

Unraveling the geological history of the Mergoscia zone, Ticino.

Contact persons

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Context

The Mergoscia zone in the Lepontine dome is a few hundred meters thick unit of gneisses that contain fragments of eclogites, metacarbonates and ultramafic rocks. The formation of this mélange and its tectonostratigraphic position within the nappe pile is still debated. This Master thesis aims to test different working hypothesis with a multidisciplinary approach that combines fieldwork, petrology and/or numerical modelling. The hypotheses for the formation of the Mergoscia zone that will be tested are: (i) magmatic mixing of xenolithic fragments (carbonatic, mafic and ultramafic lenses) within a pre-Alpine batholith, (ii) pre-Alpine origin of the mélange and (iii) tectonic mélange within an Alpine subduction channel. Depending on the interest of potential Master student, the focus of the work can be on field work, petrology or numerical modelling.

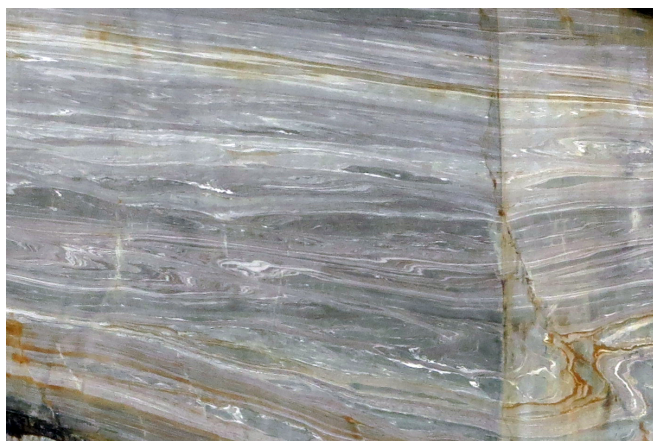
Aims and Methods

Depending on the interest of the student the methods should include:

- 1) Local detailed field mapping combined with digital mapping on already existing Lidar data over a 100x100 m area close to Cevio (Valle Maggia). The detailed structural and petrographic description will be used to constrain the numerical models of deforming rheological anomalies within simple shear. The goal is to gain insight into the deformational history of the Mergoscia zone.
- 2) Geological and structural mapping at the scale 1:10'000 of a ca. 1 km² area close to Bignasco (Valle Maggia). The mapping will be combined, depending on the outcomes of the mapping, to detailed petrological work (on the microprobe) or with geochronology (U-Pb on zircons). Here the overall goal is to depict the mélange zone and possibly constrain the PT condition of deformation.

References

- Steck, Albrecht, Jean-Luc Epard, and Henri Masson. "The Maggia nappe: an extruding sheath fold basement nappe in the Lepontine gneiss dome of the Central Alps." *International Journal of Earth Sciences* 108 (2019): 2429-2442.
- Berger, Alfons; Mercolli, Ivan; Engi, Martin. The central Lepontine Alps: Notes accompanying the tectonic and petrographic map sheet Sopra Ceneri (1: 100'000). *Schweizerische Mineralogische und Petrographische Mitteilungen*, 2005, 85.2-3: 109-146.
- Tagliaferri, A., Schenker, F. L., Ulianov, A., Maino, M., & Schmalholz, S. M. (2023). Implications of new geological mapping and U-Pb zircon dating for the Barrovian tectono-metamorphic evolution of the Lepontine dome (Central European Alps). *Geochemistry, Geophysics, Geosystems*, 24, e2022GC010772. <https://doi.org/10.1029/2022GC010772>



Website

Prerequisite

Potential students should follow the course "Physical and chemical mechanisms of geological processes".