Comparison of deformation of felsic granulite and peridotite (Premosello – Ivrea-Zone)

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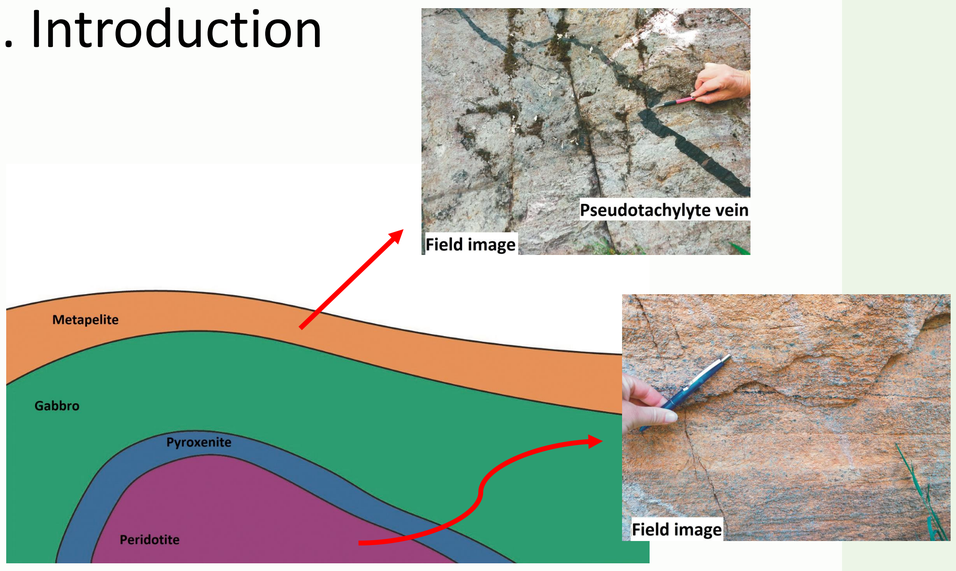
1. Introduction



Field observation at Premosello through the Crust-Mantle boundary. The sequence is characterised by peridotite in the core surrounded by pyroxenite and followed by gabbro and metapelites.

Aims

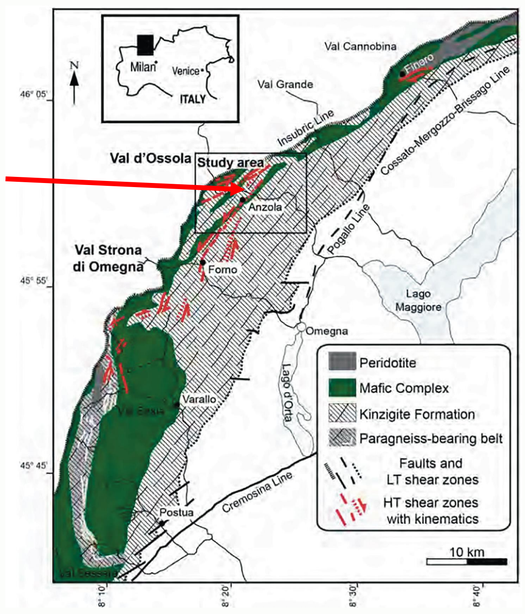
→Investigation of deformation stages between felsic, quartz-feldspar rich and mafic, olivine rich rocks in the lower crust and upper mantle

→Determine the sequence of structural events in the Metapelite and in the Peridotite

→Constraints for the exhumation of lower crust and mantle

2. Study site

Premosello

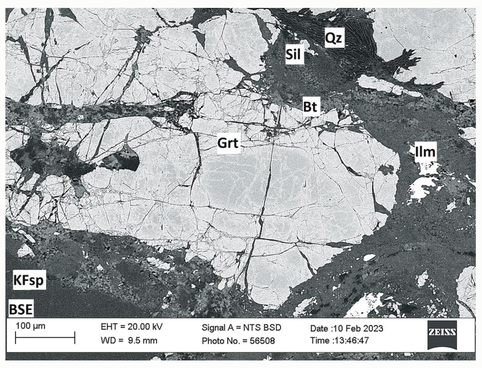


Geological map of the Ivrea-Verbano Zone in the northern part of Italy. The study site lays close to Premosello.

3. Deformation History

Pelitic Granulite (Garnet (Grt), Plagioclase (Pl), K-Feldspar (KFsp), Quartz (Qz), Ilmenite (Ilm), Rutile (Ru), Sillimanite (Sil), Biotite (Bt))

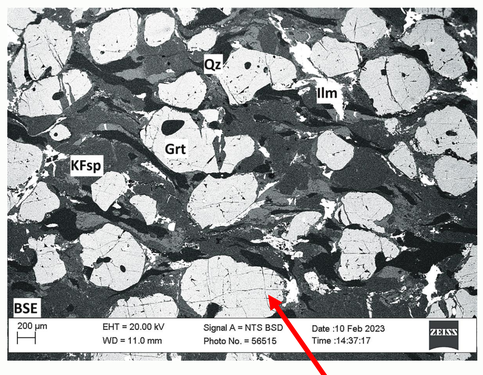
Granular



- Well shaped garnet surrounded by KFsp and Qz

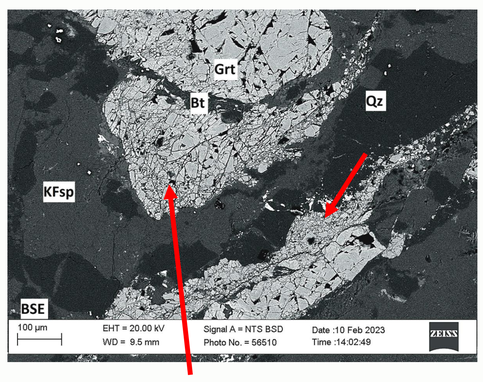
Hight temperature

Mylonite



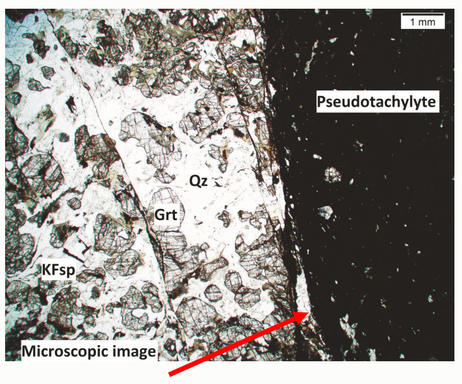
- Mylonitic framework characterised by rounded Grt-grains
→ plastic deformation

Mylonite/Cataclasite



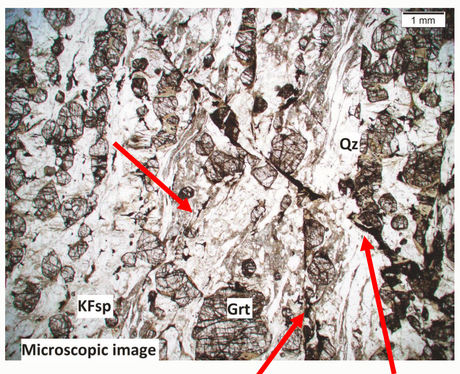
- Decrease in grainsize
- Transition from ductile to brittle deformation

Pseudotachylyte



- sharp contact to pseudotacylyte
- characteristic fine-grained, glassy texture

Fracture

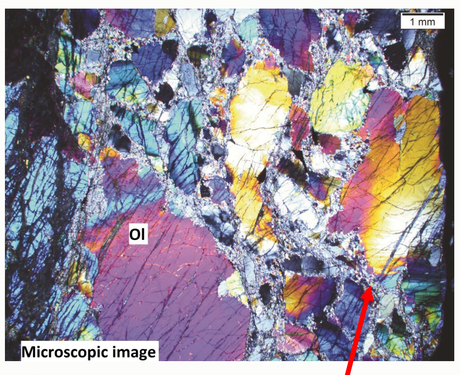


- fractures cutting through whole matrix

Low temperature

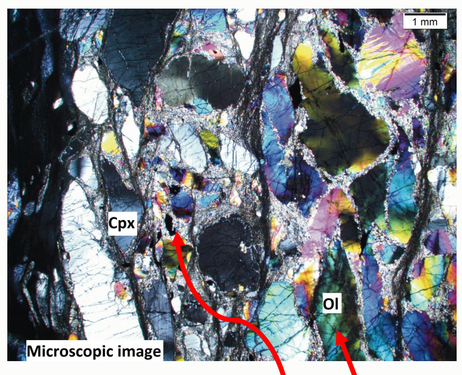
Peridotite (Olivine (Ol), Orthopyroxene (Opx), Clinopyroxene (Cpx), Spinel (Spl), Amphibole (Amp), Serpentine (Srp), ±Pyrite (Py))

Granular



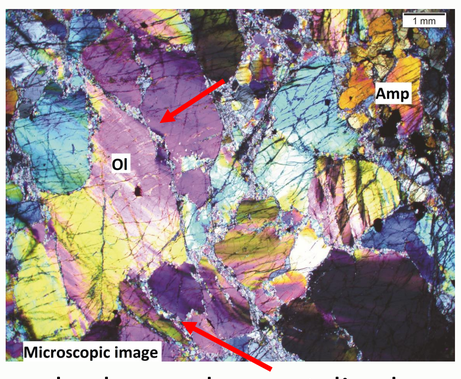
- Olivine and pyroxene dominated matrix
- Well defined grains
- beginning recrystallisation at grain boundaries

Mylonite



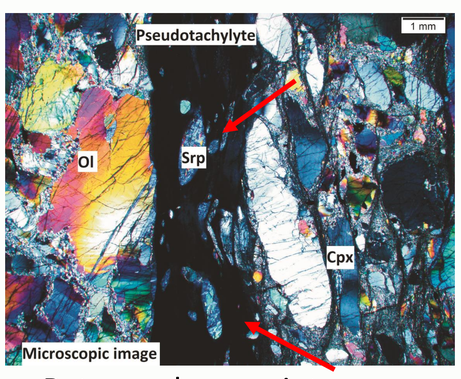
- rounded grains
- formation of sub grains
- lamellar deformation structures in olivine

Mylonite/Cataclasite



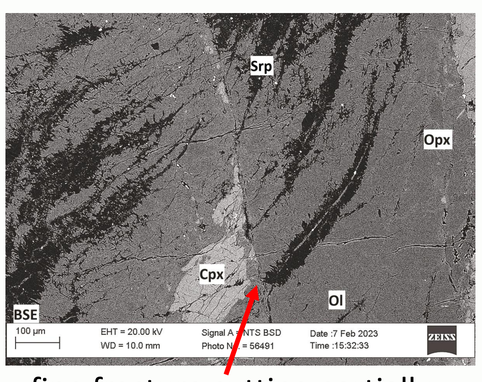
- broken and recrystalised olivine

Pseudotachylyte



- Retrograd overprint of clasts → Srp, Amp

Fracture



- fine fracture cutting partially serpentinised peridotite

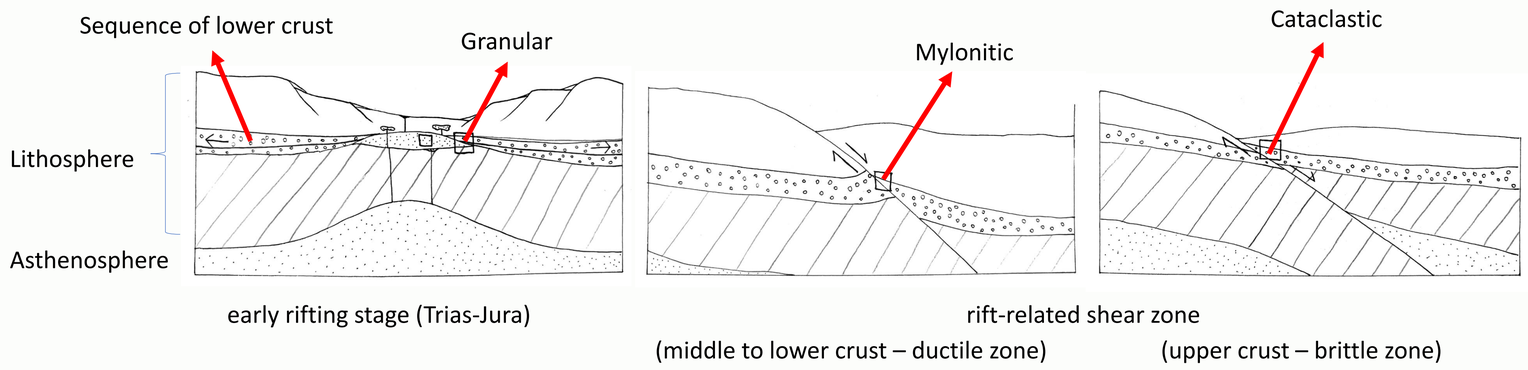
4. Key observations

→Observation of similar deformation stages and features in pelitic granulite and peridotite.

→Low amounts of hydrous phases (Amp, Bt)

→Similar rheology of dry peridotites and felsic granulites at lower crustal conditions

5. Interpretation and Conclusion



→ Decompression above a rising asthenosphere led to formation of basic mantle-derive melts with granular structure

→ Shear zone related structure are developing during rifting evolution

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Refrences
Corvo S., Maino M., Piazolo S., Seno S., Langone A., 2022. Role of inherited compositional and structural heterogeneity in shear zone development at mid-low levels of the continental crust (the Anzola shear zone; Ivrea-Verbano Zone, Southern Alps), 2, 3.
Brack, P., Ulmer P., 2010. A crustal-scale magmatic system from the Earth's mantle to the Permian surface – Field trip to the area of lower Valsesia and Val d'Ossola (Massiccio dei Laghi, Southern Alps, Northern Italy), 11.