



HAL
open science

Brittle structures in porous sandstones, south central Pyrenees, Spain: field characterization and impact for fluid flow

Elodie Pourret-Saillet, Yannick Vautier, Bennoit Proudhon, Nathanaël Guilbert, Vincent Hannot

► To cite this version:

Elodie Pourret-Saillet, Yannick Vautier, Bennoit Proudhon, Nathanaël Guilbert, Vincent Hannot. Brittle structures in porous sandstones, south central Pyrenees, Spain: field characterization and impact for fluid flow. EGU General Assembly, Apr 2014, Vienna, Austria. hal-04291112

HAL Id: hal-04291112

<https://normandie-univ.hal.science/hal-04291112>

Submitted on 24 Nov 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Brittle structures in porous sandstones, south central Pyrenees, Spain: field characterization and impact for fluid flow.

Elodie SAILLET, Yannick VAUTIER, Bennoit PROUDHON, Nathanaël GUILBERT, and Vincent HANNOT
B2R, Institut Polytechnique LaSalle Beauvais, 19 rue Pierre WAGUET, Beauvais, France.

In order to better constrain fluids flow circulations in the continental crust, understanding evolution of fault geometry and hydromechanical properties is essential. The knowledge of faulting in analogous reservoirs is particularly important in silicoclastic context. Indeed the high value of natural porosity and the impact of faulting on porosity and permeability will generate potential reservoirs. Depending on the type of faults, deformation in sands and sandstones reservoirs can produce barriers or conduits for fluids.

This study focused on an silicoclastic analogous reservoir localised in south central Pyrenees (Spain), named the Aren group, where deformation is recorded by different type of faults. The Aren group is located on the front of the Boixol thrust, on the southern side of the San Corneli anticline. The outcrops are localised in 3 different area, comprised between the towns of Aren, Tremp and Isona. Depending of the outcrop, we identify presence of veins, joints, deformation bands (DBs) and some few sites where both of them are recorded in the same unit. We present a complete field study, based on two different field mapping methods : (i) field photomosaics and associated detail 2D mapping ; (ii) linear scanlines along deformed outcrops. These two different methods, applied around ten outcrops allow us to obtain : (1) 30 meters squares of 2D detailed maps of fractures and linkage information ; (2) 90 linear meters of fracture density vs. distance all along the outcrop for each type of fracture. Field measurements and quantification was completed by a systematic sampling, in order to give an access to (i) microtectonic elements and fine characterisation of the different fault types by SEM observations ; (ii) a porosity quantification of host rock and fault zones based on the SEM pictures.

Field data shows a strong relationship between the different types of brittle structures. On the Aren outcrop, fine DBs (which act as barriers) are located in clusters or patches. Later joints or veins (which act as conduits) are located only on the sides of the DBs patches, due to a difference of rock mechanical properties between host rock and deformed rocks.

These detailed analytical methods demonstrate the evidence of different type of deformations and can allow us to determine the corresponding controlling factors and evidence of these factors on localisation processes. These geological factors are essential for determine the bulk permeability of the reservoir, by understanding the growing process for obtain conduits or barriers. In addition, a future work could show some evidence for a transition in growth mechanisms from the deformation bands to the joints, and especially to the mode I cracking process.