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**Report and preliminary results of R/V Poseidon cruise P451-2.
Practical training cruise onboard R/V Poseidon**

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**From cruise organisation to marine geological sampling:
Shipboard training for PhD students
on R/V Poseidon in the Gulf of Cádiz, Spain.**

Portimão – Lisbon, 24 April – 1 May 2013.



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Cruise Report
RV POSEIDON cruise P451-2

Practical training cruise

"From cruise organisation to marine geological sampling"

Shipboard training for PhD students on RV Poseidon
in the Gulf of Cádiz, Spain



Portimão - Lisbon
24 April - 01 May 2013

by
Wienberg C,
Asendorf S, Bartzke G, Baumer M, Brocas W, Fink H, Mill S, Rittierott C, Shahraki M

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1 Participants and institutes

Scientific shipboard party

Dr. Claudia Wienberg	Chief Scientist (Marine Geologist)	MARUM – Bremen
Dr. Hiske Fink	Co-Chief Scientist (Marine Geologist).....	MARUM - Bremen
Simon Mill	Technician (Gear handling)	MARUM - Bremen
Marlene Baumer	Trainee	MARUM - Bremen
Sanja Asendorf	Trainee	MARUM/INTERCOAST - Bremen
Gerhard Bartzke	Trainee	MARUM/INTERCOAST - Bremen
William Brocas	Trainee	MARUM/GLOMAR - Bremen
Maryam Shahraki	Trainee	MARUM/GLOMAR - Bremen
Cinja Rittierott	Spanish Observer	IEO – Malaga



Figure 1. Scientific shipboard party, RV POSEIDON cruise P451-2 (photo: C. Rittierott).

RV POSEIDON crew

Matthias Günther	Master	Frank Schrage	Boatswain
Björn Maas	Chief Officer	Bernd Rauh	SM Deckhand
Sebastian Pengel	2 nd Officer	Roland (Kuno) Kuhn	SM Deckhand
Kurre Klaas Kröger	Chief Engineer	Kurt Seiffert	SM Deckhand
Günther Hagedorn	2 nd Engineer	Benjamin Brüdigam	SM Deckhand
Dietmar Klare	Electrician	Felix Meyer	SM Deckhand
Ralf Meiling	Motorman	Waldemar Arndt	Cook
		Markus Hanken	Steward

Participating institutions



MARUM - Zentrum für Marine Umweltwissenschaften, Universität Bremen
Leobener Straße, 28359 Bremen, Germany



GLOMAR – Bremen International Graduate School for Marine Sciences



INTERCOAST – Integrated Coastal Zone and Shelf Sea Research



IEO - Centro Oceanográfico de Málaga, Instituto Español de Oceanografía
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2 Research programme / Objectives

Practical training

RV POSEIDON expedition P451-2 was scheduled for 24 April – 1 May 2013 (Portimão – Lisbon) and was organised by MARUM (Bremen). The aim of this cruise was to offer MARUM-GLOMAR PhD-students the unique opportunity to receive specialist, hands-on training in a shipboard research environment. Conventional sediment sampling gears, such as a giant box corer and a Van-Veen grab sampler were deployed to collect surface samples, and a gravity corer to retrieve long sediment sequences. The main objective of the practical training (supplemented by seminars) was to show the participating students the basic principles of the workflow on board a research vessel, beginning with the selection of sampling sites, the handling of sampling gears, the preparation of sediment samples, and finally their description and documentation. In addition, the students contributed to the cruise report and prepared a daily cruise blog for the public audience which was published on the MARUM webpage (www.marum.de/Log_POS451). Special emphasis for this cruise blog was put on a school experiment prepared by the "Class 1b" of the elementary school "Baumschulenweg" in Bremen. They painted 26 foam cups, which were connected to the Van-Veen grab sampler and deployed to a water depth of ~550 m.

Cold-water corals in the Gulf of Cádiz

The working area of the P451-2 expedition is situated in the Spanish territorial waters of the Gulf of Cádiz. The Gulf of Cádiz is one of the most important fluid venting areas worldwide with up to 60 mud volcanoes discovered so far (Léon et al. 2012). In addition, scleractinian cold-

water corals have been found widely distributed in this area. Their fossil remnants cover numerous mud volcanoes (Wienberg et al. 2009). Moreover, along the Moroccan margin of the Gulf of Cádiz several small-sized (up to 20 m high) coral mounds have been discovered which are entirely composed of cold-water coral framework (Hebbeln et al. 2008).

Sampling during RV POSEIDON cruise P451-2 concentrated on two seabed structures in the "El Laberinto" fluid venting area (Fig. 2), which is located on the upper slope of the SW Iberian margin, and which comprises three mud volcanoes (Tarsis, Pipoca, Anastasya) and one diapiric ridge (Anastasya escarpment). The Pipoca mud volcano and the Anastasya escarpment were already studied during a previous cruise with RV PELAGIA (64PE284) in 2008 and fossil cold-water corals were identified at some of the sampling sites (Hebbeln et al. 2008). As due to bad weather conditions, the sampling programme could not be finished during that cruise, the sampling programme of RV POSEIDON cruise P451-2 was designed to get additional samples and to extend our knowledge about the distribution of fossil cold-water corals in this area.

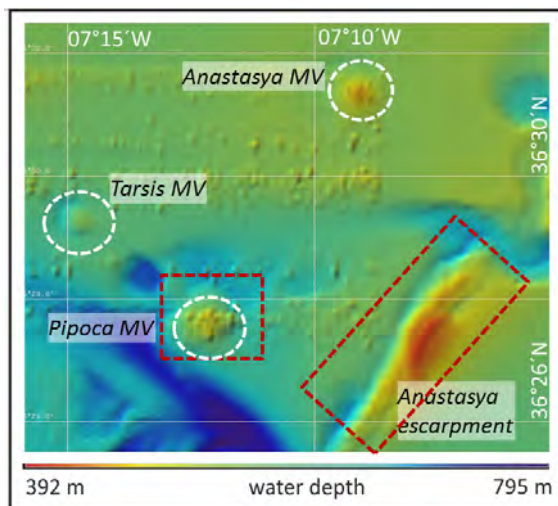


Figure 2. Map of the El Laberinto fluid venting area along the upper slope of the southwest Iberian Peninsula. The fluid venting area comprises three mud volcanoes (Pipoca, Tarsis, Anastasya) and one diapiric ridge (Anastasya escarpment). The two sampling targets of RV POSEIDON cruise P451-2 are marked by red scattered boxes.

The sampling programme for each of the two selected seabed structures is based on a strategy that had been proven to be very successful during former cruises (e.g. RV POSEIDON cruises P385 and P400; Hebbeln et al. 2009, Wienberg et al. 2010). The sampling always started with a set of grab samples to get an overview about the sediment types (soft sediments or hardgrounds) and the occurrence of cold-water corals. Based upon this information, suitable sites for further box and gravity coring were defined.

3 Narrative of RV POSEIDON cruise P451-2

April 24th Embarkation, Lab preparation & Transit

On April 24th, seven scientists and one technicians of the MARUM (Center for Marine Environmental Sciences, Bremen) arrived on-board RV POSEIDON, followed two hours later by the Spanish Observer sent from IEO (Instituto Español de Oceanografía, Malaga, Spain; Spanish

collaboration partners: Dr. Víctor Díaz-del-Río, Dr. José Luis Rueda, and Dr. Nieves López Gonzalez). The day was spent with preparing the laboratories and with the mobilisation of the scientific equipment. In the afternoon, the scientific team had their safety instructions. In addition, the first seminar was held giving all details about the equipment to be deployed, the procedure of sample description and documentation, the study area which is prominent for its wide occurrence of mud volcanoes and cold-water corals, and finally, the detailed sampling schedule. RV POSEIDON left the port of Portimão at 18:00 heading south-eastwards to the working area of this cruise: the El Laberinto fluid venting area in the northern part of the Gulf of Cádiz (Fig. 2).

April 25th First grab sampling on Pipoca mud volcano

During the night, we reached our first sampling target in the Gulf of Cádiz: the Pipoca mud volcano. After breakfast we started our sampling programme with grab sampling. Two grab samples were successfully recovered from the top of the mud volcano between 500-530 m water depth (GeoB 17501-17502). The samples were composed of sandy mud admixed with mud breccia from a few mm to several cm in size, shells of bivalves (e.g., *Astarte* sp., *Pseudamussium sulcatum*), gastropods, and brachiopods (e.g., *Gryphus vitreus*), and remnants of scleractinian cold-water corals (e.g., *Madrepora oculata*, *Lophelia pertusa*, *Desmophyllum dianthus*, *Flabellum* sp.), echinoids, and tube worms. Live organisms showed a rather scarce occurrence and comprised small encrusting sponges, amphipods, polychaetes, crinoids and ophiuroids.

The first two grab samples were intensely discussed with the students to teach them (a) how to describe the sediment (grain size, colour, bioturbation), (b) how to identify the live and dead/fossil organisms with a special emphasis on cold-water corals, (c) how to treat the samples for subsampling, sieving and storage, and finally, (d) how to document the information obtained for each sample (station list, sample protocols, inscription etc.). Grab sampling was continued with a transect along the southern slope of Pipoca mud volcano starting at the lower slope, where two sampling attempts at one position were conducted (GeoB 17503-1/-2). Both samples showed a rather limited amount of muddy sediment and mud breccia, the second sample additionally revealed large (up to 20 cm in diameter) strongly encrusted carbonatic rocks, indicating this site not to be suitable for further sampling attempts with the box and gravity corers. Grab sample GeoB 17503-1 revealed a conspicuous example of an agglutinating tube worm using an alternating sequence of small bivalve shells to build its tube (Fig. 3).



Figure 3. Grab sample GeoB 17503-1: Agglutinating tube worm using small bivalve shells to build its tube (photo: C. Rittierott).

Two grab samples from the mid and upper slope (GeoB 17504, 17505) again contained mud to sandy mud admixed with coral (mainly *Madrepora oculata*) and shell fragments. During the last grab deployment, we connected a net filled with 7 foam cups. These foam cups are part of a school experiment of the "Class 1b" of the elementary school "Baumschulenweg" in Bremen. Each of the 26 pupils painted one cup with marine motives (Fig. 4) and we are going to deploy all of them during the cruise to show them the high pressure conditions in the deep ocean.

April 26th Continuation of sampling on Pipoca mud volcano

Also this day started with collecting grab samples from the Pipoca mud volcano. During the grab sampling the remaining foam cups of "Class 1b" were deployed, hence the school experiment could be successfully completed (Fig. 4).



Figure 4. Foam cups painted by the "Class 1b" of the elementary school "Baumschulenweg". Before (left) and after (above) deployment to ~550 m water depth (photos: M. Baumer, C. Wienberg).

Grab samples were collected from the southern slope of the mud volcano (GeoB 17506, 17507) and from its eastern top area (GeoB 17508). All three samples revealed a thin surface layer, composed of brownish sandy mud, which overlays greyish mud containing mud breccia. Live and dead/fossil organisms showed a scarce occurrence and comprised mainly small *Madrepora* fragments, bivalve and brachiopod shells, agglutinating tube worms. Moreover, we found one peculiar "stranger" (holothurian?): a soft and transparent organism having a kind of trunc and a saccate body filled with greyish grains (most likely fecal pellets; Fig. 5).



Figure 5. Grab sample GeoB 17508-1: Soft, transparent organism, total length: ~2 cm (photo: C. Rittierott).

Two sites at the top of the mud volcano, where the day before two grab samples could successfully be recovered (GeoB 17501, 17502), were chosen for further sampling with the box corer and the gravity corer. The two box cores (GeoB 17509, 17510-1) showed recoveries between 0.28-0.33 m. Both were composed of a brownish sandy surface layer, which covers greyish mud admixed with mm- to cm-sized mud breccia. The faunal content was rather low, although the second box core revealed abundant live crinoids (*Leptometra* sp.) and fossil *Madrepora* fragments (Fig. 6).



Figure 6. Left: Surface of box core GeoB 17510-1 showing abundant live crinoids (*Leptometra* sp.). Above: Sieving residue (>1 cm) composed of mud breccia, fossil coral fragments (*Madrepora oculata*) and other shells (photos: C. Rittierott).

The position of the second box core was chosen for subsequent gravity coring (GeoB 17510-2). Unfortunately, the coring attempt partly failed as the tube bent ~2 m above the core catcher. Nevertheless, a core with a recovery of 0.86 m could be retrieved due to the amazing effort of the deck's crew. As the sampling schedule for the Pipoca mud volcano was finished, we set sail to the second sampling target during this cruise, the Anastasya escarpment, which is located just 5 nm to the east.

April 27th Starting sampling on the Anastasya escarpment

The today's sampling target was the Anastasya escarpment. Like the Pipoca mud volcano, also this area was already visited during a previous cruise with the RV PELAGIA in 2008. During the PELAGIA-cruise a video survey was conducted crossing the steep western slope and a set of grab samples were collected along its crest, with some of these samples containing fossil cold-water corals. To extend this limited amount of material, additional sites for grab sampling were selected. After breakfast, the grab sampling started at the northern part of the escarpment's crest. Here, four grab samples (GeoB 17511-17514) revealed mud to sandy mud with a scarce occurrence of live organisms (mainly sponges, shrimps, amphipods, polychaetes) and shell

fragments (mainly gastropods, bivalves, brachiopods, echinoids, crustaceans). One grab sample (GeoB 17513-2) contained few solitary corals (*Flabellum* sp., *Caryophyllia* spp., *Desmophyllum dianthus*) and some fossil *Madrepora* fragments, which were strongly bioeroded and altered.

Moving to the central part of the crest, we collected three grab samples (GeoB 17515-17517) with sandy mud to muddy sand, the latter even partly admixed with gravel-sized carbonatic hardground debris and mud breccia. Again only very few live and fossil organisms were found in the samples. The last two grab samples of this day were collected along the western steep slope of the Anastasya escarpment (GeoB 17518-17519). Both samples are composed of sandy mud with few live and dead organisms.

As only one of the grab samples collected this day contained fossil corals (GeoB 17513-2), this site was selected for an additional deployment of the box corer (GeoB 17520). And finally, we were successful in finding abundant fossil corals. The box core had a total recover of 0.29 m and revealed two different layers. The upper layer (0-8 cm) was composed of brownish sandy mud and the lower layer (8-29 cm) of olive grey mud. The core contained abundant small-sized shells and shell fragments comprising *Madrepora* and *Lophelia* fragments, bivalves, gastropods, pteropods, brachiopods, bryozoans, otoliths, echinoids, and crustaceans. Additionally, the surface was covered by diverse agglutinating tube worms comprising e.g. the species using small bivalve shells to form its tube which was already observed in a grab sample from the Pipoca mud volcano (GeoB 17503; Fig. 3). Further live organisms comprise small sponges, hydrozoans, amphipods, polychaetes, and ophiuroids. Due to the high content of coral fragments and muddy sediment, this location will be further explored by the gravity corer during the remaining two days on sea.

April 28th A windy day

During the night, the wind speed increased considerably to 7-8 Bft. Waves of 2-3 m in height forced us to skip the planned box and gravity corer deployment, instead ten grab samples (GeoB 17521-17530) were collected from the central to southern part of the escarpment. The grabs showed mostly muddy sand to sandy mud. However, one sample (GeoB 17524) collected from the central top of the escarpment even revealed mud breccia. Two samples (GeoB 17521, 17522) collected from the lower western slope of the escarpment contained carbonatic rocks and crusts, which were strongly altered showing signs of Fe/Mn-coating, encrustation and bioerosion. The content of live and fossil organisms was again rather low, and fossil colonial cold-water corals, such as *Lophelia pertusa* and *Madrepora oculata*, were solely found in those samples collected from its south-western steep slope (GeoB 17522, 17525, 17528, 17529). The very last grab sample (GeoB 17530) collected from the southern tip of the escarpment contained a huge piece of a sponge (*Asconema setubalense*) colonised by a crinoid (Fig. 7).

At the end of this intensive "grabbing" day, we are hoping that the sea state for the next day will be more calm to deploy the box and gravity corers.

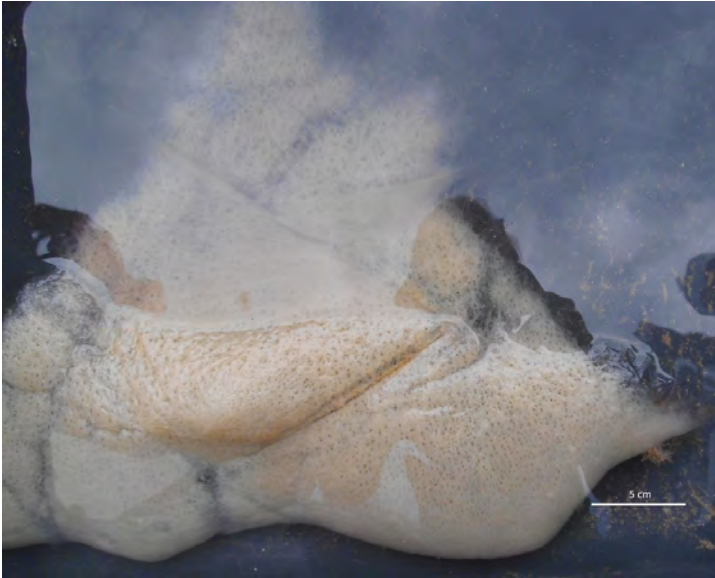


Figure 7. Grab sample GeoB 17530-1: A large piece of the sponge *Asconema setubalense* (scale: 5 cm) (photo: C. Rittierott).

April 29th Anastasya escarpment

During the night, we had a thunder storm and the wind increased again to 5-6 Bft. However, after breakfast we started with sampling. The first sampling site was situated at northernmost part of the crest of the Anastasya escarpment. At the same position, we collected already a grab sample during the former cruise with the RV PELAGIA which contained mud and abundant coral rubble. Also during this cruise, we started with a grab sample (GeoB 17531). However, during the first attempt, we just sampled a large strongly altered and colonised carbonatic rock. For a further sampling attempt, we moved the vessel ~60 m to the south and repeated the sampling. This time we collected muddy sediment admixed with carbonatic rocks of up to 7 cm in length, and (finally) this sample contained abundant coral rubble mainly made up of *Lophelia pertusa* and *Madrepora oculata* (Fig. 8).



Figure 8. Grab sample GeoB 17531-3: Cold-water coral rubble and carbonatic rocks (photo: C. Wienberg).

We decided to continue with the box corer at the same position (GeoB 17531-4). Unfortunately, the box corer hit a rock at the seafloor, which damaged the box. Nevertheless, this indicates that rocks lying exposed on the seafloor or outcropping hardgrounds are much more abundant at this site as assumed. We moved again to the southern crest of the escarpment. Two sites were selected for box coring, where we collected muddy sediment with some fossil coral fragments with the grab sampler the day before (GeoB 17528, 17529). The recovery of the first box core (GeoB 17532) partly failed as the rope of the winch got entangled with the frame of the box corer so that the box could not close properly and much of the sediment (muddy sand with few shells) was lost. The following box corer (GeoB 17533) was sampled further to the south. This time we collected a core with a recovery of ~0.25 m composed of muddy sand with abundant shells (bivalves, gastropods, pteropods, scaphopods, bryozoans, brachiopods, echinoid spines, crustacean fragments, worm tubes) but very few fossil coral fragments. The last sampling site on the Anastasya escarpment lead us back to the northern part of its crest. Here, we collected already a grab sample (GeoB 17513-2) and a box core (GeoB 17520), which revealed fossil coral fragments. We deployed the gravity corer at the same position and retrieved a core with a recovery of 2.51 m (GeoB 17534). However, the gravity core contained no coral fragments, instead the sediment was composed of greyish mud with a strong H₂S-smell. As we finished our sampling programme on the Anastasya escarpment in the early afternoon, we decided to use the remaining time for further grab sampling. The bathymetric map obtained for the area during the previous RV PELAGIA cruise 64PE284 showed some conspicuous circular and up to 20-m-high mound-like seabed structures west and northwest of the Anastasya escarpment (Fig. 9), which showed some similarities to the small-sized coral mounds found to be widespread along the Moroccan margin of the Gulf of Cádiz (Hebbeln et al. 2008).

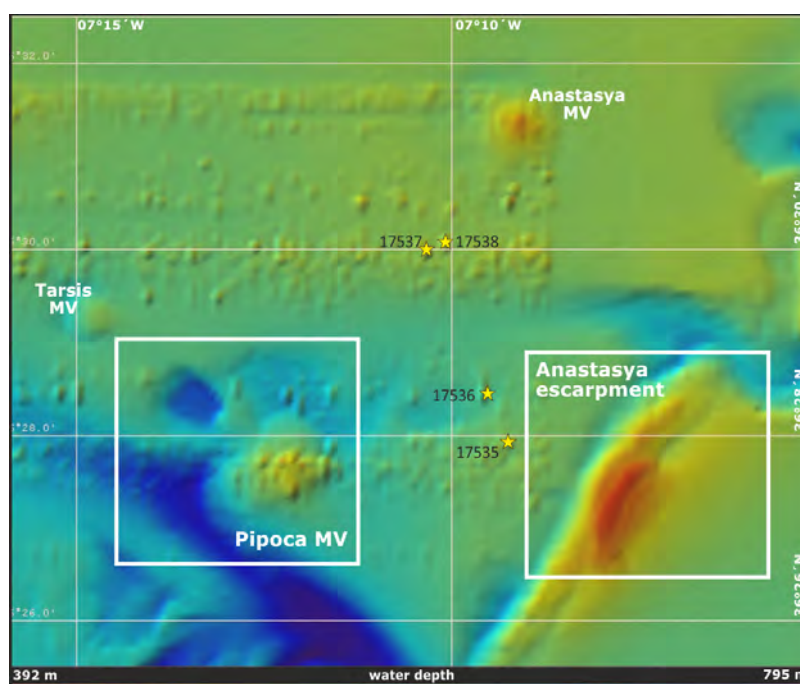


Figure 9. Map showing grab sampling sites (GeoB-stations 17535, 17536, 17537, 17538) on top of mound-like seabed structures situated W and NW of the Anastasya escarpment.

To prove the nature/origin of these mound-like structures, four stations for grab sampling were selected (GeoB 17535-17538). However, all grab samples contained (clayey) mud with few small-sized shells and occasional solitary corals (*Flabellum* sp., *Desmophyllum dianthus*), which proves that these seabed structures are not formed by cold-water corals. At 17:00 the sampling programme was finished and RV POSEIDON set sail to Lisbon.

April 30th to May 1st Transit & disembarkation

During the transit, the scientific equipment was de-installed from the lab and all devices on deck were dismantled and prepared for the container transport. In addition, all laboratories were cleaned and prepared for the scientific crew of the next upcoming cruise.

During the morning on May 1st, RV POSEIDON arrived at the harbour of Lisbon. The scientific crew immediately started to load the container with the scientific equipment, boxes and samples of cruise P451-2 (and two former MARUM-cruises: P448, P450). After lunch, the scientific crew disembarked and were transported to the airport of Lisbon.

4 Equipment and deployments

4.1 Van Veen Grab Sampler

For qualitative samples of surface sediment and benthic fauna a Van-Veen grab sampler was deployed at a total of 42 stations (Pipoca mud volcano: 10, Anastasya escarpment: 32), of which 36 deployments were successful (Fig. 10, Table 1).

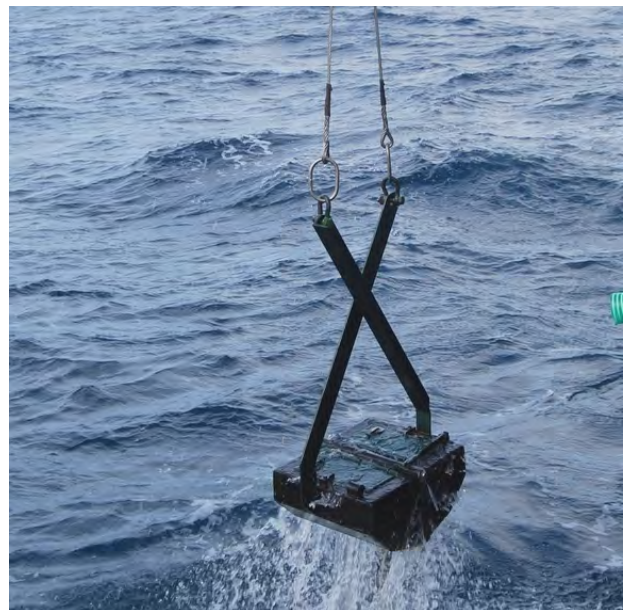


Figure 10. Above: Recovery of the Van-Veen grab sampler during RV POSEIDON cruise P451-2 (photo: C. Wienberg). Left: The students sieve the collected sediments (photo: C. Rittierott).

The positions of the samples were selected to obtain a representative sample grid over the sampling targets in the Gulf of Cádiz, and to accomplish potential box core and gravity core stations. The grab samples were photographed and the sediment and faunal composition briefly described. The entire sample was washed through sieves of 1 cm, 0.2 cm, and 0.1 cm mesh sizes (Fig. 10). The sieve residue was dried in a drying oven on board and packed for further taxonomic analyses at the home laboratories.

Table 1. Metadata of Van-Veen grab samples collected during RV POSEIDON cruise P451-2 (data are related to time of bottom contact). Abbreviations: Lat – Latitude, Lon – Longitude, WD – Water depth, REC – Recovery.

Cast	Station-No.	Date (dd.mm.yy)	Time (UTC)	Lat (N)	Lon (W)	WD (m)	REC	Description/Remark
<i>Pipoca mud volcano</i>								
01	GeoB 17501-1	25.04.13	07:02	36°27.618	07°12.397	534	bulk	mud breccia, corals
02	GeoB 17502-1	25.04.13	09:35	36°27.586	07°12.247	505	bulk	mud breccia, corals
03	GeoB 17503-1	25.04.13	10:30	36°26.833	07°12.849	746	bulk	mud breccia, carbonatic rocks, corals
04	GeoB 17503-2	25.04.13	13:24	36°26.860	07°12.837	745	bulk	carbonatic rocks, corals
05	GeoB 17504-1	25.04.13	12:08	36°27.026	07°12.595	662	bulk	mud, corals
06	GeoB 17505-1	25.04.13	14:20	36°26.427	07°12.445	551	bulk	sandy mud, rocks, corals
07	GeoB 17506-1	26.04.13	07:46	36°26.883	07°12.870	716	bulk	mud breccia, corals
08	GeoB 17507-1	26.04.13	08:32	36°27.086	07°12.560	637	./.	not released
09	GeoB 17507-2	26.04.13	08:58	36°27.104	07°12.547	636	bulk	few sand, corals
10	GeoB 17508-1	26.04.13	09:49	36°27.522	07°11.796	565	bulk	mud breccia, solitary coral
<i>Anastasya escarpment</i>								
11	GeoB 17511-1	27.04.13	07:43	36°28.038	07°07.012	487	bulk	mud, solitary coral
12	GeoB 17512-1	27.04.13	08:16	36°28.109	07°07.300	460	bulk	mud, solitary coral
13	GeoB 17513-1	27.04.13	08:52	36°28.019	07°07.483	464	./.	recovery failed
14	GeoB 17513-2	27.04.13	09:10	36°28.022	07°07.452	462	bulk	sandy mud, corals
15	GeoB 17514-1	27.04.13	09:44	36°27.803	07°07.110	526	bulk	mud
16	GeoB 17515-1	27.04.13	10:20	36°27.509	07°07.367	444	bulk	muddy sand, coral fragments
17	GeoB 17516-1	27.04.13	11:46	36°27.205	07°07.603	463	bulk	muddy sand, solitary coral
18	GeoB 17517-1	27.04.13	12:14	36°27.423	07°07.725	406	bulk	mud breccia, rocks
19	GeoB 17518-1	27.04.13	12:47	36°27.513	07°07.978	462	bulk	sandy mud
20	GeoB 17519-1	27.04.13	13:21	36°27.615	07°07.398	562	bulk	sandy mud
21	GeoB 17521-1	28.04.13	07:42	36°27.741	07°07.836	472	bulk	few carbonatic rocks
22	GeoB 17521-2	28.04.13	08:05	36°27.751	07°07.819	479	bulk	muddy sand, rocks, solitary coral
23	GeoB 17522-1	28.04.13	08:43	36°27.573	07°08.088	523	bulk	very few sediment
24	GeoB 17522-2	28.04.13	09:05	36°27.609	07°08.040	526	bulk	muddy sand, carbonatic rocks, corals
25	GeoB 17523-1	28.04.13	10:06	36°27.184	07°08.278	530	./.	empty
26	GeoB 17523-2	28.04.13	10:26	36°27.172	07°08.263	509	bulk	muddy sand, solitary coral
27	GeoB 17524-1	28.04.13	11:27	36°27.094	07°07.863	407	./.	empty
28	GeoB 17524-2	28.04.13	11:41	36°27.103	07°07.895	404	bulk	mud breccia, solitary corals
29	GeoB 17525-1	28.04.13	12:27	36°27.018	07°08.162	468	bulk	muddy sand, corals
30	GeoB 17526-1	28.04.13	13:25	36°26.746	07°08.474	502	bulk	muddy sand, solitary coral
31	GeoB 17527-1	28.04.13	14:12	36°26.732	07°07.943	436	bulk	few sandy sediments
32	GeoB 17527-2	28.04.13	14:31	36°26.731	07°07.984	437	bulk	muddy sand, solitary coral
33	GeoB 17528-1	28.04.13	15:16	36°26.548	07°08.388	465	bulk	muddy sand, corals
34	GeoB 17529-1	28.04.13	16:14	36°26.398	07°08.592	475	bulk	muddy sand, corals
35	GeoB 17530-1	28.04.13	16:50	36°26.192	07°08.836	497	bulk	large sponge with crinoid
35	GeoB 17531-1	29.04.13	07:39	36°28.431	07°07.003	504	./.	empty
37	GeoB 17531-2	29.04.13	07:57	36°28.469	07°07.011	527	bulk	large carbonatic rock, solitary coral
38	GeoB 17531-3	29.04.13	08:27	36°28.358	07°07.000	494	bulk	mud, corals

Continuation of Table1.

<i>mound-like seabed structures W and NW of Anastasya escarpment</i>								
39	GeoB 17535-1	29.04.13	13:42	36°27.938	07°09.316	565	bulk	(clayey) mud
40	GeoB 17536-1	29.04.13	14:22	36°28.501	07°09.490	597	bulk	(clayey) mud
41	GeoB 17537-1	29.04.13	15:15	36°30.012	07°10.275	547	bulk	(clayey) mud, solitary coral
42	GeoB 17538-1	29.04.13	15:41	36°30.091	07°10.094	543	bulk	(clayey) mud, solitary coral

4.2 Box corer

A box corer was used to sample undisturbed sediments of the upper ~50 cm of the sediment surface. The box corer has a diameter of 50x50 cm and a height of 55 cm (Fig. 11). Following standard description and sub-sampling scheme was conducted on each successfully sampled core:

- A) Rinsing the super-standing water.
- B) Photography and description (grain size, sediment, colour, live and fossil faunal components, structures) of the (a) sediment surface and (b) sediment column (Fig. 11).
- C) Surface sediment sampling (0-1 cm; 200 cm³).
- D) Sampling of the sediment column by one archive core.
- E) Sieving the remaining sediment (mesh sizes: 1 cm, 0.2 cm, 0.1 cm).



Figure 11. Left: Recovery of the box corer during RV POSEIDON cruise P451-2. Above: The students learn how to describe a box core (photos: C. Rittierott).

The box corer was deployed at 6 stations (Pipoca mud volcano: 2; Anastasya escarpment: 4), thereby four sampling attempts were successful and showed recoveries between 25-30 cm (Table 2). One deployment completely failed as the box corer hit a rock at the seafloor and the box were damaged. During another deployment, some sediment was lost and the remaining sediment partly disturbed as the box was not properly closed (Table 2).

Table 2. Metadata of box cores collected during RV POSEIDON cruise P451-2 (data are related to time of bottom contact). Abbreviations: Lat – Latitude, Lon – Longitude, WD – Water depth, REC – Recovery.

Cast	Station-No.	Date (dd.mm.yy)	Time (UTC)	Lat (N)	Lon (W)	WD (m)	REC (m)	Description/Remark
Pipoca mud volcano								
01	GeoB 17509-1	26.04.13	12:13	36°27.613	07°12.349	529	0.28	mud breccia, corals; same position as GeoB 17501-1 (GR)
02	GeoB 17510-1	26.04.13	13:51	36°27.590	07°12.252	514	0.30	mud breccia, corals; same position as GeoB 17502-1 (GR), GeoB 17510-2 (GC)
Anastasya escarpment								
03	GeoB 17520-1	27.04.13	14:08	36°28.007	07°07.444	460	0.29	sandy mud, corals; same position as GeoB 17513-2 (GR), GeoB 17534 (GC)
04	GeoB 17531-4	29.04.13	08:49	36°28.362	07°06.990	490	./.	box damaged as it hit a rock
05	GeoB 17532-1	29.04.13	09:47	36°26.562	07°08.335	462	~0.20	muddy sand, solitary coral; same position as GeoB 17528-1 (GR); disturbed, rope got entangled with frame
06	GeoB 17533-1	29.04.13	11:27	36°26.415	07°08.576	475	0.25	muddy sand, few corals; same position as GeoB 17529-1 (GR)

4.3 Gravity Corer

A gravity corer with a pipe length of ~6 m and a weight of 1.2 tons was applied to recover long sediment sequences (Fig. 12). Before using the coring tools, the liners had been marked lengthwise with a straight line in order to retain the orientation of the core. Once on board, the sediment core was cut into 1-m-sections, closed with caps on both ends and labelled according to a standard scheme (Fig. 12).

During RV POSEIDON cruise P451-2, the gravity corer was used at 2 stations, of which 1 coring attempt was successful with a sediment recovery of 2.51 m, whereas on coring attempt partly failed as the steel tube bent. Nevertheless, a core of 0.98 m in length could be recovered (Table 3). None of the gravity cores were opened on board. All sediment cores collected during the cruise P451-2 were transported to Bremen and stored in the MARUM core repository at the University of Bremen. The sediment cores will be opened, described, and photo-scanned, and further analyses will be done after the cruise under the responsibility of MARUM.

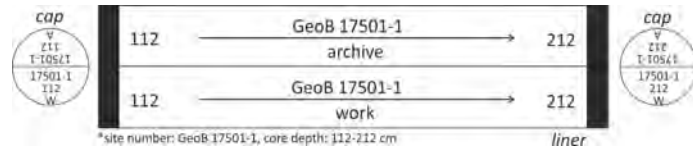
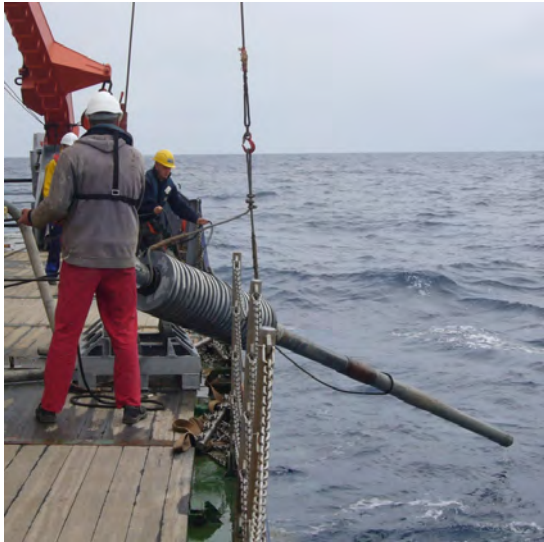


Figure 12. Left: Recovery of the gravity corer during RV POSEIDON cruise P451-2 (photo: C. Wienberg). Above: MARUM standard scheme to inscribe GeoB cores.

Table 3. Metadata of gravity cores collected during RV POSEIDON cruise P451-2 (data are related to time of bottom contact). Abbreviations: Lat – Latitude, Lon – Longitude, WD – Water depth, REC – Recovery.

Cast	Station-No.	Date (dd.mm.yy)	Time (UTC)	Lat (N)	Lon (W)	WD (m)	REC (m)	Description/Remark
<i>Pipoca mud volcano</i>								
01	GeoB 17510-2	26.04.13	14:46	36°27.590	07°12.252	515	0.86	tube bent, core top slightly disturbed, no corals; same position as GeoB 17502-1 (GR), GeoB 17510-1 (BC);
<i>Anastasya escarpment</i>								
02	GeoB 17534-1	29.04.13	12:35	36°28.006	07°07.454	470	2.51	no corals, H ₂ S smell (mud breccia?); same position as GeoB 17513-2 (GR), GeoB 17520-1 (BC)

5 Preliminary results

5.1 Pipoca mud volcano

For Pipoca mud volcano, eight sites were selected for sampling: (a) crossing the top of the mud volcano from west to east and (b) covering its southern slope (Fig. 13, Table 4). A total of nine grab samples were recovered mainly composed of brownish sandy mud (surface) overlaying greyish mud breccia. In addition, two box cores (GeoB 17509-1 and 17510-1, recoveries: 0.28 and 0.30 m) and one gravity core (GeoB 17510-2, recovery: 0.86 m) were retrieved from the top of the volcano, again revealing a thin surface layer of brownish sandy mud overlaying greyish mud breccia. All samples contained fossil scleractinian cold-water coral fragments (although in rather low number) of which the framework-forming species *Madrepora oculata* was the most abundant species (Table 4).

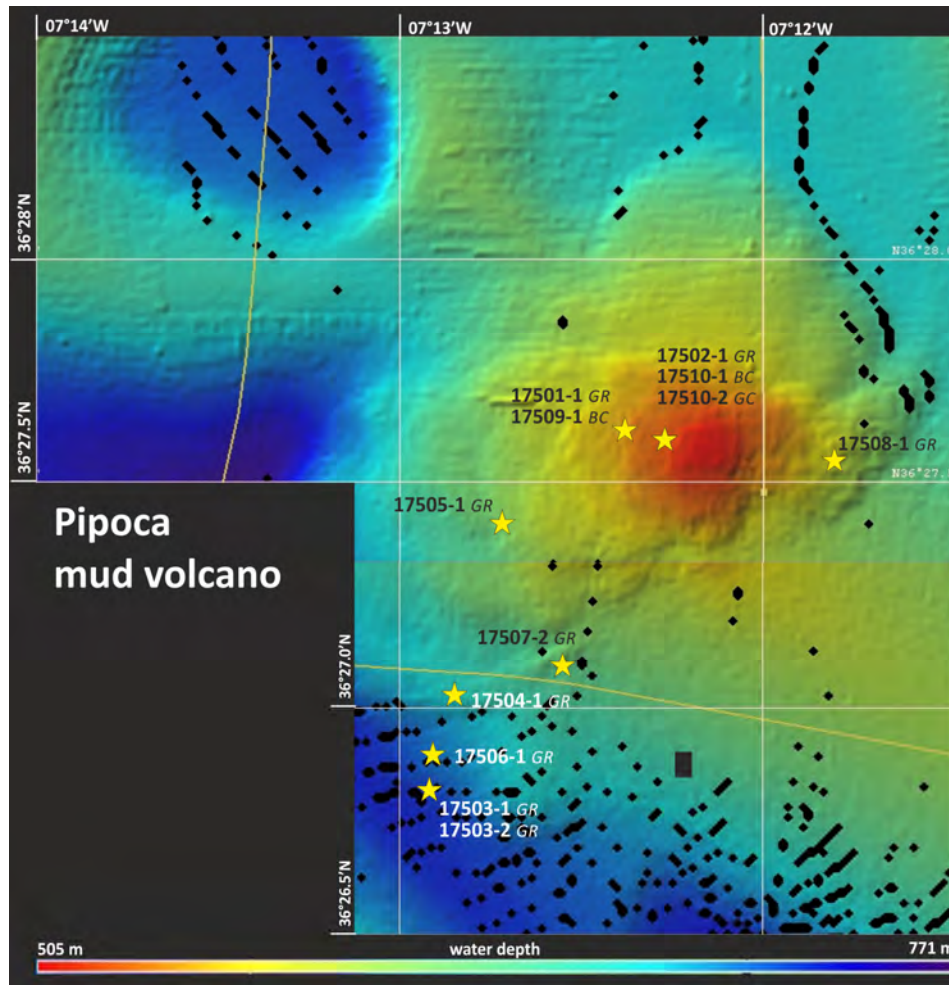


Figure 13. Bathymetric map (unprocessed data) showing the Pipoca mud volcano. The yellow stars and associated numbers indicate GeoB sampling stations of cruise P451-2 (GR: grab sample, BC: box core, GC: gravity core).

Table 4. Content of scleractinian cold-water coral species (framework-forming/solitary) found in sediment samples (Van Veen grab samples, box cores) collected from the Pipoca mud volcano (samples are ordered by area).

		framework-forming species			solitary species		
Sample	Water depth	<i>Madrepora oculata</i>	<i>Lophelia pertusa</i>	<i>Dendrophyllia spp.</i>	<i>Desmophyllum dianthus</i>	<i>Caryophyllia spp.</i>	<i>Flabellum sp.</i>
(a) top (from west to east)							
1	<i>GeoB 17501-1</i>	534	X				X
	<i>GeoB 17509-1*</i>	529	X				
2	<i>GeoB 17502-1</i>	505	X	X	X		X
	<i>GeoB 17510-1*</i>	514	X	X			
3	<i>GeoB 17508-1</i>	565					X
(b) southern slope (from shallow to deep)							
4	<i>GeoB 17505-1</i>	551	X	X			
5	<i>GeoB 17507-2</i>	636	X				
6	<i>GeoB 17504-1</i>	662	X				
7	<i>GeoB 17506-1</i>	716	X		X		
8	<i>GeoB 17503-1</i>	746	X				
	<i>GeoB 17503-2</i>	745	X				

5.2 Anastasya escarpment

For the Anastasya escarpment, 20 sites were selected for sampling comprising following areas: (a) east of the shallow crest, (b) directly on top of the NE-SW elongated crest, (c) along the western steep slope/cliff, and (d) at the base of its western slope/cliff (Fig. 14, Table 5). A total of 24 grab samples were recovered. In addition, three box cores (GeoB 17520-1, 17532-1, and 17533-1; recoveries: 0.20-0.29 m) and one gravity core (GeoB 17534, recovery: 2.51 m) were retrieved from the western slope of the escarpment (Fig. 14).

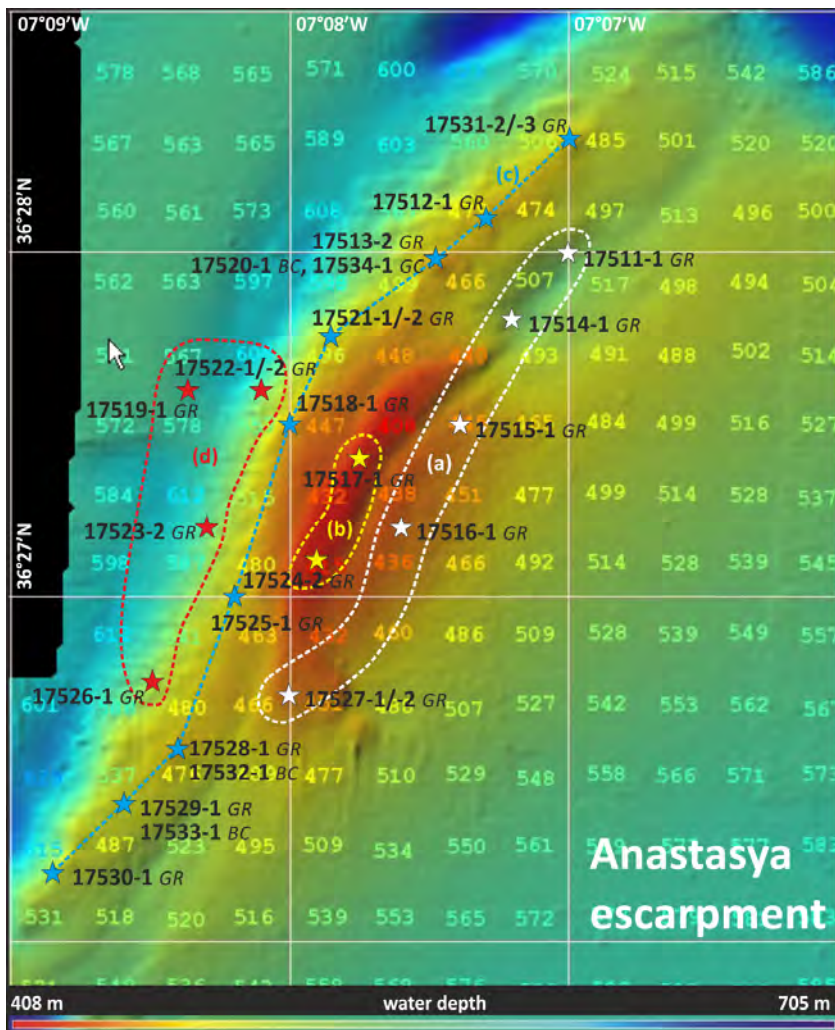


Figure 14. Bathymetric map (unprocessed data) showing the Anastasya escarpment. The stars and associated numbers indicate GeoB sampling stations of cruise P451-2 (GR: grab sample, BC: box core, GC: gravity core). The stars are grouped into areas a-d (see text for detailed description).

Six grab samples were collected at five sites east of the shallow crest of Anastasya escarpment (summarised as area **a** in Figure 14). The sediments were composed of mud to muddy sand, whereby the sediments become coarser from NE to SW. All samples showed a rather low occurrence of live organisms and shells (mainly brachiopods, bivalves and gastropods), and corals even just comprised rare specimens of solitary corals (Table 5). Two samples collected directly from the shallow crest (water depth: ~405 m; summarised as area **b** in Figure 14)

revealed greyish mud breccia, clearly documenting the mud diapiric ridge nature of the escarpment, with a low occurrence of living fauna and shells and again just rare solitary corals.

Table 5. Content of scleractinian cold-water coral species (framework-forming /solitary) found in sediment samples (Van Veen grab samples, box cores*) collected from the Anastasya escarpment (samples are ordered by area).

		framework-forming species			solitary species		
Sample	Water depth	<i>Madrepora oculata</i>	<i>Lophelia pertusa</i>	<i>Dendrophyllia spp.</i>	<i>Desmophyllum dianthus</i>	<i>Caryophyllia spp.</i>	<i>Flabellum sp.</i>
(a) east of the crest (from NE to SW)							
1	<i>GeoB 17511-1</i>	487					X
2	<i>GeoB 17514-1</i>	526					
3	<i>GeoB 17515-1</i>	444					
4	<i>GeoB 17516-1</i>	463			X		
5	<i>GeoB 17527-1</i>	436					
	<i>GeoB 17527-2</i>	437			X		X
(b) central part of the crest (from NE to SW)							
6	<i>GeoB 17517-1</i>	406					
7	<i>GeoB 17524-2</i>	407			X		X
(c) western steep slope (from NE to SW)							
8	<i>GeoB 17531-2</i>	527				?	
	<i>GeoB 17531-3</i>	494	X	X			
9	<i>GeoB 17512-1</i>	460					X
10	<i>GeoB 17513-2</i>	462	X	X	X	X	X
	<i>GeoB 17520-1*</i>	460	X	X			
11	<i>GeoB 17521-1</i>	472					
	<i>GeoB 17521-2</i>	479				X	
12	<i>GeoB 17518-1</i>	462					
13	<i>GeoB 17525-1</i>	468	X	X	X		
14	<i>GeoB 17528-1</i>	465	X	X	X		
	<i>GeoB 17532-1*</i>	462			X		
15	<i>GeoB 17529-1</i>	475		X			X
	<i>GeoB 17533-1*</i>	475		X	X		
16	<i>GeoB 17530-1</i>	497					
(d) base of western steep slope (from NE to SW)							
17	<i>GeoB 17522-1</i>	523					
	<i>GeoB 17522-2</i>	526	X		X	X	X
18	<i>GeoB 17519-1</i>	562					
19	<i>GeoB 17523-2</i>	509			X		
20	<i>GeoB 17526-1</i>	502			X		

The majority of grab samples (in total 11, plus three box and one gravity cores) were collected from the steep western slope of the escarpment (summarised as area **c** in Figure 14). All sediments were composed of sandy mud to muddy sand, and the samples from the northern and southern edge even contained centi- to decimetre-sized carbonatic rocks. In general the content of shells was rather high, and almost all samples contained partly abundant fragments of framework-forming (*Madrepora*, *Lophelia*, dendrophylliid species) and solitary cold-water coral species (Table 5).

Samples collected from the base of the steep western slope (summarised as area **d** in Figure 14) were composed of sandy mud to muddy sand partly admixed with cm-sized carbonatic rocks. The faunal content was rather moderate with occasional live organism and frequent shells. Few specimens of solitary corals were found in each sample, thereby solely one sample showed a slightly higher content of corals including some *Madrepora*-fragments (Table 5).

6 Weather diary

Area	Date – Time (UTC)	Position (N / W)	Temperature (°C)		Pressure (hPa)	Wind			Remarks
			Air	Water		in Bft.	Speed (m/s)	Direction	
Transit	24.04.13								
Pipoca mud volcano	25.04.13 – 06:48	36°27.61 / 07°12.35	16.6	17.4	1017.4	3-4	5.45	343	sunny
	25.04.13 – 17:10	36°27.561 / 07°12.23	18.5	17.9	1014.2	4	6.74	348	sunny
	26.04.13 – 06:44	36°26.901 / 07°12.89	17.2	17.5	1015.2	4-5	8.08	12	sunny
	26.04.13 – 17:14	36°26.48 / 07°09.94	17.3	18.2	1013.9	4	7.05	1	sunny
Anastasya escarpment	27.04.13 – 06:45	36°28.04 / 07°06.97	15.9	17.5		3-4	3.65	300	cloudy
	27.04.13 – 17:11	36°28.19 / 07°07.53	16.3	17.8		2-3	8.28	265	sunny
	28.04.13 – 06:54	36°27.74 / 07°07.86	11.2	17.3	1008.7	7	13.94	360	windy
	28.04.13 – 17:16	36°26.25 / 07°08.70	15.3	17.3	1009.7	5	8.64	325	sun, clouds
	29.04.13 – 07:03	36°28.43 / 07°06.99	13.1	17.1	1010.4	5	9.1	352	sun, clouds
	29.04.13 – 17:16	36°30.87 / 07°11.79	11.9	17.1	1008.8	3	4.9	75	cloudy
Transit	30.04.13								

7 Station list

GeoB-ID	POS-ID	Area	Gear	Date (dd.mm.yy)	Time (UTC)	Latitude (N)	Longitude (W)	WD (m)	REC (m)	Remarks
17501-1	670-1	Pipoca MV	GR	25.04.13	07:02	36°27.618	-7°12.397	-534	bulk	mud breccia, corals
17502-1	671-1	Pipoca MV	GR	25.04.13	09:35	36°27.586	-7°12.247	-505	bulk	mud breccia, corals
17503-1	672-1	Pipoca MV	GR	25.04.13	10:30	36°26.833	-7°12.849	-746	bulk	mud breccia, carbonatic rocks, corals
17503-2	674-1	Pipoca MV	GR	25.04.13	13:24	36°26.860	-7°12.837	-745	bulk	carbonatic rocks, corals
17504-1	673-1	Pipoca MV	GR	25.04.13	12:08	36°27.026	-7°12.595	-662	bulk	mud, corals
17505-1	675-1	Pipoca MV	GR	25.04.13	14:20	36°26.427	-7°12.445	-551	bulk	sandy mud, rocks, corals
17506-1	676-1	Pipoca MV	GR	26.04.13	07:46	36°26.883	-7°12.870	-716	bulk	mud breccia, corals
17507-1	677-1	Pipoca MV	GR	26.04.13	08:32	36°27.086	-7°12.560	-637	./.	not released
17507-2	677-2	Pipoca MV	GR	26.04.13	08:58	36°27.104	-7°12.547	-636	bulk	few sand, corals
17508-1	678-1	Pipoca MV	GR	26.04.13	09:49	36°27.522	-7°11.796	-565	bulk	mud breccia, solitary corals
17509-1	679-1	Pipoca MV	BC	26.04.13	12:13	36°27.613	-7°12.349	-529	0.28	mud breccia, corals

17510-1	680-1	Pipoca MV	BC	26.04.13	13:51	36°27.598	-7°12.244	-514	0.32	mud breccia, corals
17510-2	680-2	Pipoca MV	GC	26.04.13	14:46	36°27.590	-7°12.252	-515	0.86	tube bent
17511-1	681-1	Anastasya E	GR	27.04.13	07:43	36°28.038	-7°07.012	-487	bulk	mud, solitary corals
17512-1	682-1	Anastasya E	GR	27.04.13	08:16	36°28.109	-7°07.300	-460	bulk	mud, solitary corals
17513-1	683-1	Anastasya E	GR	27.04.13	08:52	36°28.019	-7°07.483	-464	./.	recovery failed
17513-2	683-2	Anastasya E	GR	27.04.13	09:10	36°28.022	-7°07.452	-462	bulk	sandy mud, corals
17514-1	684-1	Anastasya E	GR	27.04.13	09:44	36°27.803	-7°07.110	-526	bulk	mud
17515-1	685-1	Anastasya E	GR	27.04.13	10:20	36°27.509	-7°07.367	-444	bulk	muddy sand, coral fragments
17516-1	686-1	Anastasya E	GR	27.04.13	11:46	36°27.205	-7°07.603	-463	bulk	muddy sand, solitary corals
17517-1	687-1	Anastasya E	GR	27.04.13	12:14	36°27.423	-7°07.725	-406	bulk	mud breccia, rocks
17518-1	688-1	Anastasya E	GR	27.04.13	12:47	36°27.513	-7°07.978	-462	bulk	sandy mud
17519-1	689-1	Anastasya E	GR	27.04.13	13:21	36°27.615	-7°07.398	-562	bulk	sandy mud
17520-1	690-1	Anastasya E	BC	27.04.13	14:08	36°28.007	-7°07.444	-460	0.29	sandy mud, corals
17521-1	691-1	Anastasya E	GR	28.04.13	07:42	36°27.741	-7°07.836	-472	bulk	few carbonatic rocks
17521-2	691-2	Anastasya E	GR	28.04.13	08:05	36°27.751	-7°07.819	-479	bulk	muddy sand, rocks, solitary corals
17522-1	692-1	Anastasya E	GR	28.04.13	08:43	36°27.573	-7°08.088	-523	bulk	very few sediment
17522-2	692-2	Anastasya E	GR	28.04.13	09:05	36°27.609	-7°08.040	-526	bulk	muddy sand, carbonatic rocks, corals
17523-1	693-1	Anastasya E	GR	28.04.13	10:06	36°27.184	-7°08.278	-530	./.	empty
17523-2	693-2	Anastasya E	GR	28.04.13	10:26	36°27.172	-7°08.263	-509	bulk	muddy sand, solitary corals
17524-1	694-1	Anastasya E	GR	28.04.13	11:27	36°27.094	-7°07.863	-407	./.	empty
17524-2	694-2	Anastasya E	GR	28.04.13	11:41	36°27.103	-7°07.895	-404	bulk	mud breccia, solitary corals
17525-1	695-1	Anastasya E	GR	28.04.13	12:27	36°27.018	-7°08.162	-468	bulk	muddy sand, corals
17526-1	696-1	Anastasya E	GR	28.04.13	13:25	36°26.746	-7°08.474	-502	bulk	muddy sand, solitary corals
17527-1	697-1	Anastasya E	GR	28.04.13	14:12	36°26.732	-7°07.943	-436	bulk	few sandy sediment
17527-2	697-2	Anastasya E	GR	28.04.13	14:31	36°26.731	-7°07.984	-437	bulk	muddy sand, solitary corals
17528-1	698-1	Anastasya E	GR	28.04.13	15:16	36°26.548	-7°08.388	-465	bulk	muddy sand, corals
17529-1	699-1	Anastasya E	GR	28.04.13	16:14	36°26.398	-7°08.592	-475	bulk	muddy sand, corals
17530-1	700-1	Anastasya E	GR	28.04.13	16:50	36°26.192	-7°08.836	-497	bulk	large sponge with crinoid
17531-1	701-1	Anastasya E	GR	29.04.13	07:39	36°28.431	-7°07.003	-504	./.	empty
17531-2	701-2	Anastasya E	GR	29.04.13	07:57	36°28.469	-7°07.011	-527	bulk	large carbonatic rock, corals
17531-3	701-3	Anastasya E	GR	29.04.13	08:27	36°28.358	-7°07.000	-494	bulk	mud, corals
17531-4	701-4	Anastasya E	BC	29.04.13	08:49	36°28.362	-7°06.990	-490	./.	box damaged
17532-1	702-1	Anastasya E	BC	29.04.13	09:47	36°26.562	-7°08.335	-462	~0.20	muddy sand, disturbed, some sediment lost, solitary coral
17533-1	703-1	Anastasya E	BC	29.04.13	11:27	36°26.415	-7°08.576	-475	0.25	muddy sand, corals
17534-1	704-1	Anastasya E	GC	29.04.13	12:35	36°28.006	-7°07.454	-470	2.51	no corals, H ₂ S smell
17535-1	705-1	West of Anastasya E	GR	29.04.13	13:42	36°27.938	-7°09.316	-565	bulk	(clayey) mud

17536-1	706-1	West of Anastasya E	GR	29.04.13	14:22	36°28.501	-7°09.490	-597	bulk	(clayey) mud
17537-1	707-1	NW of Anastasya E	GR	29.04.13	15:15	36°30.012	-7°10.275	-547	bulk	(clayey) mud, solitary corals
17538-1	708-1	NW of Anastasya E	GR	29.04.13	15:41	36°30.091	-7°10.094	-543	bulk	(clayey) mud, solitary corals

Abbreviations: GR – Grab sampler, BC – Box corer, GC – Gravity corer, MV – Mud volcano, E – Escarpment, REC – Recovery, WD – Water depth

8 Acknowledgements

The scientific shipboard party aboard RV POSEIDON expedition P451-2 gratefully acknowledges the friendly and professional cooperation and outstanding support of Master Matthias Günther and his officers on the bridge. Special thanks go also to boatswain Frank Schrage, Kurre Kröger and the entire crew of RV POSEIDON for their outstanding friendly support and efficient technical assistance. We also appreciate the most valuable support of the Leitstelle in Kiel (IFM-GEOMAR), namely Klas Lackschewitz and Maike Heinitz, in planning and realisation of the cruise. The work was funded by the Deutsche Forschungsgemeinschaft DFG (Kennwort: GLOMAR - Bremen International Graduate School for Marine Sciences).

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Appendix A

Sample Protocols

[illegible]

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	01	-	1	POS/	670	/ 1	36°	27.618'	07°	12.397'	534

Description		Surface photo
Lithology	surface: sandy mud; subsurface: mud with mud breccia	
Colour	surface: light olive brown (2.5Y 5/4) subsurface: dark grey (5Y 4/1)	
Living fauna	Porifera (small specimen) Hydrozoa Scleractinia: <i>Flabellum chunii</i> Crustacea (amphipods) Polychaeta	
Dead fauna	Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Limopsis</i> sp., <i>Astarte sulcata</i> , <i>Cuspidaria curta</i> Gastropoda: <i>Neptunea contraria</i> Echinoidea (spines) Polychaeta (serpulids)	
fossil Scleractinia	<i>Flabellum chunii</i> <i>Madrepora oculata</i>	

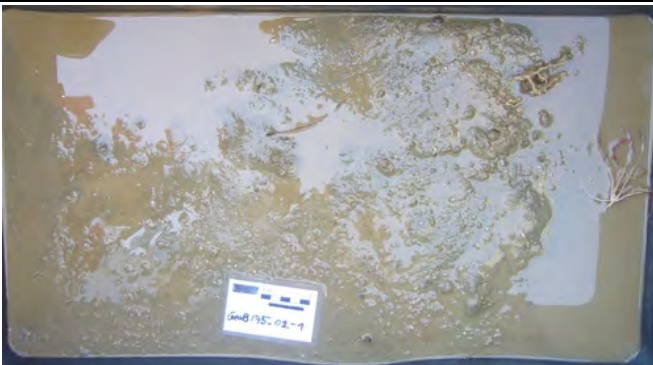
Sieved material

>1cm	>0.2cm	>0.1cm
		

Macrofauna

*Neptunea contraria*

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	02	-	1	POS/	671	/ 1	36°	27.618	07°	12.247	505

Description		Surface photo
Lithology	sandy mud and mud breccia	
Colour	olive brown (2.5Y 4/4)	
Living fauna	Porifera (small, encrusting) Hydrozoa Crinoidea: <i>Leptometra</i> sp. Ophiuroidea Crustacea (amphipod)	
Dead fauna	Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia: <i>Lucinoma asapeus</i> , <i>Pseudamussium sulcatum</i> , <i>Limopsis</i> sp. Gastropoda: <i>Nassarius coralligenus</i> Pteropoda: <i>Clio</i> sp., <i>Cavolinia</i> sp. Echinoidea (spines & fragments)	
fossil Scleractinia	<i>Flabellum</i> sp. <i>Desmophyllum dianthus</i> <i>Madrepora oculata</i> <i>Lophelia pertusa</i>	

Sieved material

>1cm	>0.2cm	>0.1cm
		

Macrofauna

	
Madrepora	shells

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	03	-	1	POS/	672	/ 1	36°	26.833	07°	12.849	746

Description		Surface photo
Lithology	sandy mud & mud breccia	
Colour	olive (5Y 4/4)	
Living fauna	Porifera (small specimens) Hydrozoa Ophiuroidea Crustacea (amphipods) Polychaeta with agglutinated tube made up of bivalve shells	
Dead fauna	Brachiopoda Bivalvia (small specimens): <i>Pseudamussium sulcatum</i> Pteropoda Echinoidea (spines) Crustacea (fragments) Polychaeta (serpulids)	
fossil Scleractinia	<i>Madrepora oculata</i>	

Sieved material

photos not available

Macrofauna



Polychaeta: *Lanice* sp.



Polychaeta: *Eunice* sp. with agglutinated tube made up of bivalve shells



shells and rocky debris

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	03	-	2	POS/	674	/ 1	36°	26.860	07°	12.837	745

Description		Surface photo
Lithology	sandy mud, large carbonatic rocks (max: 8x15 cm)	
Colour	olive brown (2.5Y 4/4)	
Living fauna	Porifera (encrusting, small) Hydrozoa Bryozoa (encrusting) Polychaeta	
Dead fauna	Bivalvia Pteropoda Polychaeta (serpulids)	
fossil Scleractinia	<i>Madrepora oculata</i>	

Sieved material

>1cm



1 - 0.1cm



Macrofauna



Vermiliopsis sp.

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	04	-	1	POS/	673	/ 1	36°	27.026	07°	12.595	662

Description		Surface photo
Lithology	mud (coal fragments)	
Colour	olive brown (2.5Y 5/4)	
Living fauna	Hydrozoa Bivalvia: <i>Pseudamussium sulcatum</i> Ophiuroidea Crustacea (amphipods) Polychaeta	
Dead fauna	Hydrozoa Bivalvia: <i>Bathyarca</i> sp., <i>Pseudamussium sulcatum</i> Gastropoda: <i>Spirotropsis sarsii</i> , <i>Emarginula</i> sp., <i>Bittium</i> sp. Pteropoda Echinoidea (spines & fragments) Polychaeta (serpulids)	
fossil Scleractinia	<i>Madrepora oculata</i>	

Sieved material

>1cm	>0.2cm	>0.1cm
		

Macrofauna



shells

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	05	-	1	POS/	675	/ 1	36°	26.427	07°	12.445	551

Description		Surface photo
Lithology	sandy mud, rocks	
Colour	surface: dark yellowish brown (10YR 4/4); subsurface: olive grey (5Y 4/2)	
Living fauna	Bryozoa Crinoidea: <i>Leptometra</i> sp. Ophiuroidea Polychaeta	
Dead fauna	Bivalvia: <i>Astarte</i> sp., <i>Pseudamussium sulcatum</i> Gastropoda Echinoidea (spines) Crustacea (fragments) Polychaeta (serpulids)	
fossil Scleractinia	<i>Madrepora oculata</i> <i>Lophelia pertusa</i>	

Sieved material		
>1cm	>0.2cm	>0.1cm
	n/a	n/a

Macrofauna			
			
<i>Astarte</i> sp.	Overview (crinoids, bivalves, corals, spines, rocks)	Polychaeta	

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	06	-	1	POS/	676	/ 1	36°	26.883'	07°	12.870'	716

Description		Surface photo
Lithology	surface: sandy mud subsurface: mud & mud breccia	
Colour	surface: olive brown (2.5Y 4/4) subsurface: dark grey (5Y 4/1)	
Living fauna	Porifera Bivalvia: <i>Cuspidaria</i> sp. Crustacea (amphipods)	
Dead fauna	Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Astarte</i> sp., <i>Bathyarca</i> sp., <i>Limopsis</i> sp., <i>Pseudamussium sulcatum</i> Pteropoda Echinoidea (spines) Polychaeta (aggl. tubes, serpulids)	
fossil Scleractinia	<i>Desmophyllum dianthus</i> <i>Madrepora oculata</i>	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

Macrofauna		
		
corals	<i>Cuspidaria</i> sp.	agglut. tubes

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	07	-	2	POS/	677	/ 2	36°	27.104'	07°	12.547'	636

Description		Surface photo
Lithology	very few sand with few gravel-sized mud breccia	
Colour	olive brown (2.5Y 4/3)	
Living fauna	./.	
Dead fauna	Bivalvia: <i>Pseudamussium sulcatum</i> Gastropoda Echinoidea (spines & fragments) Crustacea (fragments)	
fossil Scleractinia	<i>Madrepora oculata</i>	

Sieved material

>1cm	>0.2cm	>0.1cm
		

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	08	-	1	POS/	678	/ 1	36°	27.522'	07°	11.796'	565

Description		Surface photo
Lithology	surface: sandy mud subsurface: mud & mud breccia	
Colour	surface: olive brown (2.5Y 4/3), subsurface: olive grey (5Y 5/2)	
Living fauna	Hydrozoa Ophiuroidea Scaphopoda Crustacea: <i>Cymonomus granulatus</i> Polychaeta: <i>Ditrupa arietina</i> Holothuroidea or Echiurida (?)	
Dead fauna	Hydrozoa (calcified) Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia: <i>Bathyrca</i> sp., <i>Astarte</i> sp., <i>Pseudamussium sulcatum</i> Gastropoda: <i>Calliostoma</i> sp., <i>Spirotropsis sarsii</i> Pteropoda Crustacea (fragments) Polychaeta (aggl. tubes, serpulids)	
fossil Scleractinia	<i>Flabellum</i> sp.	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

Macrofauna	
 holothurian or echiurid? (length: 2 cm)	 shells and the serpulid <i>Ditrupa</i> <i>arietina</i>

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	09	-	1	POS/	679	/	1	36°	27.613'	07°	12.349'	529	0.24-0.28m

Description - Surface		Surface photo
Lithology	mud, few cm-sized carbonatic rocks, mud breccia, surface slightly tilted	
Colour	olive brown (2.5Y 4/3)	
Living fauna	Porifera Hydrozoa Ophiuroidea Crinoidea: <i>Leptometra</i> sp. Crustacea: <i>Ergasticus clouei</i>	
Dead fauna	Brachiopoda Bivalvia Gastropoda Echinoidea (spines) Polychaeta (serpulids on rocks)	
fossil Scleractinia	<i>Madrepora oculata</i>	
Samples	1 surface sample (0-1cm, 200cm ³)	

Description - Sediment column		Sediment column photo
Lithology & Sublayers	L1: 0-5cm, mud with mud breccia & few carbonatic rocks	
	L2: 5-28cm, mud breccia	
Colour	L1: olive brown (2.5Y 4/3)	
	L2: dark grey (5Y 4/1)	
Living fauna	./.	
Bioturbation	L1: no, L2: abundant	
Dead fauna	Bryozoa (on rocks, mud breccia) Brachiopoda Bivalvia: <i>Pseudamussium sulcatum</i> & others Echinoidea (spines) Polychaeta (serpulids on rocks, mud breccia)	
fossil Scleractinia	<i>Madrepora oculata</i>	
Samples	1 archive core	

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	09	-	1	POS/	679	/	1	36°	27.613'	07°	12.349'	529	0.24-0.28m

Sieved material

>1cm	>0.2cm	>0.1cm
 GeoB 17509-1 BC Surface layer 0-5cm >1cm		

Macrofauna



Crustacea: *Ergasticus clouei*



Crinoidea: *Leptometra* sp.

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	10	-	1	POS/	680	/	1	36°	27.598'	07°	12.244'	514	0.32m

Description - Surface		Surface photo
Lithology	mud with mm-sized mud breccia	
Colour	dark greyish brown (2.5Y 4/2)	
Living fauna	Porifera Crinoidea: abundant <i>Leptometra</i> sp. Crustacea (hermit crab)	
Dead fauna	Bivalvia Gastropoda Echinoidea (spines) Crustacea (fragments)	
fossil Scleractinia	<i>Madrepora oculata</i> <i>Lophelia pertusa</i>	
Samples	1 surface sample (0-1cm, 200cm ³)	

Description - Sediment column		Sediment column photo
Lithology & Sublayers	L1: 0-8cm mud with mm-sized mud breccia	
	L2: 8-32c mud with cm-sized mud breccia	
Colour	L1: dark greyish brown (2.5Y 4/2) L2: grey (5Y 5/1)	
Living fauna	./.	
Bioturbation	L1: some, L2: no	
Dead fauna	L1 Bivalvia Gastropoda: <i>Calliostoma</i> sp. Echinoidea (spines)	
	L2 very few shell fragments	
fossil Scleractinia	L1 <i>Madrepora oculata</i> <i>Lophelia pertusa</i>	
	L2 <i>Lophelia pertusa</i>	
Samples	1 archive core	

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	10	-	1	POS/	680	/	1	36°	27.598'	07°	12.244'	514	0.32m

Sieved material

>1cm	>0.2cm	>0.1cm
0-8cm 	0-8cm 	0-8cm <i>n/a</i>
8-32cm 	8-32cm 	8-32cm 

Macrofauna



Crustacea

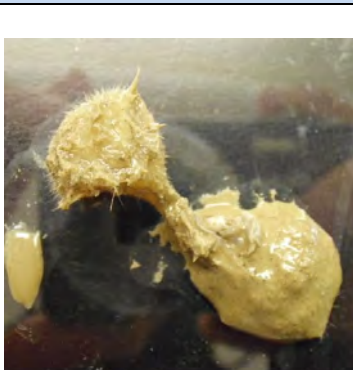
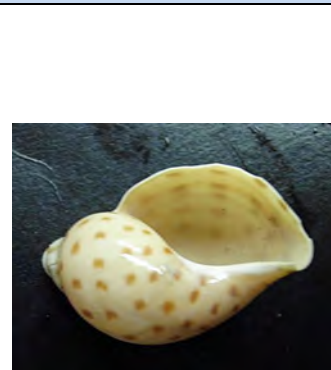
GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	11	-	1	POS/	681	/ 1	36°	28.038'	07°	07.012'	487

Description		Surface photo
Lithology	surface: mud subsurface: sandy mud	
Colour	surface: olive brown (2.5Y 4/4) subsurface: olive (5Y 4/3)	
Living fauna	Porifera: <i>Thenea</i> sp. Pennatulacea: <i>Kophobelemnion</i> sp. Crustacea: <i>Monodaeus couchii</i>	
Dead fauna	Scaphopoda Bivalvia: <i>Astarte</i> sp. Gastropoda: <i>Ampulla</i> sp. Pteropoda Echinoidea (spines & fragments) Polychaeta (agglutinated tubes)	
fossil Scleractinia	<i>Flabellum</i> sp.	

Sieved material

>1cm	>0.2cm	>0.1cm
almost no coarse material 		

Macrofauna

*Monodaeus couchii**Thenea* sp.*Kophobe-*
lemnion sp.*Ampulla* sp.

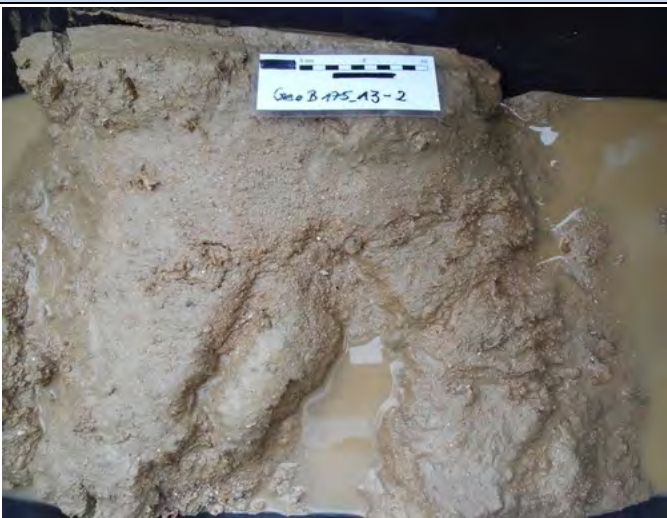
GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	12	-	1	POS/	682	/ 1	36°	28.109'	07°	07.300'	460

Description		Surface photo
Lithology	surface: sandy mud subsurface: mud	
Colour	surface: light olive grey (2.5Y 5/4) subsurface: olive grey (5Y 4/2)	
Living fauna	Ophiuroidea Polychaeta	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda Bivalvia: <i>Astarte</i> sp. Pteropoda Echinoidea (spines & fragments) Gastropoda: <i>Calliostoma</i> sp., <i>Epitonium</i> sp., <i>Ranella</i> sp., <i>Coralliophila</i> sp. Polychaeta (agglutinated tubes)	
fossil Scleractinia	<i>Flabellum</i> sp.	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

Macrofauna		
 <i>Isidella</i> remnant	 <i>Coralliophila</i> sp., <i>Epitonium</i> sp., <i>Ranella</i> sp. (from left to right)	

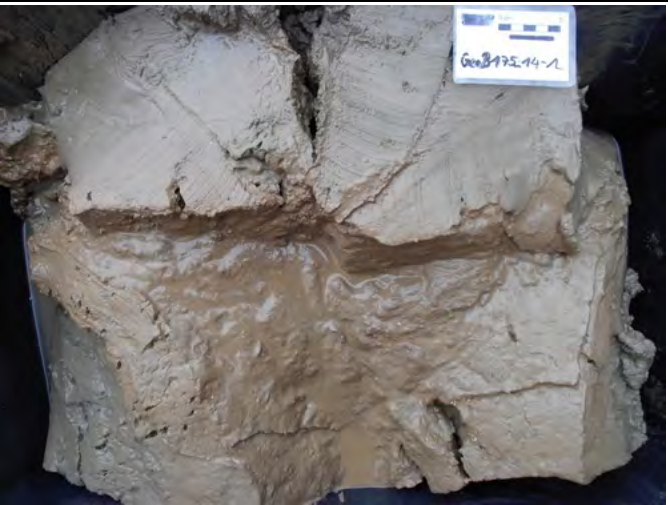
GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	13	-	2	POS/	683	/ 2	36°	28.022'	07°	07.452'	462

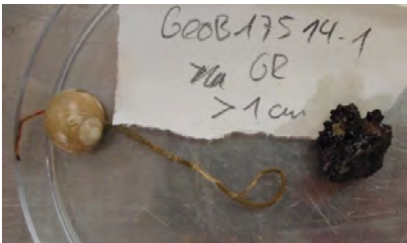
Description		Surface photo
Lithology	sandy mud	
Colour	dark greyish brown (10YR 4/2)	
Living fauna	Polychaeta	
Dead fauna	Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Astarte</i> sp. Gastropoda (strongly alternated) Pteropoda Echinoidea (spines & fragments) Crustacea (fragments) Polychaeta (tubes)	
fossil Scleractinia	<i>Flabellum</i> sp. <i>Caryophyllia</i> sp. <i>Desmophyllum dianthus</i> <i>Madrepora oculata</i> (strongly bioeroded) <i>Dendrophyllia</i> sp.	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

Macrofauna	
	solitary caryophylliid corals

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	14	-	1	POS/	684	/ 1	36°	27.803'	07°	07.110'	526

Description		Surface photo
Lithology	mud (coal fragments)	
Colour	surface: light olive brown (2.5Y 5/4) subsurface: olive grey (5Y 4/2)	
Living fauna	Porifera Polychaeta Holothuroidea or Echiurida (?)	
Dead fauna	Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia Gastropoda Pteropoda: <i>Clio</i> sp., <i>Cavolinia</i> sp. Echinoidea (spines & fragments)	
fossil Scleractinia	./.	

Sieved material		
>1cm	>0.2cm	>0.1cm
almost no coarse material 		

Macrofauna	
	holothurian or echinurid (?), length: 2cm; see also GeoB 17508-2

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	15	-	1	POS/	685	/ 1	36°	27.509'	07°	07.367'	444

Description		Surface photo
Lithology	sandy mud	
Colour	surface: olive brown (2.5Y 4/3) subsurface: olive (5Y 4/4)	
Living fauna	Porifera Crinoidea: <i>Leptometra</i> sp. Polychaeta	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Astarte</i> sp., <i>Limopsis</i> sp. Gastropoda: <i>Clelandella</i> sp. Pteropoda Echinoidea (spines)	
fossil Scleractinia	some unidentified fragments	

Sieved material

>1cm	>0.2cm	>0.1cm
		

Macrofauna



Clelandella sp.



Polychaeta



GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	16	-	1	POS/	686	/ 1	36°	27.205'	07°	07.603'	463

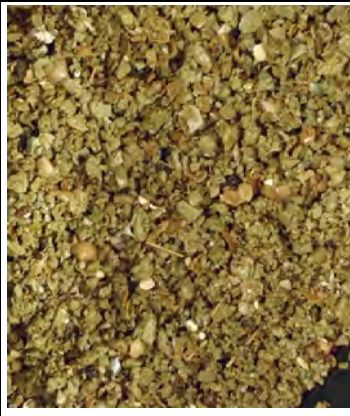
Description		Surface photo
Lithology	muddy sand	
Colour	light olive brown (2.5Y 5/4)	
Living fauna	Ophiuroidea	
Dead fauna	Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Astarte</i> sp., <i>Limopsis</i> sp. Gastropoda: <i>Epitonium</i> sp. Pteropoda Echinoidea (spines) Polychaeta (agglutinated tubes)	
fossil Scleractinia	<i>Desmophyllum dianthus</i>	

Sieved material		
>1cm	>0.2cm	>0.1cm
 not much coarse material		

Macrofauna
 <i>Desmophyllum dianthus</i> (length: 3cm)

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	17	-	1	POS/	687	/ 1	36°	27.423'	07°	07.725'	406

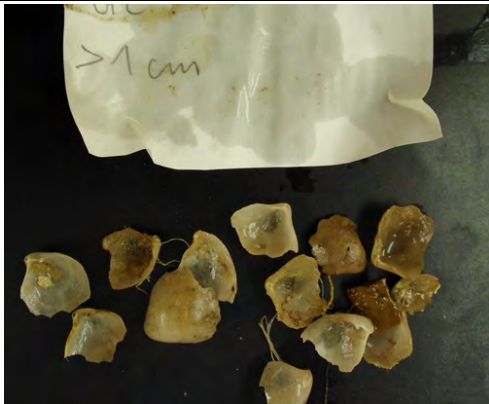
Description		Surface photo
Lithology	mud with mud breccia (and carbonatic rocks)	
Colour	olive brown (2.5Y 4/4)	
Living fauna	Porifera Crinoidea: <i>Leptometra</i> sp. Crustacea: <i>Pilumnus</i> sp.	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Bathyarca</i> sp. Pteropoda Echinoidea (spines)	
fossil Scleractinia	./.	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

Macrofauna	
	<i>Pilumnus</i> sp.

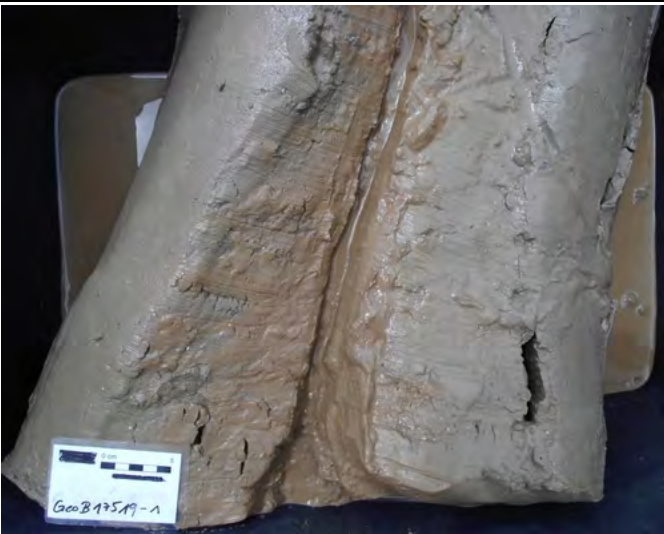
GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	18	-	1	POS/	688	/ 1	36°	27.513'	07°	07.978'	462

Description		Surface photo
Lithology	sandy mud	
Colour	light olive brown (2.5Y 4/4)	
Living fauna	Porifera Hydrozoa Crustacea (amphipods) Polychaeta: <i>Conocrinus</i> sp.	
Dead fauna	Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda Pteropoda Bivalvia: <i>Bathyarca</i> sp., <i>Limopsis</i> sp. Gastropoda: <i>Epitonium</i> sp. Echinoidea (spines) Crustacea (fragments)	
fossil Scleractinia	./.	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

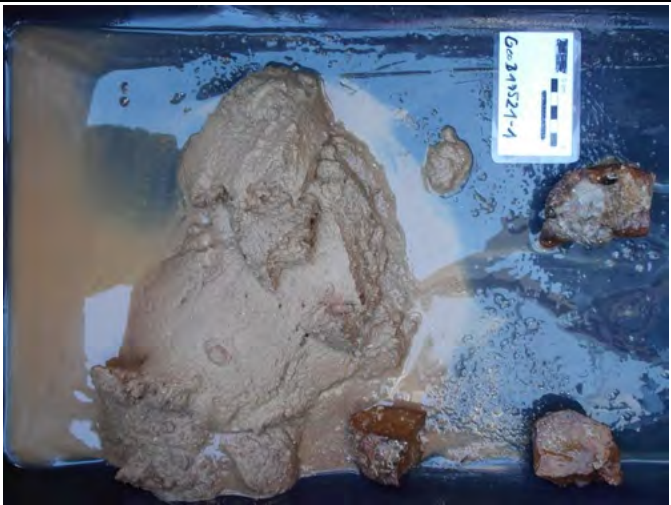
Macrofauna	
	<i>Conocrinus</i> sp. (diameter of circular cup: 10 cm)

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	19	-	1	POS/	689	/ 1	36°	27.615'	07°	07.398'	562

Description		Surface photo
Lithology	surface: sandy mud subsurf.: mud (coal fragments)	
Colour	surface: light olive brown (2.5Y 5/4) subsurface: olive (5Y 5/4)	
Living fauna	Porifera Crustacea	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Bivalvia: <i>Bathyarca</i> sp., <i>Pseudamussium sulcatum</i> , <i>Limopsis</i> sp. Gastropoda Pteropoda Echinoidea (spines & fragments) Polychaeta (serpulids)	
fossil Scleractinia	./.	

Sieved material		
>1cm	>0.2cm	>0.1cm
 very few coarse material		

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	21	-	1	POS/	691	/ 1	36°	27.741'	07°	07.836'	472

Description		Surface photo
Lithology	few sandy/muddy sediment and carbonatic rocks	
Colour	light olive brown (2.5Y 5/4)	
Living fauna	./.	
Dead fauna	small-sized shell hash composed of bryozoans, brachiopods, scaphopods, bivalves, gastropods, echinoid spines, serpulids	
fossil Scleractinia	./.	

Sieved material	
>1cm	0.1 - 0.2cm
	

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	21	-	2	POS/	691	/ 2	36°	27.751'	07°	07.819'	479

Description		Surface photo
Lithology	muddy sand & carbonatic rocks	
Colour	brown (10YR 4/3)	
Living fauna	Porifera Hydrozoa Polychaeta	
Dead fauna	Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia: <i>Bathyarca</i> sp., <i>Limopsis</i> sp., <i>Pseudamussium sulcatum</i> Gastropoda: <i>Emarginula</i> sp. Pteropoda Echinoidea (spines) Polychaeta (serpulids)	
fossil Scleractinia	<i>Caryophyllia</i> spp. (attached to rocks)	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

Macrofauna	
	solitary corals attached to rocks

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)
175	22	-	1	POS/	692	/	1	36°	27.573'	07°	08.088'	523

Description		Surface photo
Lithology	very few muddy sediment	
Colour	greyish brown (10YR 4/2)	
Living fauna	./.	
Dead fauna	Pteropoda Echinoidea (spines)	
fossil Scleractinia	./.	

Sieved material		
>1cm	>0.2cm	>0.1cm
n/a	n/a	n/a

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	22	-	2	POS/	692	/ 2	36°	27.609'	07°	08.040'	526

Description		Surface photo
Lithology	muddy sand & carbonatic rocks	
Colour	surface: greyish brown (10 Y 5/2) subsurface: grey (2.5Y 5/1)	
Living fauna	Porifera Hydrozoa, Ophiuroidea	
Dead fauna	Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia: <i>Astarte</i> sp. Gastropoda: <i>Emarginula</i> sp., <i>Galeodea rugosa</i> Pteropoda Echinoidea (spines) Polychaeta (serpulids, aggl. tube)	
fossil Scleractinia	<i>Flabellum</i> sp. <i>Caryophyllia</i> sp. <i>Desmophyllum dianthus</i> <i>Madrepora oculata</i>	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

Macrofauna	
 solitary corals	 Gastropoda: <i>Galeodea rugosa</i> (length: 5-6cm)

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	23	-	2	POS/	693	/ 2	36°	27.172'	07°	08.263'	509

Description		Surface photo
Lithology	sandy mud, carbonatic rocks	
Colour	surface: greyish brown (10YR 5/2) subsurf.: greyish brown (2.5Y 5/2)	
Living fauna	Ophiuroidea Crustacea (amphipods, isopods)	
Dead fauna	Porifera (spicules) Octocorallia: <i>Isidella</i> sp. Bryozoa Bivalvia: <i>Astarte</i> sp., <i>Limopsis</i> sp., <i>Pseudamussium sulcatum</i> Gastropoda Pteropoda: <i>Clio</i> sp., <i>Cavolinia</i> sp. Echinoidea (spines & fragments) Crustacea (fragments)	
fossil Scleractinia	<i>Desmophyllum dianthus</i> (?)	

Sieved material		
>1cm	>0.2cm	>0.1cm
		

Macrofauna	
	<i>Isidella</i> fragment

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	24	-	2	POS/	694	/ 2	36°	27.103'	07°	07.895'	404

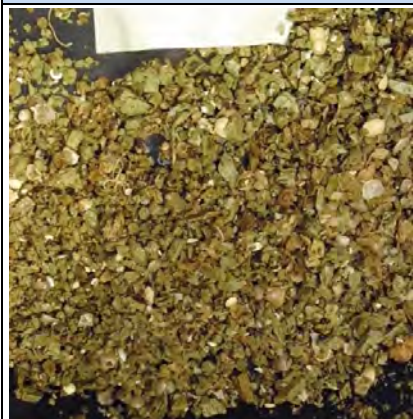
Description		Surface photo
Lithology	mud & mud breccia, carbonatic gravel (up to 5cm)	
Colour	light olive brown (2.5Y 5/2)	
Living fauna	Hydrozoa Crinoidea: <i>Leptometra</i> sp. Ophiuroidea Polychaeta	
Dead fauna	Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Limopsis</i> sp. Pteropoda Echinoidea (spine) Polychaeta (agglutinated tubes)	
fossil Scleractinia	<i>Flabellum</i> sp. <i>Desmophyllum dianthus</i>	

Sieved material

>1cm



>0.2cm



>0.1cm



GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	25	-	1	POS/	695	/ 1	36°	27.018'	07°	08.162'	468

Description		Surface photo
Lithology	muddy sand	
Colour	surface: light olive brown (2.5Y 5/4) subsurface: light olive brown (2.5Y 5/3)	
Living fauna	Porifera (spicules) Pennatulacea: <i>Kophobelomnon</i> sp. Ophiuroidea Crustacea (decapod crab) Polychaeta	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia: <i>Bathyarca philippiana</i> , <i>Pseudamussium sulcatum</i> , <i>Astarte</i> sp. Gastropoda, Pteropoda Echinoidea (spines) Polychaeta (aggl. tubes, serpulids)	
fossil Scleractinia	<i>Desmophyllum dianthus</i> <i>Lophelia pertusa</i> <i>Madrepora oculata</i> <i>Dendrophyllia</i> sp.	

Sieved material	
>1cm	
>0.2cm	>0.1cm
	

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	26	-	1	POS/	696	/ 1	36°	26.746'	07°	08.474'	502

Description		Surface photo
Lithology	muddy sand	
Colour	yellowish brown (10YR 5/6)	
Living fauna	Hydrozoa Ophiuroidea	
Dead fauna	Bryozoa Brachiopoda Scaphopoda Bivalvia: <i>Astarte</i> sp. Pteropoda: <i>Clio</i> sp., <i>Cavolinia</i> sp. Gastropoda Echinoidea (spines) Crustacea (fragments) Polychaeta (agglutinated tubes)	
fossil Scleractinia	<i>Desmophyllum dianthus</i>	

Sieved material		
>1cm	>0.2cm	>0.1cm
n/a very few coarse fragments		

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	27	-	1	POS/	697	/ 1	36°	26.732'	07°	07.943'	436

Description		Surface photo
Lithology	few sandy sediment	n/a
Colour	yellowish brown (10YR 5/4)	
Living fauna	Ophiuroidea: <i>Ophiomyces</i> sp. Crustacea	
Dead / fossil fauna	Brachiopoda Bivalvia Pteropoda Echinoidea (spines) Polychaeta (agglut. tubes)	
fossil Scleractinia	./.	

Sieved material		
>1cm	>0.2cm	>0.1cm
n/a very few coarse material		

Macrofauna	
	 <i>Ophiomyces</i> sp.

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	27	-	2	POS/	697	/ 2	36°	26.731'	07°	07.984'	437

Description		Surface photo
Lithology	muddy sand (coal fragments)	
Colour	brown (10YR 4/3)	
Living fauna	Porifera Hydrozoa	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Astarte</i> sp., <i>Limopsis</i> sp. Gastropoda Pteropoda Echinoidea (spines & fragments) Polychaeta (aggl. tubes)	
fossil Scleractinia	<i>Flabellum</i> sp. <i>Desmophyllum dianthus</i>	

Sieved material

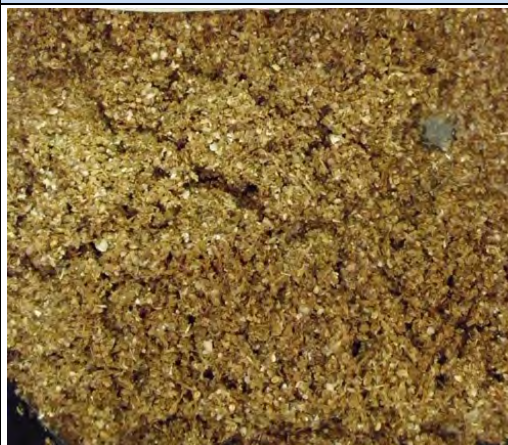
>1cm



>0.2cm



>0.1cm



GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	28	-	1	POS/	698	/ 1	36°	26.548'	07°	08.388'	465

Description		Surface photo
Lithology	muddy sand (coal fragments)	
Colour	surface: dark yellowish brown (10YR 4/4) subsurf.: greyish brown (10YR 5/2)	
Living fauna	Porifera (various species) Hydrozoa Pennatulacea: <i>Kophobelemnnon</i> sp., <i>Pennatula aculeata</i>	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia: <i>Limopsis</i> sp. <i>Astarte</i> sp. Gastropoda: <i>Colus gracilis</i> Pteropoda Echinoidea (spines & fragments) Polychaeta (serpulids)	
fossil Scleractinia	<i>Flabellum</i> sp. <i>Desmophyllum dianthus</i> <i>Lophelia pertusa</i> <i>Madrepora oculata</i>	

Sieved material	
>1cm	
	
>0.2cm	>0.1cm
	

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	29	-	1	POS/	699	/ 1	36°	26.398'	07°	08.592'	475

Description		Surface photo
Lithology	muddy sand (coal fragments)	
Colour	surface: light yellowish brown (10YR 6/4) subsurface: dark grayish brown (2.5Y 4/2)	
Living fauna	Porifera Polychaeta	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia Gastropoda Pteropoda Echinoidea (spines & fragments) Crustacea (fragments) Polychaeta (aggl. tubes, serpulids)	
fossil Scleractinia	<i>Flabellum</i> sp. Solitary corals heavily bioeroded <i>Lophelia pertusa</i>	

Sieved material

>1cm



>0.2cm



>0.1cm



GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	30	-	1	POS/	700	/ 1	36°	26.192'	07°	08.836'	497

Description		Surface photo
Lithology	no sediments collected	
Colour	./.	
Living fauna	Porifera: <i>Asconema setubalense</i> Crinoidea: <i>Leptometra</i> sp.	
Dead fauna	./.	
fossil Scleractinia	./.	

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	31	-	2	POS/	702	/ 2	36°	28.469'	07°	07.011'	527

Description		Surface photo
Lithology	large carbonatic rock (Ø 18cm)	
Colour	./.	
Living fauna	Porifera (various species) Hydrozoa Crustacea (amphipods)	
Dead fauna	Bryozoa Bivalvia: <i>Spondylus</i> sp. Crustacea (barnacles) Polychaeta (serpulids)	
fossil Scleractinia	unknown solitary coral	

Macrofauna											
				<i>Spondylus</i> sp.							

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	31	-	3	POS/	702	/ 3	36°	28.358'	07°	07.000'	494

Description		Surface photo
Lithology	mud, few carbonatic rocks	
Colour	brown (10YR 4/3)	
Living fauna	Porifera (large specimen: ~7cm) Crustacea (amphipods)	
Dead fauna	Bryozoa Bivalvia: <i>Astarte</i> sp., <i>Limopsis</i> sp., <i>Asperarca nodulosa</i> , <i>Bathyarca</i> sp., Pectinidae Gastropoda: <i>Emarginula</i> sp., Trochoidae Pteropoda Echinoidea (spines & fragments) Polychaeta (serpulids)	
fossil Scleractinia	<i>Madrepora oculata</i> <i>Lophelia pertusa</i> (abundant debris)	

Sieved material

>1cm	>0.2cm	>0.1cm
		

Macrofauna



sponge, carbonatic rock with serpulids, *Astarte* sp., coral rubble (*Lophelia*)

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	20	-	1	POS/	690	/	1	36°	28.007'	07°	07.444'	460	0.23-0.29m

Description - Surface		Surface photo
Lithology	sandy mud slightly tilted	
Colour	greyish brown (10YR 5/3)	
Living fauna	Porifera (small specimens) Hydrozoa Pennatulacea: <i>Pennatula aculeata</i> Ophiuroidea Polychaeta	
Dead fauna	small-sized shell fragments Pteropoda Echinoidea (spines) Fish (otholith)	
fossil Scleractinia	<i>Lophelia pertusa</i>	
Samples	1 surface sample (0-1cm, 200cm ³)	

Description - Sediment column		Sediment column photo
Lithology & Sublayers	L1: 0-10cm, sandy mud, coal fragments	
	L2: 10-29cm, sandy mud	
Colour	L1: light olive brown (2.5Y 5/4) L2: olive grey (5Y 4/2)	
Living fauna	./.	
Bioturbation	both layers	
Dead fauna	Hydrozoa (calcified) Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Bivalvia: <i>Pseudamussium sulcatum</i> , <i>Astarte</i> sp. Gastropoda: <i>Calliostoma</i> sp. Pteropoda Echinoidea (spines, fragments) Crustacea (fragments) Polychaeta (aggl. tubes made up of bivalve shells, see 17503-1)	
fossil Scleractinia	<i>Lophelia pertusa</i> <i>Madrepora oculata</i>	
Samples	1 archive core	

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	20	-	1	POS/	690	/	1	36°	28.007'	07°	07.444'	460	0.23-0.29m

Sieved material

>1cm	>0.2cm	>0.1cm
0-10cm 	0-10cm 	0-10cm  Note: fraction 1mm to 0.63mm was also sieved

Macrofauna



GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	32	-	1	POS/	702	/	1	36°	26.562'	07°	08.335'	462	~0.20m

Description - Bulk		Bulk photo
Lithology	muddy sand, few cm-small carbonatic rocks; sediment is disturbed, some of the sediment was lost during recovery as the box did not close properly	
Colour	yellowish brown (10YR 5/4) to olive grey (5Y 5/2)	
Living fauna	Crustacea (decapod crab)	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Brachiopoda: <i>Gryphus vitreus</i> Bivalvia Gastropoda Pteropoda Echinoidea (spines & fragments)	
fossil Scleractinia	<i>Desmophyllum dianthus</i>	
Samples	./.	

Sieved material		
>1cm	>0.2cm	>0.1cm
n/a	n/a	n/a

Macrofauna	
	Crustacea: <i>Monodaeus couchii</i> (2-3 cm in length)

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	33	-	1	POS/	703	/	1	36°	26.415'	07°	08.576'	475	0.25m

Description - Surface		Surface photo
Lithology	muddy sand	
Colour	brown (10YR 5/3)	
Living fauna	Porifera Hydrozoa Pennatulacea Ophiuroidea Crustacea (decapod crab) egg case (?)	
Dead fauna	Bryozoa Scaphopoda Pteropoda: <i>Antalis</i> sp. Echinoidea (spines) Crustacea Polychaeta (tubes)	
fossil Sclerac.	./.	
Samples	1 surface sample (0-1cm, 200cm ³)	

Description - Sediment column			Sediment column photo
Lithology & Sublayers	L1: 0-10cm, muddy sand, few small-sized coal fragments		
	L2: 10-25cm, sandy mud		
Colour	L1: light olive brown (2.5Y 5/3)		
	L2: olive brown (2.5Y 4/3)		
Living fauna	./.		
Bioturbation	both layers		
Dead fauna	L1	Bryozoa Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda Bivalvia: <i>Bathyarca</i> sp., <i>Astarte</i> sp., <i>Pseudamussium sulcatum</i> , <i>Limopsis</i> sp. Gastropoda: <i>Epitonium</i> sp., <i>Pagodula</i> sp., <i>Spirotropsis</i> sp. Pteropoda Echinoidea (spines) Polychaeta (aggl. tubes)	
	L2	Octocorallia: <i>Isidella</i> sp. Bivalvia: <i>Astarte</i> sp., <i>Limopsis</i> sp., <i>Pseudamussium sulcatum</i> Gastropoda: <i>Pagodula</i> sp.	
fossil Scleractinia	L1	<i>Lophelia pertusa</i> (bioeroded)	
	L2	<i>Desmophyllum dianthus</i>	
Samples	1 archive core		

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)	Recovery
175	33	-	1	POS/	703	/	1	36°	26.415'	07°	08.576'	475	0.25m

Sieved material

>1cm	>0.2cm	>0.1cm
0-10cm 	0-10cm 	0-10cm 
10-25cm 	10-25cm 	10-25cm 

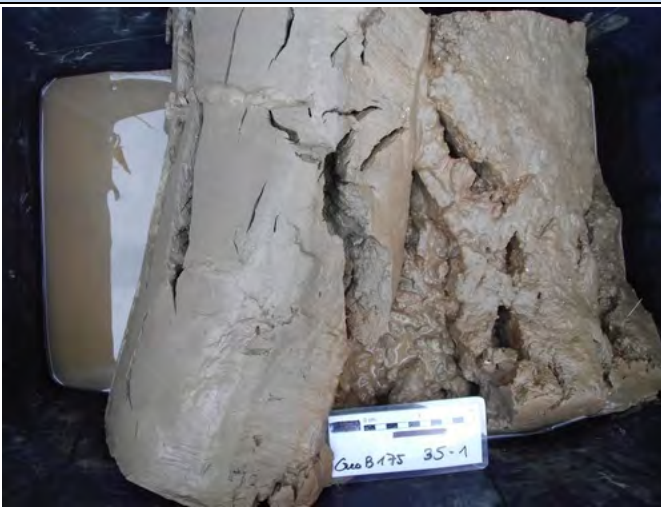
Macrofauna



egg case

*Lophelia* rubble

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)
175	35	-	1	POS/	705	/	1	36°	27.938'	07°	09.316'	565

Description		Surface photo
Lithology	(clayey) mud	
Colour	surface: brown (10 YR 5/3) subsurface: greyish brown (2.5Y 5/2)	
Living fauna	Hydrozoa Polychaeta	
Dead fauna	Scaphopoda Polychaeta (tubes)	
fossil Scleractinia	./.	

Remark

sample was not sieved, but bulk sample was taken

GeoB - ID				POS - ID				Latitude (N)		Longitude (W)		Water depth (m)
175	36	-	1	POS/	706	/	1	36°	28.501'	07°	09.490'	597

Description		Surface photo
Lithology	(clayey) mud	
Colour	surface: greyish brown (2.5Y 5/2) subsurface: olive brown (2.5Y 4/4)	
Living fauna	Crustacea (amphipods) Polychaeta	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Scaphopoda: <i>Antalis</i> sp. Bivalvia (fragments) Gastropoda (fragments) Pteropoda Echinoidea (spines) Polychaeta (tubes)	
fossil Scleractinia	./.	

Remark

sample was not sieved, but bulk sample was taken

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	37	-	1	POS/	707	/ 1	36°	30.012'	07°	10.275'	547

Description		Surface photo
Lithology	(clayey) mud, few carbonatic rocks (up to 4cm in diameter)	
Colour	olive grey (5Y 4/2)	
Living fauna	Hydrozoa Pennatulacea: <i>Kophobelemnion</i> sp. Crustacea (amphipod)	
Dead fauna	Brachiopoda: <i>Gryphus vitreus</i> Scaphopoda: <i>Antalis</i> sp. Bivalvia: <i>Bathyarca</i> sp. Gastropoda: <i>Turritella</i> sp., <i>Pagodula</i> sp. Pteropoda: <i>Cavolinia</i> sp. Echinoidea (spines & fragments) Polychaeta (agglutinated tubes)	
fossil Scleractinia	<i>Flabellum</i> sp. <i>Desmophyllum dianthus</i>	

Sieved material (material was not entirely sieved!)

>1cm	>0.2cm
	

GeoB - ID				POS - ID			Latitude (N)		Longitude (W)		Water depth (m)
175	38	-	1	POS/	708	/ 1	36°	30.091'	07°	10.094'	543

Description		Surface photo
Lithology	(clayey) mud, few coal fragments	
Colour	surface: light olive brown (2.5Y 5/3) subsurface: olive grey (5Y 5/2)	
Living fauna	Hydrozoa Pennatulacea: <i>Kophobelemnion</i> sp. Ophiuroidea Crustacea (decapod crab) Polychaeta	
Dead fauna	Octocorallia: <i>Isidella</i> sp. Bryozoa Brachiopoda Pteropoda Scaphopoda: <i>Antalis</i> sp. Bivalvia: <i>Limopsis</i> sp. Gastropoda: <i>Spirotropis</i> sp., <i>Pagodula</i> sp. Echinoidea (spines)	
fossil Scleractinia	<i>Flabellum</i> sp. <i>Desmophyllum dianthus</i>	

Sieved material (material was not entirely sieved!)

>1cm



>0.2cm



From report No. 289 onwards this series is published under the new title:

Berichte aus dem MARUM und dem Fachbereich Geowissenschaften der Universität Bremen

A complete list of all publications of this series from no. 1 to 292 (1986 – 2012) was printed at last in issue no. 292.

- No. 289 – Mohtadi, M. and cruise participants (2012).** Report and preliminary results of RV SONNE Cruise SO 223T. TransGeoBiOc. Pusan – Suva, 09.09.2012 – 08.10.2012. 47 pages.
- No. 290 – Hebbeln, D., Wienberg, C. and cruise participants (2012).** Report and preliminary results of R/V Maria S. Merian cruise MSM20-4. WACOM – West-Atlantic Cold-water Corals Ecosystems: The West Side Story. Bridgetown – Freeport, 14 March – 7 April 2012. 120 pages.
- No. 291 – Sahling, H. and cruise participants (2012).** R/V Heincke Cruise Report HE-387. Gas emissions at the Svalbard continental margin. Longyearbyen – Bremerhaven, 20 August – 16 September 2012. 170 pages.
- No. 292 – Pichler, T., Häusler, S. and Tsuonis, G. (2013).** Abstracts of the 3rd International Workshop "Research in Shallow Marine and Fresh Water Systems". 134 pages.
- No. 293 – Kucera, M. and cruise participants (2013).** Cruise report of RV Sonne Cruise SO-226-3. Dip-FIP - The extent and structure of cryptic diversity in morphospecies of planktonic Foraminifera of the Indopacific Warm Pool. Wellington – Kaohsiung, 04.03.2013 - 28.03.2013. 39 pages.
- No. 294 – Wienberg, C. and cruise participants (2013).** Report and preliminary results of R/V Poseidon cruise P451-2. Practical training cruise onboard R/V Poseidon - From cruise organisation to marine geological sampling: Shipboard training for PhD students on R/V Poseidon in the Gulf of Cádiz, Spain. Portimão – Lisbon, 24 April – 1 May 2013. 65 pages.