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GEOSITES

Eye-type folds at the Palmi shear zone (Calabria, Italy)

The Palmi shear zone (Calabria, southern Italy) trends—WNW and is of crustal-scale. It developed during the Eocene strike-slip tectonics (Ortolano et al. 2013; Festa et al. 2016) affecting the Calabria-Peloritani terrane (Cirrincione et al. 2015) in the central Mediterranean area during the Alpine Orogeny (51–56 Ma, biotite Rb–Sr age; Prosser et al. 2003). The mylonitic rocks consist of remnants of the southern European Hercynian metamorphic basement: migmatitic paragneisses, skarns and tonalites. Marked differences of lithologies sheared and attained greenschist facies (0.6 GPa, 410 °C: Prosser et al. 2003). This produced a strong rheological contrast and strain localized within carbonates. At this outcrop (SP102 road; geographic coordinates: N 38°22′52.06″N; 15°51′44.15″E) beautiful examples of eye-type folds are visible at various scales. Eye-shaped folds are usually absent in moderately strained shear zones (Mukherjee 2013, 2014a, 2015). However, flanking structures (review in Mukherjee 2014b) and intrafolial folds (review in Mukherjee et al. 2015) on high strain can resemble/produce sheath folds. Eye-type folds are very complex structures often occurring in ductile high strain shear zones dominated by simple shear (Alsop and Carreras 2007) displaying more than 90° hinge-line curvature and usually a typical elliptical Y-Z cross section of the finite strain ellipsoid (Alsop and Holdsworth 2004, 2006). Their overall vergence and minor related en-echelon tongues help to define the shear sense or flow transport direction (Alsop and Carreras 2007). The photograph (width of view ~2 m) shows a sheath fold truncated upwards by a sub-horizontal dipping minor shear plane occurring in the calc-silicates bearing skarns. The morphology shown here resembles fairly a box type fold due to the closure of lower limbs, nevertheless this geometric shape of sheath fold cross section is commonly observed (Reber et al. 2012, 2013). Our research group is presently working on the detail of such eye-type folds by doing a careful collection of structural elements such as axial surfaces, interlimb/apical angles, hinge orientations, by also considering transport direction deduced form minor associated S- and Z-type folds.

E. Fazio (✉) · G. Ortolano · R. Cirrincione
Department of Biological, Geological and Environmental Sciences – Earth Sciences Section,
University of Catania, Corso Italia 57, 95129 Catania, Italy
e-mail: efazio@unict.it

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