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Tertiary SSW directed crustal extension in the Western Cyclades: A new kinematic domain in the Aegean region (Greece)

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The Aegean region together with the surrounding mainland areas are known for active tectonics, which are the results of westward escape of Anatolia, relative to Eurasia, and southward extension of the Aegean region. These plate motion regimes are complemented by active subduction and probable slab retreat of African lithosphere beneath the Aegean at the Hellenic trench system south of Crete. This syn-convergence extension has migrated southwards over time probably starting with the Oligocene/Miocene crustal extension in the Cyclades. Almost all models seeking to explain the Tertiary geodynamic history of the Aegean are based upon knowledge from detailed investigations of metamorphic core complexes in the Eastern Cyclades. In the Western Cyclades however, the kinematics of any crustal extension are either disputed (being inferred via extrapolation of what is known for the metamorphic core complexes in the Eastern Cyclades) or completely unknown.

Project ACCEL (Aegean Core Complexes along an Extended Lithosphere) has collected equivalent datasets for the eastern Cyclades based on pioneering modern structural field mapping on the islands of Kea, Kithnos and Serifos in the Eastern Cyclades. On all three islands, crustal-scale, low angle, frictional-viscous shear zones have been identified. These shear zones typically consist of several meters up to tens of meters thick ultra fine-grained, lower greenschist facies marble mylonites with localized zones or sub-parallel layers of ultra-cataclastic deformation overlain by proto-cataclastic rocks. On all three islands, these shear zones are associated with mega-

boudins of serpentinites. Both the frictional and the viscous stretching lineation record a strikingly consistent SSW directed extensional faulting. On Serifos, these fault zones are syntectonically intruded by a Late Miocene granodiorite, which intrudes a more than hundred meter thick high-strain zone that deforms an earlier granitic pluton at temperatures above $\sim$500˚C resulting in plattengneiss type mylonites with SSW directed shear. Preliminary ion microprobe U-Pb investigations on zircons suggest a Late Eocene crystallization age for this earlier pluton.

These observations reveal that the entire W-Cyclades including Kea, Kithnos and Serifos are a hitherto unrecognized, roughly 200x100 km in area, lithospheric domain with strikingly consistent SSW directed crustal-scale extensional shear.