Assessment and Well Planning of a Shallow Marine Reservoir Based on High Resolution Angle Stack Seismic Data

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ABSTRACT

Shallow marine sandstone reservoirs of the Middle Jurassic (Bajocian-Bathonian) are observed within wells offshore Norway. In the study area the high net sandstone interval, over 100 meters in thickness, can be clearly divided into two distinct groups, poor and good permeability/porosity sandstones. The poor permeability /porosity sandstone is linked to a back-stepping shore face, contrasted by the good porosity/permeability sandstone that represents some of the best quality reservoir in the region.

Understanding the distribution of these two shallow marine reservoir types is vital for exploration, appraisal, and field development. This is made more difficult due to the lack of well control (only two wells located within the study area), combined with challenging seismic imaging associated with complex structural geometries. Other complications relate to large impedance changes associated with layers immediately above and within the shallow marine reservoir. This makes interpretation of the seismic amplitudes away from well control problematic.

Using seismic attributes and AVO analysis, a reservoir model was built incorporating the well data. This model is used for reservoir property prediction, taking specifically the two facies types into account. The volumetric uncertainty is captured through the setup of different scenarios. They address specifically the low case assumption for the facies distribution, the porosity, hydrocarbon contact, and reservoir outline. This work underlines the important role of modern high-resolution seismic on the hydrocarbon volume uncertainty estimation and well planning. A further well will be drilled on the structure, with the location based on both seismic character and model predictions. The success of these predictions will be assessed against the result of this well. The success of these predictions will be assessed against the result of this well.

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