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Assessing of tight reservoir by combining the porosity of geological units, and simulated images of rock types: A case study

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Reservoir characterization and flow studies require accurate inputs of petrophysical properties such as porosity, permeability, water and residual oil saturation and capillary pressure functions. All these parameters are necessary to evaluate, predict and optimize the production of a reservoir.

This study is the continuity of a previous work that summarize the construction of a net rock aerial map by combining stochastic simulation of rock types and processed seismic data. In this case study; petrophysical data are integrated to construct a 3D model of porosity corresponding to the 3D model of rock type. This is in order to further understand the intricacies of the geostatistical methods used and the impact of the technique on the resulting uncertainty profile

For the construction of 3D model of porosity corresponding to the 3D model of rock types, a geostatistical workflow encompassing the modelling of experimental variograms and sequential Gaussian simulation (SGS) were used. The geostatsitical methodologies of stochastic simulation such as SGS enabled the generation of several realistic scenarios of constinuous data, such as porosity, within a volume, thus facilitating the association of local probabilities of occurrence of each rock type.

The resulting porosity image properly combines the available seismic and well data and balance the local and regional uncertainty of the studied reservoir volume.

Keywords: Geostatistics, Sequential Gaussian Simulation (SGS), Rock types, Porosity, Uncertainty, Spatial resolution.