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Seismic modeling of CO_2-injection based EGR (project CLEAN)

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The joint research project CLEAN (CO2 Largescale EGR in the Altmark Natural-gas field) is a scientific program accompanying the Enhanced-Gas-Recovery (EGR) project within the second largest natural gas field in Europe - the Altmark gas field.

Within this program a set of active and passive seismic surveys are planned in order to monitor the spatial and temporal evolution as well as the related processes of CO_2 injection into the reservoir.

These experiments comprise time-lapse 3D-VSP/MSP (vertical/moving-source-profiling) surveys as well as the installation of a borehole seismometer network for monitoring and analysis of injection induced seismicity.

For both configurations we have performed elastic finite-difference simulations of the seismic wavefield based on a given subsurface model and for a range of injection-induced variations of seismic parameters.

We will show the results and discuss the findings in terms of survey design, the estimation of expected changes in the seismic wavefield (reflectivity, traveltime, etc.), the repeatability of the measurements and the understanding of the limits for a rock-physical interpretation of the observed effects.