Rheology and kinematics of the early-Alpine strike slip tectonics in the southern Calabrian terrane: the case of the Palmi shear zone (southern Italy)

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The Paleocene early-Alpine drifting of the Kabilo-Calabride crystalline basement microplate was controlled by deep rooted strike-slip tectonics, developing several crustal-scale shear zones which accommodate part of the African verging transport of these internal sectors of the Paleo-Alpine realm. Such tabular high strain zones played a key role in the mountain building processes of the Alpine belt, and determined kilometric offsets of crustal blocks at the lithosphere scale. Some of these rooted mylonitic horizons were successively exhumed and involved in Oligocene-Miocene late-Alpine brittle tectonics. One of the relics of this early-Alpine strike-slip tectonics occurs between the Serre and the Aspromonte massifs (Cirrincione et al., 2015) along the roughly oriented E-W Palmi-Antonimina tectonic alignment (Prosser et al., 2003; Ortolano et al., 2013; Festa et al., 2016). This consists of 400 m wide sub-vertically foliated Variscan mylonitic rocks that mainly comprise skarns with subordinate migmatitic paragneisses and tonalites. The mylonitic horizon is extended inland for about 1500 m from the Tyrrhenian coast near Palmi village, and divides biotite migmatitic paragneisses to the north from continuous exposures of tonalites to the south.

New mesostructural data have been mapped on a highly detailed (1:5000 scale) topographic base. This new structural map allows us to highlight the dominant kinematics of the plastic flow. The shear zone shows a complex geometry characterized by decameter-sale sheath folds (Fazio et al., 2017), and low strain domains comprising cm- to m-sized tonalite blocks, which often show opposite senses of shear. In order to unravel the main shear sense of the strike-slip plastic flow, the axial-planar intersection method (AIM) was applied to minor S- and Z-type folds (Alsop & Holdsworth, 2007). In addition, new quantitative microstructural investigations have been carried out through the acquisition of μ-XRF maps and high-resolution scans of entire thin sections, to obtain detailed mineral modal and mineral size distribution maps. These data have been integrated with new grain boundary maps of the sin-mylonitic quartz-rich domains allowing estimates of both paleostress and the dominant shear-type (pure vs simple shear).

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