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Linking Structural and Petroleum Systems Modeling- Concepts and Applications

Many of the worlds' interesting petroleum exploration areas are characterized by structurally complex geologic histories. Structural Modeling techniques are needed to interprete and reconstruct these histories and Petroleum Systems Modeling can then be used to simulate hydrocarbon generation and migration in order to improve predictions of HC locations and properties. Integrating or linking these two techniques has obvious benefits as it enables the simulation of petroleum migration and accumulation processes in structurally complex environments.

Our new approach presented here focusses on linking structural and petroleum systems modeling software tools instead of trying to create an integrated package. The main benefits are that users can continue to work with advanced special tools and the superior functionality of the tools is retained. Special grid transformation routines ensure that the geometries, properties and hydrocarbons in the system are handled correctly from timestep to timestep, and 3-phase, n-component migration modeling can then be performed in the thrusted models using advanced pvt-controlled phase/composition models such as flash calculations.

To illustrate the key points the presentation will provide details of the concepts and workflow of the linked approach, and will use a case history in a foreland-fold-and-thrust belt where contrasting deformation styles and material pathways led to a varying burial history of source rocks in neighbouring structural domains and temporally and spatially changing migration pathways.