

Structural geology and Tectonics

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RESEARCH TOPICS

- Seismic cycle in exhumed seismogenic faults
- Deformation processes in the frontal part of subduction zones
- Fluids in faults: origin and mechano-chemical interactions
- Quantification of fault and fold related fractures in carbonates

Our research is mainly focused on the deformation processes of exhumed seismogenic sources from transpressive and shallow subduction settings. Our current field areas include the Northern Apennines, where our group conducted extensive geological mapping in the last decades, the Adamello batholith and the French Subalpine chains in the Alps, and the External Dinarides of Croatia. Our approach attempts first to reconstruct the tectonic evolution and the conditions of deformation through field mapping and regional geology, then to apply up-to-date structural analysis techniques on selected outcrops, including photogrammetric 3D modelling. To constrain the mechanical and chemical interactions between fluids and brittle deformation, we integrate mesoscale and microscale structural analysis with geochemical and mineralogical investigations in collaboration with other researchers of this department.

Fluid flow in the upper crust is controlled by the time- and space-dependent permeability of fault and fold related fracture networks. The statistical quantification of fracture network geometry and connectivity is an ongoing research topic which, besides its implications for the mechanics of active faults, can also support the efficient exploitation of water and hydrocarbon reservoirs.

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