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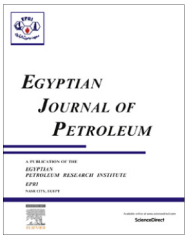

FULL LENGTH ARTICLE

# Reservoir architecture of deep marine slope channel, Scarab field, offshore Nile Delta, Egypt: Application of reservoir characterization

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Scarab;
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**Abstract** Scarab field is an analog for the deep marine slope channels in Nile Delta of Egypt. It is one of the Pliocene reservoirs in West delta deep marine concession. Channel-1 and channel-2 are considered as main channels of Scarab field. FMI log is used for facies classification and description of the channel subsequences. Core data analysis is integrated with FMI to confirm the lithologic response and used as well for describing the reservoir with high resolution. A detailed description of four wells penetrated through both channels lead to define channel sequences. Some of these sequences are widely extended within the field under study exhibiting a good correlation between the wells. Other sequences were of local distribution. Lithologic sequences are characterized mainly by fining upward in Vshale logs. The repetition of these sequences reflects the stacking pattern and high heterogeneity of the sandstone reservoir. It also refers to the sea level fluctuation which has a direct influence to the facies change. In terms of integration of the previously described sequences with a high resolution seismic data a depositional model has been established. The model defines different stages of the channel using Scarab-2 well as an ideal analog.



## 1. Introduction

A series of successive exploration and appraisal wells drilled by BG Egypt and Rashpetco encountered several trillions of gas. An early discovery was NDOA-1 well in 1975. The well explored Sapphire field at Early Pliocene by Esso company, in 1998 British gas and Edison run 3D seismic technique covered the West delta deep marine concession. That was a reason for fully understanding the Pliocene prospectivity. In addition to high resolution seismic data, Core analysis and FMI log and other wire line logs have a great participation to get a full description of these sandstone potential reservoirs, and clear identification of the depositional system. Channel systems were found in big canyon settings on the concession (Syncline bounded by Rosetta fault from the Eastern side and draped

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into NDOA in the north). This canyon contains several channel sands from west to east including Saffron, Scarab, Serpent, Simian and Sienna. All of those channels are prograded as part of El Wastani formation [12,10,11], lain within Late Pliocene age (Fig. 1).

Scarab field lies within West delta deep marine offshore license concession, which is delineated between longitudes 30° 10′ 00″ and 31° 04′ 00″ east, latitudes 32° 21′ 00″ and 31° 58′ 00″ North. Scarab gas field is located 63 km NE of Rosetta branch at the mouth of the River Nile (Fig. 1).

There are five vertical, lateral migrated channels in Scarab field. The main channels are channel-1 and channel-2. Both are penetrated by 7 wells; the 1st two wells were exploratory (Scarab-1 & Scarab-2 drilled at 1998). The other wells were development (Fig. 2).

The aim of the present study is to make a geologic model of Scarab field describing the sedimentary facies and environmental setting by integrating FMI logs and Core data, other conventional wireline logs with seismic stratigraphic response. This is to illustrate the importance of using all of the available data combined together to reach with a powerful reservoir description, showing reservoir distribution and heterogeneity within the channel geometry.

### 1.1. Stratigraphic setting

The major structures within the concession are the Southwest–Northeast trending of Rosetta fault and the east northeast–west northwest trending Nile delta offshore anticline (NDOA). Those resulted due to the wrench tectonism [13] because of the rotational movement of African plate toward Eurasian plate [14,1,6]. In parallel Nile Delta was subjected to a series of low stand (Mid Oligocene, Serravalian, Messinian, Late Pliocene) and high stand events (early Oligocene, Turtonian, Early to Middle Pliocene) since the beginning at Early Oligocene [4,5].

Rosetta fault and NDOA have the main control on the channel distribution within Pliocene section.

Scarab field lain at the Late Pliocene event draped on NDOA from south to north (Fig. 2). Seismic data clearly identified the channels scouring, and amplitude screening showing both channel trends. Channel-1 splitted to the north into two

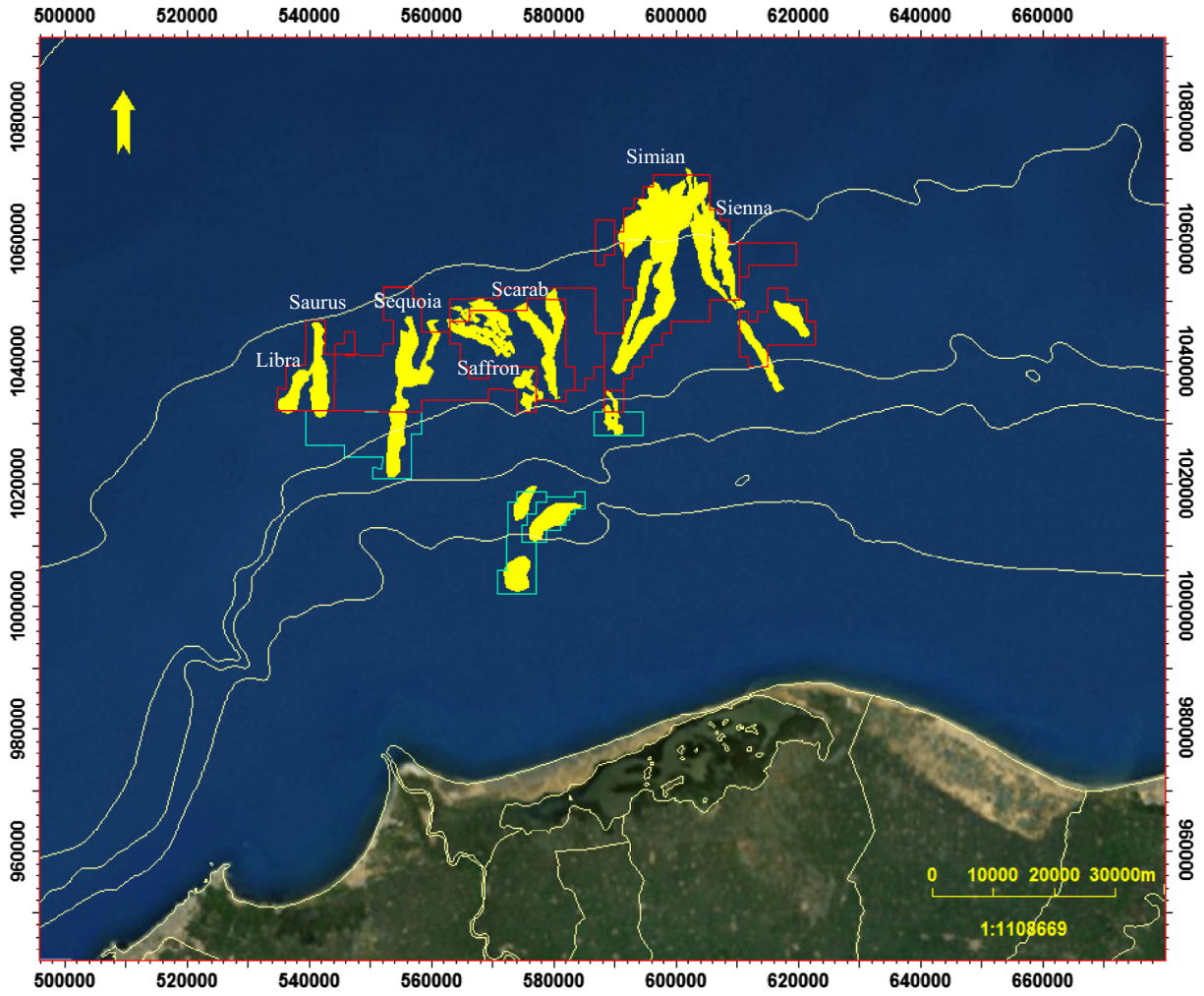


**Figure 1** Map shows WDDM concession boundaries with the most common fields including Scarab Field with the yellow color. Located approximately 100 km NE of Alexandria.