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Geologically oriented reservoir modeling of a fluvio-deltaic reservoir: The TAGI of the Ourhoud field, Berkine Basin, Algeria

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This paper describes how geostatistic models can be built by integrating all the information generated in the individual disciplines; namely geophysics, petrophysics, sedimentology, stratigraphy, and reservoir engineering. This approach creates the internal consistency of a reservoir study and provides various models to be upscaled in the forward simulation phase.

A 3D reservoir model of the Ourhoud field was built, using an object-based approach to generate models for fluvio-deltaic, aeolian and lacustrine (chott) facies intervals of the TAGI reservoir. For modeling purposes, facies composite simulation was used for the fluvio-deltaic deposits and facies belt simulation for the aeolian and chott deposits.

A coarse simulation grid was first designed within the 3D modeling package. Production and Injectivity test results as well as petrophysical interpretation of fluid contact distribution throughout the field have been incorporated to select the most likely or best fault pattern that fits with the dynamic data. This grid is then exported to the simulator to test the export/import process. Once this coarse grid has been initialized in the simulator, it will be re-imported back to the 3D modeling package and downscaled to a high resolution grid, ready to be populated with the resulting discrete facies model which will be used as input for petrophysical properties.

The high-resolution grids for various properties is up-scaled to an already initialized simulation grid and is exported seamlessly to the simulator, to history match with the available dynamic data. Reservoir heterogeneity due to both faulting (static input and common to all realizations) and reservoir quality (stochastic input and different but equiprobable with all realizations) is captured in the modeling. The aim is to select the realization, which can provide a better forecast of reservoir performance and sweep efficiency.