

Poseidon Cruise 527 to Goldeneye region in North Sea

Cruise aims

The Poseidon 527 cruise to the Goldeneye region in the North Sea forms an important component of the European Union Horizon2020 with the title “Strategies for Environmental Monitoring of Marine Carbon Capture and Storage” STEMM-CCS. This project commenced in March 2016, and more details of the project can be found on its website <http://www.stemm-ccs.eu/>.

The overall aim of STEMM-CCS is to deliver new insights, guidelines for best practice, and tools for all phases of the CO₂ storage cycle at offshore Carbon Capture and Storage (CCS) sites. The work is centred around the Goldeneye site in the North Sea, which is a depleted gas field, and earmarked as a CC Storage complex.

Contributions to the main objectives of STEMM-CCS supported by our cruise are:

- (1) Pre-define and measure sensitive and robustly measurable environmental background variables which provide an indication for subsea CO₂ leakage, prior to offshore CO₂ storage operations.
- (2) Provide water column measurements of trace gases, nutrients, and carbonate chemistry variables to assess baseline conditions in the study region. Collect under natural (baseline) conditions a set of geochemical porewater data to provide a quantitative, process-based interpretation of porewater and benthic fluxes with the use of a state-of-the-art numerical model. The baseline data is needed for comparison with data obtained during artificial CO₂-release experiments, which will be conducted in 2019 in the same area.
- (3) Undertake benthic ecology baseline measurements, to compare against conditions with perturbations from artificial CO₂ release experiments.
- (4) Test novel chemical sensors, and hydroacoustic detection systems for measuring benthic and pelagic carbon fluxes (i.e. by using lab-on-the-chip technology, optodes, eddy covariance techniques for O₂ and pH
- (5) Undertake multibeam observations of the seafloor in the Goldeneye region, with an emphasis on obtaining position and size of pockmarks.

Mobilisation and departure

Cruise POS 527 mobilised in Kiel on August 14, 2018. The participants travelled from Plymouth Marine Laboratory (UK), National Oceanography Centre Southampton (UK), MPI Marine Microbiology (Bremen Germany), Develogic GmbH (Hamburg, Germany) and GEOMAR (Kiel, Germany). We sailed in the morning of August 15 with very calm weather in the Baltic Sea. In the Skagerrak and the North Sea the wind and waves were a little more demanding for some of the cruise participants.

Arrival and start of work

We arrived at the Goldeneye site at 0730 h on August 18 and commenced with locating the NOC Develogic lander. The wind was ca. 6 Bf, with significant wave action, which made it challenging to operate.

The poor weather conditions only allowed us to undertake a CTD cast (station 1) and no box corer work or lander deployment could be undertaken.

In the period between dinner and breakfast the next day, we undertook multi-beam surveys to improve our bathymetry maps. Our multi-beam operator (Catherine Wardell) has been doing an excellent job at enhancing the quality and coverage of the multibeam data around Goldeneye.

Good weather arrives

August 19 and 20 are providing us with excellent weather and calm seas. We are making great progress and have so far conducted 3 CTD casts, deployed the MPI lander that measures sediment-water fluxes of oxygen and inorganic carbon. In addition, the benthic biologists (Saskia Ruhl and Thomas Mesher) have been handling a dozen box cores so far. The speed of their operations is impressive. The crew of the Poseidon has been facilitating all this with excellent support.

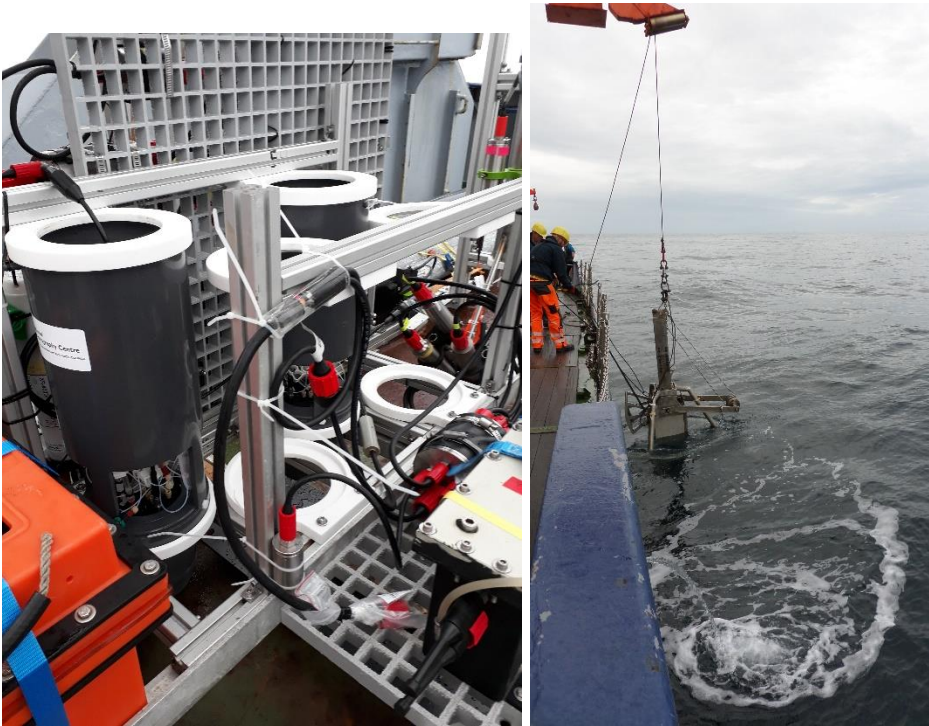


Photo left: sensors suite on MPI lander for benthic flux measurements. Right: deployment of box corer for collection of sediment samples and benthic ecology samples. Photos by Allison Schaap