Fractures and faults are common tectonic features within shallowly deformed rocks. Fracture networks play a fundamental role in fluid migration. Understanding the mechanical and chronological development of fracture networks is therefore key for tectonic studies as well as for resources exploration and waste repositories studies.

Fractures and faults are witnesses of the medium history, resulting from processes controlled by physical forces and/or chemical potential. A better understanding of the parameters that control fracture complexity in rocks will lead to new tools for reconstructing crustal-scale processes such as fluid flow and fluid-rock interactions, paleostress evolution and earthquake tectonics. However, the great challenge is the understanding of dynamic feedbacks between fluid flow, permeability rise/fall, chemical reactions and rock failure. Fluid sources, fluid flow and fluid-rock interactions vary spatially and temporally as a function of basin and reservoir structural evolution, altering the physical/mechanical properties of fractures and host rocks.

Fractures form at all stages of rock history, from early diagenesis/burial to major deformation events. Building realistic conceptual and predictive models of fracture types and occurrence therefore requires recognition of fractures formed prior to, and during deformation events. A blind spot in fracture analysis has been for long the lack of constraints on the absolute timing of brittle failure and structural diagenesis. Recent progress in absolute dating of calcite cements/coatings of veins/faults has proven the relevance of meso-structures to regional structural evolution, allowing for a refined tectonic history. New steps forward include a better appraisal of the rate of development and lifetime of individual fracture and fracture sets, and of the timing and rate of fluid flow in fractured rocks.

This session aims at bringing together scientists working in the field, in the lab, and on simulations to foster discussion towards improving our understanding of (1) the mechanics, occurrence, timing and stress history of fractures in upper crustal rocks, and (2) the role fracture networks play on subsurface fluid flow. We welcome contributions from all fields, including structural geology, mechanics, isotope geochemistry, and hydrogeology that aim at comprehending the development of fracture systems in time and space and their co-evolution with fluid flow in a variety of geological settings.