UNIVERSITÀ DEGLI STUDI DI PAVIA
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Project title

Characterization of fault and fracture networks in carbonate platforms: the interactions between tectonic evolution, sedimentary facies and diagenesis

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Key words

carbonate platforms, fractures networks, DOM (Digital Outcrop Model), facies architecture, diagenesis

Abstract

Many hydrocarbon fields of the world are in carbonate platforms, where, as the matrix properties (porosity and permeability) of carbonate reservoirs could be poor, fractures and faults play a major role as a key component. However, due to the different structure, facies architecture, diagenetic overprint and tectonic evolution, significant lateral and vertical heterogeneities in the pattern of fractures and faults can be observed and have strong impact on reservoirs potential. As most of fractures are below seismic resolution, and wells, although providing key information, represent only small volumes of the rock, outcrop analogues provide one of the most important source of data on these patterns. In order to analyze the features of the fault and fracture networks and the mutual influence of deformation, diagenesis and sedimentary facies, appropriate analogue outcrops of carbonate platforms will be identified. Subsequently, examples of different sedimentary environments will be selected to provide facies-based reference models of fractures. The structural and the sedimentary architecture analysis of the outcrops will be essentially performed on products from Terrestrial Digital Photogrammetry (TDP) and Terrestrial Laser Scanner (TLS), as well as Unmanned Aerial Vehicle Digital Photogrammetry (UAVDP) techniques. These techniques allow the realization of Digital Outcrop Models (DOMs) that can been interpreted and sampled in a 3D environment and have the advantages, in respect to manual sampling, of: (1) analyzing outcrops, totally or partially inaccessible; (2) obtaining a largest and more representative number of measures and data; (3) reanalyzing and controlling in every moment the different outcrops and (4) being an effective *space* of fusion with other geological and geophysical data in order to make more robust estimations.