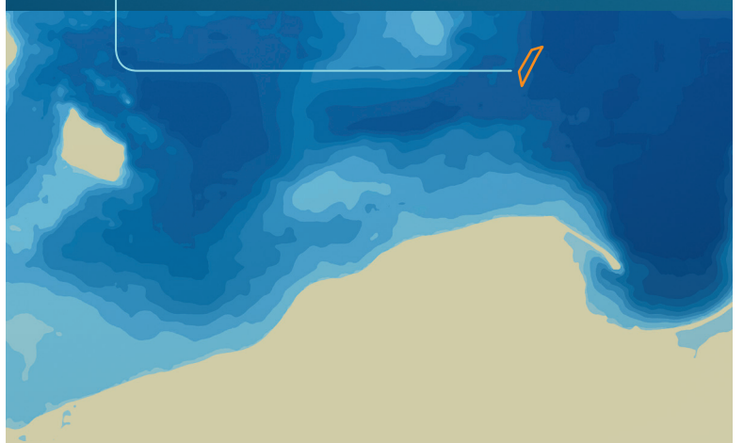
Rationale

- Carbon Capture and Storage (CCS) is regarded as a key technology for the reduction of CO_2 emissions from power plants and other large-scale industrial sources.
- In Poland, sequestration of CO_2 within depleted oil reservoirs beneath the southern Baltic Sea (B3 field) is considered a reasonable mitigation option.

Objectives

To assess the impact of CO_2 on chemical processes in marine sediments, sea water and benthic biota at a relevant hydrostatic pressure that simulates natural conditions at a potential CO_2 storage site in the Baltic Sea.

Oil-carrying B3 field, potential CO_2 storage site, southern Baltic Sea



The consortium encompasses expertise from four different scientific communities including environmental chemists and geochemists, modellers and biologists investigating biological impacts of water acidification and scientists working on CCS.

SINTEF

SINTEF Materials and Chemistry, Trondheim, Norway
Hammer K.M., Øverjordet I.B., Krause D., Nordtug T.

NTNU
Norwegian University of Science and Technology

Norwegian University of Science and Technology, Trondheim, Norway
Ardelan M., Salaverria-Zabalegui I., Olsen A.J.

UNIWERSYTET GDAŃSKI

University of Gdańsk, Gdańsk, Poland
Smolarz K., Łukawska-Matuszewska K., Burska D., Pryputniewicz-Flis D., Kozłowska D., Szymelfenig M., Ziółkowska M., Świeżak J., Sokołowski A.

NIVA
Norwegian Institute for Water Research

Norwegian Institute for Water Research (NIVA), Oslo, Norway
Ndungu K., Yakushev E.

Medical University of Gdańsk, Gdańsk, Poland
Hallmann A., Goyke E., Szuwarzyńska. M.

This project is funded / co-funded from Norway Grants in the Polish-Norwegian Research Programme operated by the National Centre for Research and Development

Contact person:

Adam Sokołowski (oceas@ug.edu.pl)
www.co2marine.ug.edu.pl
co2marine.project@gmail.com

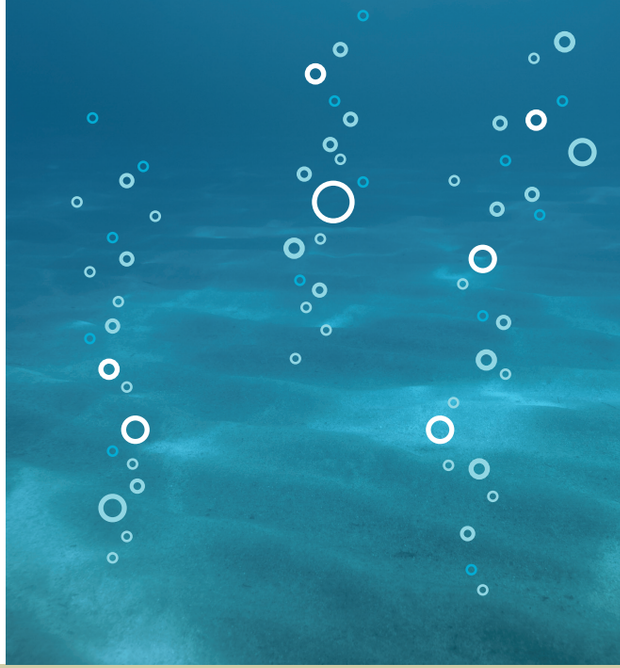
Printed on post-consumer-waste recycled paper

CO2MARINE

norway grants

CO2MARINE

Impact of potential leakage from a sub-seabed CO_2 storage site on the marine environment at relevant hydrostatic pressure

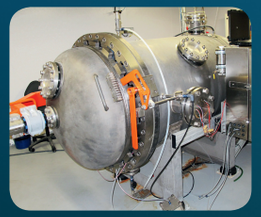


Methods

The project plans a series of three-month laboratory experiments in the unique titanium hyperbaric tank (Karl Erik TiTank) at the SINTEF / NTNU Sealab in Trondheim, Norway.

Surface sediments and two macrobenthic faunal species, the clam *Macoma balthica* and ragworm *Hediste diversicolor* from the Baltic Sea, will be exposed to different CO_2 concentrations at a hydrostatic pressure of 9 bars (water depth 80 m) to mimic natural conditions at the sea floor in the proposed CO_2 storage site.

Test species:
Hediste diversicolor and *Macoma balthica*



Karl-Erik TiTank specifications:

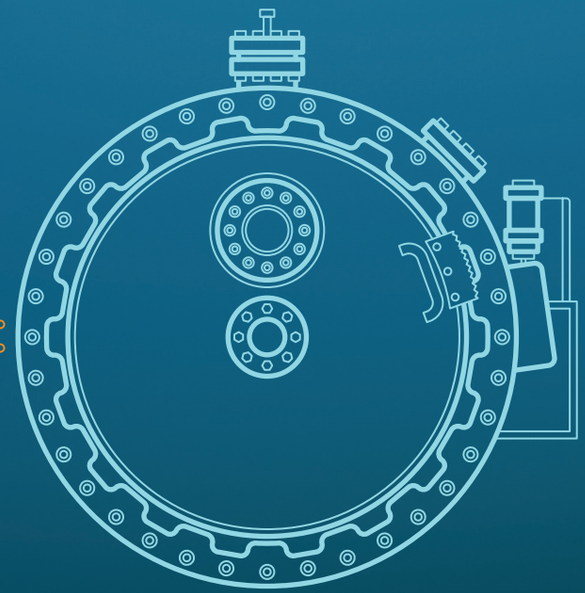
Volume: 1.4 m³
Pressure: 1–30 bar
Flow-through rate: 1 L min⁻¹
Recirculation rate: 10 L min⁻¹
50 sample containers accessible through a decompression chamber

Approach

The project will produce new data and conceptual understanding of:

1. dissolution rates of CO_2, temporal changes in sea-water carbonate and the associated other chemical variables at different CO_2 levels
2. mobilization of trace elements, heavy metals and organic pollutants from sediments during simulated leakage from sub-seabed CO_2 storage sites
3. biological responses at different levels of biological organisation spanning from cell to community to diffused seepage of CO_2 through seabed sediment.

The ultimate short-term outcome will be a list of chemical indicators and biological markers that will be proposed for use in detection and monitoring of diffuse CO_2 leakages from sub-seabed storage sites.



Project structure

WP1

Seawater and sediment-water interface chemistry: effects of leakage from sub-seabed CO_2 storage sites on speciation of metals and organic compounds at relevant pressure.

WP2

Modelling sediment-water interface chemistry: estimating influence of leakages on the distributions and fluxes.

WP3

Ecological risk assessment of potential CO_2 leakages.

WP4

Project coordination, management and dissemination.