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Static Reservoir Modeling of the Bahariya reservoirs for the Oilfields Development in South Umbarka Area, Western Desert, Egypt

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Abstract

3D static reservoir modeling of the Bahariya reservoirs using seismic and wells data can be a relevant part of an overall strategy for the oilfields development in South Umbarka area (Western Desert, Egypt). The seismic data is used to build the 3D grid, including fault sticks for the fault modeling, and horizon interpretations and surfaces for horizon modeling. The 3D grid is the digital representation of the structural geology of Bahariya Formation. When we got a reasonably accurate representation, we fill the 3D grid with facies and petrophysical properties to simulate it, to gain a more precise understanding of the reservoir properties behavior. Sequential Indicator Simulation (SIS) and Sequential Gaussian Simulation (SGS) techniques are the stochastic algorithms used to spatially distribute discrete reservoir properties (facies) and continuous reservoir properties (shale volume, porosity, and water saturation) respectively within the created 3D grid throughout property modeling. The structural model of Bahariya Formation exhibits the trapping mechanism which is a fault assisted anticlinal closure trending NW-SE. This major fault breaks the reservoirs into two major fault blocks (North Block and South Block). Petrophysical models classified Lower Bahariya reservoir as a moderate to good reservoir rather than Upper Bahariya reservoir in terms of facies, with good porosity and permeability, low water saturation, and moderate net to gross. The Original Oil In