

Unravelling the stratigraphic and structural development of the strata found underneath and above the Mid Miocene unconformity

Publieke samenvatting / Public summary

Summary

This study sought to increase our knowledge of the interval around Mid Miocene Unconformity (MMU) in order to understand the potential of this interval as a petroleum play. It found a number of problems with the existing lithostratigraphic interpretations on the NLOG.nl website and proposed alternatives. On the main goal – investigating whether a petroleum play is present around the MMU – it found no single petroleum play.

Background

The discovery of hydrocarbons in the “Little John” structure in the Danish sector of the North Sea led to a renewed interest in the Neogene. In similar aged strata in the Netherlands, found in the interval around the MMU, indications for hydrocarbons are also present. Furthermore, the MMU petroleum play also seems to be present in the area where Neogene gas fields are found. Whether this play is linked to other petroleum systems (deeper or shallower) was unclear at the start of this project, but since multiple prospects overlie each other, the risks of drilling failures are spread and Neogene prospects that were currently deemed uneconomical could become economical.

Project objective

The aim of the project was to unravel the

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stratigraphic and structural development of the strata found underneath and above the Mid-Miocene Unconformities to better understand and predict the presence of reservoir sands. This could potentially lead to a completely new petroleum play by itself or increase output by taking additional layers into production.

Project results

MMU petroleum play: The project found that no single petroleum play was present around the MMU. Interpretation of gas composition data revealed the existence of two petroleum systems around the Miocene unconformities.

Stratigraphic development: The biostratigraphic results obtained in this project showed that all existing lithostratigraphic interpretations on the NLOG.nl website were to some extent wrong and should not be relied on, and that well markers (tops) were not reliable. The new subdivision into intervals shows a very complex regional facies development. Unfortunately, the sparsity of the data analysed made it impossible to draw hard conclusions on the sedimentary development, provenance or depositional environment. However, palynological analysis indicates that the entire Eocene-Miocene succession is characterised by persistently marine depositional settings.

Old vs New: The project replaced the old lithostratigraphy with subdivision in intervals. In the new interpretation, the Rupel is subdivided into the Veldhoven and Rupel Formation and the naming and age of surfaces has changed dramatically. The project team proposed abandoning earlier definitions in favour of the Savian unconformity, Early Miocene unconformity, Mid Miocene unconformity, and Late Miocene unconformity.

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