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► To cite this version:

Romain Robert, Elodie SAILLET, Philippe Robion, Pauline Souloumiac, Christian David. Study of localised and cataclastic deformation in porous sandstone from south central Pyrenees, Spain: From outcrop to laboratory experiments. EGU General Assembly 2015, EGU, Apr 2015, Vienna, Austria. <hal-04221966>

HAL Id: hal-04221966

<https://normandie-univ.hal.science/hal-04221966v1>

Submitted on 28 Sep 2023

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Study of localised and cataclastic deformation in porous sandstone from south central Pyrenees, Spain: From outcrop to laboratory experiments.

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In high porosity sandstone lithologies, deformation occurs by a localized evolution of the host rock properties. This localization is translated by microstructural changes without discrete surfaces. These structures are called « deformation bands » (DBs).

This study focused on a silicoclastic analogous reservoir localised in south central Pyrenees (Spain), named the Aren group, where the deformation is recorded by different types of faults including DBs. 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 5 different areas, comprised between the towns of Aren, Talarn, Neret, Orcau and Isona.

In this work we will present microstructural observations by using MEB and thin section analysis, porosity and permeability results, and finally different types of measurements of anisotropic properties (magnetic susceptibility, acoustic velocities and electrical conductivity), in order to investigate the relationship between the occurrence of DBs and the petrophysical properties in both deformed and host rocks, for each area. This study also aims to link the DBs orientations and distributions with the sedimentological facies and the regional deformation.

Field data show a strong relationship between the different types of brittle deformation. 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. Eastward, the deformation is not that marked, and the DBs can present directions that are different from one outcrop to another.