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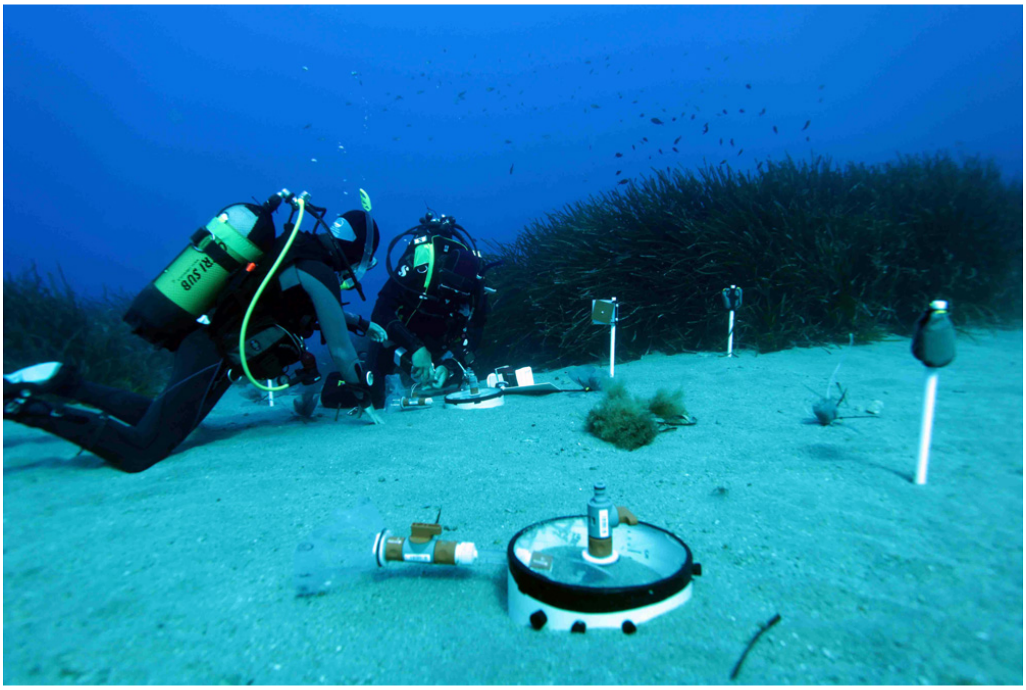
# CRUISE REPORT
# ECO2-3

(Panarea Island, Italy)



Authors:

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# 1 OBJECTIVES

Panarea Island (Italy) is part of the Aeolian Archipelago and is influenced by the active volcano Stromboli. Fumarolic activities and submarine gas seeps are common features around the island and have occurred since ancient times [1,2]. Based on the long-term seepage activity, the high $CO_2$ content of the released gases and the shallow water depth, Panarea constitutes an excellent natural analogue for investigating the effects of $CO_2$ seepage on marine benthic organisms [2]. Hence, Panarea has become an essential target site within the EU 7th Framework Programme project "$ECO_2$ – Sub-seabed $CO_2$ Storage: Impact on Marine Ecosystems" (www.eco2-project.eu) that this field trip was related to.

Research around Panarea Island has been diverse, ranging from volcanology and tectonics [e.g. 3,4] to geochemistry [e.g. 5,6] and microbiology [e.g. 7-9]. Driven by an increasing interest in studying the effects of ocean acidification or, as in the framework of $ECO_2$, the effects of $CO_2$ seepage on the structure and function of marine benthic organisms, the main objectives of our research at the shallow submarine vents off Panarea Island (Italy) are:

1) To investigate if $CO_2$ seepage may change benthic (bacterial, meiofaunal, macrofaunal) community composition and/or ecological functions as compared to non-gas-impacted areas.

2) To set up and improve monitoring strategies for investigating the effects of $CO_2$ seepage on gas-impacted ecosystems (biology, geochemistry).

3) To define areal estimates for the impact of $CO_2$ seepage on benthic organisms.

To study the effects of high $CO_2$-low pH on marine organisms and ecosystems off Panarea Island (Italy), the seepage sites should fulfill the following criteria: (i) decreased pH, (ii) no or only low sulfide concentration, (iii) no elevated temperature and (iv) visible impact on calcareous epibionts. In addition, a background site without seepage, but with comparable sedimentary characteristics and temperature is needed. During field trip ECO2-2 (2011), several sites off Panarea Island (Italy) were surveyed until three suitable areas were identified that met these demands [10]: "RedPlus" (seepage site), "GreyPlus" (seepage site) and "GreyMinus" (background site). First results on benthic bacterial and meiofauna communities revealed distinct differences between the seepage sites and the background site (S. Meyer and K. Guilini, data unpublished, Fig. 1), indicating the presence of organisms specifically adapted to high $CO_2$-low pH conditions.

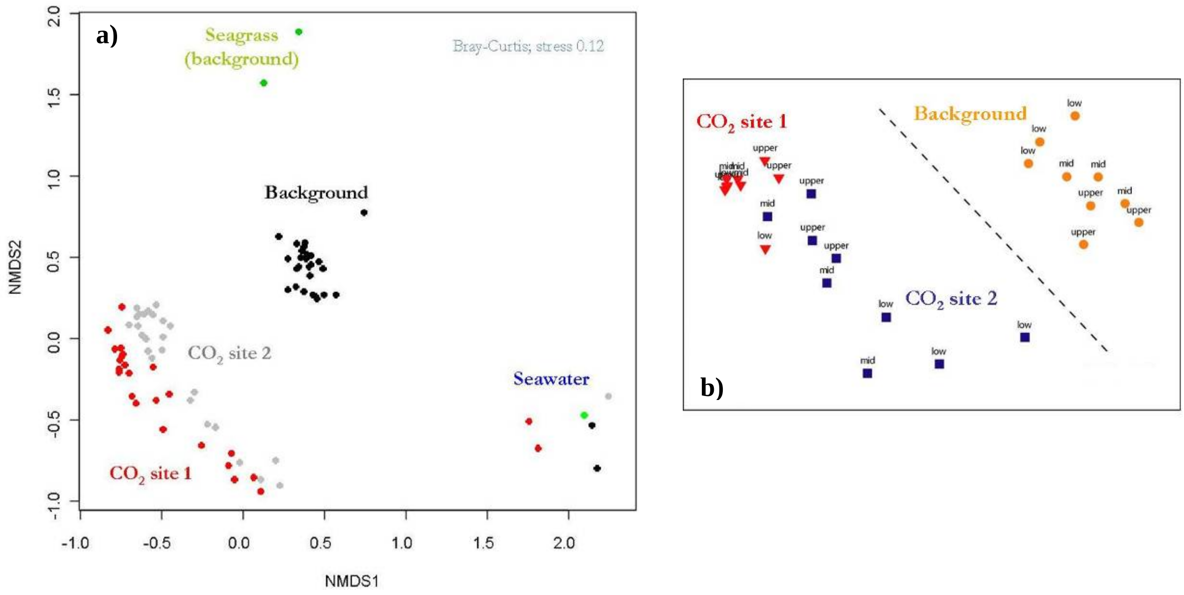



**Fig. 1 – Benthic community analyses with samples obtained during field trip ECO2-2 (2011): a) High-resolution fingerprinting with ARISA revealed distinct differences between sediment bacterial communities at the $CO_2$-impacted sites and the background site without seepage. (plot: S. Meyer/MPI). b) Nematode communities at the seepage sites differed from those at the background site (stress 0.09; MDS plot: K. Guilini/UGent).**

For field trip ECO2-3 (2012) we will focus on expanding the biological sampling efforts and supplementing it with pore-water data to infer on the geologic drivers of benthic communities at the $CO_2$ seeps. In addition, transplantation experiments with sediment, terracotta tiles, glass slides, seagrass mimics and marble tiles will contribute to identifying short- and mid-term effects of $CO_2$ seepage on the structuring and dispersal of marine organisms. Several *in situ* devices will be deployed to (i) test the comparability, accuracy, sensitivity and reliability of different $CO_2$ sensors, to (ii) improve monitoring strategies of $CO_2$ seepage, and to (iii) geochemically characterize the different habitats, i.e. to specify the $CO_2$ levels causing shifts in benthic community structure. In addition to the three main sampling sites (“RedPlus”, “GreyPlus”, “GreyMinus”), sensor deployment will also be conducted at “Bottaro Crater”, an area characterized by intense seepage (but also sulfide and elevated temperature) following a major outburst event in November 2002 [11,12].

# 2 NARRATIVE of this FIELD TRIP

With an ambitious tasks list we headed again to Panraea Island for a three weeks field trip in June 2012. Fifty-two Zarges boxes, send ahead, were waiting already for us. The diving team (Miriam Weber, Christian Lott, Boris Unger, Matthias Schneider), Frank Wenzhöfer and Katja Guilini arrived the 02.06.2012 on the island. Our colleagues from OGS/Trieste arrived with the same ferry boat. One day later Stefanie Grünke, Patrick Meyer and Alban Ramette joined the team. The field laboratories were quickly set up and the first dives were done at the same day of arrival. Between 11.06.2012 and 13.06.2012 Matthias Schneider, Frank Wenzhöfer, Katja Guilini and Alban Ramette left the island, but other colleagues now joined us for the upcoming sensor comparison campaign. Hanna Kuhfuss joined the diving team, and Nikolaus Bigalke, Lisa Vielstädte, Melanie Herrmann, Dirk de Beer, Susanne Schutting and Ines Schröder prepared and tested various sensors and monitoring strategies. Towards the end of our field trip we completed the sensor campaign and retrieved a few more samples.

We started the campaign with the relocation of the target sites and putting non-permanent moorings. During the first phase of the field trip we mainly focused on sedimentary sampling and setting up transplantation experiments, complementd by the deployment of various *in situ* instruments.The experiment will show the changes in the microbial, meio- and macrofauna community structure exposing them to sudden $CO_2$ seeps. The transplantation of sediment from “GreyMinus“ to “RedPlus“ and vice versa was completed as planned and the time zero samples (pushcores, pore water, sensor measurements) were taken accordingly. Besides the sediment our interest was also studying the $CO_2$ gas effect on the seagrass itself and the organisms (microbes, meifoauna and epibionts) living on it. *In situ* we assessed the Leaf Area Index and sampled seagrass leafs for microbial, meiofauna and epibiont comparison studies. Further tasks were putting seagrass mimics and terracotta tiles / glass slides for meiofauna and microbial community colonisation studies, respectively. Colleagues from OGS were taking samples for microphytobenthos community analysis at all three sites we are investigating.

Throughout the campaign we had continuously deployed sensors recording at the “GreyMinus“ and at the “RedPlus“ site. They measured $CO_2$, pH, ORP (oxidation reduction potential), temperature and pressure during the three weeks. Other sensors were deployed according to the actual sampling, monitoring the conditions in the water column at the same time as sampling.

During this field trip we took also gas samples to confirm the composition of the gas seeping at “GreyPlus“ and “RedPlus“. The analysis will be done by our colleagues at the UniRoma1 and INGV Palermo. With timelapse photo recording we were recording the changes in the gas flow at all three sites.

During the second phase we focused on sensor comparison tests. Four parties were collaborating: the UniRoma1 (Stan Beaubien and Stefano Graziani), Geomar (Nikolaus Bigalke, Lisa Vielstädte), Contros (Melanie Herrmann) and MPI (Dirk de Beer) were testing three different sensors for monitoring purposes. Tests were done in a stationary mode, where the three sensors were left for several hours at one site. The sensors were also tested along transects from $CO_2$ impacted to non-impacted areas, once at the “RedPlus“, at the “GreyPlus to Minus“ and at “Bottaro Crater“. One sensor called MuFO (operated by Susanne Schutting, MPI/TU Graz) was still in the preparation phase so that shorter tests during three dives for checking the feasibility and water compatibility were conducted.

A further task was to investigate activity changes in the extracellular enzymatic activity in sediments. For that sediment samples were collected at all three sites and the tests were performed at the laboratory on Panarea. At the leafs of the seagrass *Posidonia oceanica* we did pilot microsensor measurements directly in the field assessing the oxygen production of the leafs at the “RedPlus“ and the “GreyMinus“ site. In the laboratory on Panarea we did microsensor measurements assessing the changes on oxygen production at different pH levels in sediment and biofilms on stones. We also investigated the total production and consumption of oxygen and nutrients in the sediments *in situ*. We have deployed benthic chambers at all three sites and monitored the changes. During the deployment we noticed that also fluids are seeping out of the sediments. Therefore, we designed on Panarea fluid chambers assessing the composition of the fluid. The analysis will be done at the INGV in Palermo.

And the third and last phase we were mainly sampling. Ten days after the transplantation experiment start we sampled sediment. Also five of the terracotta/glass slide tiles were sampled at all three sites. The seagrass mimics were sampled thirteen days after their deployment at the “RedPlus“ and the “GreyMinus“ site.

To assess the pH of the water, divers were taking water samples and the measurements were done on Panarea in the laboratory. The pH was assessed above the sediment surface and a meter above ground at the terracotta tiles. To investigate the reduced pH over a one year period we deployed marble tiles along a transect from the “RedPlus“ to the “GreyPlus“ and to the “GreyMinus“ site. After one year we will analyse the dissolution of the marble.

During this campaign we were able to document the activities and the sites with a photo and a video camera. This field trip was special because everything was running as planned and all tasks were completed, even the weather was perfect. After three weeks (02.-21.06.2012) of an intense work program we packed all boxes again and piled them up so that they could be picked up again.  Besides the perfect weather conditions all were thankful for the friendly and productive working atmosphere and are curious to discuss the data at a meeting in February 2013.

# 3 PARTICIPANTS

| | Name | First name | Activity | Institute |
|---|---|---|---|---|
| 1 | Weber | Miriam | logistics, diving, epibionts, DOMS | HYDRA |
| 2 | Unger | Boris | diving, timelapse, photo docu | HYDRA |
| 3 | Lott | Christian | diving, timelapse, video docu | HYDRA |
| 4 | Schneider | Matthias | diving, epibionts | HYDRA |
| 5 | Kuhfuss | Hanna | diving, epibionts | HYDRA |
| 6 | Wenzhöfer | Frank | geochemistry, profiling, sensors | MPI |
| 7 | Meyer | Stefanie | microbiology | MPI |
| 8 | Ramette | Alban | microbiology | MPI |
| 9 | Meyer | Jörn Patrick | geochemistry, profiling, sensors | MPI |
| 10 | de Beer | Dirk | profiling, sensors | MPI |
| 11 | Schröder | Ines | profiling, sensors | MPI |
| 12 | Bigalke | Nikolaus | diving, geochemistry, profiling | Geomar |
| 13 | Vielstädte | Lisa | geochemistry, profiling | Geomar |
| 14 | Herrmann | Melanie | diving, sensors | Contros |
| 15 | Schutting | Susanne | MuFO tests | MPI/TU Graz |
| 16 | Guilini | Katja | meiofauna, macrofauna, sediment parameters | UGent |

# 4 DESCRIPTION of TARGET SITES

The first task was to re-locate the sites from June 2011 in order to decide whether they are still suitable for the planned experiments and sampling plan, or if new sites would have to be identified.

“RedPlus” site (seepage site)

GPS position 38°39.749‘ 15°07.132‘

The sediment is coloured orange to red and gas seeps are evenly distributed over the sampling area (Table 4.1, Fig. 2a,b). The sediment area had coarser sediment than in June 2011. The sand ripples had a round shape at the ripple top and in the troughs gravel had accumulated. Close to last year‘s sampling site, the sediment structure was more homogeneous and similar to last year. The seagrass did not look different as compared to 2011.

The divers did an exploration tour to investigate more of the surrounding area and discovered that the gas seepage was differing locally. At some areas no gas was seeping out of the sediment and at other areas few seepage spots were visible. The highest seepage activity was observed at the sampling area. However in general, gas seepage was low during the first dive. A possible explanation could be the relation of the seepage with tides.

Sediment samples were taken by scooping surface sediment into 1000 mL jars. One sediment core was taken for visual inspection on land. The samples were discarded later.

“GreyPlus” site (or MixedPlus, seepage site)

GPS position 38°39.820‘ 15°07.137‘

The sediment is coloured orange to grey and gas seeps are evenly distributed over the sampling area (Table 4.1, Fig. 2c). Compared to the previous year the sediment sampling area seemed to be slightly reduced in area and amount. The grain size seemed to have shifted to coarser particles and more gravel was visible. When digging with the hand into the sediment it seemed that one could reach rocks under the sediment closer to the surface than 2011. We assume that the sediment was partly washed away by storms. The surface of the sediment was of patchy coloration of grey and orange with yellow-orange areas, possibly precipitates and/or biofilm. The seagrass did not look different from last year.

We explored the surrounding for more sediment patches with gas seepage. Videos and photos were made for documentation to show to the non-diving scientists in order to decide where to start the sampling and experiments.

"GreyMinus" site (background site)

GPS position 38°39.827‘ 15°07.118‘

The sediment was grey coloured and no gas seeps were visible at this sampling area (Table 4.1, Fig. 2d). The site appeared not to have changed as compared to the field trip in 2011, including sediment and seagrass. Few sediment samples were taken by scooping surface sediment directly into 1000 mL jars and taking one sediment core for visual inspection on land. The samples were discarded later.

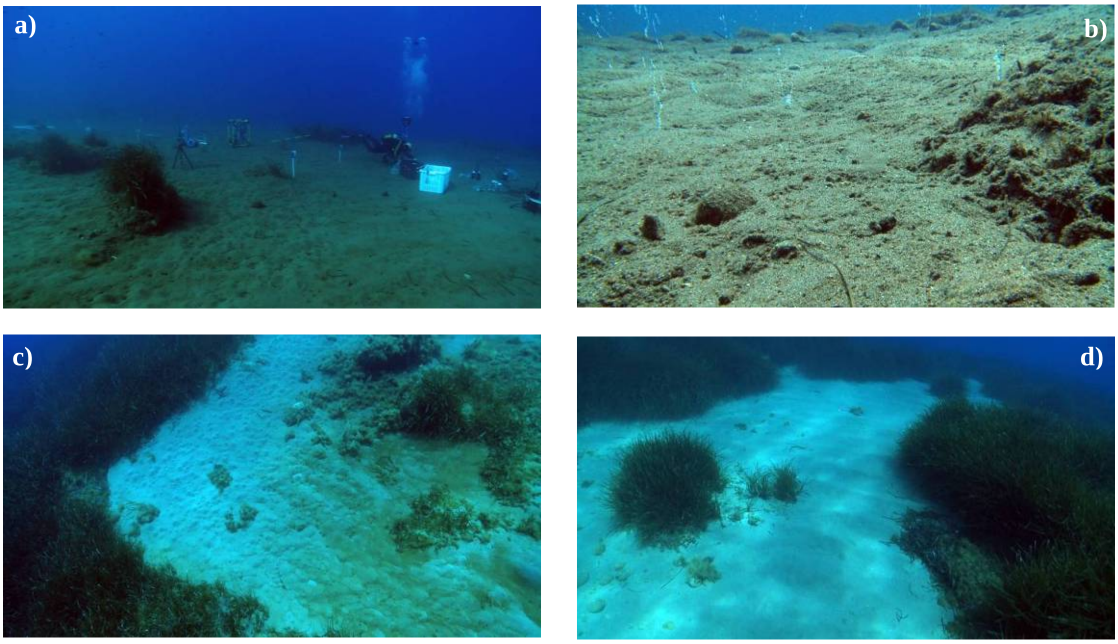



**Fig. 2 – Sedimentary sampling sites during field trip ECO2-3 off Panarea Island (Italy): a,b) "RedPlus" (seepage site), c) "GreyPlus" (seepage site), d) "GreyMinus" (background site without seepage)** © HYDRA

Table 4.1 – Main characteristics of the three sedimentary sampling at Panarea Island (Italy). Observations were made during field trip ECO2-3 (2012).

| | **"RedPlus"** | **"GreyPlus"** | **"GreyMinus"** |
|---|---|---|---|
| **Coordinates** | N 38°39.749'<br>E 15°07.132' | N 38°39.820'<br>E 15°07.137' | N 38°39.827'<br>E 15°07.118' |
| **Water depth** | 14-15 m | 21 m | 14-16 m |
| **Temperature** | 19°C | 19°C | 19°C |
| **Gas emission** | yes | yes | no |
| **Area** | 10 × 20 m | 2 areas, each 3.5 × 5 m | 10 × 10 m |
| **Substrate** | fine-medium sediment | fine-medium sediment | fine-medium sediment |
| **Substrate color** | red-brown (rusty) | grey | grey |
| **Seagrass present?** | yes (*Posidonia oceanica*) | yes (*Posidonia oceanica*) | yes (*Posidonia oceanica*) |
| **Seagrass epibionts (first impression)** | hydrozoa & bryozoa, but also calcareous | hydrozoa & bryozoa, but also calcareous | calcareous, but also hydrozoa & bryozoa |

<u>"Bottaro Crater" (major outburst event 2002-2003)</u>

GPS position 38°38.233‘ 15°06.585‘

The crater had not changed during the last year. Gas was seeping out in vast amounts and on the gravel sulfur precipitations were visible. The surroundings of the crater were still rock formations and seagrass meadows (Fig. 3).

**Fig. 3 – Overview on "Bottaro Crater" site, which is characterized by intense gas emissions.** © HYDRA

# 5 BENTHIC BIOLOGY and GEOCHEMISTRY

## 5.1 Biological Sampling of Sediment

### 5.1.1 Bacteria

Natural sediment samples for analyzing bacterial communities were obtained by using segmented push cores (0-2 cm intervals, maximum length up to 15 cm) and sterile Sarstedt tubes (for scooping 0-2 cm surface sediment). Samples were either directly frozen at -20°C for DNA analyses, or were fixed in 4% formaldehyde/seawater for cell counts. Additional samples were taken for fluorescence *in situ* hybridization (FISH). These samples were fixed for 3-12 h at 4°C in 4% formaldehyde/seawater. The samples were then washed twice with 1×PBS (phosphate buffered saline; pH 7.4) to remove the fixative before being stored at -20°C in a 1:1 mixture of 1×PBS and EtOH (molecular grade) until further use. Bacterial community composition is currently being analyzed in the laboratories of the MPI. Overall, these samples will help to elucidate the potential impact of $CO_2$ leakage and/or decreased pH on the benthic communities as compared to a non-$CO_2$-impacted background scenario.

### 5.1.2 Meiofauna

At each site five replicate meiofauna samples were taken with plastic cores that were precut in 2 cm slices and taped, and which had an inner diameter of 5 cm (equivalent to 19.6 $cm^2$). After retrieval the cores were sliced, where possible to 10 cm depth, and stored on a 4% formaldehyde-seawater solution. Meiofaunal organisms were retrieved from the sediments after rinsing the sediments with tap water over a 1mm and a 32 µm mesh sieve, and decanting the 32 µm fraction for 3 times. All meiofaunal organisms were identified to higher taxon level under a Leica MZ 12.5 stereomicroscope (8 - 100x magnification), and where possible 50 nematodes per sediment layer are currently being identified at UGent to species level under a compound microscope (1000× magnification).

### 5.1.3 Macrofauna

Natural sediment samples were collected at both the $CO_2$-impacted and the non-$CO_2$-impacted sites and categorised according to the coloration of the sediment as “RedPlus”, “GreyPlus” and “GreyMinus”, respectively. At each site five replicate macrofaunal samples were taken with plexiglass tubes with an inner diameter of 6.4 cm (equivalent to 32.17 $cm^2$). The upper 10 cm of the sediment was stored on a 4% formaldehyde-seawater solution. Meantime in the lab, samples were sieved on a 1 mm sieve and macrofaunal organisms are currently being identified to species level (UGent).

## 5.2 Sediment Geochemistry

From the segmented push cores (0-2 cm intervals, maximum length up to 15 cm) several samples were preserved for analyses of methane concentration, porosity, TOC (total organic carbon) and CPE (chloroplastic pigment equivalents). For methane concentration, 5 mL of sediment were added to 10 mL 2.5% NaOH in glass vials, mixed and stored upside down at 4°C. For porosity, 3-4 mL of each sediment horizon were stored at 4°C in 5 mL-syringes. For TOC, 1.5 mL-plastic vials were filled with sediment of each segment and stored at -20°C. For CPE, a 5 mL-syringe was inserted into the core, thereby preserving the natural vertical structure of the sediment. Each syringe was wrapped in aluminum foil and stored at -20°C. All analyses are currently in progress at MPI.

Additionally, 4 replicate plastic core samples per site were subsampled to perform sediment granulometry, porosity, pigment, and total organic matter (TOM) analyses (UGent). These subsamples were also taken from 2 cm horizons down to 10 cm where possible and stored frozen at -20°C. Results on the environmental variables show that Chl *a* was significantly higher in the "RedPlus" sediments compared to both "GreyPlus" and "GreyMinus" sediments. Granulometry analyses show that sediments became coarser from the "RedPlus", over "GreyPlus", towards "GreyMinus" sediments. TOM concentrations were somewhat higher at the "RedPlus" site compared to both other sites, and porosity fluctuated around 0.50 at all three sites.

## 5.3 Pore-water Geochemistry

To investigate how pH, DIC (dissolved inorganic carbon), TA (total alkalinity), nutrients ($NH_4^+$, $PO_4^{3-}$, $NO_2^-$, $NO_3^-/NO_2^-$, Si), sulfide/sulfate/chloride concentrations, Fe/Mn concentrations and B concentrations change with depth at the investigated sites, pore-water samples were obtained with the help of the TUBO device and by using Rhizons MOM (19.21.21F, mean pore size 0.15 µm; Rhizosphere Research Products, Wageningen, Netherlands) attached to 10 mL-syringes (Fig. 4a,b). In principle, the TUBO device was pushed into the sediment and then emptied. At each depth, 2 Rhizons were inserted into the sediment at opposite locations (Fig. 4c). To allow direct comparison with the bacterial samples (0-2 cm intervals), Rhizons were inserted at 1, 3, 5, 7 and 9 cm depth. At each of the investigated sedimentary sites ("RedPlus", "GreyPlus" and "GreyMinus"), 3 replicate pore-water profiles were taken.

Measurements of pH were directly done in the field laboratory with a pH 96 by WTW (WTW Wissenschaftlich-Technische Werkstätten GmbH, Weilheim, Germany) and an InLab Semi-Micro electrode by Mettler Toledo (Gießen, Germany). pH was determined at ambient temperature and values will have to be adjusted to *in situ* conditions later. Calibration was done with conventional buffer solutions by Mettler Toledo (pH 4.00 and 7.00). The remainder of these samples was stored at -20°C for nutrient analyses.

For DIC and TA, 2 mL pore-water were filled headspace-free into glass vials and stored at 4°C. Analyses will be done in the MPI home laboratories.

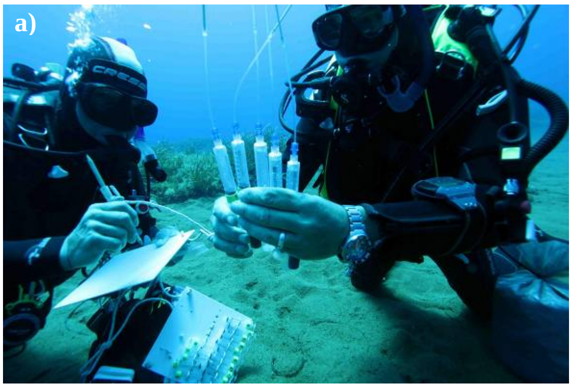





**Fig. 4 – Pore-water extraction with the TUBO device and Rhizons: a) Rhizons MOM (Rhizosphere Research Products) were connected to 10 mL-syringes. b,c) The TUBO device was pushed into the sediment and emptied before the Rhizons were positioned inside to collect pore water at 2 cm-intervals from the surrounding natural sediment.** © HYDRA

Sulfide/sulfate/chloride samples were fixed in plastic vials pre-filled with 0.5 mL 2% ZnAc before being stored at 4°C. In addition to the TUBO-Rhizon strategy, further samples were obtained by using syringes attached to a pore-water lance. The 10 mL-syringes had been pre-filled with 2 mL 2% ZnAc to allow for direct fixation of pore waters under water. Samples were obtained from 5 cm and 10 cm below the sediment surface. In the field laboratory, these samples were transferred to 15 mL-Sarstedt tubes and stored at 4°C. Analyses will be done in the MPI home laboratories.

To be able to determine Fe/Mn concentrations in the recovered pore waters, samples were fixed in plastic vials pre-filled with 0.2 mL 1M HCl before being stored at 4°C. Analyses are currently being done in the MPI home laboratories.

Samples for measuring B content were filled into 4 mL-Polyvials V (PETG; Zinsser Analytic, Northridge, CA) that had been thoroughly washed with diluted $HNO_3$ (for trace analyses; Roth, Karlsruhe, Germany) and deionized/filter-sterile water. To reduce the pH, 30 µL of

69% $HNO_3$ (for trace analyses; Roth) were added to each sample before being stored at 4°C. Analyses will be done in cooperation with Dr. M. Haeckel from Geomar (Kiel, Germany).

## 5.4 Enzymatic activities

The task was to investigate the microbial extracellular enzyme activity in the surface sediment at all three sedimentary sampling sites.

At each site, 4 samples of the surface sediment were obtained. The top 2-3 cm of the sediment were scooped into sterile 50 mL-Sarstedt tubes. In addition, 3 water samples were taken with 50 mL-syringes approx. 10 cm above the sediment surface to set up the experiments.

For each site, 3 of the 4 sampling tubes were chosen to set up the essays, while the fourth one was immediately stored at -20°C (backup and for calibration purposes). In total, 4 different substrates were used to set up the essays, i.e. β-glucoside (β-glucosidase), N-acetyl-glucosamine (chitobiase), Leucine (Leucine-aminopeptidase) and Fluorescein diacetate (esterase). Dublicates were set up in sterile 15 mL-Sarstedt tubes with each substrate by mixing each time 3 mL sediment and 3 mL filter-sterile seawater with 120 µL of the substrate stock solutions (final concentrations 100 µM for all, except 500 µM for Leucine). Essays were mixed well before and inbetween incubation at *in situ* temperature (16-19°C). Sampling was done after 0.5 h and 1.5 h by taking off 1 mL of the supernatant and directly transferring it to -20°C (storage in cryo-vials). Vials are kept dark until analyses in the MPI home laboratories. The protocol is a modified version of the one described by Boetius & Lochte (1994) [13].

# 6 SEAWATER MICROBIOLOGY and GEOCHEMISTRY

In order to obtain background information with regard to benthic bacterial community composition and geochemistry, a 5 L-Niskin bottle was used to sample seawater at a height of approx. 30 cm above each of the sedimentary sampling areas (“RedPlus”, “GreyPlus” and “GreyMinus”). All subsequently described analyses are pending and will be conducted in the home laboratories of the MPI.

Sub-samples for pH, nutrients and B concentrations, as well as DIC and TA (but with addition of $HgCl_2$) were processed the same way as pore-water samples (see 5.3). Samples for measuring $CH_4$ concentration were filled into evacuated and pre-weighed glass containers that contained 2-3 NaOH pellets. Samples for sulfide/sulfate/chloride concentrations were fixed in 15 mL-Sarstedt tubes pre-filled with 2 mL 2% ZnAc at 4°C.

To investigate the bacterial community composition, seawater samples were filtered and filters were stored at -20°C for subsequent DNA analyses in the MPI home laboratories. With the help of a portable vacuum pump, 500 mL of seawater were passed through a 0.2 µm GTTP-filter (Merck Millipore, Billerica, MA). A cellulose nitrate filter (0.45 µm; Sartorius, Göttingen, Germany) was used as support filter. Filtrations were repeated at least three times (i.e. finally at least 2 L of seawater had been filtered per site).

Part of the seawater was fixed with filter-sterile formaldehyde (final concentration of 1%) over night at 4°C in sterile 50 mL-Sarstedt tubes. Finally, 15 mL were filtered through a 0.2 µm GTTP-filter (Merck Millipore), while using a 0.45 µm cellulose nitrate filter (Sartorius) as support filter. Filtrations were repeated 5 times to obtain in total 6 replicate filters (stored at -20°C). These samples will be used for counting bacterial cell numbers by DAPI-staining and fluorescence *in situ* hybridization.

To obtain information on the 3D-pattern of pH at the three sedimentary sampling sites, separate pH samples were taken. The original idea was to measure a pH grid with the DOMS (see 10.7) using a pH macrosensor. Unfortunately, two attempts (16. and 17.06.2012) failed, possibly due to pressure compensation problems. Therefore, it was decided to take water samples with 10 mL-syringes above the ground and at approx. 50 cm in the water column at selected transplantation bags and posts. Data analyses are still in progress.

# 7 SEAGRASS SURVEY

For background information, but also to improve future monitoring strategies on the effects of high $CO_2$-low pH in marine ecosystems, we included the surrounding seagrass meadows (*Posidonia oceanica*) into our investigations. The main objectives were to assess the leaf area index (7.1), to investigate bacterial (7.2.1) and meiofauna community composition (7.2.2), and to determine the presence/absence as well as abundance of epibionts (7.2.3).

## 7.1 Leaf Area Index (LAI)

For the assessment of the LAI, the seagrass rhizomes were counted in an area of 0.25 m². At least three counts were conducted per site (Table 7.1).

Table 7.1 – Amount of rhizomes of *Posidonia oceanica* meadows at Panarea Island (Italy, 2012).

| | "RedPlus" (seepage) | "GreyPlus" (seepage) | "GreyMinus" (backgr.) |
|---|---|---|---|
| **Rhizome Count 1** | 173 | 149 | 168 |
| **Rhizome Count 2** | 172 | 98 | 163 |
| **Rhizome Count 3** | 161 | 68 | 126 |
| **Rhizome Count 4** | - | 75 | - |
| **Area Counted** | 0.25 m² | 0.25 m² | 0.25 m² |

From each counted area, ten rhizomes were sampled including the leafs. All leafs were scanned on land in Panarea. In the HYDRA laboratory, the leaf area will be assessed and the LAI will be calculated.

## 7.2 Seagrass Biology

### 7.2.1 Bacteria

At each site, seagrass leaves were sampled at three different spots. For one sample, 10 outermost leaves were randomly chosen, ripped off and transferred into one sterile plastic bag.

Back in the field laboratories, at first the leaf dimensions (length × width) were measured. Initial results revealed an average of 18.4 (± 5.7) × 0.6 (± 0.1) cm for the "RedPlus" site, 32.5

(± 10.7) × 0.7 (± 0.1) cm for the "GreyPlus" site and 38.6 (± 12.9) × 0.7 (± 0.1) cm for the "GreyMinus" site.

The top 5 cm of each leaf were cut off and preserved for DNA analyses and cell counts: Three of the 10 leafs were fixed at 4°C in 14.5 mL 4% formaldehyde/seawater. These samples will later be analyzed for bacterial cell counts. Two of the 10 leafs were frozen (-20°C) as is in sterile 15 mL-Sarstedt tubes (backup). For DNA analyses, the rest of the leafs were each wetted with 1 mL 1 × TE-buffer (molecular grade; Promega Corporation, Madison, WI) before being scraped on both sites with a sterile scalpel. The detached material was then transferred via pipetting (autoclaved tips) into autoclaved plastic vials and stored at -20°C. The analyses will be conducted next year at MPI.

In addition to the leaf sampling, the divers also collected seawater samples above and between the seagrass leafs for each of the three different spots per site. For this purpose, 50 mL-syringes were filled and brought back to the field laboratory. Sub-samples were taken for pH measurements and nutrient analyses, DIC, TA and B concentrations (see 5.3 and 6). The analyses are still ongoing.

### 7.2.2 Meiofauna

At each site, six replicate samples were collected from the natural sea grass beds. The divers collected around 12 to 18 leafs per sample by placing a plastic bag over the leafs and gently cutting of the leafs at the base before closing the bags with elastic bands. The remaining shoots were cut off from the rhizomes and gently transferred into separate plastic bags, with a minimal of transfer through the water column. On land, both leaf and shoot samples were poured on a 32µm sieve to eliminate the water. The material collected on the 32 µm sieve was stored on a 4% formaldehyde-seawater solution. Back at the lab (UGent), the samples were poured on a 1 mm and 32 µm sieve and the meiofauna and nematodes in the 32 µm fraction are currently being studied in a similar way as is done for the organisms inhabiting the sediment. In order to standardize the meiofaunal densities, seagrass leaf surfaces were calculated with the software program ImageJ before they were burned to determine the ash-free dry weight. As for the shoots, their volume was measured by means of submersion, before they were burned to determine their ash-free dry weights.

### 7.2.3 Epibionts

First observations on epibiont coverage include mostly calcareous epibionts at the "GreyMinus" (background) site (Fig. 5a,b), and less calcareous but more hydrozoan and bryozoan epibionts at the seepage sites (Fig. 5c,d). However, these are only first observations made during the dives that should be considered with caution.

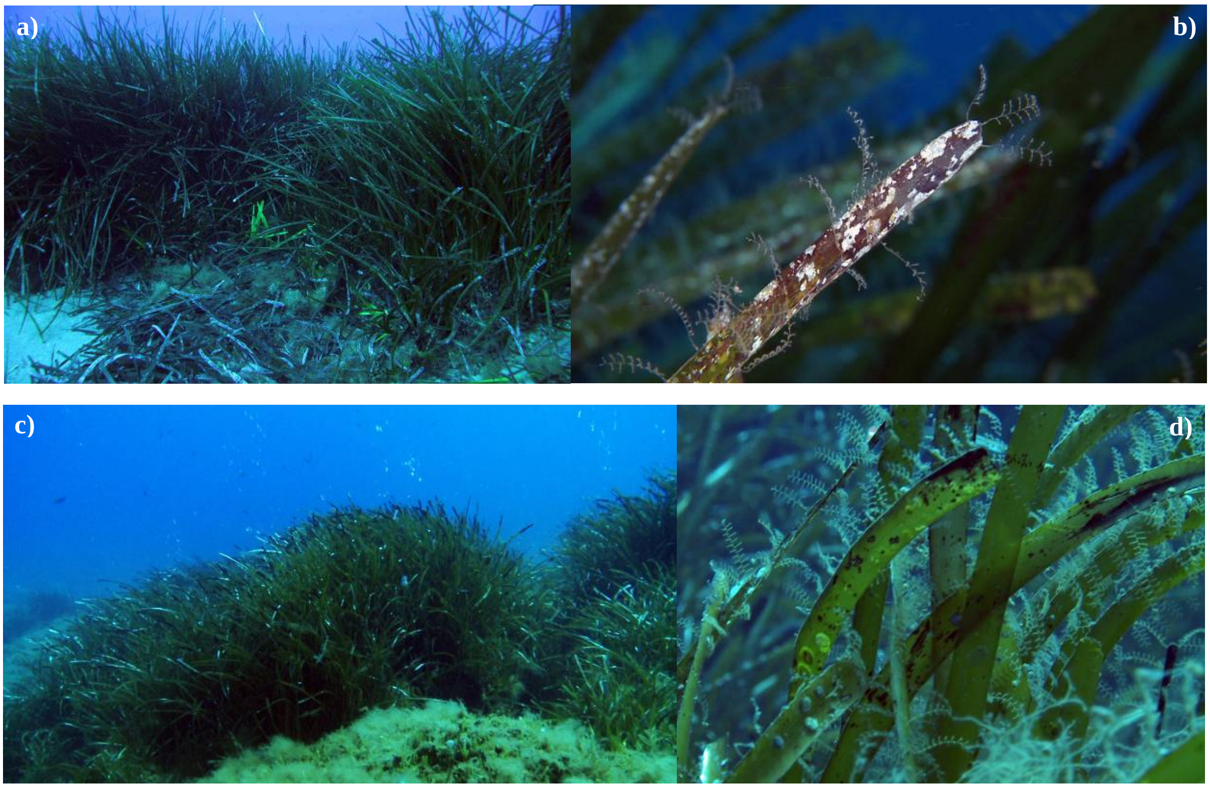



**Fig. 5 – Examples of epibionts found on *Posidonia oceanica* leafs at the "RedPlus" (seepage) site (a,b) and at the "GreyMinus" (background) site (c,d).** © HYDRA

A thorough assessment of the epibionts will be done in the laboratories of HYDRA: For the epibiont samples, the leaves of one rhizome were grabbed at the lowest part and cut off. The leaf bundle was put into one plastic bag. All leaves from one sample were scanned with high resolution on each side for later analysis. The samples were then fixed in 4% formaldehyde/seawater. Epibionts will be identified from the samples and scans during winter 2012.

# 8 TRANSPLANTATION EXPERIMENTS

Transplantation experiments with sediment, conventional Terracotta tiles, glass slides (microscope slides; Menzel-Gläser/Thermo Fisher Scientific, Braunschweig, Germany), seagrass mimics (Bio Models Company, CA; www.biomodelscompany.com) and conventional marble tiles will contribute to identifying short- and mid-term effects of $CO_2$ seepage on the structuring and dispersal of marine organisms.

## 8.1 Sediment Transplantation

Sediment transplantation was done with natural sediments from the "RedPlus" (seepage) site and the "GreyMinus" (background) site. The following steps were performed under water: A TUBO device was pushed into the sediment (Fig. 6a,b). It was then emptied and the sediment was transferred into a mesh bag (30 Liter, vinyl-coated fiberglass mosquito net: fiber diameter 280 µm and 1.8 mm × 1.6 mm mesh). An additional plastic bag within the mesh protected the sediment from the surrounding seawater during transportation of the bags. At the desired site, the bags were put back into an empty TUBO hole (Fig. 6c). The TUBO and the plastic bag were then removed, and the mesh bags were closed (Fig. 6d,e).

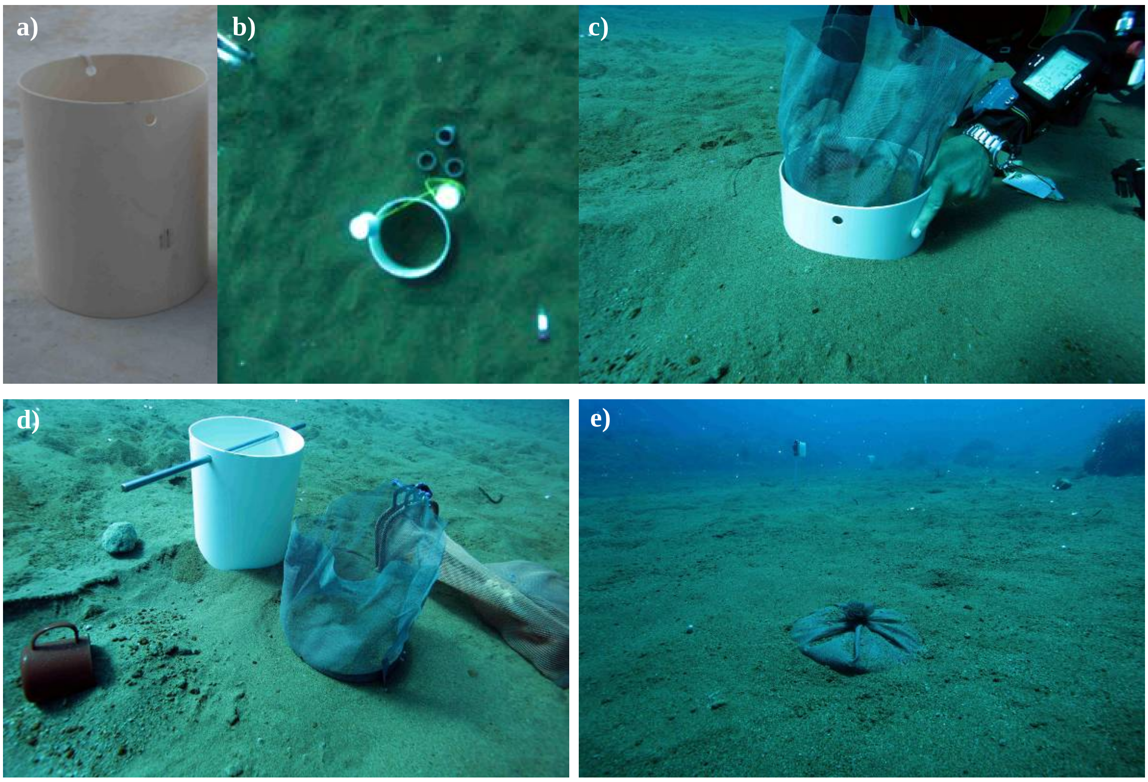



**Fig. 6 – Sediment transplantation with TUBO device and mesh bags.** © HYDRA

There were two different transplantation strategies: (i) removed sediment was re-implanted at the same site (“self-transplant”), and (ii) removed sediment was re-implanted at another site (“transplant”). Immediately upon (self-)transplantation as well as after 8-13 d, segmented push cores (0-2 cm intervals, maximum length up to 15 cm) for bacterial and meiofauna analyses were taken out of the bags. Natural sediment samples will serve as control.

Sediment samples were fixed for DNA analyses, cell counts and FISH (bacteria, MPI; see 5.1.1) as well as for sediment geochemistry (MPI; see 5.2). The analyses are still in progress. Sediment samples destined for meiofaunal and granulometrical analyses (UGent) were taken with the plastic cores that were precut in 2 cm slices and taped, and which had an inner diameter of 5 cm (equivalent to 19.6 cm²). Sediments in the transplanted bags (3 replicates) were sampled at $T_0$, the moment the sediments were implanted into the other sites, in order to determine the effect of the mixing of sediments on the meiofaunal communities and granulometry of the sediments. After 13 days ($T_1$), the transplantation bags (3 replicates) were sampled again in order to determine the short-term changes that might have occurred. Additionally, sediments next to the bags were sampled to determine the state of the surrounding, potential colonizers or colonized community. All samples were sliced in 2 cm intervals, where possible down to 10 cm depth, and stored on a 4% formaldehyde-seawater solution. At the lab, the samples were processed in the same way as described for the natural sediment samples (see 5.12 and 5.2). Meiofauna was identified to higher taxon level and counted, and where possible 50 nematode individuals per sediment slice are currently being identified to species level.

## 8.2 Seagrass Mimics

Seagrass plastic mimics that resemble the natural *Poseidonia oceanica* (Bio Models Company, CA; www.biomodelscompany.com) were implanted in natural seagrass beds at the “RedPlus” and “GreyMinus” site in order to study the colonization by meiofauna under different environmental conditions (Fig. 7). The mimics are made from a flexible, buoyant plastic and each replicate consisted of 2 mimic items, with a total of 12 leafs that had blade ranges of 36cm – 45cm long × 6mm – 10mm wide. The mimics were anchored with a plastic pin of 15 cm long. Per site 6 replicates were implanted and recovered by means of plastic bags after 13 days. When brought on land, the samples were poured on a 32 µm sieve and stored on a 4% formaldehyde-seawater solution. At the lab (UGent), meiofauna was identified to higher taxon level and counted, and both nematodes and copepods are currently being identified to species level.

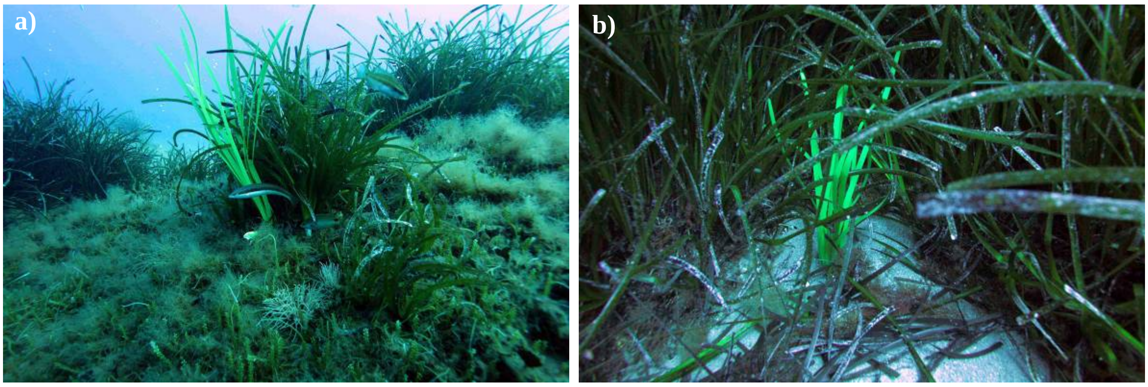



**Fig. 7 – Seagrass mimics were implanted at the seepage site "RedPlus" (a) and at the background site "GreyMinus" (b).** © HYDRA

## 8.3 Terracotta Tiles / Glass Slides

The aim was to investigate the succession of biofilm on hard substrates such as terracotta tiles and glass slides. Each set up consisted of a POM post on which 1 terracotta tile and 4 glass slides were attached (Fig. 8a). Sterilisation of the tile surfaces was done by UV radiation. Deployment was done at each of the three sedimentary sampling sites ("RedPlus" and "GreyMinus" each 20, "GreyPlus" 15 stands), so that tiles and glass slides were approx. located 50 cm above the seafloor (Fig. 8b). The posts were randomly positioned at the sites, and tiles and glass slides were transported into plastic bags to the seafloor, and also later back to the sea surface, to avoid contamination during handling. The first sampling was done 10 days after deployment and the next sampling is scheduled for June 2013.

After 8-12 days, none of the tiles or slides were visibly covered with biofilms. Light microscopy of representative glass slides remained inconclusive. Nevertheless all tiles and slides were scraped with sterile scalpels. Slides: For bacterial cell counts, one slide per post was scraped and then rinsed with 1 mL sterile artificial seawater (ASW, 38‰). The seawater was transferred into a cryo-vial that had been filled with 2 mL filter-sterile 4% formaldehyde/seawater before being stored at 4°C. The remaining slides were used for DNA analyses, i.e. they were each scraped and rinsed with 1 mL 1 × TE-buffer (molecular grade; Promega Corporation) before being transferred to autoclaved plastic tubes and put to -20°C. Tiles: For bacterial cell counts, two diagonals were scraped off each tile before being added to 2 mL filter-sterile 4% formaldehyde/seawater and being stored at 4°C. For DNA analyses, the rest of the tile was scraped and the material added to with 1 mL 1 × TE-buffer (molecular grade; Promega Corporation). Storage was at -20°C. The samples are currently being analyzed at MPI.

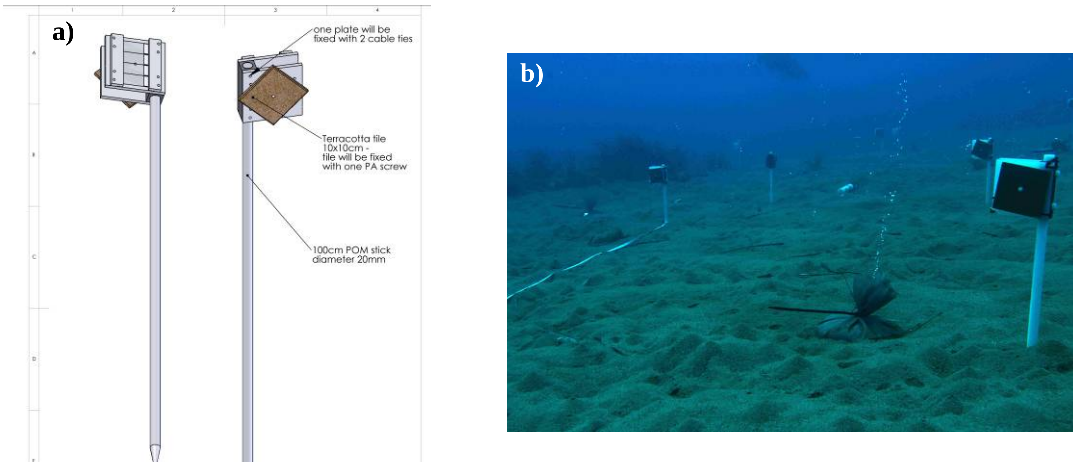



**Fig. 8 – Transplantation experiment with terracotta tiles/glass slides. a) Set up (sketch by J.P. Meyer, MPI; program: SolidWorks 2006-2007 Education Edition, www.solidline.de), b) *in situ* picture of deployed tiles and slides (© HYDRA).**

## 8.4 Marble Tiles

To determine the long-term effect of reduced pH on calcium carbonate structures, pre-weighed marble tiles were deployed between “GreyMinus” and “GreyPlus” and between “RedPlus” and “GreyPlus”. Each set up consisted of a POM post with two marble tiles, each contained within a mesh bag (Fig. 9). The marble tiles will be retrieved in June 2013.

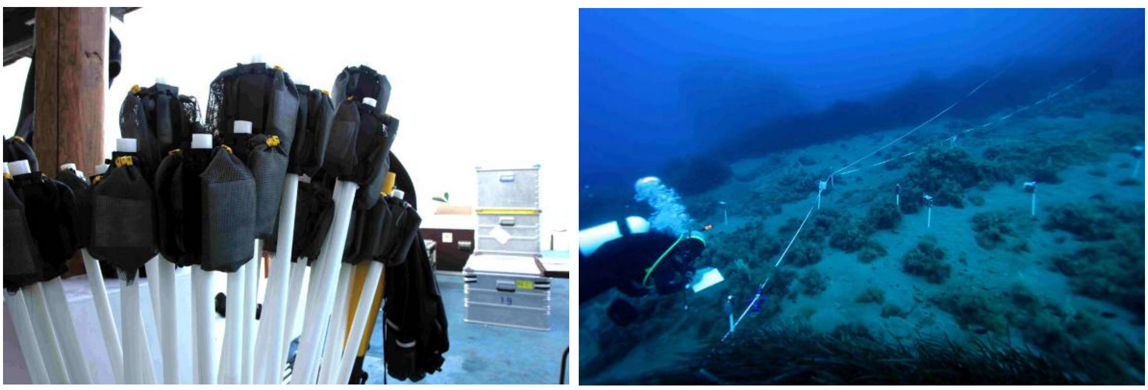


**Fig. 9 – Implantation experiment with marble tiles.** © HYDRA.

# 9 GAS SAMPLING

The goal was to determine the overall gas composition and to verify again that no methane and no sulfide are emitted at the investigated sites. Sampling and analyses were done in cooperation with Dr. S. Beaubien (UniRoma1, Italy) and Dr. F. Italiano (INGV Palermo, Italy).

Gas samples were taken at the “RedPlus” and at the “GreyPlus” site. Sampling was done by holding an exetainer upside down over the seep until it was filled. During surfacing the exetainer had a syringe needle stuck through the septum for the pressure release. The needle was pulled out shortly before surfacing with the samples. The exetainer content was transferred into metal containers on board and analysis will be done at UniRoma1 (Italy). From sub-samples out of 2 gas collecting tubes analysis of $H_2S$ were done immediately on board directly after sampling (UniRoma1, Italy). The concentration of $H_2S$ was <1ppm. The sampling for the extended analysis was done with funnels into gas collecting tubes. The containers were closed when full with gas and surfaced without any pressure compensation. The analysis were done INGV Palermo (Italy) and revealed a $CO_2$ content of ~97% at both sites as well as a $CH_4$ content of <0.001%.

# 10 IN SITU MEASUREMENTS

Several *in-situ*-measuring devices were deployed at the investigated sedimentary sites and at "Bottaro West Crater" to geochemically characterize the respective habitats and to test the comparability, accuracy, sensitivity and reliability of different $CO_2$ sensors. In addition, the divers thoroughly documented each site by video and photography.

## 10.1 Timelapse Camera

The gas flow was monitored for several hours during each deployment with the timelapse technique using a Canon EOS D600 (Fig. 10a). These recordings are currently being evaluated by HYDRA. Observations made by the divers under water indicate the potential for considerable differences in seepage intensity during the day that may be caused by wave action, tides or changing currents.

## 10.2 Handheld

The "Handheld" microsensor instrument can be operated by divers and records sensor data at high temporal resolution within the water column (Fig. 10b). During this field trip, it was equipped with sensors for $pCO_2$ (Microelectrodes Inc., USA), temperature (Pt100; UST Umweltsensortechnik GmbH, Geschwenda, Germany), pH and oxygen [14,15]. The profiles are currently being evaluated.

## 10.3 SEAGUARD Recording Current Meter

As during last year's field trip, a SEAGUARD recording current meter (AADI, Norway) was used to monitor current speed and direction, temperature, salinity/conductivity, pressure, turbidity and oxygen concentrations within the water column (Fig. 10b). Data analysis is still in progress.

## 10.4 Benthic / Fluid Chambers

Benthic chambers (Fig. 10b,c) were deployed to measure total flux rates of oxygen concentration, nutrients and DIC within a defined volume of sediment and seawater. During each deployment, light and dark incubations were conducted. A water sample was taken with a glass syringe from the cylinders at the beginning and at the end of each deployment. To measure the fluid efflux, bags were attached to each chamber to account for the additional volume during the incubation. The analyses are still in progress.

To assess the amount of fluid seepage at the three sedimentary sampling sites, so-called "fluid chambers" were designed during the field trip (Fig. 10d,e). During each deployment, the fluid chambers were put into the sediment to approx. the same height. The lid was closed with tape and 3 holes in the frame were closed with rubber plugs. The time of the start and the end of the deployment were noted. Each fluid chamber was sampled at the end of a deployment. Via a valve, samples for fluid analysis were taken into small and big serum bottles as well as 10 mL-syringes. Fluid analysis from serum bottles will be done by Dr. F. Italiano (INGV Palermo, Italy). Analysis of syringe samples will be conducted at MPI, focusing on sulfide/sulphate/chloride concentrations, pH, nutrients, DIC, TA, Fe/Mn concentrations and B concentrations (see 5.3).

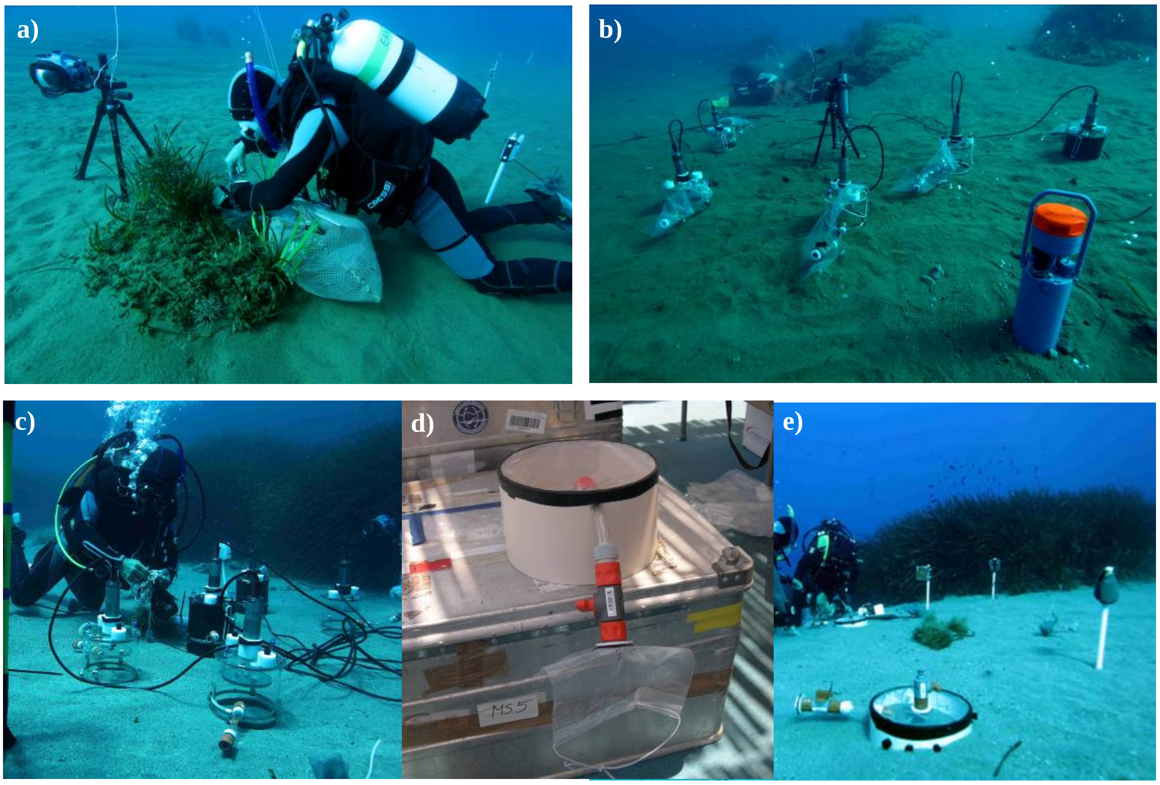



**Fig. 10 – *In situ* devices deployed during field trip ECO2-3 (2012) at Panarea Island (Italy). a) Timelapse camera, b) Handheld profiler (middle), SEAGUARD (with orange top; AADI, Norway) and benthic chambers, c) Sampling of benthic chambers, d,e) Fluid chambers.** © HYDRA.

## 10.5 Microsensor Profiler

A microsensor profiler for sediments (Fig. 11) was equipped with sensors for pH [14 and Microelectrodes Inc., USA], $O_2$ [15], $CO_2$ (Microelectrodes Inc., USA), ORP (oxidation reduction potential; a Pt wire, exposed tip is 50 µm thick and 0.5 mm long), T (Pt100; UST Umweltsensortechnik GmbH, Geschwenda, Germany), $H_2$ (Unisense, Denmark) and $H_2S$ [16]. It was deployed at all three sedimentary sampling sites as well as at “Bottaro Crater”. In addition to the recording of high-resolution profiles in the sediment, the unit was also used to assess the spatial heterogeneity of the water column.

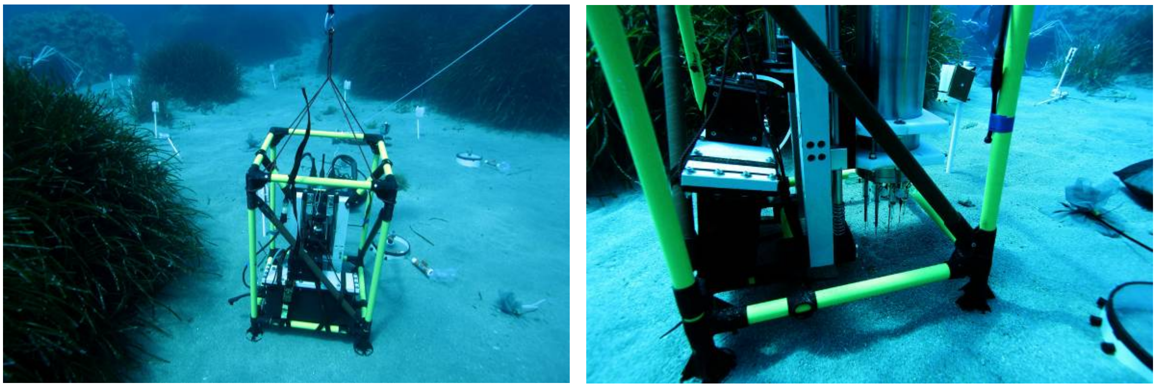


**Fig. 11 – Microsensor profiler.** © HYDRA.

Transects conducted with the profiler at “Bottaro Crater” from non-seep-impacted background areas over seagrass beds to seepage sites revealed that seagrass indeed preferentially grows on seeps (Fig. 12). The seeps emit $CO_2$, leading to pH decrease and $H_2$. The $H_2$ is not of biological origin (e.g. from N-fixation), as it was also abundant in the bubble stream.

At the three sedimentary sampling sites, the microprofiles show distinct differences between the sites (Fig. 13). The seepage sites are highly acidic (down to pH 5.3), and at “RedPlus” the ORP is strongly reduced. No $H_2$ or $H_2S$ were measured, until further analysis we suspect the reductant in pore water to be $Fe^{2+}$. The absence of $H_2$ in sediments, but presence in bubble streams strongly suggests that $H_2$ is completely consumed in the deeper sediments by sulfate and Fe(III) reduction. Time series of microprofiles showed that the pore-water chemistry is not tidally influenced. The high $O_2$ flux into the red sediments at “RedPlus” is driven by $Fe^{2+}$ oxidation.

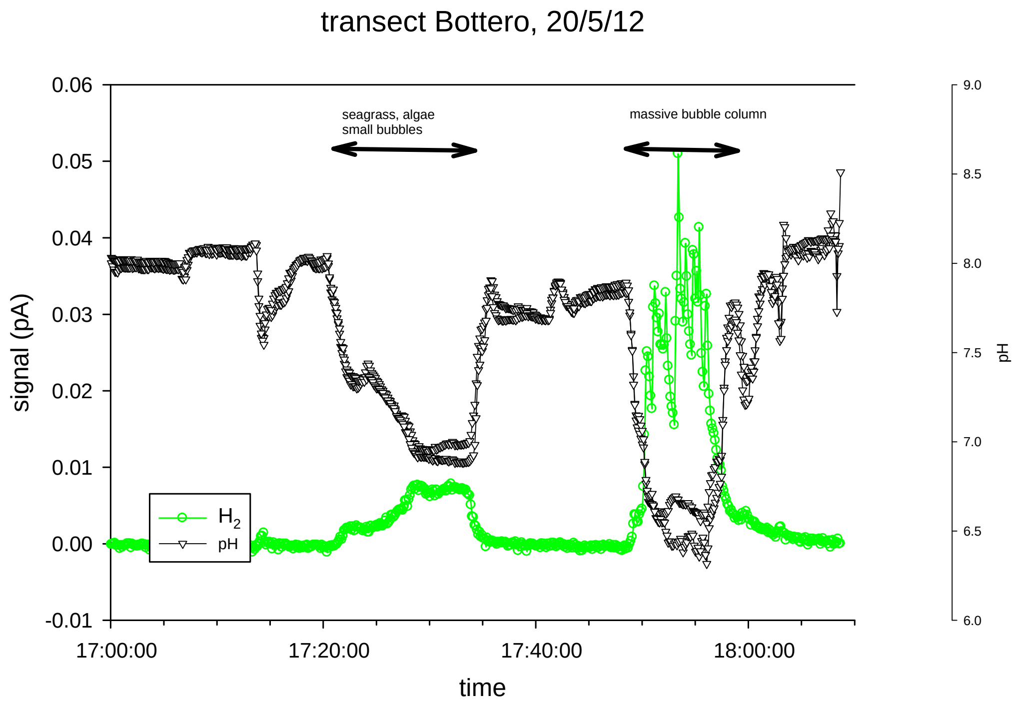



**Fig. 12 – Transect with the microsensor profiler in the vicinity and across "Bottaro Crater". The $H_2$ and pH data were the most conclusive. Seepage was also correlated with increased T (not shown). (plot: D. de Beer, MPI)**

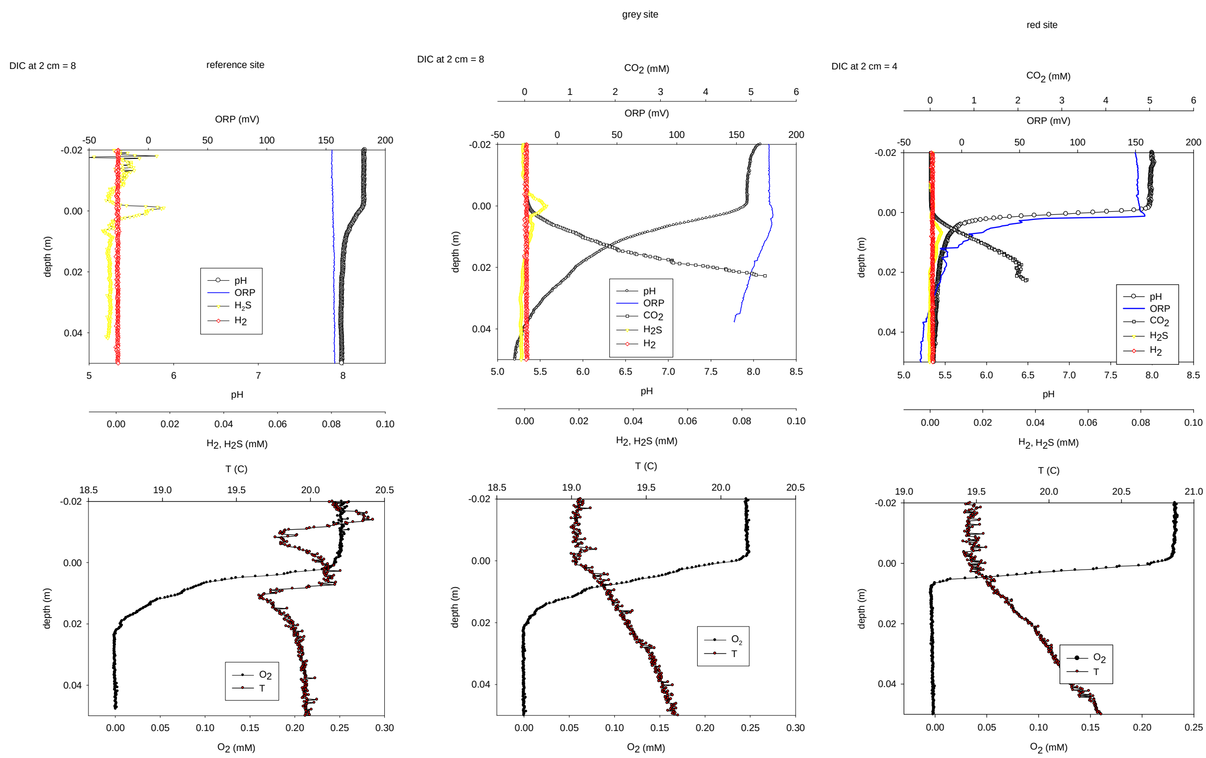



**Fig. 13 – Comparison of microsensor profiles from the non-gas-impacted background site "GreyMinus" (left), to the seepage site "GreyPlus" (middle) and the second seepage site "RedPlus" (right). The red sands at "RedPlus" are supposedly rich in iron. The reduced iron reacts very strongly with the redox electrode, giving strongly negative values. None of the sediments contained $H_2$ or $H_2S$. (plot: D. de Beer, MPI)**

## 10.6 RBR Sensors

RBR sensors (RBR-Datalogger XR-420 D; RBR, Ottawa, Canada, www.rbr-global.com) are loggers for pH, $O_2$, ORP and pressure (tides), here measuring at 2 cm from the sediment surface (Fig. 14a). Out of 6 loggers, 5 functioned well and revealed strong dynamics of $O_2$, pH and ORP that were perfectly synchronous to tides (Fig. 14b). Seepage occurred mainly at low tide, during which anoxic, acidic and reduced substances are emitted into the water column. The reductant could be either $H_2S$, $H_2$ or $Fe^{2+}$.

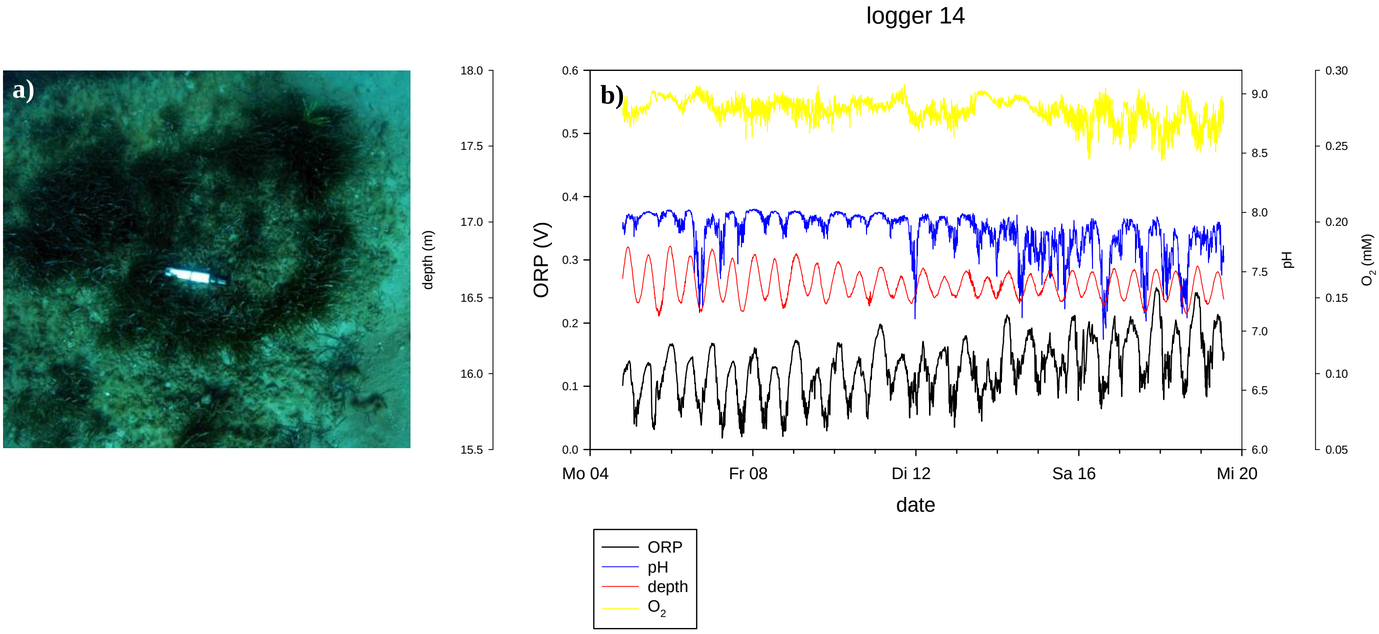



**Fig. 14 – RBR sensors measured pressure, pH, $O_2$ and ORP (RBR, Canada). a) Deployment within seagrass beds. © HYDRA., b) Data from one of the RBR loggers that was positioned at the "RedPlus" seepage site. The red line represents the tides. The ORP and pH are decreased at low tide. The oxygen dynamics are not well correlated. (plot: D. de Beer, MPI)**

## 10.7 DOMS

The photosynthetic potential of the *Posidonia* plant was investigated by using a diver operated microsensor system for *in situ* oxygen measurements on a seagrass leaf on the $CO_2$ - impacted and the non-impacted site. The sensor was positioned on a seagrass leaf and oxygen concentration was measured along a profile away from the leaf surface to asses the net photosynthesis. Shading the plant while doing continuous oxygen measurements on the leaf surface allows for the calculations of the gross photosynthesis later on [17]. More oxygen measurements will be conducted during the next field campaign in June 2013 so that the data obtained here are mainly used to optimise the design of the *in situ* investigations.

In addition to the *in situ* measurements, oxygen dynamics, production and consumption were also investigated *ex situ* on recovered seagrass leaves, on stones and in sediment. First results indicate that seagrass photosynthesis increased with lower pH (D. de Beer, data not shown). Further data evaluation is in progress.

## 10.8 MuFO

MuFO (multiple fibre optics) is an optical sensing device for measuring $pCO_2$. The aim was to measure carbon dioxide with not just one, but 100 of freely positionable fibres with only one excitation source on one end (Fig. 15). The measurement principle is based on optical chemosensing. The MuFO device consists of 3 main parts: The sensor that contains a pH-sensitive dye, the optical fibres that guide the excitation/emission light and the camera that takes pictures of the polished fibre ends.

**Fig. 15 – MuFO (multiple fibre optics).** © HYDRA.

On the tip of every fibre a sensing foil is fixed via a metal sleeve. The sensing foil consists of three layers knife coated on a PET supporting foil. Layer 1 contains a pH-sensitive dye and a base embedded in an ethyl cellulose matrix. Layer 2 is a protective silicone layer impermeable for protons to avoid interferences with the pH of the sea water and permeable for $CO_2$. Layer

3 is a black silicone layer to avoid interferences from the surrounding light. When $CO_2$ enters the ethyl cellulose matrix, bicarbonate and protons are produced and the indicator dye gets protonated.

During the measurements, the excitation light of LEDs is guided through the fibres to the sensing foil. When excited, the dye emits light with different wavelength maxima depending on its protonated or deprotonated form. The emitted light is guided back through the fibres and the camera takes a picture of the polished fibre head that holds the polished ends of all 100 fibres in a 10 x 10 matrix (Fig. 16). Via software the pictures are analyzed for their red, green and blue channel, which contain the information of emitted light. After a calibration with certain $pCO_2$ values the $pCO_2$ can be calculated.

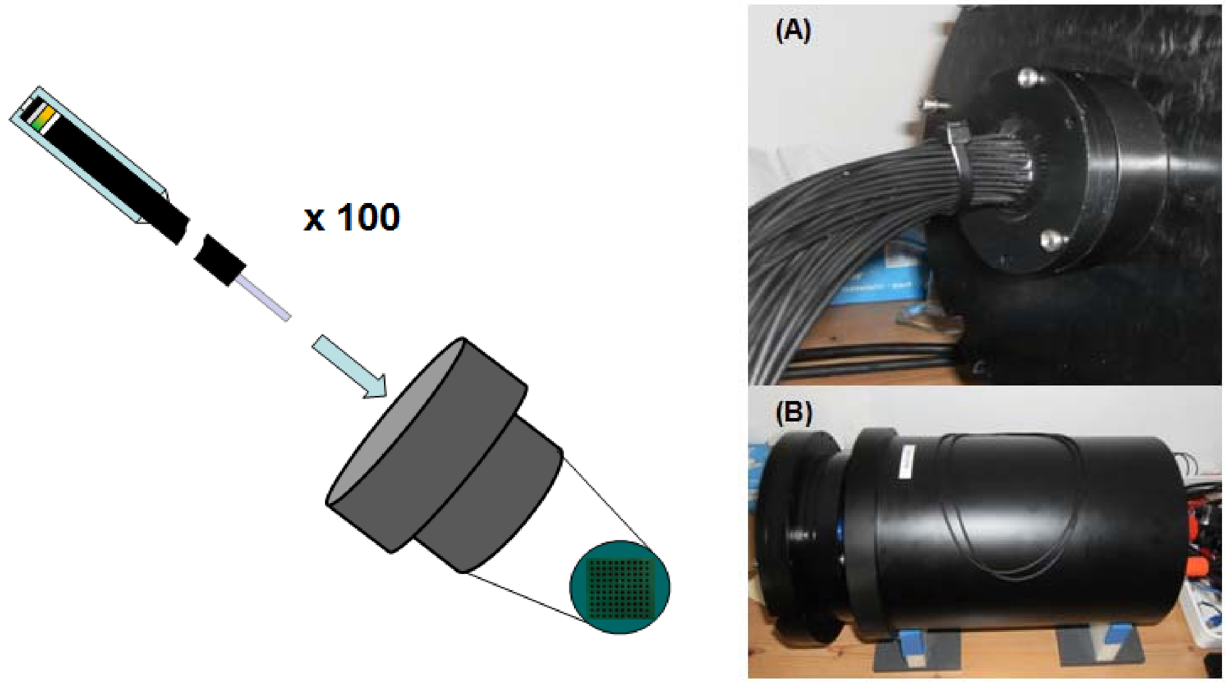


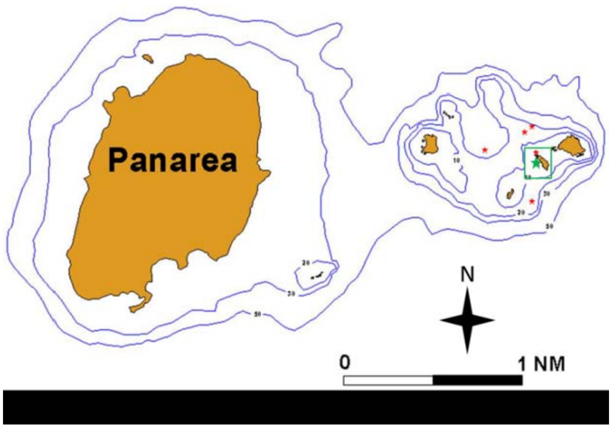

**Fig. 16 – Left: Scheme of the 10 × 10 matrix. Right: (A) Fixation of the fibre head to the camera housing. (B) Housing with camera and excitation LEDs inside. (photos and scheme by S. Schutting, MPI/TU Graz)**

At Panarea, seawater from the haven was used for calibration. After calibration, the MuFO was taken twice to the haven for test measurements and was deployed twice at the seafloor. However, unexpected software problems occurred during calibration and data analysis and prevented further deployments of the device during this field trip.

# 11 PLUME PARAMETERIZATION and GEOCHEMICAL SURVEY

## Introduction

In June 11th to June 21st 2012 shallow submarine $CO_2$-rich hydrothermal vent sites near the Aeolian island of Panarea (Italy) were visited for plume parameterization and geochemical surveying of dissolved $CO_2$ in the water column (Geomar, Map 11.1). Furthermore, a variety of $CO_2$ sensors was deployed simultaneously for inter-comparison. Two sites were targeted for investigation. Site 1 was located east of the island of Basiluzzo (38°39.82' N, 15°07.14' E), Site 2 south of the island of Bottaro (38°38.24' N, 15°06.57' E). The latter was characterized by relatively strong gas fluxes emitted on an area of ~48 $m^2$ and 12 m water depth (Fig. 11.1.1).




Map 11.1 *The working area, Site 2 (green star) was located nearby the small island of Bottaro, approx. 3 km east off Panarea Island. (map modified from Caramanna et al., 2011).*

Fig. 11.1.1 *Venting of gas at Bottaro Crater. (© Melanie Herrmann)*

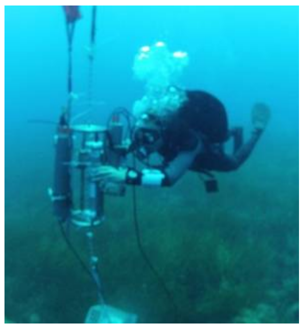


Fig. 11.1.2 *Scuba diver, deploying measuring devices. (© Melanie Herrmann)*

## Method

In order to parameterize plume dynamics investigations at site 2 (Bottaro) encompassed geochemical analyses ($pCO_2$, TA, DIC, B, $H_2S$), hydro-physics (conductivity, temperature, pressure) as well as local hydrodynamics (current flow). The distribution of the dissolved $CO_2$ in the water column was performed using the HydroC™ $CO_2$-sensor from CONTROS Systems and Solutions GmbH, Kiel, Germany. The other chemical parameters were determined from water samples taken at discrete vertical heights and horizontal distances from the vent field, and will also be used as reference for the sensor data. CTD and current flow measurements were done in parallel to $pCO_2$ logging and were performed using a Seabird SBE 37-SM MicroCAT recorder and a current meter (SonTek Argonaut S/N D338). The current meter was deployed 20 m to the northwest of the main vent field. HydroC$^{TM}$ and CTD were mounted to a vertically adjustable rack and were deployed and vertically adjusted under water by scuba divers (Fig. 11.1.2). The HydroC$^{TM}$ was programmed to take a measurement each 5-10 s, while the CTD recorded data every minute. Current conditions were recorded in time intervals of 5 minutes. During vertical step measurements the HydroC$^{TM}$ remained at a certain depth for at least 10 minutes. Long-term measuring time for the $pCO_2$ data was limited to 16 h. Three long-term stationary measurements, two of which upstream of the vent, one downstream were performed. In addition, two vertical profiles, both up- and downstream of the vent were carried out. The gas flux was spatially resolved by volumetric measurements above nodes of a grid set out across the vent field.

Measurements at Site 1 (Basiluzzo) encompassed $pCO_2$ and CTD. Both devices as well as two additional $pCO_2$ sensors of the University of Rome were mounted on a wire crate box for long-term data logging at a single station as well as for short-term measurement at discrete stations along transects across the study area. At the stations all analyses occurred 10 cm above ground to match measuring positions of MPI instruments. The sensors were programmed to read in time intervals of 5 – 60 s. Measuring locations/transects were selected according to seepage activity and sediment characteristics and match those described in the sections above (MPI instruments).

## First results

**Basiluzzo.** Fig. 11.2.1.1 shows $pCO_2$ as well as $P$ data recorded at Site 1 at a single station on a bare sand bed with no apparent seepage (i.e. gas venting) activity during time of deployment. Pressure data exhibit some noise due to significant swell, particularly during initial stages of the recording. However, evaluation of the $P$-data filtered with a moving average over 4 minute intervals allowed determining a tidal amplitude of 22 cm. Despite this low value the figure reveals a correlation of hydrostatic pressure with $pCO_2$: at low tide seepage activity seems to be enhanced with $pCO_2$ reaching a peak value of 1819 µatm whereas seepage is attenuated to values around 500 µatm during high tide. This correlation is also reflected in the $T$-log, which exhibits a mean temperature increase of approx. 1 °C at low tide (21.1 °C), shortly after $pCO_2$ reached maximum values (data not shown).

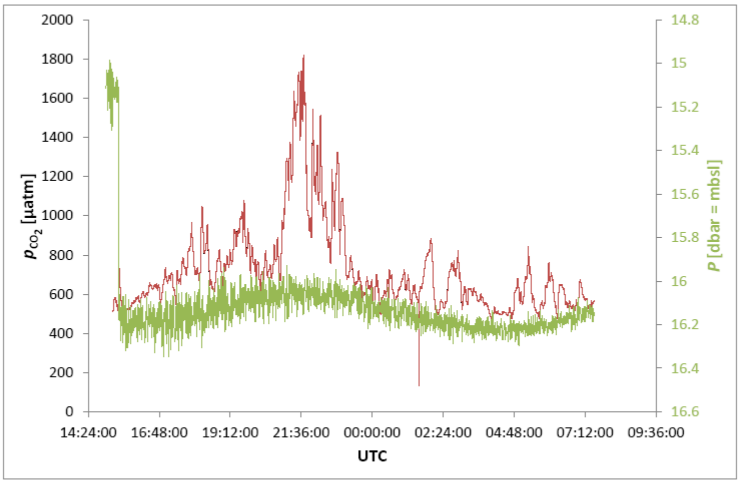



Fig. 11.2.1.1: *Stationary ~16 h pCO₂ (red) and P (green) data obtained near Basiluzzo, Panarea on June 13th – 14th, 2012. Shortly after starting the data acquisition, instruments were relocated by divers from 15.1 mbsl to the target location at 16.1 mbsl. The negative pCO₂ spike at 01:35 (UTC) on the 14th is due to a scheduled zeroing procedure of the HydroC™-sensor. The correlation of pCO₂ and P suggests a strong tidal control on seepage strength. (plot: N. Bigalke, Geomar)*

Fig. 11.2.1.2 shows results of stationary measurements along a transect across the study area, 2.5 h after high tide. Most active gas venting occurred at Station 2, which was characterized by a bare sand surface featuring several pockmarks. Gas venting was anecdotal at Stations 1 and 3. The latter was a 1 $m^2$ patch of sand surrounded by seagrass. Station 4 was chosen as reference site and had no gas emissions. Registered $pCO_2$ mirror the venting activity: $pCO_2$ ranged from lowest values around 435 µatm at the reference site (Station 4) via 460 µatm at Station 1 to a plateau value of 490 µatm at Stations 2 and 3. A medium-strength but conspicuous $pCO_2$ anomaly peaks from the plateau value of 490 µatm to 580 µatm in the second half of the measurement at Station 2 and during relocation of the instruments to Station 3. Temperature was not measurably affected by the $CO_2$ pulse but stayed at a constant 20 °C throughout the entire stationary measuring time (data not shown). Similar medium-amplitude anomalies outside the low-tide regime are also visible in Figure 11.2.1.1 and reveal an additional, currently unknown, factor to tidal control on $CO_2$ seepage in the study area.

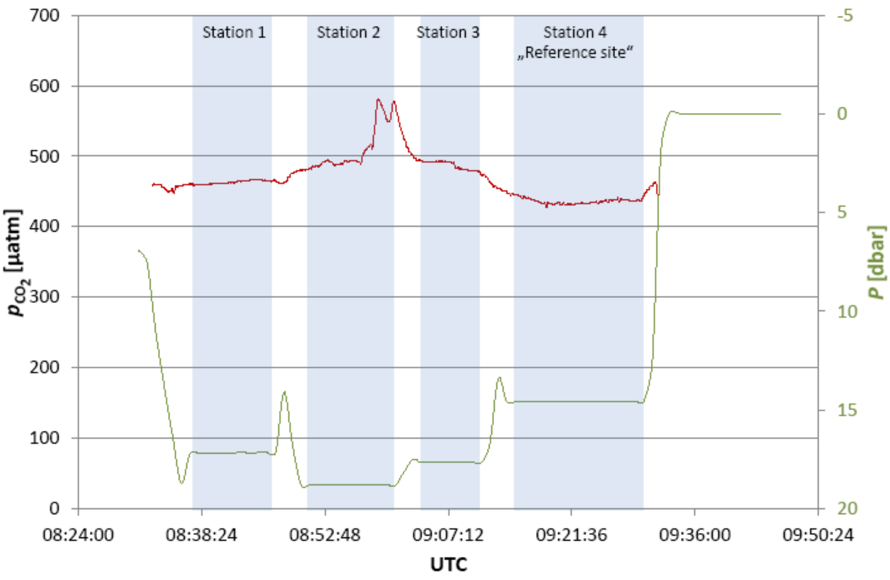



Fig. 11.2.1.2: *Data log from transecting the study area near Basiluzzo, Panarea on June 16th, 2012, 2.5 h after peak tide. Medium amplitude peaks such as occurring between 8:57 and 9:03 (UTC) are a common feature in the study area and testify the large temporal variability of $CO_2$ seepage, in addition to tidal control. (plot: N. Bigalke, Geomar)*

**Bottaro Crater.** Seepage activity varied in time and space. Highest flux rates of 26.4 L $min^{-1}$ $m^{-2}$ were measured at the NE border of the crater, whereas smaller seepage occurred in the SW. The total gas flux across the entire seepage area (48 $m^2$) was determined to 62 - 90 L/min.

Bubble diameters (d) immediately above the seafloor ranged from 5 to 10 mm. First model results indicate a rapid gas exchange through the gas-water interface. A d> 6 mm gas bubbles composed of 93.98% $CO_2$, 3.88% $N_2$, 2.2 % $H_2S$ and 0.93% $O_2$ [18] reach the sea surface (Fig. 11.2.2.1). Due to rapid gas exchange between bubble and seawaterthe final bubble consists of $N_2$ and $O_2$ identical to an atmospheric ratio. Analysis of gas samples for validation of these first model results will be performed in the near future.

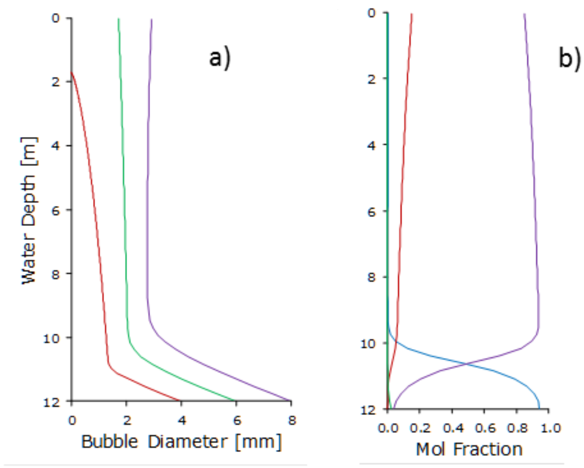



Fig. 11.2.2.1 *First results modeling diameter (a), and gas exchange (b) of mixed gas bubbles emerging at d = 4, 6, and 8 mm from the seafloor (blue: $CO_2$, purple: $N_2$, red: $O_2$, green: $H_2S$). Bubble diameter in (b): 6 mm. (plot: N. Bigalke, Geomar)*

Figure 11.2.2.2 (a, b, and c) shows results of stationary and vertical measurements taken upstream and downstream of the vent field on the 19th of June 2012. The local current regime controlled tidally, with higher current speeds occurring during low tide. Currents were predominantly directed towards the NW (Fig. 11.2.2.2 a). The figures suggest $pCO_2$ variability in the near field of the seep is governed by a combination of complex hydrodynamics and dynamic gas release mechanisms. In agreement to observations close to the nearby island of Basiluzzo the figures suggest a tidal control on $pCO_2$ concentrations. However, signs appear to be reversed as $pCO_2$ near Basiluzzo peak at low tide (Fig. 11.2.2.3). This indicates that changes in $pCO_2$ are governed by the tides via changes of the local current scheme rather than by tidal controlled pressure fluctuations in the gas reservoir of the subsurface.

Downstream investigations along a vertical profile indicate highest dissolved concentrations of $CO_2$ (almost 6000 µatm) close to the sea floor, where most of the $CO_2$ is likely to be transferred into the seawater. This agrees with numerical modeling (Fig. 11.2.2.2 c and 11.2.2.1 b). High $pCO_2$ values of 3800 µatm were also observed at 9.2 mbsl and between 7.5 – 6 mbsl, whereas significantly lower values occurred at 8.8 mbsl. At shallow depths (5 mbsl) $pCO_2$ values decreased significantly (<800 µatm), suggesting effective dilution of $CO_2$ into surface waters in the far field.

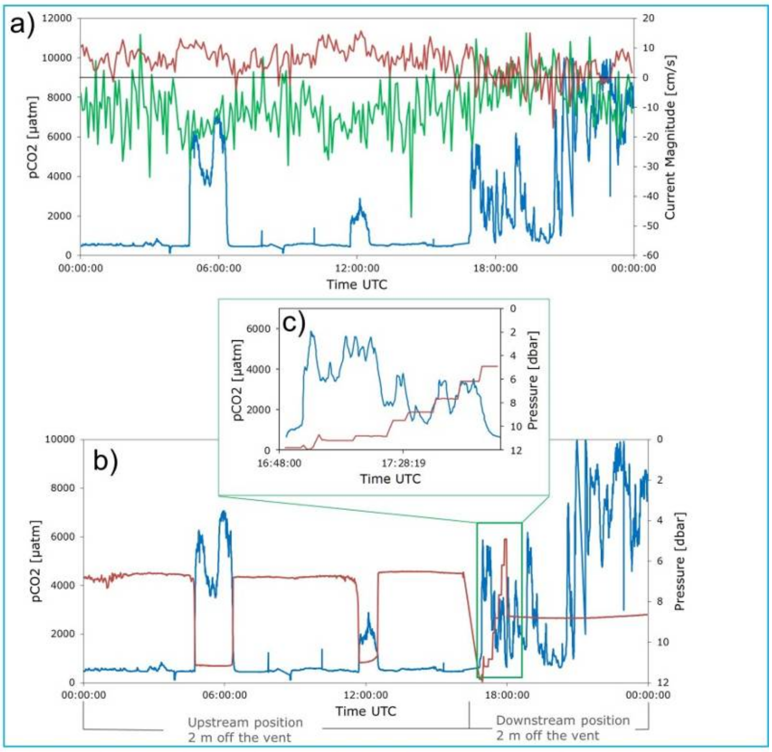



Fig. 11.2.2.2 **(a)** *Preliminary data show the local hydrodynamics (green= east-, red= north component) and* $pCO_2$ *values (blue) as a function of time. Figure* **(b,** and **c)** *illustrate* $pCO_2$ *(blue) and pressure data (red) versus time, obtained during a stationary measurement in upstream position and avertical log followed by an overnight measurement in downstream position. Two negative P-anomalies around 6 am UTC and noon UTC coincide with distinct* $pCO_2$ *increases and were attributed to a temporal drop of the sensors onto the floor of the vent field. Figure* **(c)** *shows a detail of the vertical step measurement conducted at 2 m distance to the seepage area. (plot: N. Bigalke, Geomar)*

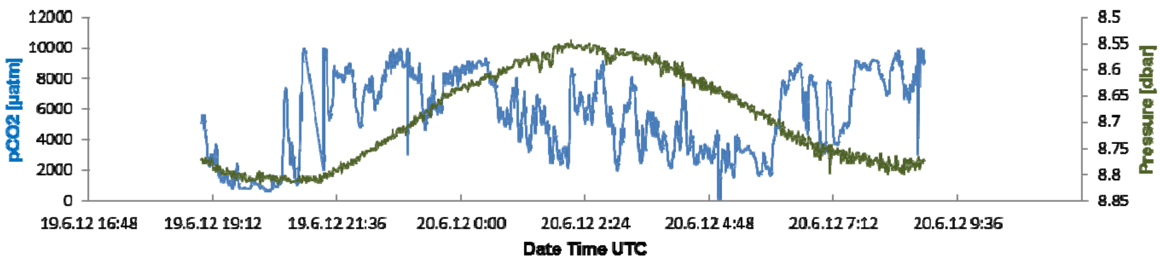



Fig. 11.2.2.3 *$pCO_2$- and pressure data as a function of time, conducted during a stationary measurement downstream of seepage at Bottaro Crater. The data indicate generally higher $pCO_2$ values during high tide. (plot: N. Bigalke, Geomar)*

The measurements indicate rapid dissolution of $CO_2$ within the first 1-2 m (depending on the initial bubble size) and subsequent vertical transport of $CO_2$-enriched bottom water, due to plume- induced advection/convection. Lower concentrations, which have been measured at 3.30 m above seafloor, might be due to the entrainment of ambient seawater and thus dilution of the $CO_2$-rich plume water. Further modeling and interpretation is in progress.

## Summary

At Site 1 (Basiluzzo) stationary long-term and short term measurements along a 4-station transect revealed that $CO_2$ seepage showed large variability in both time and space. Data from a stationary 16 h measurement suggests that tides exert the strongest control on seepage activity. Elevated $pCO_2$ at low tides are immediately followed by a minor $T$-increase. This could not be detected at medium-amplitude, positive $pCO_2$ anomalies in high-tide regimes, likely due to insufficient instrument sensitivity.

Stationary measurements at Site 2 (Bottaro Crater) indicate a highly dynamic current regime and a strong temporal variability of gas emissions. Vertical step measurements demonstrate rapid dissolution of $CO_2$ within the first 1-2 m, depending on the initial bubble size as well as the occurrence of local hydrodynamics. In contrast to observations at Basiluzzo Island, enhanced gas emissions did not occur at low tide, indicating variations in $pCO_2$ are governed by tidal-controlled currents.

## 12 OTHER ON-SITE COOPERATIONS

Colleagues from OGS/Trieste were sampling the water column of all three sites: "RedPlus", "GreyPlus" and "GreyMinus". They will analyze nutrient conntens and the communitiy structure of viro-, phyto- and zooplancton . Furthermore they sampled microphytobenthos of the sediments at each site. The analyses are in progress.

## 13 ACKNOWLEDGEMENTS

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# 15 STATION LIST (as published in www.pangaea.de)

| Event label | Campaign label | Area name | Date/Time | Latitude | Longitude | Eleva-tion | Latitude end | Longitude end | Elevation end | Date/Time end | Device | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-1 | ECO2-3 | Panarea | 2012-06-02T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; site exploration |
| ECO2-3-2 | ECO2-3 | Panarea | 2012-06-02T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; site exploration |
| ECO2-3-3 | ECO2-3 | Panarea | 2012-06-02T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; site exploration |
| ECO2-3-4 | ECO2-3 | Panarea | 2012-06-03T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; site exploration |
| ECO2-3-5 | ECO2-3 | Panarea | 2012-06-03T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; site exploration |
| ECO2-3-TL-1 | ECO2-3 | Panarea | 2012-06-03T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Video camera | grey with gas; first test with timelapse camera |
| ECO2-3-RCM-1 | ECO2-3 | Panarea | 2012-06-03T16:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-06T17:50:00 | Current meter | red with gas |
| ECO2-3-SES-1 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; self-transplantation of sediment (K2) |
| ECO2-3-SES-2 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; self-transplantation of sediment (K8) |
| ECO2-3-SES-3 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; sediment from grey no gas (K1) |
| ECO2-3-SES-4 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; sediment from grey no gas (K3) |
| ECO2-3-SES-5 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; sediment from grey no gas (K7) |
| ECO2-3-SES-6 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; sediment from grey no gas (K9) |
| ECO2-3-SES-7 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; sediment from grey no gas (K19) |
| ECO2-3-SES-8 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; self-transplantation of sediment (K18) |
| ECO2-3-SES-9 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; self-transplantation of sediment (K20) |
| ECO2-3-SES-10 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; sediment from red with gas (K5) |
| ECO2-3-SES-11 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; sediment from red with gas (K10) |
| ECO2-3-SES-12 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; sediment from red with gas (K15) |
| ECO2-3-SES-13 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; sediment from red with gas (K16) |
| ECO2-3-SES-14 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; sediment from red with gas (K17) |
| ECO2-3-PUC-4a | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas |
| ECO2-3-PUC-5a | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas |
| ECO2-3-PUC-6a | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas |
| ECO2-3-PUC-D1 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas |
| ECO2-3-PUC-E1 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas |
| ECO2-3-PUC-F1 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas |
| ECO2-3-PUC-1a | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas |
| ECO2-3-PUC-2a | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas |
| ECO2-3-PUC-3a | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas |
| ECO2-3-PUC-A1 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas |
| ECO2-3-PUC-B1 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas |
| ECO2-3-PUC-C1 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas |
| ECO2-3-SeaMim-P1 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; seagrass mimics P1-P6 |
| ECO2-3-SeaMim-P7 | ECO2-3 | Panarea | 2012-06-04T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-17T00:00:00 | Sampling by diver | grey no gas; seagrass mimics P7-P12 |
| ECO2-3-TL-2 | ECO2-3 | Panarea | 2012-06-04T12:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-04T17:50:00 | Video camera | red with gas |
| ECO2-3-RBR-1 | ECO2-3 | Panarea | 2012-06-04T12:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-19T10:30:00 | RBR Sensors | grey no gas; in seagrass |
| ECO2-3-RBR-2 | ECO2-3 | Panarea | 2012-06-04T12:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-19T10:30:00 | RBR Sensors | grey no gas; on sediment |
| ECO2-3-RBR-5 | ECO2-3 | Panarea | 2012-06-04T16:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-19T14:30:00 | RBR Sensors | red with gas; in seagrass |
| ECO2-3-RBR-6 | ECO2-3 | Panarea | 2012-06-04T16:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-19T14:30:00 | RBR Sensors | red with gas; on sediment |
| ECO2-3-RBR-3 | ECO2-3 | Panarea | 2012-06-04T17:45:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-19T14:30:00 | RBR Sensors | red with gas; on sediment |
| ECO2-3-RBR-4 | ECO2-3 | Panarea | 2012-06-04T17:45:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-19T14:30:00 | RBR Sensors | red with gas; in seagrass |
| ECO2-3-FT-2 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-3 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-FT-4 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-5 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-6 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-7 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-8 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-9 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-10 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-11 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-12 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-13 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-14 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-15 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-16 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-17 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-18 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-19 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-FT-20 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-PW-1 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-PW-2 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-PW-3 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-NIS-1 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Bottle, Niskin 5L | red with gas |
| ECO2-3-TCT-1 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-2 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-3 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-4 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-5 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-6 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-7 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-8 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-9 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-10 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-11 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-12 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-13 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-14 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-15 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-GLASS-1 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-2 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-3 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-4 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-5 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-6 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-7 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-8 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-9 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-10 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-11 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-12 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-13 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-14 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-15 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T00:00:00 | Sampling by diver | red with gas; glass slides |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-SES-15 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; self-transplantation of sediment (K4) |
| ECO2-3-SES-16 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; self-transplantation of sediment (K11) |
| ECO2-3-SES-17 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; self-transplantation of sediment (K13) |
| ECO2-3-PUC-4b | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-2b | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-17a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-11a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-13a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-15a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-5b | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-7a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-9a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-8a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-12a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-16a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-14a | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-4x | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-Ia | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-IIa | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-IIIa | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-IVa | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-Va | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-FT-1 | ECO2-3 | Panarea | 2012-06-05T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; natural sediment |
| ECO2-3-TL-3 | ECO2-3 | Panarea | 2012-06-05T10:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-05T17:00:00 | Video camera | red with gas |
| ECO2-3-MICH-1 | ECO2-3 | Panarea | 2012-06-05T10:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-06T17:50:00 | Microsensor profiler | red with gas |
| ECO2-3-PUC-6b | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-7b | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-17b | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-2c | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-13b | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-Seagras-1a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; several leafs & water |
| ECO2-3-Seagras-2a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; several leafs & water |
| ECO2-3-Seagras-3a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; several leafs & water |
| ECO2-3-Seagras-P1 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; natural seagrass |
| ECO2-3-Seagras-P2 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; natural seagrass |
| ECO2-3-Seagras-P3 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; natural seagrass |
| ECO2-3-Seagras-P4 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; natural seagrass |
| ECO2-3-Seagras-P5 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; natural seagrass |
| ECO2-3-Seagras-P6 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-GAS-1 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; onboard measurement |
| ECO2-3-GAS-2 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; onboard measurement |
| ECO2-3-GAS-3 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-GAS-4 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas |
| ECO2-3-CHAM-1a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-07T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-2a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-07T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-3a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-07T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-4a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-07T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-5a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-07T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-6a | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-07T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-TCT-16 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-17 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-TCT-18 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-19 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-20 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-21 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-22 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-23 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-24 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-25 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-26 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-27 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-28 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-29 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-TCT-30 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; Terra cotta tile |
| ECO2-3-GLASS-16 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-17 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-18 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-19 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-20 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-21 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-22 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-23 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-24 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-25 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-26 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-27 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-28 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-29 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T00:00:00 | Sampling by diver | grey with gas; glass slides |
| ECO2-3-GLASS-30 | ECO2-3 | Panarea | 2012-06-06T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; glass slides |
| ECO2-3-TL-4 | ECO2-3 | Panarea | 2012-06-06T17:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-06T19:30:00 | Video camera | red with gas |
| ECO2-3-SeagrasE-1 | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-SeagrasE-2 | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-SeagrasE-3 | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-FT-EA1 | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; enzyme activity |
| ECO2-3-FT-EA2 | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; enzyme activity |
| ECO2-3-FT-EA3 | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; enzyme activity |
| ECO2-3-FT-EA4 | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Hand push corer | red with gas; enzyme activity |
| ECO2-3-CHAM-1b | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-2b | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-3b | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-4b | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-5b | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-6b | ECO2-3 | Panarea | 2012-06-07T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-TL-5 | ECO2-3 | Panarea | 2012-06-07T09:00:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-07T16:45:00 | Video camera | red with gas |
| ECO2-3-RCM-2 | ECO2-3 | Panarea | 2012-06-07T10:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T18:00:00 | Current meter | grey no gas |
| ECO2-3-MICH-2 | ECO2-3 | Panarea | 2012-06-07T17:45:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T16:45:00 | Microsensor profiler | grey no gas |
| ECO2-3-SES-18 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; self-transplantation of sediment (K6) |
| ECO2-3-SES-19 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; self-transplantation of sediment (K12) |
| ECO2-3-SES-20 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; self-transplantation of sediment (K14) |
| ECO2-3-PUC-4c | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |
| ECO2-3-PUC-2d | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |
| ECO2-3-PUC-11b | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-PUC-7c | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |
| ECO2-3-PUC-12b | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |
| ECO2-3-PUC-13c | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |
| ECO2-3-PUC-6c | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-3b | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-9b | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-10a | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-14b | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-5c | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-17c | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-15b | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-8b | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-6d | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-14c | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-16b | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-IIb | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-IIIb | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-IVb | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-Vb | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-F2 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-FT-36 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-37 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-38 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-39 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-40 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-41 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-42 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-43 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-44 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-45 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-46 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-47 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-48 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-49 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-50 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-51 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-52 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-53 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-54 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-FT-55 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; natural sediment |
| ECO2-3-PW-4 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-PW-5 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-PW-6 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-NIS-2 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Bottle, Niskin 5L | grey no gas |
| ECO2-3-TCT-31 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-32 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-33 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-34 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-35 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-36 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-37 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; Terra cotta tile |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-TCT-38 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-39 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-40 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-41 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-42 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-43 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-44 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-45 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-GLASS-31 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-32 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-33 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-34 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-35 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-36 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-37 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-38 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-39 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-40 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-41 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-42 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-43 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-16T00:00:00 | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-44 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-45 | ECO2-3 | Panarea | 2012-06-08T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-TL-6 | ECO2-3 | Panarea | 2012-06-08T09:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-08T16:45:00 | Video camera | grey no gas |
| ECO2-3-Seagras-4 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; several leafs & water |
| ECO2-3-Seagras-5 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; several leafs & water |
| ECO2-3-Seagras-6 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; several leafs & water |
| ECO2-3-Seagras-1b | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; several leafs & water |
| ECO2-3-Seagras-2b | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; several leafs & water |
| ECO2-3-Seagras-3b | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; several leafs & water |
| ECO2-3-Seagras-P7 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; natural seagrass |
| ECO2-3-Seagras-P8 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; natural seagrass |
| ECO2-3-Seagras-P9 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; natural seagrass |
| ECO2-3-Seagras-P10 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; natural seagrass |
| ECO2-3-Seagras-P11 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; natural seagrass |
| ECO2-3-Seagras-P12 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; natural seagrass |
| ECO2-3-Seagras-P13 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; natural seagrass |
| ECO2-3-Seagras-P14 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; natural seagrass |
| ECO2-3-Seagras-P15 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; natural seagrass |
| ECO2-3-Seagras-P16 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; natural seagrass |
| ECO2-3-Seagras-P17 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; natural seagrass |
| ECO2-3-Seagras-P18 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; natural seagrass |
| ECO2-3-SeagrasE-4 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas |
| ECO2-3-SeagrasE-5 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas |
| ECO2-3-SeagrasE-6 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas |
| ECO2-3-SeagrasE-7 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas |
| ECO2-3-SeagrasE-8 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas |
| ECO2-3-SeagrasE-9 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas |
| ECO2-3-SeagrasE-10 | ECO2-3 | Panarea | 2012-06-09T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas |
| ECO2-3-MICH-3 | ECO2-3 | Panarea | 2012-06-09T10:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-10T10:00:00 | Microsensor profiler | grey with gas |
| ECO2-3-RCM-3 | ECO2-3 | Panarea | 2012-06-09T10:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-10T10:00:00 | Current meter | grey with gas |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-TL-7 | ECO2-3 | Panarea | 2012-06-09T14:30:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-09T15:40:00 | Video camera | grey with gas |
| ECO2-3-FT-77 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-78 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-79 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-80 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-81 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-82 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-83 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-84 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-85 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-86 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-87 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-88 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-89 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-90 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-PW-7 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-PW-8 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-PW-9 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-NIS-3 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Bottle, Niskin 5L | grey with gas |
| ECO2-3-PW-A1 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-PW-A2 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-PW-A3 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-PW-A4 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-PW-A5 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-PW-A6 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas; porewater profile |
| ECO2-3-PW-A7 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-PW-A8 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-PW-A9 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-PW-A10 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-PW-A11 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-PW-A12 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; porewater profile |
| ECO2-3-PUC-Ox1 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas |
| ECO2-3-PUC-Ox2 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas |
| ECO2-3-SeagrasOx-1 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-SeagrasOx-2 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-SeagrasOx-3 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-ROCK-Ox1 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-ROCK-Ox2 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-FT-BF3 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; biofilm sample |
| ECO2-3-FT-BF4 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; biofilm sample |
| ECO2-3-FT-BF6 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; biofilm sample |
| ECO2-3-PUC-8c | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-3c | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-13d | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-17d | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-4d | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-12c | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-10b | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-15c | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-5d | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-Ib | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-PUC-Vc | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-IVc | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-FT-71 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-72 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-73 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-74 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-75 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-FT-76 | ECO2-3 | Panarea | 2012-06-10T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; natural sediment |
| ECO2-3-TL-8 | ECO2-3 | Panarea | 2012-06-10T08:50:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-10T14:00:00 | Video camera | grey with gas |
| ECO2-3-MICH-4 | ECO2-3 | Panarea | 2012-06-10T16:30:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-12T11:00:00 | Microsensor profiler | red with gas |
| ECO2-3-RCM-4 | ECO2-3 | Panarea | 2012-06-10T16:30:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-12T11:00:00 | Current meter | red with gas |
| ECO2-3-MICP-1 | ECO2-3 | Panarea | 2012-06-10T16:30:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-12T11:00:00 | Microsensor profiler | red with gas |
| ECO2-3-GAS-5 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas |
| ECO2-3-GAS-6 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas |
| ECO2-3-FT-EA5 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; enzyme activity |
| ECO2-3-FT-EA6 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; enzyme activity |
| ECO2-3-FT-EA7 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; enzyme activity |
| ECO2-3-FT-EA8 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Hand push corer | grey with gas; enzyme activity |
| ECO2-3-PUC-Ox3 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas |
| ECO2-3-ROCK-Ox3 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas |
| ECO2-3-ROCK-Ox4 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas |
| ECO2-3-ROCK-Ox5 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas |
| ECO2-3-TL-9 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-12T00:00:00 | Video camera | grey with gas |
| ECO2-3-CHAM-1c | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-12T00:00:00 | Benthic Chamber | grey with gas |
| ECO2-3-CHAM-2c | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-12T00:00:00 | Benthic Chamber | grey with gas |
| ECO2-3-CHAM-3c | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-12T00:00:00 | Benthic Chamber | grey with gas |
| ECO2-3-CHAM-4c | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-12T00:00:00 | Benthic Chamber | grey with gas |
| ECO2-3-CHAM-5c | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-12T00:00:00 | Benthic Chamber | grey with gas |
| ECO2-3-CHAM-6c | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-12T00:00:00 | Benthic Chamber | grey with gas |
| ECO2-3-PUC-6e | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-2e | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-11c | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-IIc | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-IIIc | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-FT-EA9 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; enzyme activity |
| ECO2-3-FT-EA10 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; enzyme activity |
| ECO2-3-FT-EA11 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; enzyme activity |
| ECO2-3-FT-EA12 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Hand push corer | grey no gas; enzyme activity |
| ECO2-3-Marble-1 | ECO2-3 | Panarea | 2012-06-12T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6637 | 15.119 | -18 | 2012-06-12T00:00:00 | Sampling by diver | transect from grey no gas to grey with gas |
| ECO2-3-CHAM-1d | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-13T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-2d | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-13T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-3d | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-13T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-4d | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-13T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-5d | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-13T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-CHAM-6d | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-13T00:00:00 | Benthic Chamber | red with gas |
| ECO2-3-MICP-2 | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-14T00:00:00 | Microsensor profiler | red with gas |
| ECO2-3-MUFO-1 | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-14T00:00:00 | Multi fibre optics sensor mooring | red with gas |
| ECO2-3-Marble-2 | ECO2-3 | Panarea | 2012-06-13T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6637 | 15.119 | -18 | 2012-06-14T00:00:00 | Sampling by diver | transect from red with gas to grey with gas |
| ECO2-3-TL-10 | ECO2-3 | Panarea | 2012-06-13T09:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-13T14:35:00 | Video camera | red with gas |
| ECO2-3-MICH-5 | ECO2-3 | Panarea | 2012-06-13T09:30:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-14T17:45:00 | Microsensor profiler | red with gas |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-RCM-5 | ECO2-3 | Panarea | 2012-06-13T09:30:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-14T17:45:00 | Current meter | red with gas |
| ECO2-3-CTD-1 | ECO2-3 | Panarea | 2012-06-13T16:45:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-14T17:45:00 | CTD, Seabird | red with gas |
| ECO2-3-HC-1 | ECO2-3 | Panarea | 2012-06-13T16:45:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-14T17:45:00 | CO2 Sensor | red with gas |
| ECO2-3-PW-A13 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-PW-A14 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-PW-A15 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-PW-A16 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-PW-A17 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-PW-A18 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; porewater profile |
| ECO2-3-SeagrasOx-4 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas |
| ECO2-3-SeagrasOx-5 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Sampling by diver | grey with gas |
| ECO2-3-PUC-D1a | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas |
| ECO2-3-PUC-D2a | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas |
| ECO2-3-PUC-D3a | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas |
| ECO2-3-FLUCHAM-1a | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-17T00:00:00 | Benthic fluid chamber | red with gas |
| ECO2-3-FLUCHAM-2a | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | 38.6624833 | 15.118867 | -17 | 2012-06-17T00:00:00 | Benthic fluid chamber | red with gas |
| ECO2-3-TCT-46 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-47 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-48 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-49 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-TCT-50 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; Terra cotta tile |
| ECO2-3-GLASS-46 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-47 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-48 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-49 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-GLASS-50 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; glass slides |
| ECO2-3-BIOS-1 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; shrimp |
| ECO2-3-BIOS-2 | ECO2-3 | Panarea | 2012-06-14T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Sampling by diver | red with gas; shrimp |
| ECO2-3-TL-11 | ECO2-3 | Panarea | 2012-06-14T09:45:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-14T15:45:00 | Video camera | grey with gas |
| ECO2-3-MUFO-2 | ECO2-3 | Panarea | 2012-06-15T00:00:00 | 38.6637 | 15.1190 | -18 | 38.6638 | 15.1186 | -15 | 2012-06-15T00:00:00 | Multi fibre optics sensor mooring | transect from "grey no gas" to "grey with gas" to "grey no gas" |
| ECO2-3-CTD-2 | ECO2-3 | Panarea | 2012-06-15T08:15:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-15T11:16:00 | CTD, Seabird | red with gas; transect across the site |
| ECO2-3-HC-2 | ECO2-3 | Panarea | 2012-06-15T08:15:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-15T11:16:00 | CO2 Sensor | red with gas; transect across the site |
| ECO2-3-CTD-3 | ECO2-3 | Panarea | 2012-06-15T08:18:00 | 38.6637 | 15.1190 | -18 | 38.6638 | 15.1186 | -15 | 2012-06-15T11:19:32 | CTD, Seabird | transect from "grey no gas" to "grey with gas" to "grey no gas" |
| ECO2-3-HC-3 | ECO2-3 | Panarea | 2012-06-15T08:18:00 | 38.6637 | 15.1190 | -18 | 38.6638 | 15.1186 | -15 | 2012-06-15T11:19:32 | CO2 Sensor | transect from "grey no gas" to "grey with gas" to "grey no gas" |
| ECO2-3-MICP-3 | ECO2-3 | Panarea | 2012-06-15T09:30:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-15T11:16:00 | Microsensor profiler | red with gas; transect across the site |
| ECO2-3-TL-12 | ECO2-3 | Panarea | 2012-06-15T10:20:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-15T15:15:00 | Video camera | red with gas |
| ECO2-3-MICP-4 | ECO2-3 | Panarea | 2012-06-15T10:29:00 | 38.6637 | 15.1190 | -18 | 38.6638 | 15.1186 | -15 | 2012-06-15T12:32:00 | Microsensor profiler | transect from "grey no gas" to "grey with gas" to "grey no gas" |
| ECO2-3-CTD-4 | ECO2-3 | Panarea | 2012-06-15T11:19:32 | 38.6637 | 15.1190 | -19 | 38.6637 | 15.119 | -19 | 2012-06-16T10:00:00 | CTD, Seabird | overnight deployment at Grey with gas |
| ECO2-3-HC-4 | ECO2-3 | Panarea | 2012-06-15T11:19:32 | 38.6637 | 15.1190 | -19 | 38.6637 | 15.119 | -19 | 2012-06-16T10:00:00 | CO2 Sensor | overnight deployment at Grey with gas |
| ECO2-3-MICP-5 | ECO2-3 | Panarea | 2012-06-15T17:25:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-16T09:30:00 | Microsensor profiler | overnight deployment at grey with gas |
| ECO2-3-RCM-6 | ECO2-3 | Panarea | 2012-06-15T18:30:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-16T10:45:00 | Current meter | grey with gas |
| ECO2-3-PUC-D1b | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas |
| ECO2-3-PUC-D2b | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas |
| ECO2-3-PUC-D3b | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas |
| ECO2-3-PUC-16c | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-12d | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-PUC-10c | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas (K15) |
| ECO2-3-PUC-13e | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-14d | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-8d | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas (K10) |
| ECO2-3-PUC-9c | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas (K16) |
| ECO2-3-PUC-7d | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |
| ECO2-3-PUC-3d | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-PUC-6f | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |
| ECO2-3-PUC-15d | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from self-transplantation |
| ECO2-3-PUC-17e | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; sediment from red with gas (K15) |
| ECO2-3-PUC-x | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas; natural sediment |
| ECO2-3-TCT-51 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-52 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-53 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-54 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-TCT-55 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; Terra cotta tile |
| ECO2-3-GLASS-51 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-52 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-53 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-54 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-GLASS-55 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Sampling by diver | grey no gas; glass slides |
| ECO2-3-PUC-Ox4 | ECO2-3 | Panarea | 2012-06-16T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Push corer | grey no gas |
| ECO2-3-TL-13 | ECO2-3 | Panarea | 2012-06-16T08:50:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-16T14:00:00 | Video camera | grey with gas |
| ECO2-3-MICP-6 | ECO2-3 | Panarea | 2012-06-16T09:30:00 | 38.6637 | 15.1190 | -18 | 38.6638 | 15.1186 | -15 | 2012-06-16T12:05:00 | Microsensor profiler | transect from "grey no gas" to "grey with gas" to "grey no gas" |
| ECO2-3-CTD-5 | ECO2-3 | Panarea | 2012-06-16T10:00:00 | 38.6637 | 15.1190 | -18 | 38.6638 | 15.1186 | -15 | 2012-06-16T11:30:00 | CTD, Seabird | transect from "grey no gas" to "grey with gas" to "grey no gas"(reversed) |
| ECO2-3-HC-5 | ECO2-3 | Panarea | 2012-06-16T10:00:00 | 38.6637 | 15.1190 | -18 | 38.6638 | 15.1186 | -15 | 2012-06-16T11:30:00 | CO2 Sensor | transect from "grey no gas" to "grey with gas" to "grey no gas" (reversed) |
| ECO2-3-A-1 | ECO2-3 | Panarea | 2012-06-16T11:40:00 | 38.3832 | 15.0639 | -15 | 38.3832 | 15.0639 | -15 | 2012-06-17T09:40:00 | Acoustic Doppler Current Profiler | Area 26, long-term deployment |
| ECO2-3-CTD-6 | ECO2-3 | Panarea | 2012-06-16T11:40:00 | 38.3832 | 15.0639 | -15 | 38.3832 | 15.0639 | -15 | 2012-06-17T09:40:00 | CTD, Seabird | Area 26, long-term deployment |
| ECO2-3-HC-6 | ECO2-3 | Panarea | 2012-06-16T11:40:00 | 38.3832 | 15.0639 | -15 | 38.3832 | 15.0639 | -15 | 2012-06-17T09:40:00 | CO2 Sensor | Area 26, long-term deployment |
| ECO2-3-MICH-6 | ECO2-3 | Panarea | 2012-06-16T17:15:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T17:45:00 | Microsensor profiler | grey with gas |
| ECO2-3-RCM-7 | ECO2-3 | Panarea | 2012-06-16T17:15:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T17:45:00 | Current meter | grey with gas |
| ECO2-3-MICP-7 | ECO2-3 | Panarea | 2012-06-16T17:15:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-17T17:45:00 | Microsensor profiler | grey with gas |
| ECO2-3-PUC-8e | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-6g | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-13f | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas (K3) |
| ECO2-3-PUC-17f | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-4e | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-7e | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas (K3) |
| ECO2-3-PUC-15e | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-16d | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-9d | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-PUC-11d | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from self-transplantation |
| ECO2-3-PUC-2f | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas (K19) |
| ECO2-3-PUC-10d | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; sediment from grey no gas (K7) |
| ECO2-3-PUC-y | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Push corer | red with gas; natural sediment |
| ECO2-3-WS-1 | ECO2-3 | Panarea | 2012-06-17T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Water sample | red with gas; pH grid |
| ECO2-3-TL-14 | ECO2-3 | Panarea | 2012-06-17T09:15:00 | 38.6625 | 15.1189 | -17 | 38.6625 | 15.1189 | -17 | 2012-06-17T15:45:00 | Video camera | red with gas |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-A-2 | ECO2-3 | Panarea | 2012-06-17T09:40:00 | 38.3832 | 15.0639 | -13 | 38.3832 | 15.0639 | -13 | 2012-06-17T17:55:00 | Acoustic Doppler Current Profiler | Area 26, instrument check & re-deployment |
| ECO2-3-CTD-7 | ECO2-3 | Panarea | 2012-06-17T09:40:00 | 38.3832 | 15.0639 | -13 | 38.3832 | 15.0639 | -13 | 2012-06-17T17:55:00 | CTD, Seabird | Area 26, instrument check & re-deployment |
| ECO2-3-HC-7 | ECO2-3 | Panarea | 2012-06-17T09:40:00 | 38.3832 | 15.0639 | -13 | 38.3832 | 15.0639 | -13 | 2012-06-17T17:55:00 | CO2 Sensor | Area 26, instrument check & re-deployment |
| ECO2-3-G | ECO2-3 | Panarea | 2012-06-17T17:00:00 | 38.3824 | 15.0657 | -12 | 38.3824 | 15.0658 | -12 | 2012-06-20T12:00:00 | Transfer of samples/instruments from/to seafloor | Bottaro crater, Crosswise installation of two measuring tapes at the seabed to enable sampling (of water, free and dissolved gas) at discrete points |
| ECO2-3-FLUCHAM-1b | ECO2-3 | Panarea | 2012-06-17T17:15:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-18T17:30:00 | Benthic fluid chamber | grey with gas |
| ECO2-3-FLUCHAM-2b | ECO2-3 | Panarea | 2012-06-17T17:15:00 | 38.6637 | 15.1190 | -18 | 38.6637 | 15.119 | -18 | 2012-06-18T17:30:00 | Benthic fluid chamber | grey with gas |
| ECO2-3-PUC-z1 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-PUC-z2 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas; natural sediment |
| ECO2-3-CHAM-1e | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-18T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-2e | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-18T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-3e | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-18T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-4e | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-18T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-5e | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-18T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-CHAM-6e | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-18T00:00:00 | Benthic Chamber | grey no gas |
| ECO2-3-PUC-Ox5 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas |
| ECO2-3-PUC-Ox6 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Push corer | grey with gas |
| ECO2-3-WS-2 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Water sample | grey no gas |
| ECO2-3-WS-3 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Water sample | grey no gas |
| ECO2-3-WS-4 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Water sample | grey no gas |
| ECO2-3-DOMS-1 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Microsensor profiler | grey no gas |
| ECO2-3-DOMS-2 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Microsensor profiler | grey no gas |
| ECO2-3-WS-5 | ECO2-3 | Panarea | 2012-06-18T00:00:00 | 38.6637 | 15.1190 | -18 | | | | | Water sample | grey with gas; pH grid |
| ECO2-3-A-3 | ECO2-3 | Panarea | 2012-06-18T09:50:00 | 38.3825 | 15.0657 | -12 | 38.3825 | 15.0657 | -12 | 2012-06-18T17:45:00 | Acoustic Doppler Current Profiler | Bottaro crater NW |
| ECO2-3-GAS-7 | ECO2-3 | Panarea | 2012-06-18T09:50:00 | 38.3824 | 15.0657 | -12 | 38.3824 | 15.0657 | -12 | 2012-06-18T11:05:00 | Sampling by diver | Bottaro crater |
| ECO2-3-TL-15 | ECO2-3 | Panarea | 2012-06-18T10:00:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-18T15:45:00 | Video camera | grey no gas |
| ECO2-3-MICH-7 | ECO2-3 | Panarea | 2012-06-18T10:15:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-19T09:45:00 | Microsensor profiler | grey no gas |
| ECO2-3-RCM-8 | ECO2-3 | Panarea | 2012-06-18T10:15:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-19T09:45:00 | Current meter | grey no gas |
| ECO2-3-MICP-8 | ECO2-3 | Panarea | 2012-06-18T10:15:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-19T09:45:00 | Microsensor profiler | grey no gas |
| ECO2-3-A-4 | ECO2-3 | Panarea | 2012-06-18T17:45:00 | 38.3825 | 15.0657 | -12 | 38.3825 | 15.0657 | -12 | 2012-06-20T12:00:00 | Acoustic Doppler Current Profiler | Bottaro crater NW, re-deployment |
| ECO2-3-CTD-8 | ECO2-3 | Panarea | 2012-06-18T17:25:00 | 38.3824 | 15.0658 | -10 | 38.3824 | 15.0658 | -7 | 2012-06-18T18:35:00 | CTD, Seabird | Bottaro crater SE, vertical profile |
| ECO2-3-GAS-8 | ECO2-3 | Panarea | 2012-06-18T17:25:00 | 38.3824 | 15.0657 | -12 | 38.3824 | 15.0657 | -12 | 2012-06-18T18:35:00 | Sampling by diver | Bottaro crater |
| ECO2-3-HC-8 | ECO2-3 | Panarea | 2012-06-18T17:25:00 | 38.3824 | 15.0658 | -10 | 38.3824 | 15.0658 | -7 | 2012-06-18T18:35:00 | CO2 Sensor | Bottaro crater SE, vertical profile |
| ECO2-3-CTD-9 | ECO2-3 | Panarea | 2012-06-18T18:35:00 | 38.3824 | 15.0658 | -7 | 38.3824 | 15.0658 | -7 | 2012-06-19T10:10:00 | CTD, Seabird | Bottaro crater SE, overnight deployment |
| ECO2-3-HC-9 | ECO2-3 | Panarea | 2012-06-18T18:35:00 | 38.3824 | 15.0658 | -7 | 38.3824 | 15.0658 | -7 | 2012-06-19T10:10:00 | CO2 Sensor | Bottaro crater SE, overnight deployment |
| ECO2-3-DOMS-3 | ECO2-3 | Panarea | 2012-06-19T00:00:00 | 38.6638 | 15.1186 | -15 | | | | | Microsensor profiler | grey no gas |
| ECO2-3-DOMS-4 | ECO2-3 | Panarea | 2012-06-19T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Microsensor profiler | red with gas |
| ECO2-3-WS-6 | ECO2-3 | Panarea | 2012-06-19T00:00:00 | 38.6625 | 15.1189 | -17 | | | | | Water sample | red with gas; pH grid |
| ECO2-3-TL-16 | ECO2-3 | Panarea | 2012-06-19T08:45:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-19T14:00:00 | Video camera | grey no gas |
| ECO2-3-FLUCHAM-1c | ECO2-3 | Panarea | 2012-06-19T09:45:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-19T17:30:00 | Benthic fluid chamber | grey no gas |
| ECO2-3-FLUCHAM-2c | ECO2-3 | Panarea | 2012-06-19T09:45:00 | 38.6638 | 15.1186 | -15 | 38.6638 | 15.1186 | -15 | 2012-06-19T17:30:00 | Benthic fluid chamber | grey no gas |
| ECO2-3-CTD-10 | ECO2-3 | Panarea | 2012-06-19T10:40:00 | 38.3824 | 15.0658 | -7 | 38.3824 | 15.0658 | -7 | 2012-06-19T16:15:00 | CTD, Seabird | Bottaro crater SE, instrument check & re- deployment |
| ECO2-3-GAS-9 | ECO2-3 | Panarea | 2012-06-19T10:40:00 | 38.3824 | 15.0657 | -12 | 38.3824 | 15.0657 | -12 | 2012-06-19T11:40:00 | Sampling by diver | Bottaro crater |
| ECO2-3-HC-10 | ECO2-3 | Panarea | 2012-06-19T10:40:00 | 38.3824 | 15.0658 | -7 | 38.3824 | 15.0658 | -7 | 2012-06-19T16:15:00 | CO2 Sensor | Bottaro crater SE, instrument check & re- deployment |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECO2-3-WS-7 | ECO2-3 | Panarea | 2012-06-19T10:40:00 | 38.3824 | 15.0657 | -12 | 38.3824 | 15.0657 | -11 | 2012-06-19T11:40:00 | Sampling by diver | Bottaro crater |
| ECO2-3-TL-17 | ECO2-3 | Panarea | 2012-06-19T17:30:00 | 38.6372 | 15.1098 | -12 | 38.6372 | 15.1098 | -12 | 2012-06-19T23:30:00 | Video camera | Bottaro West Crater |
| ECO2-3-CTD-11 | ECO2-3 | Panarea | 2012-06-19T18:10:00 | 38.3824 | 15.0657 | -12 | 38.3824 | 15.0657 | -5 | 2012-06-19T20:00:00 | CTD, Seabird | Bottaro crater NW, vertical profile |
| ECO2-3-GAS-10 | ECO2-3 | Panarea | 2012-06-19T18:10:00 | 38.3824 | 15.0657 | -11 | 38.3824 | 15.0657 | -8 | 2012-06-19T20:00:00 | Sampling by diver | Bottaro crater |
| ECO2-3-HC-11 | ECO2-3 | Panarea | 2012-06-19T18:10:00 | 38.3824 | 15.0657 | -12 | 38.3824 | 15.0657 | -5 | 2012-06-19T20:00:00 | CO2 Sensor | Bottaro crater NW, vertical profile |
| ECO2-3-WS-8 | ECO2-3 | Panarea | 2012-06-19T18:10:00 | 38.3824 | 15.0657 | -11 | 38.3824 | 15.0657 | -8 | 2012-06-19T20:00:00 | Sampling by diver | Bottaro crater NW |
| ECO2-3-MICP-9 | ECO2-3 | Panarea | 2012-06-19T18:15:00 | 38.6372 | 15.1098 | -12 | 38.6372 | 15.1098 | -12 | 2012-06-20T12:45:00 | Microsensor profiler | Bottaro West Crater; overnight deployment and transect seagrass-mats-seep-mats-seagrass |
| ECO2-3-CTD-12 | ECO2-3 | Panarea | 2012-06-19T20:00:00 | 38.3824 | 15.0657 | -9 | 38.3824 | 15.0657 | -9 | 2012-06-20T12:00:00 | CTD, Seabird | Bottaro crater NW, overnight deployment |
| ECO2-3-HC-12 | ECO2-3 | Panarea | 2012-06-19T20:00:00 | 38.3824 | 15.0657 | -9 | 38.3824 | 15.0657 | -9 | 2012-06-20T12:00:00 | CO2 Sensor | Bottaro crater NW, overnight deployment |
| ECO2-3-MICP-10 | ECO2-3 | Panarea | 2012-06-20T00:00:00 | 38.6372 | 15.1098 | -12 | 38.6372 | 15.1098 | -12 | 2012-06-20T00:00:00 | Microsensor profiler | Bottaro West Crater; transect |
| ECO2-3-GAS-11 | ECO2-3 | Panarea | 2012-06-20T10:30:00 | 38.3824 | 15.0657 | -8 | 38.3824 | 15.0657 | -4 | 2012-06-20T11:30:00 | Sampling by diver | Bottaro crater |
| ECO2-3-WS-9 | ECO2-3 | Panarea | 2012-06-20T10:30:00 | 38.3824 | 15.0657 | -9 | 38.3824 | 15.0657 | -4 | 2012-06-20T11:30:00 | Sampling by diver | Bottaro crater NW |