

Process understanding of the seismicity induced by CO₂ injection at the Illinois Basin

Project description

Carbon capture and storage (CCS) in deep saline aquifers is widely considered a promising technology for mitigating global warming. However, the injection of large volumes of CO₂ underground may induce earthquakes with potential nuisance to the population and damage to infrastructures. The knowledge of the causes of induced earthquakes, while developed for other geo-energy applications in recent years, is arguably in an earlier stage for geologic CO₂ storage. This project aims at filling in this research gap and improving process understanding of CCS-induced earthquakes, which is key to optimize geologic CO₂ storage and enable its large-scale deployment. To achieve this goal, we propose the numerical simulation of CO₂ injection at the Illinois Basin, US, that triggered a *M*1.7 earthquake and hundreds of smaller events.

Tasks to be performed by the candidate

- Constructing a conceptual model of the Illinois Basin with embedded faults diagnosed from geophysical surveys,
- Coupled two-phase flow and geomechanical modeling of CO₂ injection using the finite element code CODE_BRIGHT,
- Fault stability analysis based on the calculated pore pressure and stress changes,
- Inferring the triggering mechanisms.

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