

Crustal melting: working with melt inclusions

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Crustal anatexis, accompanied by melt extraction and ascent of magma to upper crustal levels, constitutes the most important mechanism of geochemical differentiation of the continental crust. Hence knowledge of the mechanisms, as well as of the composition of anatectic melts, is essential for characterizing the internal differentiation of the Earth's crust.

Despite the important role of crustal anatexis in the chemical differentiation of our planet, from a petrological and geochemical point of view there is the strong urge for a better chemical characterization of natural crustal melts.

We aim at establishing a clear link between melt compositions and melting mechanisms (water-fluxed vs. fluid-absent melting; equilibrium vs. disequilibrium melting). This aim of utmost importance in crustal petrology will be pursued through 1) a cutting edge approach which consists in the study of inclusions of anatectic melt – preserved as glass or crystallized as "nanogranitoids" - trapped in peritectic minerals (e.g., garnet); 2) their experimental remelting by a piston cylinder apparatus; 3) the application of thermodynamic modeling using Perple_X and THERMOCALC softwares.

This study will involve field work, microscopy, experimental petrology and lab characterization with integrated methodologies (FEG-based SEM and EMP, LA-ICP-MS, FIB-SEM, Raman spectroscopy, NanoSIMS).

Available financial resources: SIR 2014 (end of the project March 2019), DOR grants (Cesare, Bartoli), PRIN projects (if granted) presented by Cesare and Bartoli.