Integration of Seismic Facies Proportions in a Geomodel and Derived Facies Stochastic Simulations

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TOTAL

We performed an uncertainty study on a deep offshore turbiditic field to compute updated STOOIP distribution by taking into account the facies and the petrophysical uncertainties. To take into account the facies uncertainty, we used seismic facies proportions coming from our in-house Caress software. The seismic facies proportions were derived from Probability Density Functions maps issued from crossplots combining geological and seismic attributes (elastic impedances). The output is composed of facies proportion cubes at the seismic scale (one cube of proportions for each facies). Then, these proportion cubes are upscaled to the reservoir grid scale by performing an average of seismic proportions inside the reservoir grid scale. Vertically, no downscaling was necessary because the seismic and reservoir depth sampling rates are similar. Seismic facies proportions were combined with geological facies proportions, coming from log and core analysis. The combined facies proportions are then used as input to facies simulations. Two geostatistical methods have been tested for facies simulations:
- SIS (Sequential Indicator Simulation)
- Truncated Gaussian

The method finally chosen for facies mapping is the Truncated Gaussian Simulation, in order to reproduce facies heterogeneities, facies order of deposition and facies prior proportions.

300 realisations have been performed with the in-house Jacta software. We obtained greater ranges between STOOIP quantiles compared to previous results (Crystal ball) due to the introduction of seismic facies uncertainty.