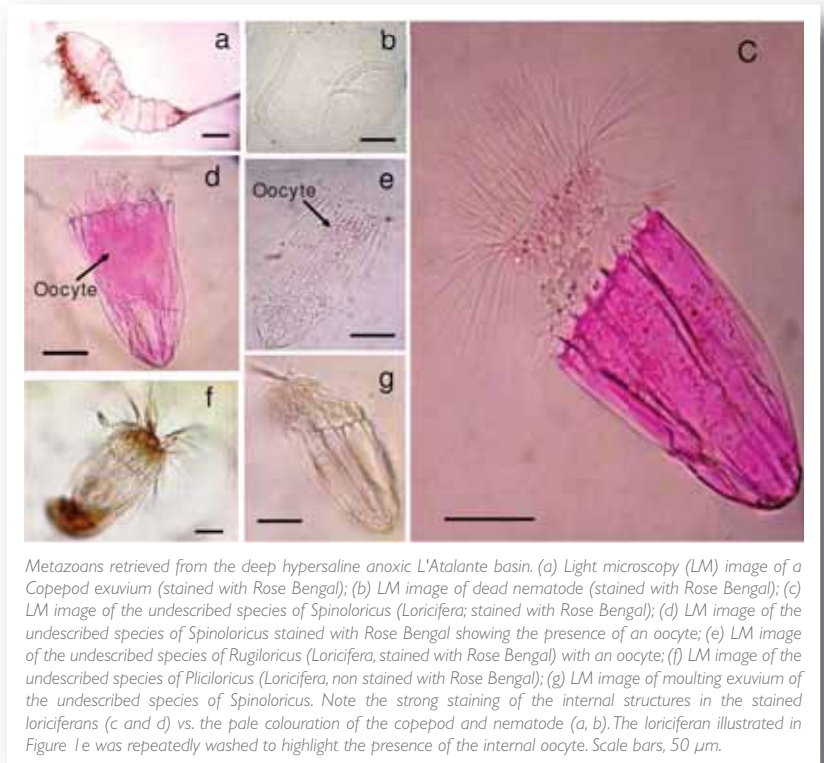


## Mediterranean sediments reveal world's first oxygen-free metazoa

HERMIONE scientists from the Polytechnic University of Marche, Ancona, have discovered the first multicellular organisms living exclusively in oxygen-free environments. Until now, the ability to spend an entire life cycle in anoxic conditions was thought to be limited to unicellular organisms, or eukaryotes, so this exciting breakthrough has opened the door to a world of possibility for future exploration, experimentation and discovery. The team, led by Prof. Roberto Danovaro, have been investigating the deep, hypersaline, permanently anoxic basins of the Mediterranean Sea for ten years, examining the sediments for such fauna. Three new species of the phylum Loricifera were eventually found and further investigation showed that they were not only able to survive these extreme conditions, but were also well-adapted to them. Cells from *Spiroloricus* nov. sp., *Rugiloricus* nov. sp., and *Pliciloricus* nov. sp. lacked mitochondria (cell organelles involved in the aerobic respiration processes carried out by most multicellular organisms), but contained highly specialised hydrogenosome-like organelles that are normally associated with endosymbiotic prokaryotes. The discovery of these three new species, and subsequent publishing in the BMC journal ([www.biomedcentral.com/1741-7007/8/30](http://www.biomedcentral.com/1741-7007/8/30)) understandably sent a ripple of excitement through the scientific world, and the PUM team's work has been highlighted by the BBC, Nature, New Scientist, Science, amongst many others.



Metazoans retrieved from the deep hypersaline anoxic L'Atalante basin. (a) Light microscopy (LM) image of a Copepod exuvium (stained with Rose Bengal); (b) LM image of dead nematode (stained with Rose Bengal); (c) LM image of the undescribed species of *Spinoloricus* (Loricifera; stained with Rose Bengal); (d) LM image of the undescribed species of *Spinoloricus* stained with Rose Bengal showing the presence of an oocyte; (e) LM image of the undescribed species of *Rugiloricus* (Loricifera, stained with Rose Bengal) with an oocyte; (f) LM image of the undescribed species of *Pliciloricus* (Loricifera, non stained with Rose Bengal); (g) LM image of moulted exuvium of the undescribed species of *Spinoloricus*. Note the strong staining of the internal structures in the stained loriciferans (c and d) vs. the pale colouration of the copepod and nematode (a, b). The loriciferan illustrated in Figure 1e was repeatedly washed to highlight the presence of the internal oocyte. Scale bars, 50 µm.



## HERMIONE Annual Meeting 2010 (and The Great Escape)

110 delegates gathered on Malta earlier this month to take part in the first HERMIONE annual meeting. Scientists, socio-economists, NGO and industry partners spent a week at the Corinthia Palace Hotel in Attard discussing the science carried out during the past year and plans for the future. Fifty-four oral presentations were given in plenary sessions that were arranged according to HERMIONE's seven crosscutting themes and over 40 posters were displayed. Lively presentations, beautiful weather and good food set the scene for a week of discussion, debate, catching up with old colleagues and forging new links. We also held the first HERMIONE image competition, drawing 80 entries to four categories. We hope the competition will be even bigger next year, and may

Right: Delegates gather for the conference dinner at the Castello Zamittello

(Continued overleaf)

even open a short video category! Entries were put to public vote and the winners were:

1. Underwater images: Tomas Lundalv "Anarhichus pair"
2. Science in action: Damien Guihen "Adrenaline"
3. Specimen images: Lydia Beuck "Live Lophelia pertusa (white) infested by bioeroding sponge (blue)"
4. Technical images: Fernando Tempera "Scheme of the Condor de Terra seamount observatory"



Amid all the science, we of course managed to fit in a field trip to sample some of Malta's cultural delights; a series of megalithic temples that date back to 3000 BC. This interesting excursion was followed up that evening by a lovely conference dinner held at one of Malta's many castles.

But our Maltese adventure didn't end there. Whilst we were happily exchanging the latest in cold seep microbial diversity, an ominous cloud was spreading over Europe...the infamous Eyjafjallajokull Volcano in Iceland was busy erupting and churning out vast plumes of ash right into European airspace. Flights were grounded left, right and centre, prompting HERMIONE delegates to stop at nothing to ensure the return to their home countries and continuation of HERMIONE science production.

The Incredible Journey began...as we go to press, we are still trying to uncover the most sensational return to homelands. Unconfirmed reports are beginning to filter through of car-buying schemes, 1000 km taxi rides, and our personal favourite – hitch-hiking from Rome airport to the far reaches of Northern Europe! Now we are all happily back at work and science continues, the volcanic disruption nothing but a distant memory. As someone commented on the UK news..."Dear Iceland, We said "send cash"".



# Seamounts give up their secrets in the Azores



Researchers from IMAR/DOP-Azores were out at sea again last September and October participating in the latest cruise led by the Portuguese Task-Group for the Extension of the Continental Shelf (EMEPC) in the Azores archipelago. During their stay onboard, the Portuguese ROV Luso was used to further explore the hydrothermal vent fields of Menez Gwen and Lucky Strike, as well as the Dom João de Castro Bank and Furnas de Fora hill.

The cruise was hampered by severe weather conditions but the teams onboard sought to make the most of the ship-time by conducting opportunistic dives to collect geological samples and investigate the biological assemblages while taking shelter around São Jorge island. Apart from fantastic cliffs colonized by deep-sea oysters (*Neopycnodonte cf. zibrowii*), additional occurrences of splendid coral gardens were recorded. These harboured species compositions that were previously poorly documented around the Azores, including assemblages dominated by black corals (*Leiopathes* spp.), the scleractinian *Madrepora oculata* and golden corals (*Chrysogorgia* sp.).

Approximately 150 species of corals (sensu lato) are presently recorded for the Azores region. Their habitats are currently protected from massive short-term impacts through the European Commission Council Resolution no. 568/2005, which forbids the use of trawling, gillnets, entangling nets and trammel nets in large areas which encompass the most important seamounts of the Azores, Madeira and Canary islands.

Research dedicated to deep water corals at IMAR/DOP-Azores has been taking shape for several years now and a description of the ongoing research can be found at [www.horta.uac.pt/intradop/](http://www.horta.uac.pt/intradop/). Several ongoing projects have been concentrating on the habitats structured by these organisms, aiming at studying their distribution, describing their composition, assessing fishery impacts

and evaluating their role as essential habitats for species of commercial interest, namely fish and crustaceans.

The new observations reiterate the scarce knowledge that persists about deep-sea benthic assemblages and demonstrate the appealing scenarios that can be found at IMAR/DOP-Azores' doorstep for deep-sea marine science and conservation.



Above: Íris Sampaio from IMAR/DOP-Azores inspects an ROV chamber containing a live *Acanthogorgia* brought up at Dom João de Castro Bank © EMEPC



Above: ROV Luso approaching a large black coral colony (*Leiopathes cf. glaberima*) © EMEPC

Main image: ROV Luso carrying the *Hermione* colonization modules planned for deployment at the Menez Gwen hydrothermal field © ImagDOP



# CHEMOSYNTHETIC ECOSYSTEMS IN THE DEEP EASTERN MEDITERRANEAN



F. Wenzhöfer (MPI, Bremen) and the scientific parties of MSM 13/3 and 4

In autumn 2009 two cruise legs aboard the German research vessel RV Maria S Merian investigated chemosynthetic ecosystems in the deep Eastern Mediterranean; cruise leg MSM13/3 (25 October - 18 November 2009, PI Antje Boetius, MPI) and MSM 13/4 (21 November - 14 December 2009, PI Frank Wenzhöfer, MPI). Scientist from MPI for Marine Microbiology (Bremen, Germany), University Gent (Belgium), IFM-Geomar (Kiel, Germany), Université Pierre et Marie Curie (Paris, France) and Marum (Bremen, Germany) studied the rich and abundant microbial life and diverse chemosynthetic communities at fluid escape structures in water depths of 1000 - 2000 m fueled by energy rich chemical substances such as sulfur and hydrocarbon compounds.

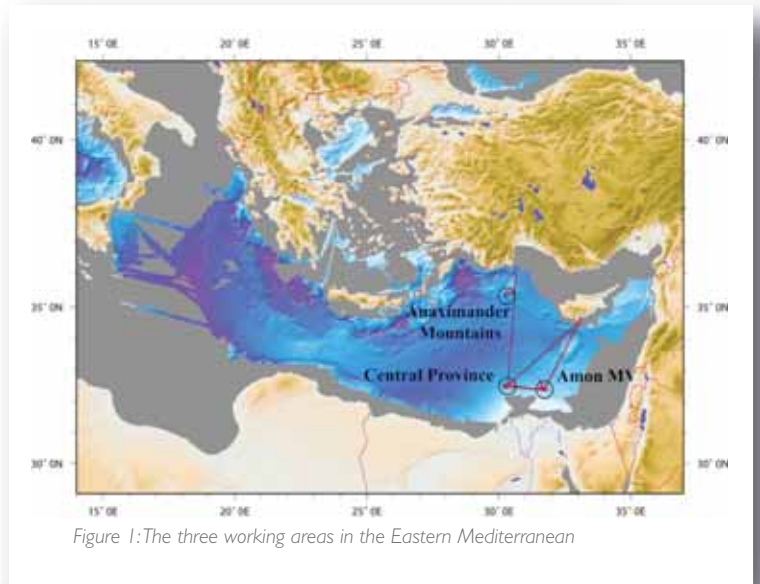


Figure 1: The three working areas in the Eastern Mediterranean

Three working areas were investigated: the “East Delta” in the eastern Nile fan province, around 32°22’N, 31°42’E with comparably young mud volcanoes with fluid seepage; the “Central Area” around 32°38’N, 29°55’E, with a high density of pockmarks harboring carbonate chimneys and pavements as well as patchy colonies of chemosynthetic organisms, and the Anaximander area at 35°10’ N, 29°10’ E with its dense accumulations of tube worms. Both expeditions contribute to the EC’s 7th FP HERMIONE, the GDRE DIWOOD and ESF EUROCORES project CHEMECO, as well as to the goals of the research center MARUM (Geosphere-Biosphere Research). The main objectives were to obtain a quantitative insight in element cycling and export at different types of fluid seeps in the Eastern Mediterranean and to understand the relation and interaction between fluid seepage and seep biodiversity and community distribution.

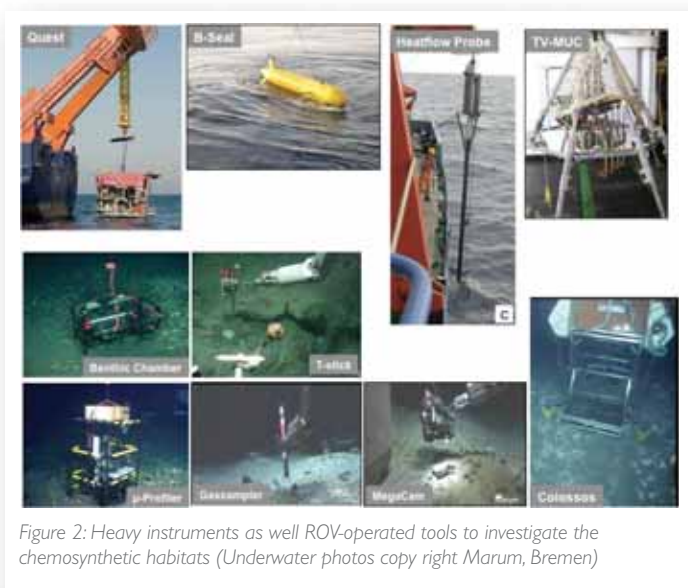


Figure 2: Heavy instruments as well ROV-operated tools to investigate the chemosynthetic habitats (Underwater photos copy right Marum, Bremen)

Another special type of chemosynthetic ecosystem investigated was large wood falls. Experiments have been deployed 3 and 2 years ago but also during leg MSM13/3 and have been re-sampled and recovered to get a better understanding of temporal succession of wood degrading communities. It is an old theory that chemosynthetic organisms can use sunken woods as stepping stones for their dispersal, and our experiments clearly show that some mussels use this strange habitat to get their energy from sulfur, even at > 100m distance from the next seep, in a normal pelagic setting. Coming back now for the third time to these experiments has allowed us to record a fascinating succession of the diverse life forms settling on the wood, and also different biogeochemical phases in the life of the chemosynthetic ecosystem and our sunken

wood experiments. The main technologies to study these chemosynthetic ecosystems were the ROV QUEST4000 (MARUM) equipped with a variety of payloads for in situ measurements (MPI Bremen) and sampling and the AUV B-SEAL (MARUM) for detailed near-field mapping of selected habitats with Multibeam and side scan sonar. Additionally an online





Figure 3: Ann and Clara sieving sediment onboard RV Merian.

heat flux corer (Ifm-Geomar) was used for in situ measurements of sediment temperature and thermal conductivity. The targeted videographic and biogeochemical as well as ecological investigations were used in combination to quantify physical, biogeochemical and ecological processes in chemosynthetic ecosystems, and to study the link between the deep-water geosphere and biosphere in the Eastern Mediterranean.

Cold seeps including mud volcanoes and pockmarks are considered as “hotspots” of increased biological activity on the seabed. In the food-poor environment of the East Mediterranean the contrast is large between the rather scarce fauna of the regular deep-sea sediments, and the highly abundant fauna of many of the cold seeps in the area, including the mud volcano Amsterdam. Several ROV explorations of the different habitats on this mud volcano allowed us to identify the numerous spots or patches of increased bivalve or polychaete abundance. The presence of species such as the mussel *Idas*, clam (Vesicomid) species and tube

worms in association with dark grey or black sediments pointed to the presence of reduced habitats thriving on chemical derived energy. In contrast to other seeps worldwide the East Med seep fauna is characterized by much smaller species but the local diversity seemed at first sight relatively high. We also used a new high-resolution camera from MPI on the ROV to achieve a better view of the small-scale structure of benthic habitats. This camera was built in cooperation with our colleague Ian MacDonald (Florida State University, USA). The obtained pictures are remarkable; placing the camera in front of interesting objects it offers the chance to see even small details, which are otherwise not visible. However, a rather smooth operation of the ROV manipulator was necessary but with some patience the pilots were able to place the camera directly in front of the object. During the dive we also realized how much time it cost taking nice images. We spend half the dive for this purpose but it is worthwhile as can be seen on the pictures.



Figure 4 (main image): High-resolution image of the seafloor showing tubeworms, shells, animal tracks and fecal pellets.

In situ biogeochemical measurements to investigate changes in the geological and chemical drivers of chemosynthetic ecosystems have been conducted at the Amon mud volcano. We have studied this area already during the METEOR expedition M70/2 BIONIL in 2006 (EU-Hermes). Coming back to the same chemosynthetic habitats three years later, we were totally surprised to find the previously rather fauna-impoverished central area populated by a rich world of bacteria, fish, crabs, worms and bivalves, along with several different signs of a declining activity in mud volcanism. First result from in situ oxygen uptake rate measurements, as a measure for the overall benthic activity, revealed increased oxygen consumption at microbial mat sites between 2006 and 2009. The heat flux transects carried out by the team from IFM-GEOMAR showed strongly decreased temperature gradients in the underlying seabed compared to 2006.

These combined studies will help to reveal the geological processes, which cause different ecosystem structures and habitat distributions, and to quantify the amount and fate of climate relevant gases that escape with the fluids or are utilized and consumed by the chemosynthetic biota.



Figure 5: Scientific party of leg MSM 13/3 (left) and MSM 13/4 (right)

# Hidden deep-sea biodiversity: the case of the Southern Adriatic margin

Roberto Danovaro<sup>1</sup>, Daniela Zeppilli<sup>1</sup>, Cristina Gambi<sup>1</sup>, Antonio Pusceddu<sup>1</sup>, Fabio Trincardi<sup>2</sup>

<sup>1</sup>CoNISMa ULR - Department of Marine Science, Polytechnic University of Marche – Italy  
<sup>2</sup>CNR ISMAR Institute of Marine Sciences – Bologna -Italy

Spatial heterogeneity at various scales influences important ecosystem characteristics including population structure, community composition and several ecosystem processes. It is consolidated both in terrestrial and marine ecosystems, but not yet extensively investigated in the deep sea.

A full assessment of the deep-sea benthic biodiversity requires a detailed analysis of the complexity of the bottom topography. Still we do not know at which spatial scales benthic organisms interact with the environment and which is their potential dispersal. Determining whether a given phenomenon appears or applies across a broad range of scales, or whether it is limited to a narrow range of scales, and assessing the appropriate scales to investigate distinct ecological phenomena is a key topic within the HERMIONE project.

The Polytechnic University of Marche-CONISMA (Italy) in collaboration with CNR-ISMAR (Italy; Fig. 1) has been investigating the Southern Adriatic margin since 2006 in the framework of HERMES project. The Southern Adriatic margin is markedly steep and erosional above ca. 350 m water depth and morphologically more articulated below.



Fig. 1 The staff of scientists and PhD students of the CoNISMa - Polytechnic University of Marche and CNR onboard of the R/V Urania during the IMPACT09 cruise

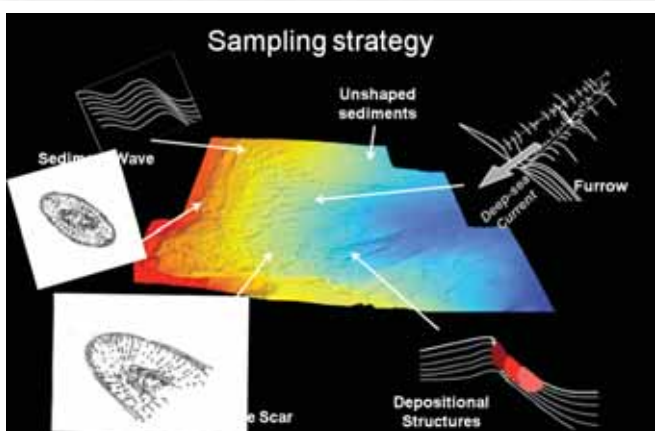


Fig. 2 A bathymetric map of South-Western Adriatic margin, acquired using multibeam, which reveals the extreme complexity of the seabed (by CONISMA -Polytechnic University of Marche and CNR-ISMAR)

stations, between different deployments in the same station, and within a single deployment).

The comparison of the different 3D-structures revealed the presence of significant differences in species composition, with a large fraction of them exclusively associated to specific topographic structures (Fig. 3). These studies will provide crucial information for the mapping of deep-sea benthic biodiversity and for defining the future experimental designs aimed at investigating deep-sea biodiversity.

The Southern Adriatic Margin is markedly steep and erosional above ca. 350 m water depth and morphologically more articulated below. We collected 239 sediment samples from 73 deep-sea sites in the Southern Adriatic margin from the Bari Canyon, the Gondola landslide, the Dauno seamount, and from several seabed structures (furrows, sediment waves, troughs, landslide scars, etc.). This margin is characterized by the presence of a canyon (Bari canyon), several submarine landslides (including Gondola slide) and a seamount (Dauno seamount; Fig. 2). Where the slope is not erosional, a large variety of bedforms and sediment drift deposits record the prolonged activity of bottom currents.

During the HERMIONE cruise IMPACT09 (Urania, 17th-26th March 2009) we selected six stations along a transect with increasing water depth of 200 meters (the shallowest 200 m water depth, the deepest 1200 m water depth). The sampling strategy included, for each station, three independent deployments of box corer, each one sub-replicated three times.

This strategy allowed us to identify the variability of benthic prokaryotic and meiofaunal assemblages at several scales along a bathymetric transect in the South-Western Adriatic Sea (between

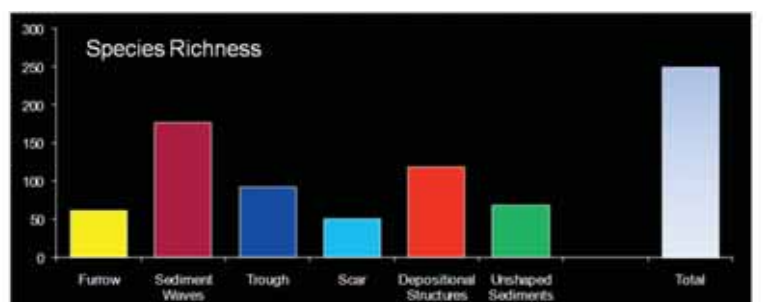


Fig. 3 An example of the differences in benthic biodiversity (nematode assemblages among different structures)

# News from the MAREANO project

The project MAREANO (Marine AREA database for NORwegian coast and sea areas) aims to map marine benthic habitats and biodiversity in Norwegian waters. MAREANO is a multi-disciplinary programme, bringing together biologists from the Institute of Marine Research (IMR), geologists from the Geological Survey of Norway (NGU), and the Hydrographic Service (SKSD). In addition to responsibilities for different fieldwork activities, the partners collate existing information and present it integrated in the web portal [www.mareano.no](http://www.mareano.no). The project is financed by the ministries of the Environment, Fisheries and Coastal Affairs, Trade and Industry and the Research Council of Norway.

The focus during the first mapping period, 2005-2010, has been to provide knowledge to support the implementation of the Norwegian Barents Sea management plan. The goal is to obtain information for the regulation of human activities such as the petroleum industry and fisheries. This is done by conducting seabed mapping with sampling and video recordings of sediments and fauna. The new information provides a baseline for management of the environment and biodiversity in the sea.

MAREANO was launched in 2005, starting with multi-beam mapping in a small area, and since then a total of 7 cruises have been conducted. For 2010 two cruises (42 days in total) are planned for the area off Lofoten-Vesterålen. To date, 51 000 km<sup>2</sup> has been mapped by multi-beam surveys, and 48 000 km<sup>2</sup> investigated by visual inspection and sampling for geology, biology, and pollutants. The mapped areas cover different landscapes from shallow banks to the abyssal plains (40 – 2700m) with troughs, ridges, canyons, mega sand waves, cold seeps and coral reef areas. The task of mapping marine substratum, biodiversity and vulnerable biota in a varied seascape is challenging. Not all habitats can be sampled using the same gear,

Figure 1: The basketstar (*Gorgonocephalus eucnemis*) is a key species in a special biotope at around 900 m depth sitting on pebbles and cobbles.



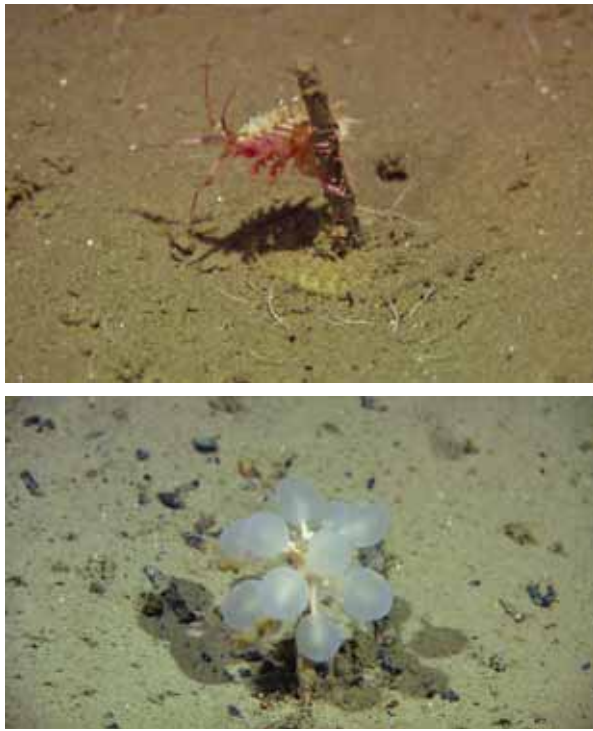


Figure 2: Top: amphipods inhabiting stalks and tubes of other organisms to get a better feeding position; bottom: the carnivorous sponge *Chondrocladia gigantea*.

and not all taxonomic groups are equally well known. The MAREANO mapping program tries to take this into account by applying a wide set of sampling techniques to get as correct picture as possible of the diversity of bottom fauna. To document infauna, epifauna and hyperbenthos, video, grab, beam trawl and epibenthic sled are used. These provide unique information of both fauna and their environment. At all stations video-transects are conducted that are 700 – 1000 m in length. High resolution bathymetric maps are available from all areas (5-m grid above 500 m depth) and the substratum is analyzed using backscatter interpretation. With this information at hand, locations for sampling of fauna and sediments are selected. The habitat descriptors provided are: composition of sediment (where sampling is possible), percentage cover of sediment types from video, multi-beam information that provides values for rugosity, relief, bathymetric position index, acoustic reflection (seabed hardness).

#### Preliminary results from MAREANO cruises in 2009

In 2009 The MAREANO program completed baseline mapping in the areas the “Egga-margin” and in “Nordland VII” off Vesterålen/Lofoten. Altogether, 129 localities were investigated during two three-week long cruises covering 132 video-transects and 26 sampling stations in an area of 16 000 km<sup>2</sup>. The coverage of video-transects was 8.3/1000 km<sup>2</sup> and for sampling stations 1.6/1000 km<sup>2</sup>.

#### The “Egga-margin”

On the northern “Egga-margin” many of the same biotopes as identified earlier by MAREANO on the “Tromsøflaket” area were observed. At 200-500 m depth on the shelf, “sponge-bottoms” with patches of dense sponge communities are common, occurring on a seabed consisting of a matrix of sponge spicules and mud. In this area trawl-marks were frequent and occurred at 81 of the 115 study sites surveyed in 2009.

Another biotope is the morainic shelf-break gravel areas with basket stars (*Gorgonocephalus eucnemis*). These biotopes are intersected by areas with strong currents and large sand waves. Similar sand waves have earlier been documented by MAREANO in the “Høla” area in the vicinity of 330 *Lophelia* reefs. In general the fauna is poor and currents are strong in the sand-wave fields.

In deeper water (700-900 m), in the Bjørnøya slide area the gorgonian coral *Radicipes* was observed for the first time in Norwegian waters. This coral occurred in relatively dense stands in a restricted area.

On the soft bottom on the lower slope (900-1100 m) on the “Egga-margin” a rich fauna of small crustaceans (Peracarida) were found living on stalks and tubes of other organisms (polychaetes, crinoids, hydroids, sponges, etc). In this area the

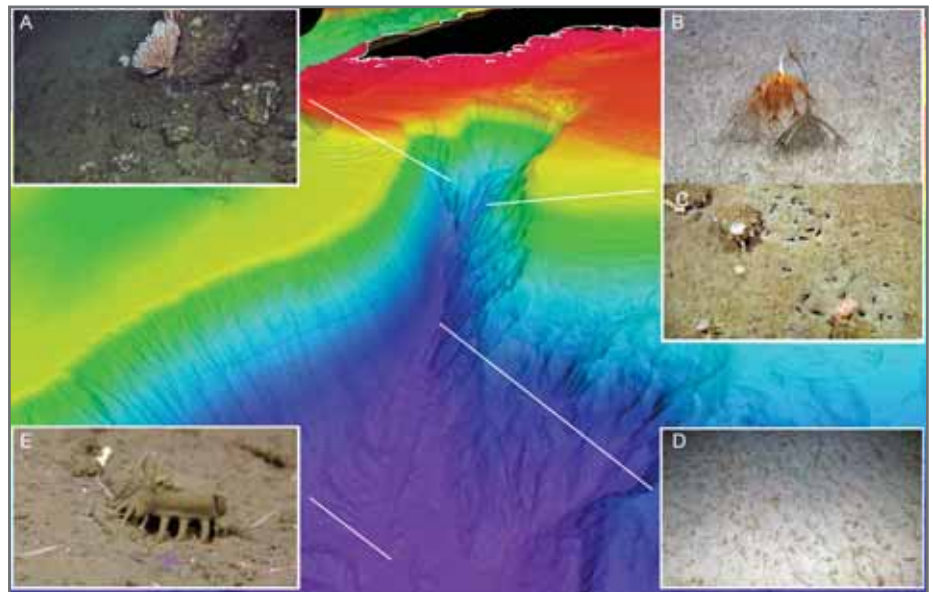


Figure 3: The Andøya canyon, with examples of habitats and fauna.

A: Upper parts with steep sides covered with consolidated clay and occasional occurrence of corals like *Paragorgia arborea*. B C and D: In the thalweg the sediment is soft and here the large sea-pen *Umbellula encrinus* occurs at ~900 meters depth and borrows made by infauna can be seen. Areas with sand ripples and dense cover of anemones were observed at greater depths. E: Below 2000 m the holothurians *Elpidia* sp were frequent.



carnivorous sponge *Chondrocladia gigantea* was much more common than further south in Nordland VII.

### **Nordland VII off Lofoten and Vesterålen**

The greatest depths were mapped in Nordland VII (2700 m) where the bottom temperature is between - 0,5 and -1,1 'C, and the fauna is arctic. Here the landscape is dramatic with short distances (10-25 km) between shallow banks and the deep-sea basin.

The shelf and slope with canyons in the Nordland VII area represent a varied terrain with a strong gradient also in hydrography. Above ~600 meters, corresponding to the light blue zone, temperature stays above +0,5 'C in the north Atlantic water. At 600 – 900 meters depth there is a transition layer of Norwegian Sea arctic intermediate water (the light blue zone) with temperatures between 0,5 and -0,5 'C. Below, in the Norwegian Sea deep-water, the temperature is permanently below zero, between -0,5 and -1,1 'C .

In the deepest areas in Nordland VII (2200-2700m) the environment seemed homogenous. Fewer locations than planned were visited due to bad weather and technical problems but the documentation of biology and geology is regarded as sufficient. The megafauna at these depths appear to be common for the deep northern parts of the Atlantic and the Norwegian Sea. This fauna was dominated by the holothurians *Elpidia* sp. and *Kolga hyalina*, the stalked crinoid *Rhizocrinus lofotensis* together with the crustaceans *Bythocaris leucopis* and *Saduria* sp. and the sea urchin *Pourtalesia* cf. *jeffreysi*. These species or close relatives have been documented in recent studies from the Canadian basin. The fauna is not species rich, but specific for the arctic deep-water. The abundance of infauna at these depths was very low and fauna is clearly richer on the shallower slope than at 2000 m.

Some strange formations were observed at 2100 m that are difficult to explain both biologically and geologically. The deep

and wide tunnels (~40 cm across) that have been observed several times on the slope are hard to imagine having been produced by any marine organism we know from these depths. However, the geologists also lack an explanation for these features. In the vicinity, bacteria coating on gravel indicates that cold seeps may occur. We also observed the peculiar hydroid *Candelabrum* sp. which is known from areas at the Mid-Atlantic ridge in relation to gas seeps.

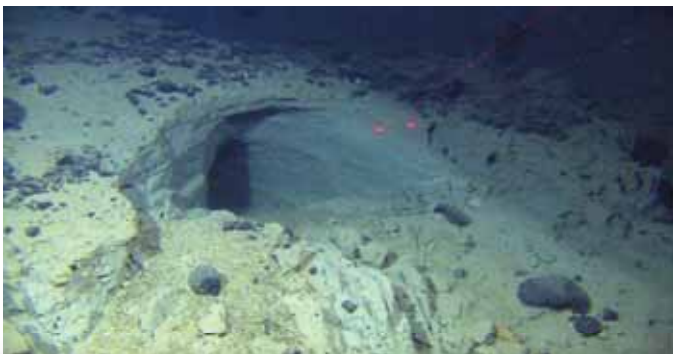


Figure 4: Top: Strange sediment features observed at 2000 m on the slope. Bottom: From left: the stalked crinoid *Rhizocrinus lofotensis*, the red shrimp *Bythocaris leucopis*, and the blue holothurian *Kolga hyalina*, found below 2000 m.

### **Plans for 2010**

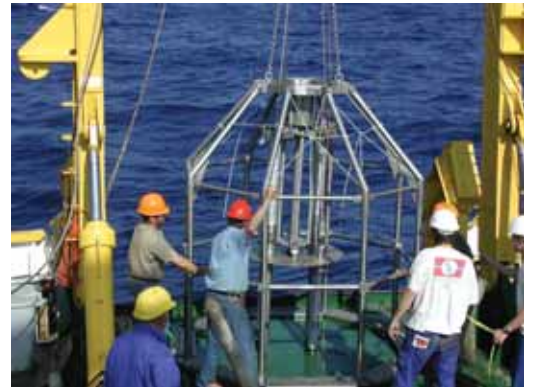
This year MAREANO will conduct two mapping cruises in areas covering neighboring parts of the shelf and slope to complete the mapping of prioritized areas in the Barents Sea. Guest scientists are welcome to participate on our cruises.

*Lene Buhl-Mortensen and team*

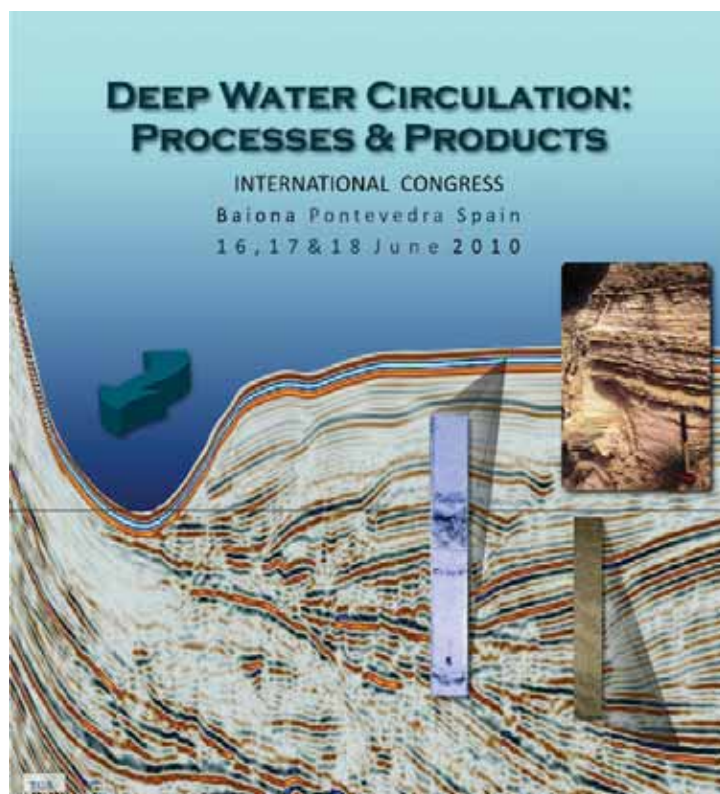
## New Paper: High spatial heterogeneity of prokaryotic communities in the Kazan MV

A new paper is in press regarding the structure of prokaryotic communities from the Kazan mud volcano (MV) sediment. This MV is part of the Anaximander Mountains, eastern Mediterranean Sea, which host several active and non-active mud volcanoes. We investigated the high-resolution sediment depth (every 5 cm, for the top 30 cm) 16S rRNA gene diversity in an active site of the MV, characterised by recent mud flow and the occurrence of gas hydrates the size of rice grains. We found only 38 unique archaeal phylotypes but 205 for bacteria. In addition, in each sediment layer, bacteria always had higher diversity than Archaea. Both of the communities were very different even at consecutive depths (i.e. every 5 cm) but at 15 and 20 cm below sea floor the prokaryotic communities were highly similar, hosting AOM-specific Archaea and bacteria. Most of the archaeal phylotypes were related to the famous methane-oxidisers ANME-1, -2 and -3 and the ones we found were very similar to those from habitats where anaerobic oxidation of methane (AOM) occurs, even though they occurred in sediment layers with no apparent AOM (below the sulfate depletion depth). Proteobacteria were the most abundant and diverse bacterial group, with the  $\gamma$ -Proteobacteria dominating in most sediment layers and were related to phylotypes involved in methane cycling. The  $\delta$ -Proteobacteria included several of the sulfate-reducers related to AOM. The rest of the bacterial phylotypes belonged to 15 known phyla and three unaffiliated groups, with representatives from similar habitats. It seems that the prokaryotic communities are not fully established in this site, apart from the 15 and 20 cm bsf. This raises the need for monitoring of these communities on a temporal scale, so we can tell when the prokaryotic communities respond and how long it takes for them to establish and perform their functional role, e.g., methane oxidation.

Maria G. Pachiadaki, Vasilios Lykousis, Euripides G. Stefanou, Konstantinos Ar. Kormas (in press) "Prokaryotic community structure and diversity in the sediments of an active submarine mud volcano (Kazan MV, East Mediterranean Sea)" FEMS Microbiol. Ecol. DOI: 10.1111/j.1574-6941.2010.00857



Above: Deploying a corer to sample mud at Kazan mud volcano



## An international congress "Deep-water Circulation: Processes and Products" is being held in Baiona, Spain, 16 - 18 June 2010.

The main aim of this Congress will be integrating deep-bottom current circulation, sedimentary processes, deposits and their implication for palaeoceanographic reconstructions. This will lead to better understanding the oceans' role in the global climate system; recognising contourites as a new target for economic resources; and consideration of specific biota and deep-water ecosystems related to bottom current circulation. This has become a truly multidisciplinary meeting. We have now updated the Web Page and hereby distribute the attached Second Circular.

We aim to provide a scientifically stimulating and socially enjoyable forum to meet and discuss results and ideas related to the conference theme. The meeting should be of interest to both academic and industrial participants, and although it is focused on Deep Water Circulation: Processes & Products, the congress is open to discussion of shallow water and even lacustrine drifts.

For more details, visit [www.facultadecdomar.es/contourites](http://www.facultadecdomar.es/contourites)



# In brief...

## Science, students and Southampton: the first HERMIONE student training workshop

Thirteen HERMIONE students and young post-docs arrived in Southampton last month for a week-long training course in all things HERMIONE. An all-star cast of lecturers were flown in from Italy, Germany, Scotland, Norway and Spain to bring the workshop participants up to speed on HERMIONE topics from cold-water corals to cold seeps. In addition to lectures, a great day was had on the NOC's near-shore vessel, the RV Callista, which provided training in seafloor surveying using multibeam bathymetry and side-scan sonar. Workshop participants also spent an afternoon looking at deep-sea sediment cores, which gave everyone the opportunity to get their hands dirty and learn a bit about the use of cores to examine sedimentary processes.



HERMIONITES aboard the RV Callista



Learning about contourites in cores from Dr. Veerle Huvenne

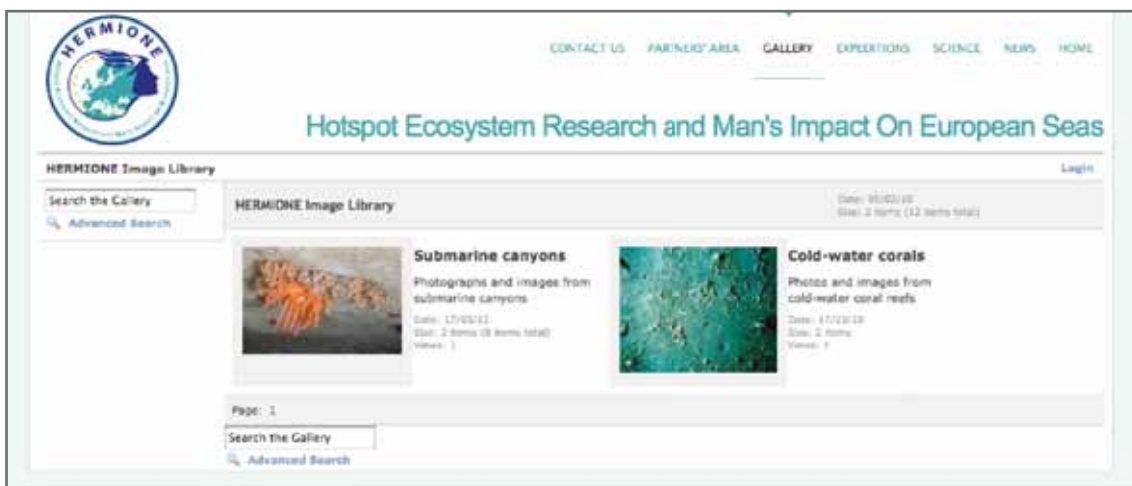
The last session of the week was dedicated to putting all the science into

perspective, with talks from socio-economists Sybille Van den Hove, Claire Armstrong and OSPAR's executive secretary, David Johnson, on the societal and economic importance of the deep sea, and how deep-sea research can be used to develop science-policy.

Overall, the general consensus from the HERMIONE student community was that they learnt a lot and had a good time... however, as one student noted, now that they know more of the breadth and depth of HERMIONE science, they are going to be kept very busy chasing up new ideas for their PhDs!

## HERMIONE image library goes LIVE!

HERMIONE's new image library will soon be up and running - this month, visit the HERMIONE website and click the "gallery" link in the top navigation bar. We are busily adding images from the HERMES image library and our own stocks, but we need more images! Please send your photographs and images to [adcp@noc.soton.ac.uk](mailto:adcp@noc.soton.ac.uk) so we can get this show on the road. All images will be properly credited to the appropriate source.





# Noticeboard



## TRACES



## Trans-Atlantic Coral Ecosystem Study

### European Science Foundation announces first international call for TRACES proposals

Following two years of development we are delighted to announce the first TRACES call for proposals. The EuroTRACES call was launched by the European Science Foundation in late January 2010 with a deadline for applicants set for 26 March.

This call is open to researchers from Belgium, Germany, Ireland, Luxembourg, Netherlands, Poland, Portugal and Spain. Discussions between ESF and NOAA in the United States are on-going and we are hopeful that NOAA will provide project support for US researchers to join EuroTRACES.

This represents a significant advance in developing the first basin-scale study of cold-water corals, their ecology and palaeoceanographic archives. Thanks are due to everyone who's contributed to developing TRACES and its overall Science Plan over the first two years.

#### EuroTRACES Scientific Goals

EuroTRACES will examine the connectivity, ecology, biodiversity and palaeoceanographic archives of Atlantic deep-sea coral habitats. As we enter a time of rapid climate change induced by anthropogenic carbon dioxide emissions, cold-water corals are not only threatened by ocean warming and acidification but their skeletal remains and associated reef deposits contain vital clues to past rapid climate change events.

EuroTRACES sets out to unlock this information and set these long-lived, biodiverse deep-sea habitats in a wider context. Alongside its scientific vision, EuroTRACES collaborative research projects should maintain a strong dialogue with policy makers to ensure relevant information quickly becomes available to support on-going efforts to conserve the Atlantic's cold-water coral ecosystems.

Key scientific questions to be addressed by the projects include:

- Ecosystem research: Linkages and connectivity
- Ecosystem research: Biodiversity & biogeography
- Ecosystem research: Coral biology
- Climate records research

The following cross-cutting research activities are planned to supplement and support the previously mentioned scientific research themes:

- Mapping & habitats
- Oceanography & food supply
- Policy

TRACES programme development has been funded by the European Commission, Royal Society of Edinburgh, Canadian Department of Fisheries and Oceans, U.S. NOAA Undersea Research Center, University of North Carolina Center for Marine Science, US Geological Survey, Environmental Defense, Oceana, South Atlantic Fishery Management Council, UK Natural Environment Research Council, Scottish Association for Marine Science, Marine Conservation Biology Institute and the British Consulate-General Boston.

For more details see [www.esf.org/eurotraces](http://www.esf.org/eurotraces)

For more information on TRACES and to download the TRACES Science Plan see [www.lophelia.org/traces](http://www.lophelia.org/traces)

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