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Structural analysis of a crystalline batholith in an extensive context (Catalunya, Spain)

Preliminary results for a 3D model of fracturation and faulting

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The Catalan margin is a region which allows extensive deformation studies on a crystalline basement. Surface exposition of this Hercynian igneous batholith is related to the southwestward Oligocene-early Miocene propagation of the Western European rift system, and the Burdigalian oceanic accretion associated with the southeastward drift of the Corsica-Sardinia block. Thus, we have access to the complex fractures and faults network which structures this massif.

Faults zones are structural and lithological heterogeneous discontinuities. Determination of faults zones architecture and fracture network geometry are fundamental for high temperature geothermy applications, hydrocarbon migration, radioactive waste disposal, or metallogeny. Analysis at different scales of this kind of networks and faults structures allows us to identify preferential paths for fluid transfer.

The preliminary results of a 3D structural recognition and detailed fracturation analysis will be presented at different scales (from hectometer to centimeter). A special attention is paid to fault zones, studied by consideration of their inner architecture

(fault core, damaged zone, protolith) and their petrophysical properties resulting in different behaviors regarding fluid flows (porosity, permeability, thermal conductivity). We have to define not only the fault network geometry (extension, connectivity, opening), but also the damage zone architecture, and associated fracturation in the protolith by statistical analysis.

In addition, this 3D structural model is investigated by photogrammetry methods and by teledetection methods in order to extend our structural map to a larger region.