

**AIN SHAMS UNIVERSITY
FACULTY OF SCIENCE
GEPHYSICS DEPARTMENT**



Petrophysical Seismic Study of the Jurassic Sandstone Reservoirs: El-Obaiyed Field, Western Desert, Egypt

A Thesis Submitted in Partial Fulfillment of the Requirements for the Master Degree
of Science in Geophysics

BY

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دراسة بتروفيزيكية سيزمية لخزانات عصر الجوراسي الرملية: حقل الابيض, الصحراء الغربية, مصر

رسالة مقدمة لاستكمال متطلبات الحصول
على درجة الماجستير في العلوم
في الجيوفيزياء

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Dedication

I would like to dedicate my work to my parents, my sisters, my dear wife, my daughter and my son whose love, help and support kept me going.

Abstract

Petrophysical seismic study represented by core data analysis, wireline logs analysis and 3D seismic data interpretation was carried out at El-Obaiyed Field, North Western Desert, Egypt. Core description was aimed at the petrography, while core analysis was used for porosity-permeability relationship and permeability prediction. Wireline log analysis aims to reservoir petrophysical properties evaluation. Seismic interpretation was performed to detect the subsurface structural and stratigraphic features. The Obaiyed Field lies at the western flank of the Matruh basin.

The results were collected together to build-up the reservoir static model. Static model is a representative tool by which the facies, petrophysical properties and structure can be imagined. Such static model can support the detection of suitable places for hydrocarbon potential.

The Lower Safa static model reservoir shows a combined trap formed of faulted anticline structural trap with pinching out stratigraphic feature. This reservoir is subdivided into four units composed of sand and shale intercalations with thickness increasing northwards. Higher effective porosity and permeability values were noticed for the sand, while lower values are found for the shale. The Lower Safa reservoir has porosity averaged values ranged from 4 to 11 %, with abrupt change in reservoir quality due to diagenesis process, and net pay thickness of reservoir varied from few meters to hundreds of meters due to stratigraphic situation of the Jurassic deposits.

The obtained results of seismic attributes with seismic inversion predicted from the neural network algorithm software were correlated with wireline log derived porosity at well locations to perform a porosity-acoustic impedance relationship. This relation was used to estimate porosity from the inverted seismic data (acoustic impedance) along all available seismic lines and

to produce an effective porosity map for the Lower Safa reservoir, which look to be a gas charged reservoir.

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