Geophysical Research Abstracts
Vol. 20, EGU2018-13242, 2018
EGU General Assembly 2018

Magmatic to solid state deformation recorded in syntectonic granitoids emplaced at different crustal levels (Serre Batholith, southern Italy)

Eugenio Fazio (1), Patrizia Fiannacca (1), Rosolino Cirrincione (1), and Manish A. Mamtani (2)

(1) Dipartimento di Scienze Biologiche Geologiche e Ambientali, Università di Catania, Catania, Corso Italia 57 - 95129 - Italy (efazio@unict.it), (2) Department of Geology & Geophysics, Indian Institute of Technology, Kharagpur - 721302 - India

The Serre Batholith covers an area of ca. 1200 km^2 in central Calabria, forming a large part of the Serre Massif. It is mostly tonalitic to granitic in composition and was formed during the latest stages of the Variscan Orogeny (ca. 300 Ma). The main rock types, from the deepest to shallowest levels, consist of foliated and unfoliated quartz diorites and tonalites, porphyritic to equigranular two-mica granodiorites and granites and biotite$\pm$amphibole granodiorites. The batholith has an estimated thickness of 10-12 km and is sandwiched between lower crustal migmatitic metapelites to the North and upper crustal paragneisses and phyllites to the South. All these were affected by poly-metamorphic events. However, relationships between regional deformation, magma emplacement and fabric development of the Serre granitoids have not been fully evaluated. The aim of the present study is to investigate the interplay of different controlling factors (i.e., depth and timing of emplacement, lithology) in developing specific granitoid fabrics by using a combination of field, microstructural and anisotropy of magnetic susceptibility (AMS) studies.

AMS findings suggest that intrusive rocks recorded deformational episodes, as those detected in the host rocks. Orientation of magnetic fabric (magnetic lineation/foliation) recorded from AMS in the granitoids, is similar to the field fabric (fold axes/lineation/foliation) recorded in the surrounding metamorphic country rocks. Microstructural studies reveal different types of deformation textures in the granitoid samples. In particular, evidence of sub-magmatic flow, high- and low-temperature solid state flow vary in frequency and intensity in all studied intrusive rocks. Sub-magmatic flow is widespread and more marked in granitoids from deeper crustal levels. Fabrics developed under subsolidus conditions are dominant. However, there is evidence of solid state-high temperature (Ss-HT) deformation superposition on deformation developed during sub-magmatic conditions. Low temperature subsolidus microstructures (Ss-LT) is also widespread and largely obliterates textures that developed under Ss-HT and submagmatic conditions. Moreover, in the shallower lithotypes, solid-state deformation (Ss-HT and Ss-LT) is less widespread and intense than in deeper lithotypes. The deformation history and the fabrics developed in the granitoids during cooling were closely related to the respective level of emplacement. This implies a dominant control of the depth of emplacement on the final fabric.