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Fracture properties analysis and discrete fracture network modelling of faulted tight limestones, Murge plateau, Italy

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The modelling of natural fracture in reservoirs requires, as input data, the results of previous detailed and accurate analysis of the 3D fracture network. These data could be derived from well logs and production tests (which however limit our understanding of the fracture geometry, intensity and distribution) and outcrop analogues. Data obtained applying scanline and scanarea methodologies on rocks exposed at the surface, in fact, allow the construction of more representative numerical models of natural fractured reservoirs.
This work focuses on with the (DFN) modelling of natural fractures associated to strike-slip faults crosscutting tight carbonates, which are exposed along vertical walls and pavements of an inactive quarry of the Murge area, southern Italy. The studied outcrops expose the inner structure of two conjugate fault zones striking WNW-ESE and NNW-SSE, respectively. DFN models were built according to the spatial and dimensional properties computed for the natural fracture network. The results of these models show that the overall fault permeability is 3-to-4 orders of magnitude higher than the host rock permeability. The fault damage zones form the main fluid conduits, with the highest permeability values computed for fault-parallel fluid flow. Such a pronounced permeability anisotropy obtained for the fault damage zone is mainly related to the fracture dimension, both lengths and heights, and their aperture values.