

بسم الله الرحمن الرحيم





شبكة المعلومات الجامعية التوثيق الالكتروني والميكرو فيلم



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**Seismic and Petrophysical Characterization of Pliocene
Reservoir, Saffron Field, West Nile Delta Deep Marine
Area, Egypt**

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Abstract

The Nile Delta basin is a major gas province; commercial gas discoveries have been proven mainly in Pleistocene to Oligocene sediments where most discoveries are within sandstone reservoirs. 3D seismic data acquired over the basin has massively helped in imaging and visualization of stratigraphy and structure leading to robust understanding of the subsurface. channel fairways serve as potential reservoir units, hence mapping channel surfaces, identification and defining infill lithology is important.

Saffron gas Field is located in the Scarab-Saffron development lease, which lies in the central part of the offshore west delta deep marine concession, approximately 100 km offshore from the present-day Nile Delta shoreline. Saffron Field is described as a slope channel complex deposited on the Nile Delta slope in the Late Pliocene El-Wastani sedimentary units. Saffron area of interest showed a laterally and vertically stacked deep marine channel complex consisting of four different main channels namely (from youngest to oldest), Channel 1, 2, 3, and 4 encased within a more or less NNW-SSE trending.

Predicting sand distribution and reservoir presence is one of the key workstreams and uncertainties in exploration. Integrating state-of-the-art technologies like including 3D seismic reflection surveys, seismic attributes, geobody extractions and static reservoir model, can reduce this uncertainty through recognition and accurate mapping of channel features.

In this study, seismic attribute analysis, frequency analysis through spectral decomposition (SD), geobodies and seismic sections have been used to delineate shallow Plio-Pleistocene El Wastani Formation channel

fairways within the Nile Delta offshore Saffron Field. This has ultimately led to providing more reliable inputs for volumetrics calculations.

Interpretation of the stacked channels complex through different seismic attributes helped to discriminate between sand-filled and shale-filled channels and understanding their geometries. Results conclude more confident delineation of four distinct low sinuosity channelized features.

Petrophysical evaluation was conducted on five wells penetrating Saffron reservoirs including electric-logs and Modular Dynamic Test (MDT) data interpretation. The calculated average reservoir properties were used in different volumetric calculation cases.

Different approaches were applied to delineate channel geometries which were later used in performing different volumetric cases. These approaches include defining channels from Root Mean Square (RMS) amplitude extractions, SD color blended frequencies, and geobodies, all calculated from pre-stack seismic data.

El-Wastani reservoir static model shows that the thickness increases at the core of the channels and decreasing at the channel's levees. This reservoir is subdivided into four units Channel 1, Channel 2, Channel 3 and Channel 4 composed of sand and shale intercalations. Higher effective porosity and saturation values were noticed for the sand, while lower values are found for the shale.

The different volumetric cases done were compared against the latest field volume estimates proven after several years of production where the static reservoir model input showed the closest calculated hydrocarbon volumes to the actual field proven volumes.

Keywords: Saffron Field, Well logging, Seismic attributes, Channel Definition, Static model and Volumetric calculations.

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