

## **Regional to Field-Scale Structural Reconstruction: The Key in Understanding the Paleo-Topography and Building a Conceptual Depositional Model of a Complex Glacial Reservoirs - A Case Study from South of Oman**

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### **Abstract**

#### **Objective:**

The glacial sedimentary rocks in the south of Oman, so called AL-Khalata, are one of the most complex reservoirs due to the complex nature of the depositional processes within the glacial environments. It was deposited during tectonically non-active period, but the pre-depositional tectonics has played a major role in defining the paleo-topography which controlled the depositional patterns at both regional and field scales. Therefore, the reconstruction of the tectonic history to understand the paleo-topography and accordingly the depositional patterns is very important for the sand prediction in such complex reservoirs. This was very helpful in building a geological conceptual models for fields like Field-X.

#### **Method/Workflow/Data/Tool:**

Defining the sitting of Field-X in the regional sedimentary basin was the starting point to identify the flow and the sediment influx directions and to identify the available accommodation space at Field-X location in relative to the accommodation space in the nearby areas in the basin.

The field is situated at the faulted/ruptured crest of a turtle back structure anticline (turtle back structure is a regional structure that formed as a result of salt evacuation/dissolution at the side of the structure). The fault blocks within this crest generated complex topography which resulted into a complex depositional pattern and distinguished Field-X by relatively a bigger accommodation space for AL-Khalata deposition in comparison to the nearby fields.

At later stage (relatively recent in Tertiary geological age), one side of the field, which was the high during AL-Khalata deposition, was exposed to a gravitational collapse caused by the underlying Ara salt dissolution. As a result, this high turned over to be the trough in the field nowadays. Thus, the reconstruction of the field tectonic history is a key for Field-X.

#### **Results/Conclusions:**

The reconstruction of the geology of Field-X through the understanding of the tectonic history and the definition of the paleo-accommodation space has helped in predicting the sand distribution and opened further opportunities to mature virgin oil. This resulted in drilling around 30 new wells that doubled the field production.

**Novel/Additive Information:**

In the fields where the sedimentary reservoirs are complex and the available seismic/well data does not provide direct image of the field geology, then, re-building the topographic history could guide in identifying the complex depositional patterns and hence enhanced reservoir sand prediction.