) and maybe part of the Sub-Pelagonian Berzekos Unit. Comparatively, the Kamariza Unit yields Early to Middle Miocene  $40\text{Ar}/39\text{Ar}$  ages, and coupled with Late Miocene zircon (U-Th)/He ages and top-to-SSW shear sense, suggests these footwall rocks experienced the same extensional tectonism as the other WCDS footwall exposures of Makronisos, Kea, and Kythnos. Moreover, the Miocene geology of Lavrion peninsula is strikingly similar to Serifos island on the southeast termination of the WCDS. Pinning the ends of the detachment system, the geology of Lavrion and Serifos both include late-tectonic granodiorite plutons intruded at c. 10 Ma into the low-angle normal fault contact that cuts different structural levels of the Cycladic Blueschist Unit, which preserves an Eocene-Oligocene cooling signature and ENE-WSW trending lineations. The western Cyclades including the Lavrion peninsula can be resolved into a coherent and uniform tectonic progression commencing in the Eocene involving ENE-WSW to NNE-SSW ductile to brittle extension through the Miocene, localized plutonism at the tips of the detachment system, and relatively rapid cooling of the footwall.