



Quantifying the role of mechanical stratigraphy and dolomitization in fractured carbonates: the added value of a scale-independent approach linked to petrophysical classes

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An integrated multidisciplinary study has been carried out on fault-related fracture sets in Cretaceous (Aptian-Turonian) limestones and dolomitized limestones of the Sorrento Peninsula. These form an analogue of the Val d'Agri major hydrocarbon reservoirs of southern Italy. Fracture analysis has been coupled with detailed field mapping and reconstruction of dolomitized bodies, integrated facies and petrographic analysis, petrophysical (helium and mercury injection porosimetry and sonic velocities) and geochemical characterization of limestone and dolomites. The resulting data set provides information on the control exerted by petrophysical characteristics, in turn depending on depositional facies and diagenesis, at the meso- and micro-scale on fracture patterns and on the quality and heterogeneity of carbonate reservoirs. In particular, the distinction of different dolomite generations is correlated with their respective petrophysical characteristics; moreover, the geometry and lateral persistence of dolomitized intervals has been followed up to a few kilometers scale. Based on this litho-stratigraphical and petrophysical framework, structural analysis (including in situ scan line and scan area data acquisition, as well as microstructural studies) has been performed on selected outcrops to assess the different fracture patterns characterizing each specific rock fabric unit. This was carried out by means of scale-independent fracture-intensity estimates. This approach to fracture analysis makes use of fracture-size distributions, allowing meaningful comparisons between different rock fabric units and/or different locations.

The proposed multidisciplinary approach, involving fracture analysis integrated with facies and petrophysical characterization, allows a comprehensive picture of the role

of mechanical stratigraphy and diagenesis in faulted/fractured carbonated rocks to be obtained.