

## **Key Conditions Controlling the Jurassic-Cretaceous Chalk Petroleum System, Dutch Central Graben**

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This paper presents novel results from the analysis of the Jurassic-Cretaceous Chalk petroleum system in the Dutch Central Graben, with special focus on the Posidonia-Chalk oil system.

In the analysis we used new tectonic heat flow reconstructions, and Cenozoic paleo sea surface temperatures, detailed biostratigraphical and paleoenvironmental analysis and petrophysical log interpretations of the Chalk in combination with the latest results of TNO's detailed geological mapping programme to analyze petroleum systems in the Dutch part of the North Sea.

Recent 3D petroleum systems modeling in selected areas of the Dutch Central Graben revealed a large variation in burial history of the Posidonia Shale Formation, resulting in very different temperatures, maturities and hydrocarbon generation histories, depending on structural position. The Posidonia source rock started generating hydrocarbons in Cretaceous times, generation rates reaching their maximum values before the Late Cretaceous inversion of the graben. Depending on structural position, the Posidonia source rock also generated hydrocarbons during Paleogene and, in selected areas, in Neogene times, a favorable timing for sourcing the Chalk.

Hydrodynamic analysis showed that fluid overpressures in the Chalk reach high values in Quaternary times approaching measured leak-off pressures in the Dutch Central Graben, thus influencing late hydrocarbon charging and preservation conditions in the Chalk. In selected areas the combination of favorable conditions of Chalk composition, trap geometry, timing of oil generation and overpressured conditions explain the presence of oil accumulations in the Chalk.