

## **Experiences from the ICO<sub>2</sub>P Project applied to Migration Monitoring of Injected CO<sub>2</sub>**

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In the ICO<sub>2</sub>P project [1] a monitoring scheme for carbon capture and storage (CCS) is developed employing noble gases as tracers in geological CO<sub>2</sub> storage reservoirs. Noble gases have been used successfully to refute alleged CO<sub>2</sub> leakage in the past [2].

So far, we collected samples from several CO<sub>2</sub> capture facilities in Norway. Further, we accompanied water and CO<sub>2</sub> injection experiments.

We put the experiences and data gathered during such smaller scale, onshore experiments and capture operations into perspective for application in future surface and subsurface migration monitoring. For this purpose we use PHREEQC, a computer program for aqueous geochemical calculations. Results from modelling based on dispersion and differential diffusion and results from basic mixing scenarios with background fluid reservoirs are given for noble gases and are compared to CO<sub>2</sub>.

Noble gas concentrations in injected CO<sub>2</sub> are simulated with their inherent signature in captured CO<sub>2</sub>, as found during our sampling campaigns or as artificially added tracers. The calculations shall allow for estimations of amounts of injected CO<sub>2</sub> needed to migrate to be detectable for current on-site and laboratory-based mass spectrometric technologies for noble gas analysis.

[1] [www.mn.uio.no/geo/english/research/projects/ico2p/](http://www.mn.uio.no/geo/english/research/projects/ico2p/)

[2] Gilfillan et al. [2017] Int. Jour. of Greenhouse Gas Control, 63, 215-225.