



Imaging of a rupture path by X-ray microtomography when hydro-fracturing a porous limestone

F. Renard (1,2) and D. Bernard (3)

1. Laboratoire de Géodynamique des Chaînes Alpines, LGCA-CNRS-OSUG, Université de Grenoble, BP 53, 38041 Grenoble, France (francois.renard@ujf-grenoble.fr)
2. Physics of Geological Processes, University of Oslo, Oslo, Norway
3. ICMCB-CNRS-University of Bordeaux, 87 avenue du Dr. Schweitzer, 33608 Pessac, France

Hydraulic tension fractures were produced in porous limestones using a specially designed hydraulic cell. The 3D geometry of the centimeter-scale samples was imaged before and after fracturation, using X-ray computed microtomography with a voxel resolution of $4.91 \mu\text{m}^3$ at beamline ID19 at the European Synchrotron Radiation Facility. Using these 3D data, the permeability of the porous medium could be calculated and compared to that measured during the experiment. Moreover, the fracture path could be identified by comparing the samples before and after fracturation. It can be shown that a fracture meets more heterogeneities (pores) than if it has propagated randomly into the porous medium. This demonstrates the important role of local mechanical heterogeneities that partially controlled the rupture propagation.