Resoptima

CASE STUDY

Getting better volume estimates at the early field appraisal stage

Improved future production estimates achieved by incorporating drill stem test data into ensemble-based reservoir models

Big decisions, limited data

Multi-billion dollar decisions are often made with very little data and the uncertainties associated with these are usually anchored to a single base case and/or a small set of scenarios. The key to reducing the risks associated with this approach is to create as large and diverse a set of subsurface models as possible which consistently honor available static and dynamic data.
During the exploration and field development phases, well test data are often gathered and used to assess field potential. However, these data are not transferred to the reservoir model in a consistent manner. Therefore, valuable information about reservoir properties can be overlooked in the assessment.

Integrating data with ResX

Using ResX, dynamic data including drill stem test (DST) build up pressure derivatives together with static data inputs are used to condition the models. The solution combines these data, the subsurface know-how of the asset team, reservoir physics, and machine learning algorithms to generate an ensemble of reservoir models. The results from this full suite of models provide a more reliable view of subsurface uncertainties thus reducing the risk of the chosen development strategy..

Objective

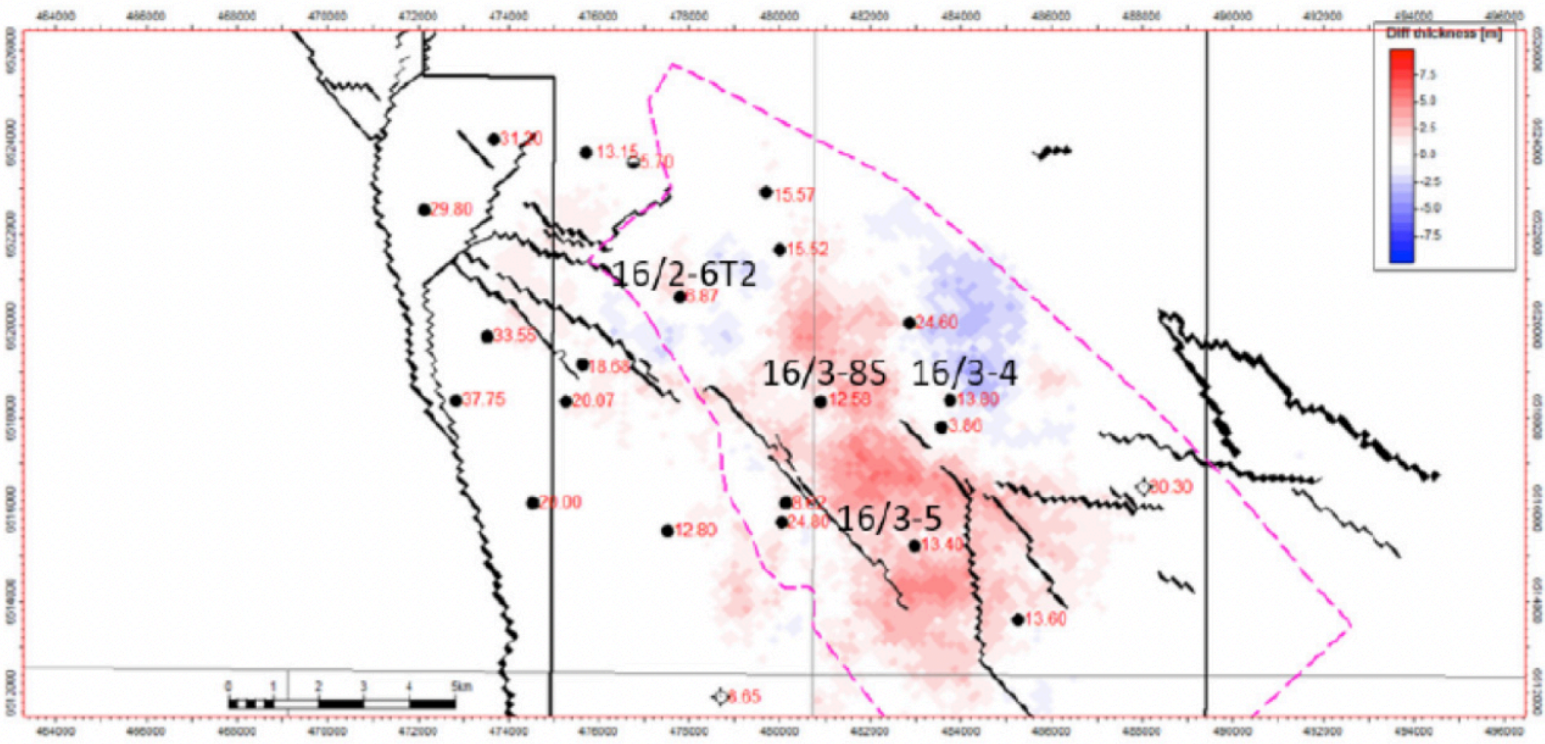
Use static and dynamic data to better understand and estimate volumes for the Johan Sverdup field

Solution

Generate a large set of models capturing subsurface uncertainties using the ResX ensemble based reservoir modeling tool

Outcomes

- Streamlined data integration and reservoir modelling workflow saved considerable time over traditional workflows
- Achieved an improved subsurface under-standing of permeability and thickness by consistently using all available data (static and dynamic)
- More time for the team to analyze the results and focus on field planning



Median of the difference in sand thickness for the initial 200 ensemble members and the updated set conditioned to DST data

Solution highlights

- Static models were simultaneously matched with dynamic DST data from four tests.
- Large unphysical updates during dynamic data conditioning were avoided through small and local geostatistically consistent updates to a large number of model variables, while ensuring that key subsurface uncertainties were captured and propagated throughout the entire reservoir modelling and data conditioning process.
- By including DST information in the reservoir modelling process, clear spatial trends in the sand thickness and permeability were revealed which improved initial volume estimates.
- The solution enabled frequent model updates as new data arrived, and an automated workflow assisted in analyzing new results for management decisions.

The full article can be found at SPE 181352