

Facies and Porosity Distribution Modelling in the R2ab Reservoir Hassi Messaoud Field (Algeria)

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The R2c, Cambrian, reservoir of Hassi Messaoud (Algerian Sahara) is considered as a secondary reservoir compared to the main reservoirs Ra and Ri. R2 is subdivided into two lithozones R2 ab and R2c.

The exploitation of R2 reservoir is confronted with several Problems due, mainly; to the random distribution of sedimentary bodies and damages or improvement of petrophysics qualities following the diagenesis.

To assess, as best as possible, the heterogeneities in the reservoir we have used geostatistic simulation methods; the target being to obtain a set of models of the subsurface equiprobable and representative of the heterogeneities supposed to exist inside the reservoir from the available data.

Because of the insufficient data about the R2c sub-lithozones, the 3D modelling has been conceived only for the R2ab; beside of that, R2c is under the water/oil interface and is not important for oil production. Five sections have been done through 12 wells, the final model has been done from the twinning of a matrix model and a fracturing model.

The first model needs the combination of oil saturation, permeability and porosity models. The second one requires the understanding of the fractured domain, based on the use of the sonic and seismic data with drill cores and imagery descriptions. The facies model has been done by a stochastic modelling of indicatrice type (SIS) while the one of porosity-permeability has been done by a modelling of Gaussian type (SGS).

The modelling has shown that the succession of R2ab layers from the bottom to the top, Confirms the hypothesis of a particularly privileged direction of supply sediments.

The map issued from this modelling shows a facies distribution characteristic of a flooding plain belonging to a WNW- ESE fluvial system. The high values of porosity are located in the fine deposits mainly silstones and clays. The space distribution of the porosities is linked with the variation of the nature of the sedimentary bodies, lithofacies and diagenesis processes.

The result of this modelling able us to assess petrophysics the properties distribution and to locate principal potential area. Simulated map help us to, correctly, plan drilling programs to be carried out shortly.

Key words: 3D Modelling, Cambrian, Reservoir, Stochastic, Gaussian, Petrophysics.