

A combined petro-structural study assisted by UAV-survey of mafic microgranular enclaves hosted by syn-tectonic tonalites at Rovaglioso outcrop (Calabria-Peloritani Orogen)

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The southern Calabria-Peloritani Orogen, in southern Italy, hosts a batholith composed of late Variscan granitoids emplaced at depths ranging from 23 to 6 km (Caggianelli et al., 2000; Fiannacca et al., 2015). The outcrop at Rovaglioso beach (38°21'51.35"N, 15°50'18.85"E) occurring in the southern area of the Palmi shear zone (Fazio et al., 2017) consists of foliated tonalites (Grande et al., 2009) related to the deepest part of batholith; the tonalite is scattered with flattened quartz-dioritic microgranular enclaves, ranging in size from a few cm to several dm. On these enclaves we focused our study. Marine erosion has contributed at this site to offer a multi-perspective view of ellipsoid-shaped enclaves, considered to be good strain markers, by exposing them on different surfaces and then facilitating measurements of the spatial orientation of maximum and minimum axes of 2D ellipses, assisted also by an UAV-aerial survey. The measured enclaves show a mean XY plane of the associated strain ellipsoid averagely WNW-ESE oriented and mostly SW dipping (from 40° to 70°), suggesting an associated maximum stress at 6°/37° (dip direction / dip). The aspect ratio between major and minor axes (R) spans from 3 to 15. As already pointed out by Caggianelli et al. (2000), the deformation event began while the pluton was still hot and at suprasolidus conditions and, to explain such a large range of enclave aspect ratios, we might hypothesize that the injection of the quartz-dioritic melt that formed the enclaves was diachronous. Thus the strain recorded by each enclave would be proportional to the time spent within the crystallizing and cooling tonalites under shear conditions. The outcrop bears also the evidence of subsequent magmatic activity and deformation represented by: a) inter-crossing aplitic and pegmatitic dykes; b) layering produced by fluids permeating through m-spaced fractures and causing mineral alteration, and c) pseudotachylite veins.

- Caggianelli A., Prosser G. & Rottura A. (2000) - Thermal history vs. fabric anisotropy in granitoids emplaced at different crustal levels: an example from Calabria, southern Italy. *Terra Nova*, 12, 109–116.
- Fazio E., Ortolano G. & Cirrincione R. (2017) - Eye-type folds at the Palmi shear zone (Calabria, Italy). *Int. J. Earth Sci.*, 106, 2039-2040.
- Fiannacca P., Cirrincione R., Bonanno F. & Carciotto M.M. (2015) - Source-inherited compositional diversity in granite batholiths: the geochemical message of Late Paleozoic intrusive magmatism in central Calabria (southern Italy). *Lithos*, 236-237, 123–140.
- Grande A., Di Vincenzo G., Prosser G. & Caggianelli A. (2009) - Direct evidence of Middle Oligocene extension in the Calabria–Peloritani terrane from co-seismic faulting: the pseudotachylite-bearing shear zones of Palmi (Southern Calabria, Italy). *Terra Nova*, 21, 293-303.