

Master Thesis

Reconstructing basement driven fluid-flow in sedimentary basins: insights from the North Sea

Supervisory team: TT. Prof. Nevena Tomašević (AGW-GG), Dr. Jimmy Moneron (AGW-GG), Dr. Amr Talaat (AGW-INE)

Contact: TT. Prof. Nevena Tomašević, nevena.tomasevic@kit.edu

Motivation: Sedimentary basins record the interaction of tectonic, deposition, and fluid flow through time. A key challenge in basin analysis is understanding how deep-rooted structures, such as inherited basement faults and salt-related deformation, control the migration of fluids within sedimentary successions. While some structures act as an effective seal and compartmentalize the basin, others evolve into long-lived permeable pathways. These processes shape basin-scale fluid flow systems and influence geothermal systems, mineral resources distribution, and the long-term integrity of subsurface nuclear waste disposals.

Goal and approach: This MSc project investigates the relationship between basin architecture and fluid-migration systems in the North Sea using seismic reflection, well log and borehole data. The main objectives include mapping deformations and indicators of fluid flow, reconstructing fluid flow pathways by linking these two and finally identifying geological conditions that control seal integrity and fluid migration.

Skills gained: 3D geological interpretation; seismic attribute analysis, geological data synthesis and critical thinking for subsurface characterisation

Ideal Candidate: Students with interest in basin analysis and subsurface fluid flow processes. Students should have successfully completed the Seismic Interpretation course and actively participated in the Basin Analysis and Modelling course.

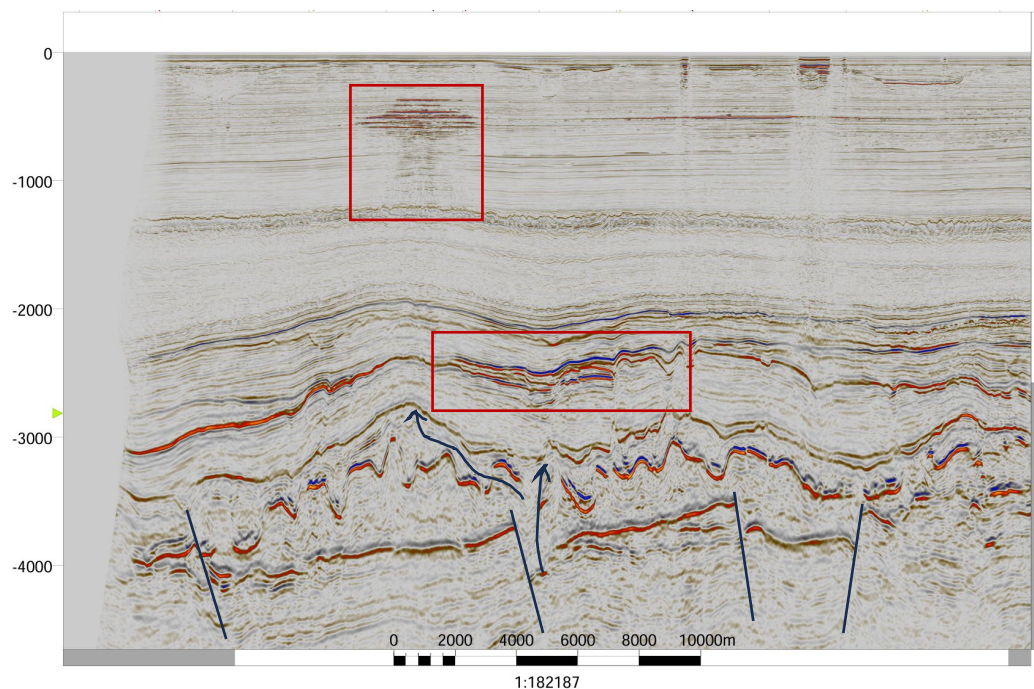


Figure 1. North Sea seismic line showing fault controlled fluid migration.