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Prediction of Source Rock Distribution and Quality Variations: The New OF-Mod 3D Technology

In exploration the ability to predict hydrocarbon occurrence and quality variations within a prospect - prior to drilling - is of large importance. Particularly, recently developed 3D modeling techniques are gaining significance with respect to volumetric hydrocarbon predictions. The source rock is the basis of every petroleum system and the first pre-requisite for a hydrocarbon accumulation to occur. But source rock distribution, type and quality variations are still among the least constrained parameters during basin modeling studies.

The OF-Mod program is a process-based modeling tool, which mimics the development and the variation of source rock facies. Consequently, it allows quantitative prediction of source rock potential away from well control and results in a significantly improved input for kinetics, expulsion and migration studies. The concept was designed in early 98 and in meantime the 2D version of the software has been applied in many national and international studies and has gathered scientific approval.

The further development of the software into a 3D version is a consequence of the technological evolution during the last years and will lead to a significantly improved picture of the complex interaction of processes effecting source rock deposition. In a theoretical example we will illustrate the possibilities, differences and consequences of 2D and 3D source rock models with respect to quantitative estimates. Additionally, we will show the capabilities of the new 3D tool with special attention to integrated, high-resolution basin modeling studies and, in contrast, application in exploration frontier areas, where only little information is available.