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Reservoir Characterization, Interpretation and Modeling in a Deep Marine Geological Environment: An Integrated Approach

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SUMMARY

In this presentation we want to demonstrate how Statoil and co-venture ExxonMobil perform reservoir characterization and modelling for the field development. This has been done for the commercial discoveries offshore Tanzania, which are deep water turbidites deposits. All available data, including seismic, wireline log and core data as well as fluid analysis and Drill Stem Tests have been used as input to the geological model. The integrated workflow allows us to investigate the uncertainty in both the static and dynamic reservoir description.

Introduction

Statoil and co-venturer ExxonMobil Exploration and Production Tanzania Limited have made 8 discoveries in Tanzania in a deep marine depositional environment. In order to reduce and understand uncertainty, and to ensure optimal decision making during the field development planning, a range of appraisal activities, integration and analytical methods have been performed.

During the exploration drilling and appraisal phase, comprehensive data acquisition has been performed, including extensive logging, coring and DST (Drill Stem Testing, production test).

Theory

Reservoir characterization is performed in an integrated team of geophysicists, geologists and petrophysicists in close cooperation with the reservoir and production engineers. Data from all sources need to be combined; regional and reservoir scale seismic interpretation, petrophysical and core analysis, image log interpretation, sedimentological core descriptions, biostrat analysis and petrographic studies.

Seismic interpretation of both the reservoir and the aquifer gives the basic input to the structural geological model. Faults that may have an impact on flow are also included in the models. In the deep water turbidites of the discoveries in Tanzania, facies models are built at different levels of channel/lobe hierarchy. Seismic attributes, isochores and inversion products can be used directly in the model to distribute facies and reservoir properties. Core measurements, log data are used for reservoir property input to the geological model. DST results are being used in order to calibrate and constrain the flow properties and communication patterns in the model. In the process of developing static and dynamic models, simplified screening models are used to test several geological scenarios, and determine which parameters are important to capture in the final models

The integrated workflow allows us to investigate the uncertainty in both the static and dynamic reservoir description.