

Crustal melting and metamorphic rock exhumation in collisional orogens: insights from petrological-thermo-mechanical modeling

PhD proposal by Dr. Manuele Faccenda

The aim of this project is to study the formation and distribution of partially molten crustal rocks and their subsequent exhumation at collisional margins. In particular, the project will focus on partial melting occurring in the continental crust in hot collisional orogens such as the Himalaya.

The formation and exhumation of migmatites and high grade metamorphic rocks (Great Himalayan sequence, GHS) along the Himalayan orogen is currently debated. The main geodynamic model proposed for this area (coherent lateral extrusion of the GHS by viscous flow of a partially molten mid-crustal level (Beaumont et al., 2001)) has been recently questioned in the light of the new petrological data acquired along the orogen (Montomoli et al., 2013), indicating a sequential exhumation of metamorphic rocks younging toward the foreland.

The PhD candidate will conduct petrological-thermo-mechanical simulations accounting for crustal melting and metamorphism by means of the implemented thermodynamic database in order to study the dynamics and petrological processes characteristic of hot orogens. These experiments are expected to shed light into this complex tectonic setting where numerous studies have previously failed to provide a comprehensive explanation for the numerous geological and geophysical data.

In collaboration with Università di Torino.

References

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Montomoli, C., Iaccarino, S., Carosi, R., Langone, A., Visonà, D. Tectonometamorphic discontinuities within the Greater Himalayan Sequence in Western Nepal (Central Himalaya): insights on the exhumation of crystalline rocks. *Tectonophys.* 608, 1349-1370 (2013).