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Deepwater Exploration in the Vøring Basin (Norwegian Sea): Is There A Cretaceous Source Rock?

In the scope of the 17th Norwegian concession round areas on deep water (central Vøring Basin) as well as blocks near the coastline of the Norwegian Sea were announced. In the central Vøring Basin, the upper Jurassic (main source rock interval at the Norwegian Shelf) and even the lower Cretaceous sediments are too deeply buried and hence extremely unlikely to be a source for hydrocarbon accumulations. Additionally, there exists evidence that specific biomarker components encountered in occurrences in the Vøring Basin are of post-Jurassic age.

To investigate the probability of a late Cretaceous source rock in the central Vøring Basin we carried out an integrated study applying structural restoration, sedimentology and organic facies modeling techniques to evaluate source rock occurrence, distribution and potential. We focused on the Cenomanian/Turonian interval as extraordinary green-house conditions during this time (Global/Oceanic Anoxic Event II) led to wide-spread organic carbon deposition in marine environments and resulted in deposition of the source rocks of over 60 % of the currently known large hydrocarbon reservoirs.

Various modeling scenarios were performed to account for the specific boundary conditions. However, the results indicated that the development of high quality source rocks can only be expected locally in thin layers associated with times of reduced sediment input. Otherwise, high sedimentation rates resulted in dilution of the modeled organic matter even when assuming a high organic carbon flux and very good (anoxic) preservation conditions. Further, the probability for gas prone source rocks is higher than that for oil prone source rocks.