Integrated Petrophysical Analysis to Discriminate Reservoir Facies and Its Productivity Potential in Fluvial Eolian Gas Bearing Sandstones

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This work integrates several different data aiming the petrophysical evaluation of fluvial eolian reservoirs and their geological meaning using a single well data. This data set includes core analysis, conventional logging tools, nuclear magnetic resonance log and borehole resistivity image data. The correlation between log analysis and core data has succeeded, revealing new approaches for the exploration in the area. Based on core data allied to the borehole image it was possible to distinguish eolian and fluvial deposits and also determining bedding, bed boundaries, cross bedding, paleocurrent estimation, faults, fractures and geomechanical features. With this knowledge the model that assumes eolian reservoirs as the main target can be revised, since the integrated analysis showed that the fluvial deposits are also present with excellent petrophysical properties, and sometimes with better porosity and permeability, where the clay type and content are the major aspects controlling the reservoir quality. Accepted that fluvial eolian sequence is the regional setting it is probable that a constant interaction between both depositional systems happened, providing a stacked succession of quartz-sandstones reservoirs, where sequence boundaries represents an enrichment of the clay content as such as an increment in Kaolinite and Chlorite content over the usual Ilite/Smectite background. This increase on clay content reflects directly on the flow properties of the reservoirs, therefore on the flow units behavior within the gas field, being extremely important to map and know how to deal with these where they occur.