Petrogenesis and geochronology of late-Variscan quartz-diorites and tonalites from Capo Vaticano Promontory (southern Italy)

R. LOMBARDO[1*], P. FIANNACCA[1], M.A.S. BASEI[2], R. CIRRINCIONE[1]

[11]University of Catania, Department of Biological, Geological and Environmental Sciences, Catania, Italy ([*]rlombardo@unict.it, pfianna@unict.it, rcirrincione@unict.it)

[2] University of São Paulo, Institute of Geosciences, São Paulo, Brazil (baseimas@usp.br)

Quartz diorites and tonalites from Capo Vaticano Promontory (Calabria, southern Italy) make up the deepest portion of the late-Variscan Serre Batholith [1, 2]. They represent a magmatic sequence that share the following features: linear trends for major elements in Harker plots; small variability in mineral chemistry and similar initial Sr, Nd and Pb isotopic ratios. The $Sr_{(290)}$ vs. $\varepsilon_{Nd(290)}$ plot shows narrow compositions (0.7098-0.7102 and -7.48 to -6.33, respectively), defining a vertical array consistent with partial melting of a slightly heterogenous source. These values indicate a significant crustal contribution, probably ascribable to melting of old lower crust. In fact, similar ε_{Nd} values and initial Sr and Pb isotopic compositions have been found in the metabasites from the Serre lower crust [3]. SHRIMP U-Pb zircon data highlight a superposition of multiple processes. The emplacement age varies from 298±1.1 to 295±0.8 Ma, but an ubiquitous zircon recrystallization occurred at c. 290 Ma; older dates, up to 317±1.8 Ma might reflect anatectic conditions at the magma source. Calculation of zircon saturation temperature [4] provides a T_{mean}=783°C. Little difference between Zr_{sat} and Zr_{obs} contents indicates a Zr-saturated and low-temperature magma. Furthermore, negative trends for P_2O_5, Ba, Zr support differentiation of an I-type magma at relatively low T. Major and trace element modelling fits with 40% fractional crystallization of plagioclase, amphibole and biotite from an initial tonalitic magma.

[1] Fiannacca *et al.* (2015) *Lithos* **236-237**, 123-140.
[2] Fiannacca et al. (2017) *Lithos* **277**, 302-314.
[3] Caggianelli *et al.* (1991) *Eur. J. Mineral.* **3**, 159-180.
[4] Watson and Harrison (1983) *Phys. Earth Planet Inter.* **35**, 19-30.