

Outcrop/Behind Outcrop Characterization of Siliciclastic Reservoirs

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ABSTRACT

A workflow, developed by the Sedimentary Reservoirs Workgroup of the University of Granada, Spain (SEDREGROUP, www.sedregroup.com), is presented here based on the comparison between outcrop and subsurface data, at diverse scales, in outcrop analogues of siliciclastic reservoirs (O/BO characterization). The methodology consists on (1) Selection of outcrops and elaboration of a digital model by photogrammetry in images obtained with drone; (2) Facies and architectural element analyses on outcrop; (3) Selection of characteristic sub-environments in the geobody to be drilled (4) Drilling of wells with continuous core recovery; (5) Core description and interpretation of the corresponding borehole logs (Natural and Spectral Gamma Ray as well as Optical and Acoustic Televiewers); (6) Performance of Ground Penetrating Radar profiles behind the outcrop; (7) Characterization in thin section of the composition and diagenetic history of the sediments; (8) Analysis of spatial distribution pattern of petrophysical properties (porosity and permeability) and heterogeneity; (9) Reservoir Quality Assessment; (10) Numerical modeling of facies and petrophysics. This workflow is being applied with great success to examples of outcrop analogs of fluvial, deltaic and tidal flats reservoirs, demonstrating their utility for the strategy in fluid enhanced recovery (oil, gas or water) as well as for the CO₂ storage in analogue reservoirs.