

Looking for the volcanic-plutonic connection of the Permian magmatism in the Eastern Alps

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Silicic igneous rocks, such as granite and rhyolite, are among the major components of the continental crust and they represent major heat and mass transfers from the lower crust to shallower levels, contributing to crustal formation and differentiation, thermal maturation and ore deposits. Following crustal thickening, the final stages of an orogenic cycle are periods of intense magmatic activity and emplacement of large amounts of silicic products associated with lateral extension or orogenic collapse. Therefore, the late- to post-collisional silicic magmatism is of primary importance to a better understanding of key topics which are matter of long-standing debate, such as i) the nature of the sources involved in transcrustal magmatic systems, ii) the mechanisms of pluton growth and iii) the genetic relationships of plutonic and volcanic rocks (volcanic-plutonic connection).

The aim of this PhD project is to investigate the Permian magmatism in the Eastern Alps by means of modern cutting edge approaches and techniques. This area is characterized by post-collisional Permian granite complexes whose magmatic activity is likely related to the voluminous silicic volcanic eruptions and formation of multiple calderas forming the Athesian Volcanic District.

After detailed sampling and petrographic screening, bulk-rock geochemical characterization and mineral-scale isotope data (in particular Sr isotope composition of plagioclase and apatite) will be used to identify the different magma batches contributing to the growth of plutons and volcanic districts. Particular importance will be placed on the finding of complementary silicic cumulates which are the residues of high-silica rhyolites. U-Pb zircon dating will then be applied on the diverse components previously identified, in order to reconstruct the timescales of magmatic processes. Additionally, characterization of the Hf and O isotopic composition of zircon crystals will allow to identify possible crustal and/or mantle contributions to the Permian magmatism of the Eastern Alps.

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Funds: DOR (Bartoli, Marzoli, Carvalho), SID Bartoli, PRIN (Marzoli), other PRIN projects if funded (submitted by Bartoli and Marzoli)