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Tracer Desgin and Gas Monitoring of a CO_2 Injection Experiment at the ECCSEL CO_2 Field Lab, Svelvik, Norway

Svelvik CO_2 Field Lab

- Water and CO_2 injection experiments
- Four monitoring wells 100m deep
- Central injection well with injection at 64-65m
- Geophysical and geochemical monitoring

Fig. 1: Location map

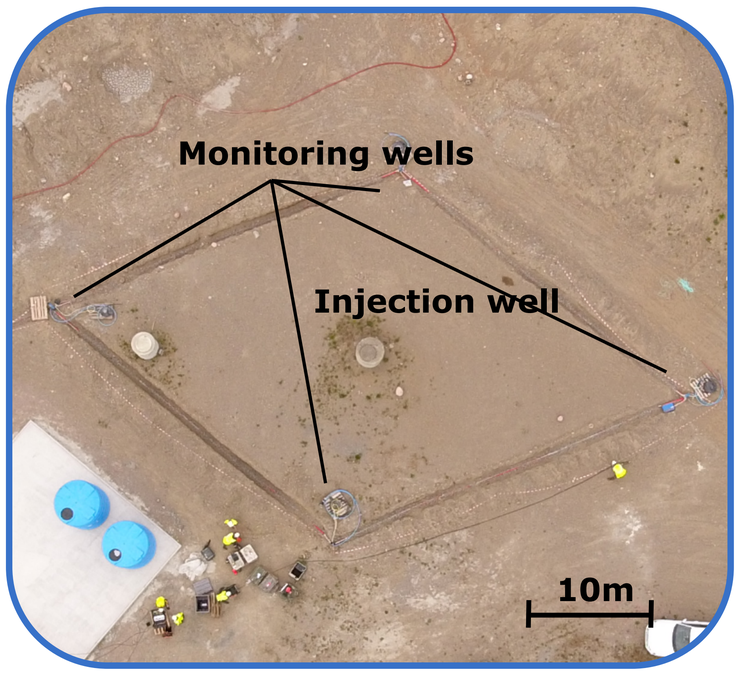

Fig. 2: Bird's eye view on the lab

Portable Mass Spectrometer

- (Noble gas) measurements with MembraneInletMS
- On-site analysis of N_2, O_2, CO_2, He, Ar, Kr
- Used for monitoring and determining background conditions

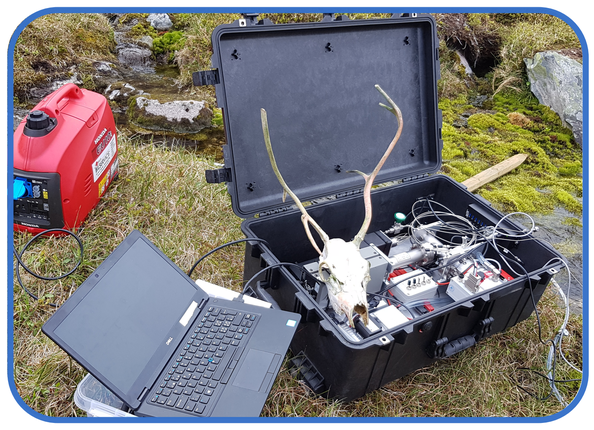

Fig. 3: MS "miniRuedi"

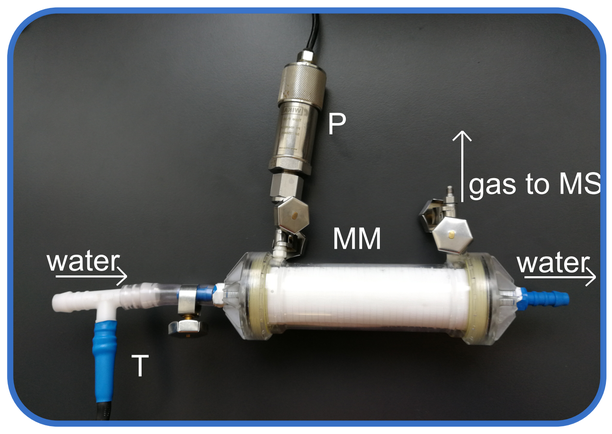

Fig. 4: Membrane Inlet Setup

Brennwald et al. 10.1021/acs.est.6b03669

Ideas for projects with this technology? Contact us!

Svelvik Ridge

- Glacial front deposits of Holocene ice contact
- >300m poorly sorted sandrich deposits
- Fjord encloses ridge from west, north and south
- Lower Aquifer: Saltwater: He enriched by order of magnitude
  - ⋙ Long residence time?
- Upper Aquifer: Freshwater: ~ Atmospheric noble gas concentrations
- Background monitoring of CO_2 flux

Crosssection of CO_2 Field Lab

Experiment

Injection:

- Water and CO_2 injection by the Pre-ACT project in October and November 2019
- Kr and He injected as noble gas tracers
- Continuous injection of tracer directly into CO_2 stream controlled by mass flow meter

Monitoring:

- miniRuedi at two monitoring wells and injection well
- Subsequent CO_2 analysis with LI-COR 820
- Gas flux chambers (LI-COR 8100) on surface spread out over study area
- Parallel geophysical monitoring by the Pre-ACT project

Fig. 6: Gas flux chamber on site

Summary and Outlook

- On-site noble gas measurement prior to inejction guide design of noble gas tracer.
- Monitoring with combination of several gas detection technologies
- On-going work on analysis of injection experiment; correlating monitoring techniques and environmental conditions

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