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Multiphase shear zones with south directed kinematics in the Western Cyclades (Greece)

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Crustal extension in the Aegean region has been accompanied by formation of metamorphic core complexes and multistage shear zones since the Oligocene. Models for the Cyclades are mostly based on detailed investigations in the Eastern and Central Cycladic islands showing north-directed kinematics within different tectonic regimes from the middle to the upper crust.

This work is part of Project ACCEL (Aegean Core Complexes along an Extended Lithosphere) focusing on pioneering investigations on petrology, geochronology and structural geology in the Western Cyclades.

First results of field work data and detailed micro-structural observations and descriptions of newly discovered major shear zones on the islands of Kea and Serifos show evidence for a multiphase history with south-directed kinematics. Whereas on Serifos an approximately two hundred meter thick high-strain zone of orthogneisses has been deformed under amphibolite to greenschist facies conditions, on Kea a several hundred of meters stack of strained greenschist material can be observed. On these two islands, low-angle, lower greenschist facies shear zones, typically consisting of up to dozens of meters thick ultra-fined grained marble mylonites accompanied by ultra-cataclasites may be present.

These studies show the importance of the tectonic regime in the Western Cyclades and point to a geodynamic evolution with strikingly consistent south-directed kinematics.