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ABSTRACT

This study presents in-depth geometric and kinematic analyses of a complex transpressional shear zone (Fellos Shear Zone, FSZ) that integrates structural mapping with microstructural and quartz crystallographic texture data. The FSZ strikes NE-SW and formed in the short limb of a map-scale antiform. The foliation pattern within the zone indicates dextral shearing whereas the macroscopic object lineation is dispersed over a half great-circle girdle along the mean mylonitic foliation. Based on this deformation pattern, the FSZ could be interpreted as a dextral, NE-directed triclinic transpressional zone. However, the integration of field-based with microtectonic data reveal a more complicate kinematic history. We show that the elongation trend is dispersed along an entire great-circle girdle when we take into account the trends of incremental elongations, recorded by fabrics with different strain memories. Mapping of incremental shear directions implies that the FSZ initiated as a NE-directed dextral transpressional shear zone, and progressively evolved into a NW-directed dextral zone. The passage from NE- to NW-directed shearing was accompanied by transpression whilst local transtension likely occurred during the last stages of ductile deformation. Deformation in the FSZ ended up, at semi-ductile conditions, with localized NE-directed dextral shearing. Our study demonstrates that the integration of field observations and fabrics/microstructures that have different strain memories is a powerful tool for unravelling the complex kinematics of high-strain zones.

Keywords: Ductile shear zone; object lineation; quartz fabrics; triclinic deformation; Cyclades

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