# Short Report POSEIDON Cruise 438

## I. Objectives

POSEIDON cruise 438 was the follow up cruise of Poseidon 434 (May/June 2012) to one of the northernmost European cold-water coral reefs in the Stjernsund (North Norway). Our aim is to investigate the environmental boundary conditions of recent cold-water coral ecosystem functioning (growth and distribution pattern). Overarching objective was to look at potential reef effects and feedbacks of cold-water coral reefs and the ambient water masses in a 4D-observation mode employing a novel long-š Œ u } • Œ À š } Œ Ç ^ D } • ] > _ for meso-scale (~5 km x 3 km) investigations
The study area is an ideal test bed to address these objectives since the Stjernsund reef is characterized by healthy living corals and rich associated fauna while the oceanographic setting is limited to a NW-SE trending passage with dominating flow from the NW. Additionally, the reef displays all structures/zones which are known for this type of ecosystem such as normal sund/fjord trough sediments, coral rubble, as well as living and dead corals. The MoLab observatory array measures physical, biogeochemical, and hydro-chemical parameters in 4D resolution.
During cruise POSEIDON 434 we deployed the MoLab observatory to measures timely synchronized physical, chemical, and biogeochemical parameters for a period of ca. 105 days. During cruise POSEIDON 438 we retrieved the MoLab array and made some additional short deployments of a MoLab Eddy Correlation Module. We further made a series of photography transects with the ROV in hitherto uninvestigated regions of the sill.
The comprehensive data set gained will be used as the basis for various types of numerical models which improve our understanding of oceanographic-biological interaction. The combination of high quality data sets and numerical models will further facilitate our knowledge of future coral reef development under prognosticated global change in Arctic environments.

The MoLab observatory comprises of the following components and sensors:

2x Moorings (VKM and VKM+SYK) equipped with:

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Figure.3: Bathymetric map

## V. Narrative of the cruise

Monday, 10. 09. 12: The scientific equipment arrived on two trucks from Kiel at 13:00h in Tromsø harbor and was loaded immediately on the ship during the afternoon. We started with the installation of the ROV system.

Tuesday, 11. 09. 12: We continued with the setup of the 3000m rated GEOMAR work o •• ZKs ^W,K _X /v šZ (š Œv}}v Á ‰ Œ(}Œu •Z}C harbor basin. We left Tromsø at 17:00h and headed to the open Norwegian Sea through the Malangen Fjord.

Wednesday, 12.09.12: We reached the position 69° 42,4´N / 15° 28,5´E at 08:00h where we performed a ROV-winch test by 2120m. Afterwards we continued our passage to the Stjernsund.

Thursday, 13.09.12: We reached our first working station in the Stjernsund and started with a CTD/RO cast by 364m (Stat. 423). This action was followed by an ROV deployment at 367m (Stat 424). In the afternoon we recovered the first satellite lander (SLM#3, Stat. 425) from the western slope of the sill.

Friday, 14.09.12: The day started with a ROV-survey on the western slope of the sill (Stat. 426). During the late morning we recovered the first mooring of 350m length (VKM#2, Stat. 427) from the western basin. In the afternoon we deployed a new eddy correlation module (ECM#4) with the ROV on the crest of the sill in a rich coral occurrence (Stat. 428)

Saturday, 15.09.2012: Our first action was the recovery of the second oceanographic mooring (VKM#1) from the eastern basin (Stat. 429). Afterward we steamed to the western crest region of the sill where we recovered ECM#3 with the ROV (Stat. 430). Next we recovered two satellite landers SLM#2 and SLM#1 from the top region of the sill (Stat 431-432) which was followed by a CTD/RO cast (Stat. 433) by 210m.

Sunday, 16.09.2012: The morning was dedicated to a ROV photographic survey of the northern sill region at the slope of Stjernøya (Stat. 434). Afterwards the ship changed position to the mid of the sund where we recovered the ECM#4 with the ROV PHOCA (Stat. 435).

Monday, 17.09.2012: The first action in the morning was the redeployment of ECM#4 with the ROV on the top region of the sill (Stat. 436). Next came the recovery of ECM#1 (Stat. 437). In the afternoon we recovered the MLM from the crest of the sill (Stat. 438). The rest of the working day was spent testing the ROV in shallow water by 65m water depth (Stat. 439).

Tuesday, 18.09.2012: We started the day with a CTD/Ro cast on the top of the sill (Stat. 440). Afterwards we launched the ROV for a longer photographic transect across the eastern flank of the sill (Stat. 441). Afterwards the ROV was employed again to recover ECM#4 (Stat. 442). With this action all instruments deployed on the seabed either from cr6ns0yEs RHmseidn c38-3(4)7(1)-

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Wednesday, 19.09.2012: We arrived at Tromsø harbour in the morning and moored after a short stop at the bunker station at the passenger terminal where we stayed until next morning. A part of the scientific crew was disembarked to fly back home.

Thursday, 20.09.2012: At 08:00 we cast off at Tromsö and started our journey home to Kiel. We steamed through the inner fjord passage and entered the open sea at the mouth of the Vestfjord (Lofot Islands).

Friday, 21.09. Wednesday, 26.09.2012: We continued our home journey by steaming through the Norwegian Sea, North Sea, Skagerrak and Kattegat.

Thursday, 27.09.2012: POSEIDON arrived at the GEOMAR east shore pier at 09:00h in the morning and with discharge of the ship Cruise POS 438 ended.

## VI. Equipment used and gear abbreviations

CTD/RO: CTD/Rosette water sampler
ECM#1: Eddy Correlation Module 1
ECM#2: Eddy Correlation Module 2
ECM#3: Eddy Correlation Module 3
ECM#4: Eddy Correlation Module 4
MLM: Master Lander
ROV: Remotely Operated Vehicle
SLM#1: Satellite Lander 1
SLM#2: Satellite Lander 2
SLM#3: Satellite Lander 3
VKM#1-HAM: Oceanographic Mooring with HAM-Node (350m length).
VKM#2: Oceanographic Mooring (350m length)

## VII. List of sampling Stations

See over leaf in Table 1.

Table 1: Station list POSEIDON 438

| Station | Gear | Date | Time | Coordinates 1 | Depth | Coordinates 2 | Depth | Time |
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