



Gas-recovery from deep reservoirs and its potential to trigger earthquakes

T. Dahm (1), F. Krüger (2)

Institut für Geophysik, Universität Hamburg (torsten.dahm@zmaw.de), (2) Institut für Geowissenschaften, Universität Potsdam

In 2004, a Mw 4.4 earthquake struck the aseismic region of North Germany. The epicenter was near large gas fields under production at a depth between 4 and 4.5 km. The hypocenter depth was between 5 and 7 km and the event was classified by us as being related to gas recovery (Dahm et al. 2007, BSSA).

Using a 3-D boundary element method and a simple poro-elastic field model, the relative field compaction, depletion and surface subsidence of the Rotliegend fields in North Germany have been estimated. The relative compaction is used to estimate relative changes of shear stress on nearby passive faults, which are known from active seismic surveys.

The analysis reveals that the Rotenburg earthquake occurred on a patch of large increase of shear stress on the Rotenburg fault. The size of the rupture fault and the location of aftershocks was apparently controlled by stress perturbations induced by field production.

The analysis approach is extended to study shear stress change on other faults in the region and their potential for earthquakes. Predictions are made for the stress change development assuming a constant production rate.