

The ICO2P project: APPLICATION OF NOBLE GAS SIGNATURES IN MONITORING SCHEMES FOR CO₂ STORAGE

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ICO2P:

This project is a feasibility study
appointed by CLIMIT and scheduled to run
Nov. 2016 – Sept. 2017.

CHALLENGE:

Is measurement of noble gases and CO₂ by use of
a mobile mass-spectrometer a suitable method
for geochemical and quantitative monitoring in
long-term, safe storage of CO₂ on the Norwegian
continental shelf?

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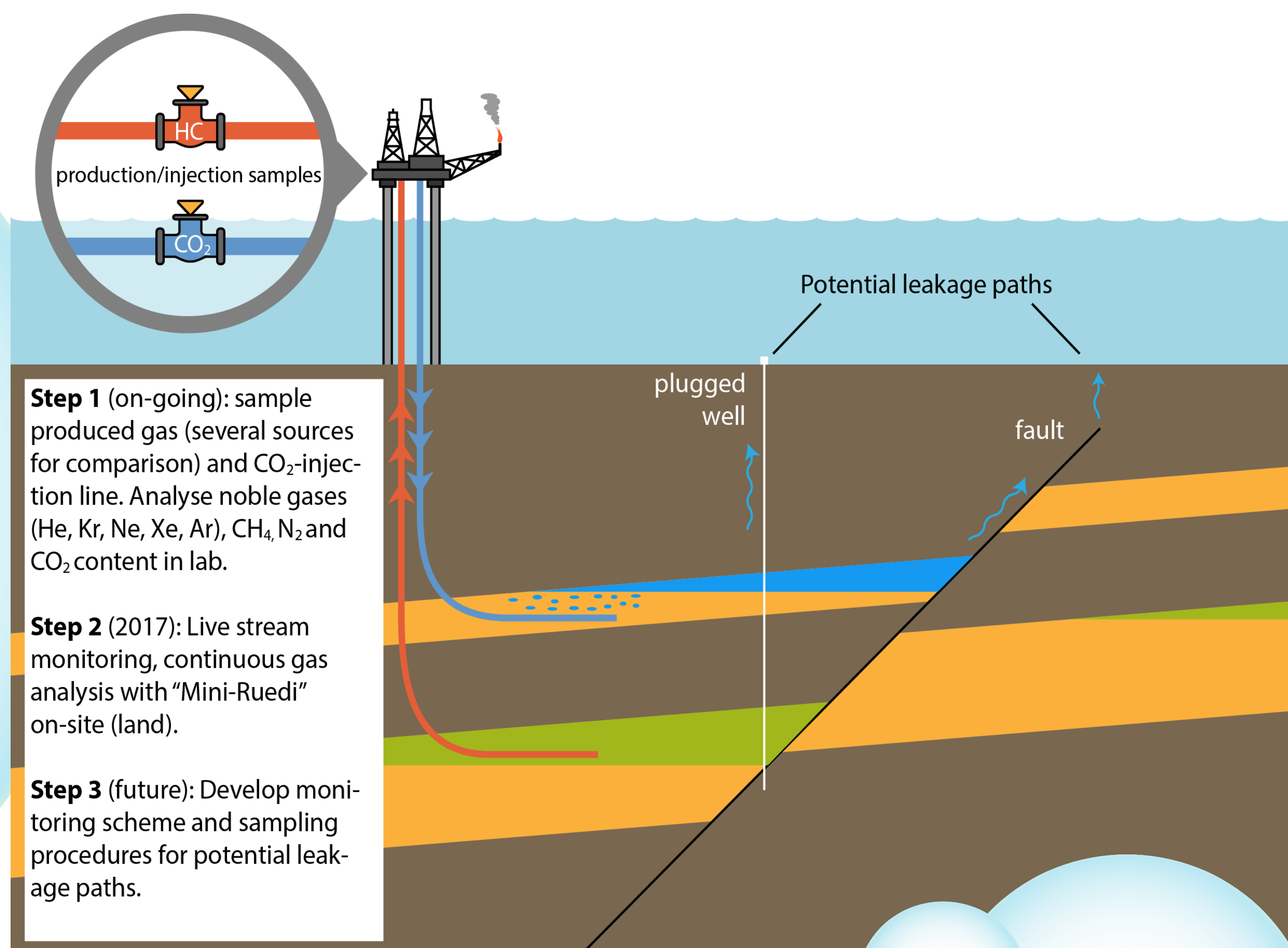


Fig. 1: Project scheme: ongoing (1), planned (2) and future (3) sampling and monitoring of noble gases in produced, injected and stored gas.

INNOVATION:

The “Mini-Ruedi”-instrument [1, 2] is portable (60 cm × 40 cm × 14 cm, 13 kg) and unique in its ability to analyse and record CO₂ and noble gas concentrations semi-continuously and on-site. Noble gas signatures will change with time due to radioactive decay, mixing of fluids, diffusion etc. By isotopic analysis of gas and gas dissolved in water it may be determined if any detected CO₂ corresponds to the stored CO₂

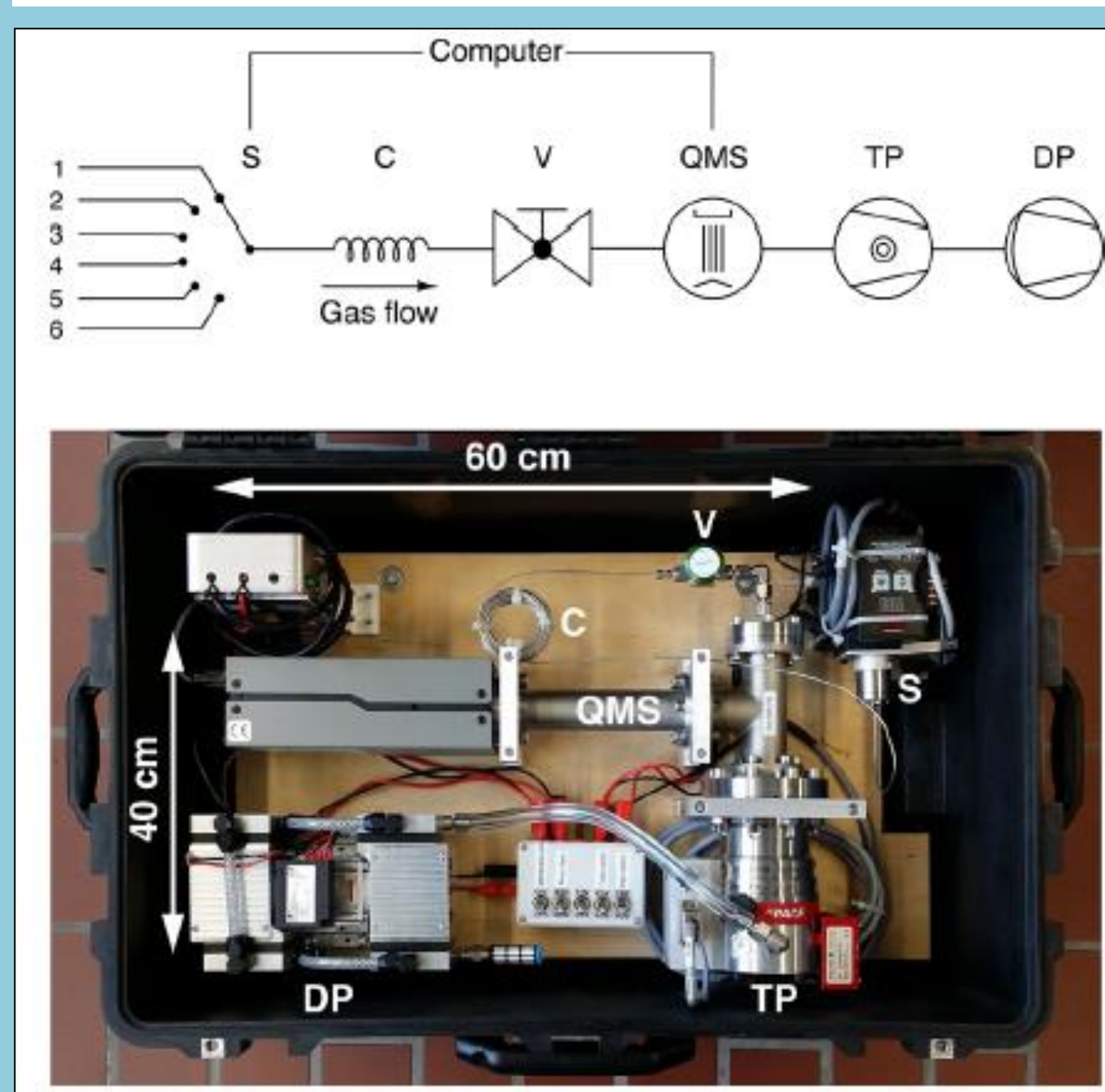


Fig. 2 A: The Mini-Ruedi set-up [1] B: The Mini-Ruedi instrument in operation on oceanic expeditions. The portable GE-MIMS system was installed on RV Sonne during the SO241 expedition in the Guyamas Basin, Gulf of Mexico to analyse gas seeping from the ocean floor [2]. The instrument was connected over small membrane modules with the Niskin bottles of a standard oceanographic rosetta. This set-up allowed to determine the dissolved gas conc.(e.g., He, Ar, Kr, CH₄, CO₂) in sampled ocean water on-line and on-board [1, 2]. C: Fascination of the Mini Ruedi. Photo: M.S. Brennwald. References: [1] Brennwald, M. S., Schmidt, M., Oser J. & Kipfer, R. (2016) A portable and autonomous mass spectrometric system for on-site environmental gas analysis. Environ. Sci. Technol. 50(24), 13455-13463. [2] Berndt, C., Hensen, C., Mortera-Gutierrez, C., Sarkar, S., ... & Muff, S. (2016). Rifting under steam—How rift magmatism triggers methane venting from sedimentary basins. Geology, 44(9), 767-770.

THE IMPORTANCE OF “ICO2P” AND GEOCHEMICAL MONITORING IN CCS:

- With the proposed method detected gas from potential leakage points may be separated from other, natural sources of CO₂.
- Identification and quantification of sources for CO₂ may improve political and public confidence in storage security
- Mixing ratios, solubility and diffusion rates may be estimated from noble gas data, improving the understanding of reservoirs

!!! OPEN INVITE SEMINAR !!! The «ICO2P» project team is hosting a seminar on noble gases in the environment, monitoring techniques and applications in CCS and hydrogeology at the University of Oslo on the 14th of March 2017. The seminar is free and everyone is welcome.



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PHOTO: M.S. Brennwald