HERMIONE news

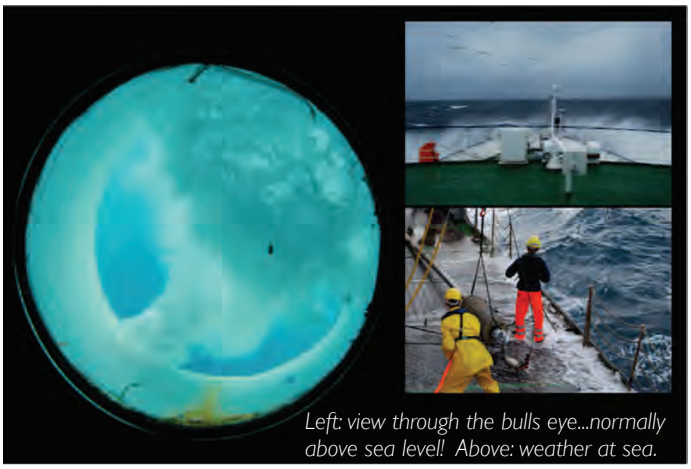
Issue 6, Winter/Spring 2011

www.eu-hermione.net

EXPLORING COLD-WATER CORALS OFF IRELAND: WHEN SCIENCE BECOMES A CHALLENGE

Claudia Wienberg (MARUM), Lydia Beuck (Senckenberg Institute) and POS400 cruise participants

In summer 2010, the German research vessel POSEIDON started its 400th cruise to the Porcupine Seabight off Ireland. Led by the HERMIONE scientist Claudia Wienberg, a team of 9 scientists and technicians from MARUM, SaM (Senckenberg Institute Wilhelmshaven) and UCC (University College Cork) was exploring the unique cold-water coral ecosystems of this area. The focus of expedition POS400 was set on the investigation of cold-water coral mounds of the Belgica Mound Province, where coral mounds are aligned as chains stretching from north to south, parallel to the slope. The coral mound chains are more or less restricted to distinct water depth intervals (shallow mound chain: ~700-900 m; deep mound chain: 900-1,050 m) and show significant variations in their recent coral coverage, with the deeper mounds hosting the most vivid coral communities in the area, whereas the mounds of the shallow mound chain are dominated by coral rubble and dead coral framework. This points to a displacement of the vital coral communities towards deeper waters in former times that might be related to changes in the water mass structure. The aim of the expedition was therefore the reconstruction of the Holocene development of the Belgica Mounds with special emphasis on the relationship between changes of the regional oceanography (and/or other environmental parameters) and the vitality of cold-water coral ecosystems. Existing data revealed that the onset of an interglacial current regime with increased bottom currents has favoured the re-settlement of cold-water corals in the Porcupine Seabight after the last glacial period. But there is still little knowledge about the dynamic development of these ecosystems primarily on millennial timescales during the Holocene.



Left: view through the bulls eye...normally above sea level! Above: weather at sea.

Despite the very bad weather conditions, a total of 18 gravity cores (total recovery: 78 core metres) and 29 grab samples were collected. The CTD was deployed at three stations for so-called yoyo measurements during which the CTD was continuously lowered and raised for a ~12 hours period to trace tidal fluctuations. Finally, during 7 ROV dives, 23 hours of video material was

Above (from left to right). Macrofauna observed during an ROV dive across Lion's Head Mound: cerianthid, fly-trap anemone Actinoscyphia cf. saginata, Stichastrella rosea , Paromola cuvieri *carrying an octocoral with its fifth pereiopods,* Octopus vulgaris *observing the ROV (ROV images ©MARUM).*

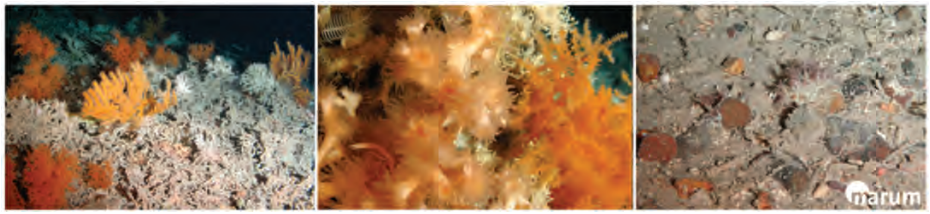
(Continued overleaf)

In this issue...

(continued from previous page)

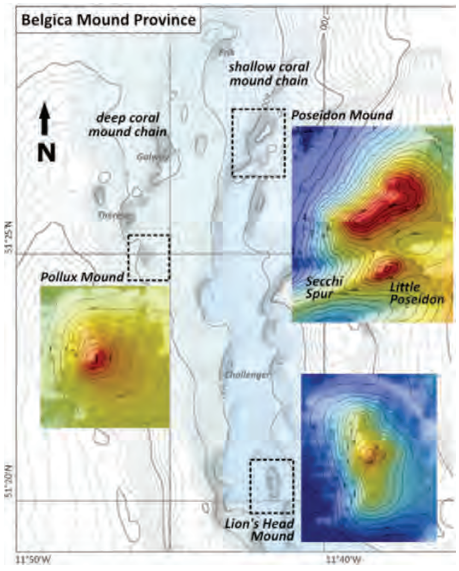
recorded and over 1,250 still images of the fascinating deep-sea world of cold-water coral ecosystems were collected (see below).

The studies during expedition POS400 concentrated on three areas within the Belgica Mound Province: (A) an 'off-mound' area situated to the north of the studied coral mounds, (B) Pollux Mound which belongs to the deep coral mound chain, and (C) Poseidon Mound, Little Poseidon Mound and Lion's Head Mound, which all belong to the shallow mound chain (see map at right side). Solely for these coral mounds extended video observations were conducted, which revealed partly surprising and new insights regarding the facies and faunal distribution.



Above (from left to right). Lion's Head Mound. Western flank: large coral framework abundantly colonised by octocorals, antipatharians, and few small-sized Lophelia *and* Madrepora *colonies. Mound top: large* Lophelia *colonies. Eastern flank: dropstones (ROV images ©MARUM).*

Above (from left to right). Poseidon Mound. Southern top: large boulders colonised barnacles, the calcified hydrozoan Pliobothrus symmetricus. Northern top: carbonatic seabed structures of unknown origin colonised by hydrozoans and live Lophelia (ROV images ©MARUM, Bremen).



Lion's Head Mound was named after the famous mountain in Cape Town, where the World Cup of 2010 took place concurrent to expedition POS400. The mound is located in a water depth between 720 and 840 m and was described for the very first time. The lower southwestern flank of Lion's Head Mound was dominated by current ripples, dropstones and abundant coral rubble pointing to rather strong bottom currents. Further uphill, the amount of coral rubble and dead coral framework increased and live scleractinian colonies and antipatharians became abundant. On the upper western flank (720-780 m) and on top of the mound, large megabars or dunes were developed which have an approximate N-S orientation. The crests of these dunes were densely covered by dead coral framework colonised by a highly diverse macrofauna comprising numerous live Lophelia and Madrepora colonies, antipatharians, octocorals, sponges, crinoids and anemones. The upper eastern flank was covered by large coral framework colonised by abundant Lophelia pertusa and Madrepora oculata colonies, whereas towards the lower eastern flank (770-820 m), a conspicuous change towards a dropstone dominated facies was observed. The dropstones were densely colonised by barnacles, the calcified hydrozoan Pliobothrus symmetricus and small stoloniferous octocorals.

Poseidon Mound is a SW-NE elongated mound that has an elevation of ~130 m with a base at around 820 m water depth. As already observed for Lion's Head Mound, the western flank was covered by large dunes. Whereas the dune troughs were dominated by dropstones and small-sized coral rubble, the dune crests were covered by massive dead coral framework which was colonised by few small live Lophelia and Madrepora colonies, abundant antipatharians, octocorals, crinoids, echinoids, crustaceans and sponges. To the surprise of the scientists, the southwestern top of Poseidon Mound (680-690 m) was covered by large boulder-sized dropstones (2-3 m in diameter) colonised by barnacles, the calcified hydrozoan Pliobothrus and very few juvenile Lophelia. Such a dropstone-barnacle facies is more characteristic for troughs or channels than for the top of a coral mound, and points to very strong bottom currents. On the northern edge of the top, a large area with several conspicuous metre-sized seabed structures occurred. The structures had a rough surface and were colonised by hydrozoans and small-sized Lophelia colonies. A sample collected by the ROV was preliminary defined as a medium lithified carbonate containing coral fragments and other shells, further analyses in the home laboratories will give more detailed information about the origin of these carbonates.

For further information about work and life onboard RV POSEIDON during POS400, please check the online cruise blog: http://www.marum.de/en/Log_POS400.html.

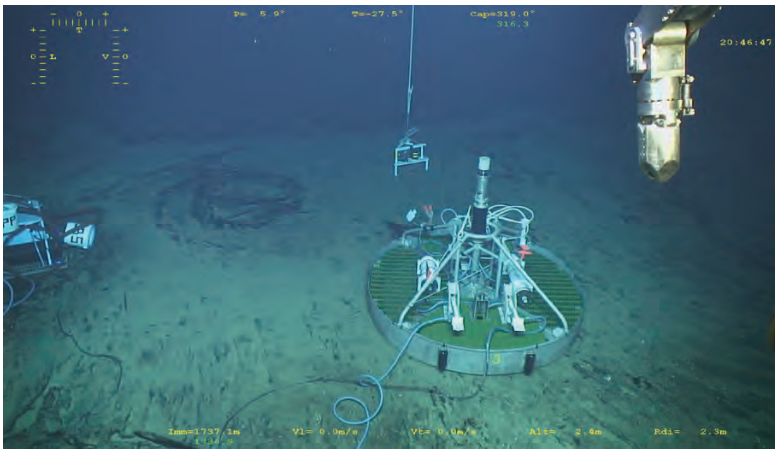
Right: cruise participants (from left to right): André Freiwald, Götz Ruhland, Jana Stone, Lydia Beuck, Claudia Wienberg, Mark Coughlan, Markus Eisele, Werner Dimmler, Marco Klann.

HYDROTHERMAL VENTS ON THE MID-ATLANTIC RIDGE UNDER CLOSE OBSERVATION UNTIL JUNE 2011

J. Sarrazin, P-M Sarradin, A. Colaço, M. Cannat, J. Blandin, J. Legrand, J. Escartin and the MoMARSAT cruise participants

Hydrothermal circulation at mid-ocean ridges is a fundamental process that impacts the transfer of energy and matter from the interior of the Earth to the crust, hydrosphere and biosphere. The unique faunal communities that develop near these vents are sustained by chemosynthetic microorganisms that use the hot fluid chemicals as a source of energy. Environmental instability resulting from active mid-ocean ridge processes create changes in the flux, composition and temperature of emitted vent fluids and influence the associated hydrothermal communities.

The MoMAR (Monitoring the Mid-Atlantic Ridge) project was initiated 10 years ago by the InterRidge Program to promote and coordinate long-term multidisciplinary monitoring of hydrothermal vents at MAR. It aims to study vent environmental dynamics from geophysics to microbiology. More recently, the MoMAR area has been chosen as one of the 11 key sites of the European project ESONET NoE. The MoMAR-D project was selected as a demonstration mission to deploy and manage a deep-sea observatory at Lucky Strike during for one year. Monitoring this large hydrothermal field, located in the centre of one of the most volcanically active segment of the MAR, will offer a high probability of capturing evidence for volcanic events, observing interactions between faulting, magmatism, hydrothermal circulations and, evaluating their impacts on the ecosystem.



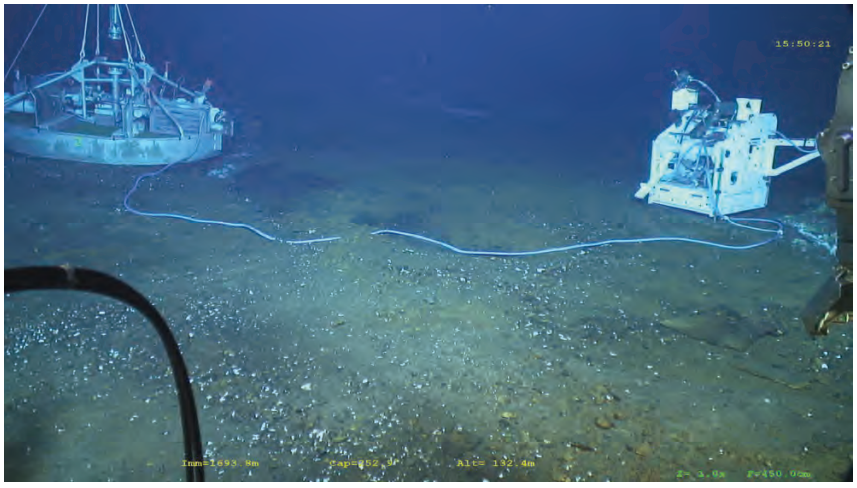
Above: the SEAMON West node was deployed in the centre of the lava lake in the Lucky Strike vent field. Momarsat cruise 2010 (c) *Ifremer*

The MoMARSAT 1 oceanographic cruise, led jointly by Ifremer and the Institute of Earth Physics of Paris (IPGP) (CNRS/Universities Paris 7-Diderot and Paris 6-UPMC), was conducted on board RV Pourquoi pas? from 1-16 October 2010. During this cruise, the ROV Victor 6000 deployed a series of autonomous oceanographic instruments in the Lucky Strike vent field on the Mid-Atlantic ridge, off the Azores. The observatory infrastructure is composed of two Sea Monitoring Nodes (SEAMON) acoustically linked to a surface relay buoy (BOREL), ensuring satellite communication to the land base station in Brest (France). A first SEAMON node, dedicated to large-scale geophysical studies, was moored in the centre of the large lava lake present in the Lucky Strike vent field. This node hosts an Ocean Bottom Sismometer (OBS) and a permanent pressure gauge (JPP) that were connected underwater using wet mateable connectors.

A second node was deployed at the base of the Tour Eiffel active edifice to study the links between faunal dynamics and variations of physico-chemical factors. This node is composed of a High Definition (HD) video camera, 6 LED lights, an Aanderaa optode (oxygen, temperature) and two in situ chemical analysers.

These two nodes communicate via underwater acoustics to a BOREL buoy that was moored on the ocean surface within acoustic range of the SEAMON stations. The buoy is equipped with two identical and redundant back up data transmission channels to ensure uninterrupted data flow. Scientific and technical data (including a low-resolution photo) are transmitted daily to the data centre in Brest. The MoMAR deep-sea observatory has transmitted data to Ifremer's Brest centre since 12 October 2010.

Autonomous instruments (OBS, ocean bottom tiltmeter, current meters, particle trap, colonisation experiments and temperature probes) were also deployed in the LS vent field.



Above: the SEAMON East node was deployed at the base of the Tour Eiffel active edifice. Momarsat cruise 2010 (c) *Ifremer*

(Continued overleaf)

(continued from previous page)

Above: the BOREL buoy and research vessel Pourquoi pas? on the Mid-Atlantic Ridge. Momarsat cruise 2010 (c) *Jérôme Blandin*

They will store their data for the duration of the experiment (1 year). Treatment of data sets will be conducted in two stages: in near-real time for the subset that is transmitted through the SEAMON system; and after the 12 months for the whole data set. The near-real time data will serve both as support for scientific interpretation, and as an indicator that an event is occurring. Volcanic (eruption, underground dyking event, or rapid degassing of the magma chamber), tectonic (displacement along axial faults), or hydrothermal events are all expected to occur on the MAR. Understanding the impact of these events on biological communities is one of our key objectives.

As part of WP5 of HERMIONE, we aim to understand the changes in hydrothermal vent communities, here a Bathymodiolus azoricus faunal assemblage, in relation to variations in environmental conditions at different spatial and temporal scales. In the longer term, imagery data along with abiotic factors will be investigated and compared using multivariate statistics and cluster analyses. More specifically, we are looking to answer the following questions: (i) What biological, physical and geological data can be manually and automatically extracted from video imagery to feed the temporal data base, (ii) what are the different scales of variations of environmental conditions and (iii) what are the links between environmental changes and faunal dynamics at different spatial scales in hydrothermal ecosystems? Ultimately, these data plus those from other scientific disciplines (physics, geophysics, chemistry) will be fed within a GIS that will allow for a graphical representation of all the observed temporal variations. The role of environmental factors on different aspects of vent faunal dynamics (community structure, behaviour, reproduction, colonization, activity rhythm, etc) will be evaluated.

The MoMAR technological feat, involving several European research institutes, is the fruit of several years' work. Through this newly installed observatory, the active hydrothermal processes on the Lucky Strike field are monitored on a continuous basis. Participating scientists can now monitor variations in physico-chemical conditions as well as in the seismic activity of the area and observe the dynamics of the hydrothermal faunal assemblage. This observatory will be operational for one year and its instruments will be recovered in summer 2011 during the MoMARSAT II cruise. The data can be viewed online, according to ESONET data policy and European directives (temporary access through http://www.ifremer.fr/WC2en/allEulerianNetworks). The system should be recovered in 2011 after 12 months on the bottom. The extension of the deployment for another year is currently planned.

Several research institutes are actively involved in the project: Ifremer and IPGP are leading the two MoMARSAT cruises with the participation of the University of the Azores, the University of Lisbon, the National Oceanography Centre in Southampton (NOCS), University of Bremen and several other French CNRS laboratories, including the European Institute for Marine Studies (IUEM), the Transfer Mechanisms in Geology Laboratory (LMTG) and the Laboratory for Experimentation and Numerical Methods in Oceanography and the Climate (LOCEAN). The MoMARSAT cruises are part of the marine observatory project for the Azores region, one of the components of the two European programmes ESONET (European Seafloor Observatory Network) and EMSO (European Multidisciplinary Sea Observatory) that aim to establish a network of deep-sea marine observatories. The objective of these deep-sea observatories is to monitor — in real time — the natural dynamics of marine ecosystems, from deep in the ocean crust to the surface of the seafloor, along with the fauna that inhabit these depths. Knowledge gained will also help to better manage the resources found in this area, which became a protected marine area in 2006 as part of the OSPAR network.

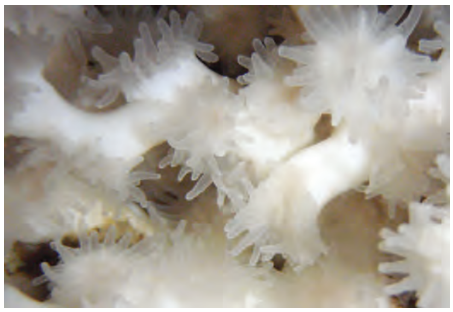
For more information and photos of the MoMAR observatory operations, you can look at the cruise web site: www.ifremer.fr/momarsat2010

Above: the MoMAR observatory transmits one low-resolution image of the Bathymodiolus azoricus faunal assemblage that is being monitored on the Lucky Strike vent field along with related oxygen and temperature data. SMOOVE/Momar observatory 2010 (c) *Ifremer.*

OCEAN ACIDIFICATION VS. BIOGENIC CALCIFIERS

L Wicks, S Hennige & JM Murray, HWU

Researchers from Heriot Watt University (HWU), Edinburgh, have begun to investigate the potential response of the cold-water coral Lophelia pertusa to ocean warming and acidification. Heriot Watt is one of 12 organisations involved in the Benthic Consortium UK Ocean Acidification Research Programme (UKOARP). This new programme allows the team at Heriot-Watt to scale-up their earlier work on cold-water coral physiology begun during the HERMES and HERMIONE projects. The UK ocean acidification programme brings together 101 scientists from 21 of the UK's top scientific institutions, addressing biochemical, biological and physiological questions associated with this global issue.



Above: Lophelia pertusa *photographed in the lab. Image courtesy JM Roberts, HWU*

Lophelia pertusa is the most widespread and important species of cold-water coral. It is an important biogenic calcifier, with its extensive reef frameworks providing habitat for hundreds of organisms. The charismatic tropical coral reefs were one of the first ecosystems to be recognized as vulnerable to ocean acidification, with the formation of their calcium carbonate skeletons altered when exposed to increased CO2 conditions. However, knowledge is lacking on the potential effects of ocean acidification and warming on cold-water corals, which have remained out of sight and out of mind. To this end, in June 2011, Heriot-Watt researchers will be heading out to Mingulay Reef, UK as part of the UKOARP Pelagic Consortium's RRS Discovery Cruise. Here they will collect live L. pertusa colonies, which will be used in a long-term multi-replicated ocean acidification system currently being built at Heriot-Watt University.

In the shallower regions closer to shore, red coralline algae beds (maerl) perform a similar ecological function as the deep L. pertusa reefs, by acting as a nursery ground and providing habitat to a variety of organisms. The potential effect of ocean acidification and warming upon the formation and longevity of the maerl algal thallus remains unknown, and is of key concern when considering the future of these maerl ecosystems and the organisms they support. To address these concerns, long-term ocean acidification experiments, carefully co-ordinated with those at Heriot-Watt, are being performed at the University of Glasgow.

Field work is a crucial component for both projects to compare and contextualize laboratory work to in situ systems. Maerl fieldwork will involve sampling around the coast of Scotland, to assess in situ maerl growth, photosynthesis, calcification and water carbonate chemistry. Fieldwork for L. pertusa will involve further cruises around the UK in 2012, to perform additional short term ocean acidification experiments on L. pertusa samples. These cruises include a dedicated cruise with the UK's deep-diving remotely operated vehicle ISIS. The ISIS cruise will again visit the Mingulay reefs, before heading offshore to experiment within the cold-water coral habitats of the Rockall Bank.

Below: Maerl. Image courtesy N Kamenos

The results gained from these studies will be used to build and run conceptual, statistical and numerical models which will predict the impact of future ocean pH scenarios on the biodiversity and function of these key coastal and deep-sea ecosystems.

AMPHIPODS...

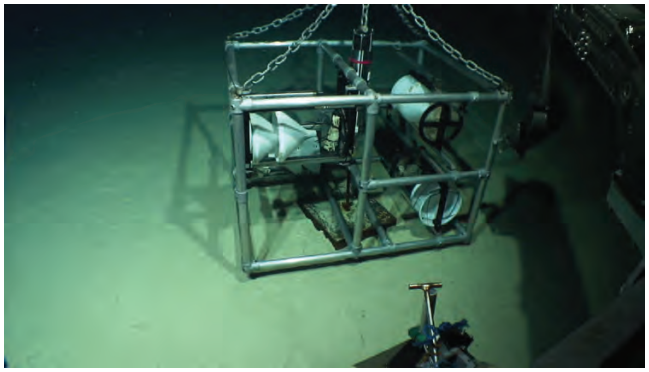
...SCAVENGERS OF THE DEEP

Above: Paralicella caperesca

Grant A. Duffy & Tammy Horton
National Oceanography Centre, Southampton, UK

The main aim of our work is to determine how the presence of submarine canyons affect scavenging amphipod assemblages in the deep sea. Scavenging fauna play a vital role in reintroducing organic carbon from large food falls, such as whale and fish carcasses, into the wider deep-sea food chain via predation by larger deep-sea organisms such as fish, and faecal matter enrichment of the surrounding sediments. Thus far the focus of this work has been the Nazaré, Cascais, and Setúbal canyons on the Iberian Margin using samples collected during HERMES expeditions.

As observed in other baited traps deployed in the deep sea, the majority of specimens caught were lysianassoid amphipods, a large and diverse superfamily of amphipods with specially adapted mouthparts ideal for feeding on large food falls (De Broyer et al., 2004). So far a total of nine species have been identified from six genera, all common to the abyssal plain and previously found at similar depths in the adjoining Tagus and Iberian abyssal plains (Thurston, 1990). Paralicella caperesca Shulenberger and Barnard 1976 and P. tenuipes Chevreux, 1908 were found in abundance in all samples, with P. caperesca being the dominant species in terms of abundance in all but one of the samples examined.



A baited trap on the seafloor luring amphipods with its fishy aroma.

Of particular note are the changes in abundances observed between samples from trapsets in different canyons. Although quantitative comparisons are difficult due to non-standardisation of trapping methodology and a lack of local current data, samples from submarine canyons contain higher numbers of individuals than samples taken at similar depths on the abyssal plains of the North-East Atlantic (Thurston, 1990). A similar pattern of relatively high numbers of common abyssal species has been previously observed in scavenging fishes within submarine canyons (King et al., 2008).

Top: Eurythenes gryllus
Above: Grant sorting amphipods aboard an ECOMAR cruise

The samples from Nazaré canyon are especially intriguing, with a far higher total number of specimens in each sample than samples from either Cascais or Setúbal Canyons. This is in accordance with the high sedimentation rate of organically enriched carbon recorded within Nazaré canyon as a result of interception of matter travelling laterally across the continental shelf (Garcia et al., 2007). The catches seen in Cascais and Setubál, although smaller than those in Nazaré, are larger than one would expect from a comparable depth on the abyssal plain, this is a reflection of increased organic sediment input in comparison to the open slope (Garcia et al.,2010) as a result of lateral interception and estuarine input from the Tagus and Sado Rivers.

The future direction of this research will encompass an in-depth look at the species composition of all samples and a study of the population ecology of P. caperesca and P. tenuipes inhabiting the Iberian Margin submarine canyons. This work can be aided with the addition of more data from submarine canyons, abyssal plains, and continental margins within the North-East Atlantic. If any HERMIONE partners have amphipod samples from baited traps, or as yet unpublished occurrence and abundance data of scavenging deep-sea amphipods please contact us.

Gully networks: Fine-scale morphology analysis to understand the evolution of submarine canyon systems

Tubau, X.[1], Micallef, A.[1,2], Lastras, G.[1], Canals, M[1].

[1] GRC , Universitat de Barcelona, [2] University of Malta

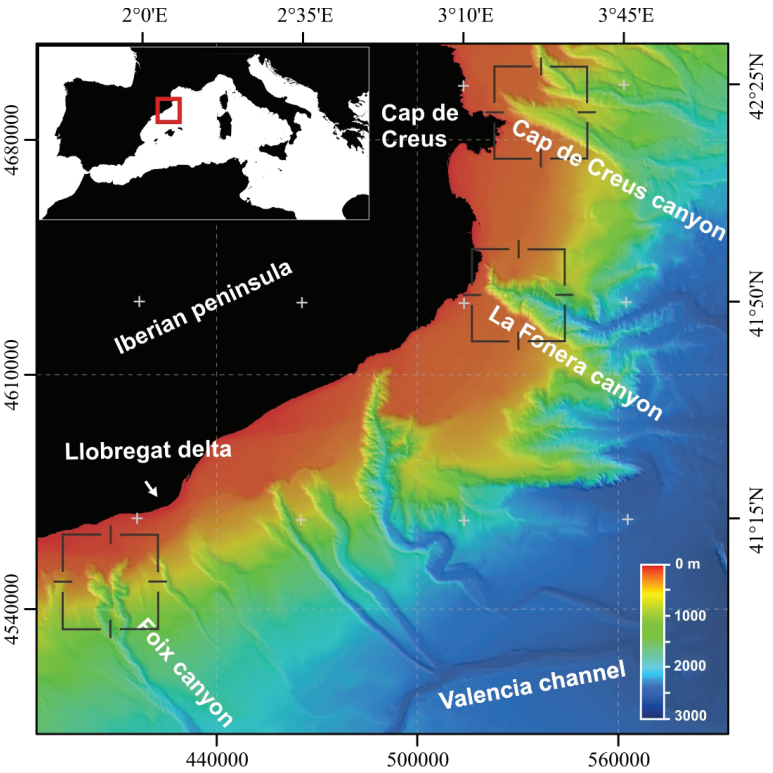


Fig. 1. Shaded coloured relief map of the northeastern Iberian margin. Boxes provide location of canyons cited in the text.

The Catalan passive continental margin in the northwestern Mediterranean Sea is a main area of interest for HERMIONites. Numerous multi-staged submarine canyons incise the margin. These canyons host coral ecosystems and are major pathways for the transport of sediment to the deep sea during seasonal hydro-sedimentary events (Canals et al., 2006; Palanques et al., 2006). Though substantial progress has been made in the last two decades, new high- resolution acoustic data acquired during recent cruises show that there is still a lot to understand from the Catalan submarine canyons.

A fine-scale morphological analysis shows that these canyons are characterized by well-organized gully systems, the study of which can provide new insight on the canyon's formative geological processes. Some of the best studied amongst these canyon systems are, from north to south, Cap de Creus, La Fonera and Foix canyons (Fig. 1). These three canyons are representative of the morphological complexity and the diversity of geological controls that distinguish the Catalan margin (Amblas et al., 2006).

The Cap de Creus canyon displays very large round-headed gullies and hanging gullies along its northern wall that extend from the canyon rim at 100 m down to 600 m of water depth (Fig. 2). The gully drainage system in the southern wall is mostly obliterated by the passage of dense shelf water cascading currents (Lastras et al., 2007). At the head of La Fonera canyon, the largest in the Catalan margin, located 50 km to the south, gullies on the southern wall initiate at the canyon rim and are complex, closely spaced and well defined, reflecting an advanced stage of development and a high erosive capability (Fig. 3). On the contrary, gullies on the northern wall can only be observed below 1000 m of water depth and are simple, smooth and round-headed, likely due to minor density flows escaping from the shelf (Lastras et al., in press).

Nearby the Llobregat river mouth, and 140 km south of Cap de Creus canyon, the Foix canyon originates at the continental shelf break (Fig. 4). Its two branches display several systems of dense gully networks from the canyon rim down to 800 m water depth. The northern branch of the canyon displays a well developed gully pattern, whereas the gullies in the southern branch are at an earlier stage of development. High resolution bathymetric data from the Foix Canyon are currently being analysed and classified in order to identify the controls on gully network evolution and model the development of the canyon.

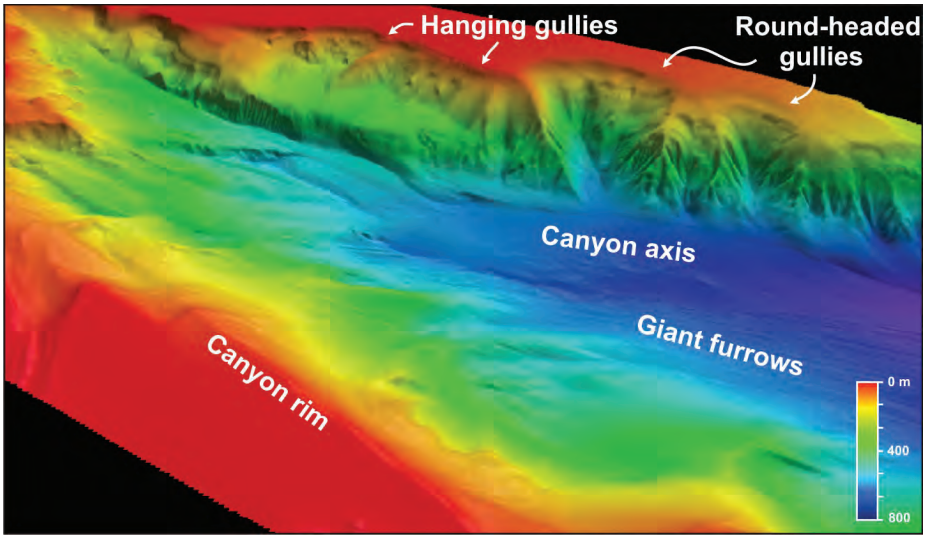
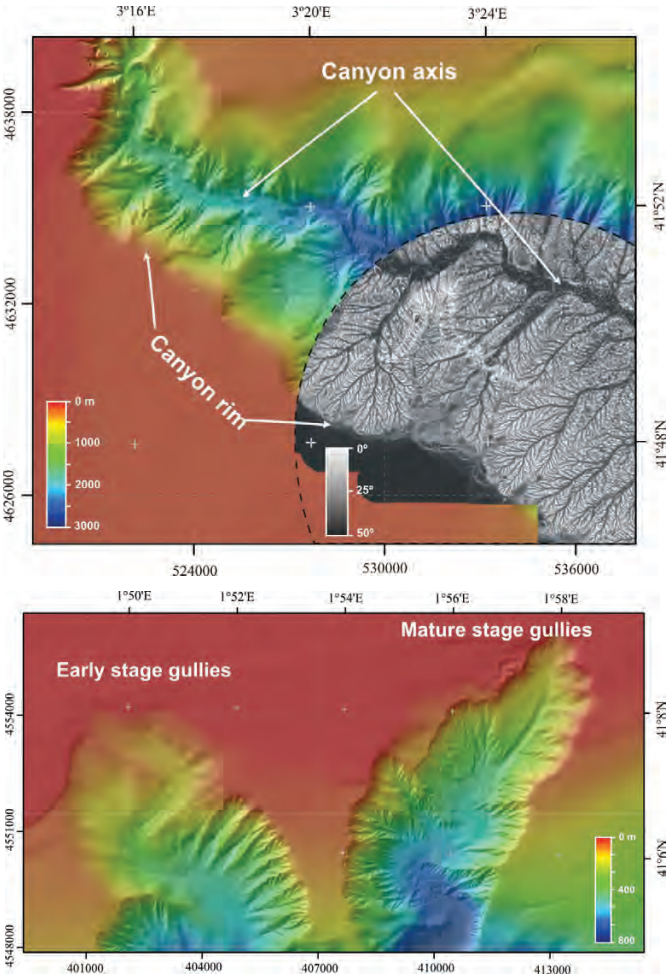


Fig 2. 3D view of Cap de Creus canyon, showing different types of gullies.

The upper sections of these submarine canyons section are located in a

(Continued overleaf)

(continued from previous page)



changeable and dynamic submarine environment due to the influence of river floods, storms, mesoscale currents and dense shelf water cascading, among other processes. The extent of erosion and infilling of gully networks is regulated by the intensity and frequency of these processes. Studying the development and occurrence of the fine scale geomorphology of canyon heads can thus help to better understand the above mentioned processes and their role in canyon evolution.

References

Amblas, D., Canals, M., Urgeles, R., Lastras, G., Liquete, C., Hughes-Clarke, J.E., Casamor, J.L., Calafat, A.M., 2006. Morphogenetic mesoscale analysis of the northeastern Iberian margin, NW Mediterranean Basin. Marine Geology 234 (1–4), 3–20.

Canals, M., Puig, P., Durrieu de Madron, X., Heussner, S., Palanques, A., Fabres, J., 2006. Flushing submarine canyons. Nature 444, 354–357.

Lastras, G., Canals, M., Urgeles, R., Amblas, D., Ivanov, M., Droz, L., Dennielou, B., Fabrés, J., Schoolmeester, T., Akhmetzhanov, A., Orange, D., García-García, A., 2007. A walk down the Cap de Creus canyon, northwestern Mediterranean Sea: recent processes inferred from morphology and sediment bedforms. Marine Geology 246 (2–4), 176–192.

Lastras, G., Canals, M., Amblas, D., Lavoie, C., Church, I., De Mol, B., Duran, R., Calafat, A.M., Hughes-Clarke, J.E., Smith, C., Heussner, S., "Euroleón" cruise shipboard party, 2011. Understanding sediment dynamics of two large submarine valleys from seafloor data: Blanes and La Fonera canyons, northwestern Mediterranean Sea. Marine Geology, in press.

Palanques, A., Durrieu de Madron, X., Puig, P., Fabres, J., Guillén, J., Calafat, A., Canals, M., Heussner, S., Bonnin, J., 2006. Suspended sediment fluxes and transport processes in the Gulf of Lions submarine canyons. The role of storms and dense water cascading: Marine Geology, 234 (1-4): 43-61.

Fig 3 (top). Shaded coloured relief of La Fonera canyon, with the slope gradient map in the inset. Note how gullies develop a complex drainage network.
Fig 4 (above). Shaded coloured relief map of the Foix canyon two main heads gully. See Fig. 1 for location.

Upcoming cruise: RV METEOR to investigate recent and fossil cold-water coral growth in the Bay of Biscay

Sascha Floegel, IFM-GEOMAR

Leg 5 of cruise M84 to the bay of Biscay will investigate the environmental conditions of recent and fossil cold-water coral growth. The work will be carried out in four working areas spanning a transect between Vigo (Spain) and Brest (France). We will use benthic lander systems and CTDs to explore the physical and hydrochemical characteristics of bottom water masses. The goal of leg 5 is to analyse the distribution and occurrences of recent and fossil cold-water corals as well as their biological, chemical, and hydrographic boundary conditions. During past scientific cruises we have successfully collected extensive data sets regarding their geological and oceanographic environmental conditions. These studies have shown that parameters such as temperature, salinity, dissolved oxygen, current intensities, and different substrates may vary considerably without being the limiting control factor on the large-scale distribution of living cold-water coral communities.

The goal of this cruise is to investigate the large-scale pattern (16°N; Mauretania to 72°N; Norway) of physical, chemical, and biological boundary conditions necessary for the growth of recent cold-water coral reef growth in the bay of Biscay thus closing important gaps in our existing data sets along the African and European continental margin, qualitatively and quantitatively. To study the boundary conditions of thriving coral communities we will use the following methodologies: hydroacoustics, CTD, ADCP, biogeochemistry, geology/sedimentology, and biology. We will place an emphasis on the exploration of new occurrences of cold-water coral reefs.

A second focus of this cruise is the evolution of the radiogenic Neodymium (Nd) isotope signature of Mediterranean Outflow (MOW) water along its flow path in the Bay of Biscay and the potential influence of weathering contributions from land. Since Nd has a residence time of 400-2000 years in the ocean, water masses are labelled with a certain Nd isotopic signature in their source region. Subsequent mixing of water masses in the ocean can be reconstructed using the Nd isotope signature. The planned cruise track in the Bay of Biscay is a unique opportunity to simultaneously study water mixing on the one hand and the influence of exchange processes between the open ocean and the shelves on the other.

One of the two arms of MOW flows along the continental shelves of Portugal and Spain to the North. This component has an isotopic signature (ENd) of -9.4 at its source in the Strait of Gibraltar. Surrounding water masses above and below have a significantly more negative signature (ENd = -11 to -13.5). The detailed sampling of the water column along the cruise track will enable us to trace the proceeding mixing of MOW with north Atlantic waters and its reflection in the Nd-isotopic signature. These signatures can then be compared with past seawater data extracted from pelagic sediments in the Bay of Biscay. These data will allow us to reconstruct the intensity and flow pattern of MOW in the past.

Simultaneously, we will sample bottom waters directly at the sediment-water interface to investigate the interaction of MOW with the sediments. For the first time, we will be able to directly investigate the influence of these "Boundary Exchange" processes on the dissolved Nd-isotopic signature in bottom waters where ultimately the paleo proxy signature is formed.

DEEP-SEA COMMERCIAL TRAWLING: HEAVY PHYSICAL IMPACTS ON FISHING GROUNDS AND BEYOND

Jacobo Martín, Pere Puig, Albert Palanques, Joan Batista Company, Marta Ribó

Among the anthropogenic activities that can impact the seafloor and remobilize marine sediments, trawling is recognized as the most alarming due to its widespread geographical distribution and recurrent nature.

Perhaps the most worrying issue is that, following the exhaustion of traditional coastal fisheries, commercial trawling has been progressively extending offshore during the last decades. The impacts of artificial resuspension on the seafloor tend to be more severe and long-lasting with increasing water depth (Collie et al., 2000) owing to the correlative decrease of natural disturbances that can overcome them.

Furthermore, the impacts associated with trawling may extend down-slope beyond the regions that are actually being fished (Bailey et al., 2009). This is particularly true in steep environments such as submarine canyons, where previous studies have shown that trawling gears can generate far-reaching sediment gravity flows (Palanques et al., 2006).

Submarine canyons and their rims, due to their peculiar hydrodynamic and biogeochemical features, harbour considerable biodiversity and faunal abundance and, as a consequence, the soft bottoms surrounding submarine canyons are often targeted by trawlers, which today can even venture in the steep canyon walls.

In 2001, studies conducted in the Palamós (=Fonera) submarine canyon (Fig. 1a) in the NW Mediterranean documented the propagation to the canyon axis of trawling-induced resuspension in the canyon walls and the imprint of this anthropogenic activity in the deep sedimentary budget (Martin et al., 2007, 2008).

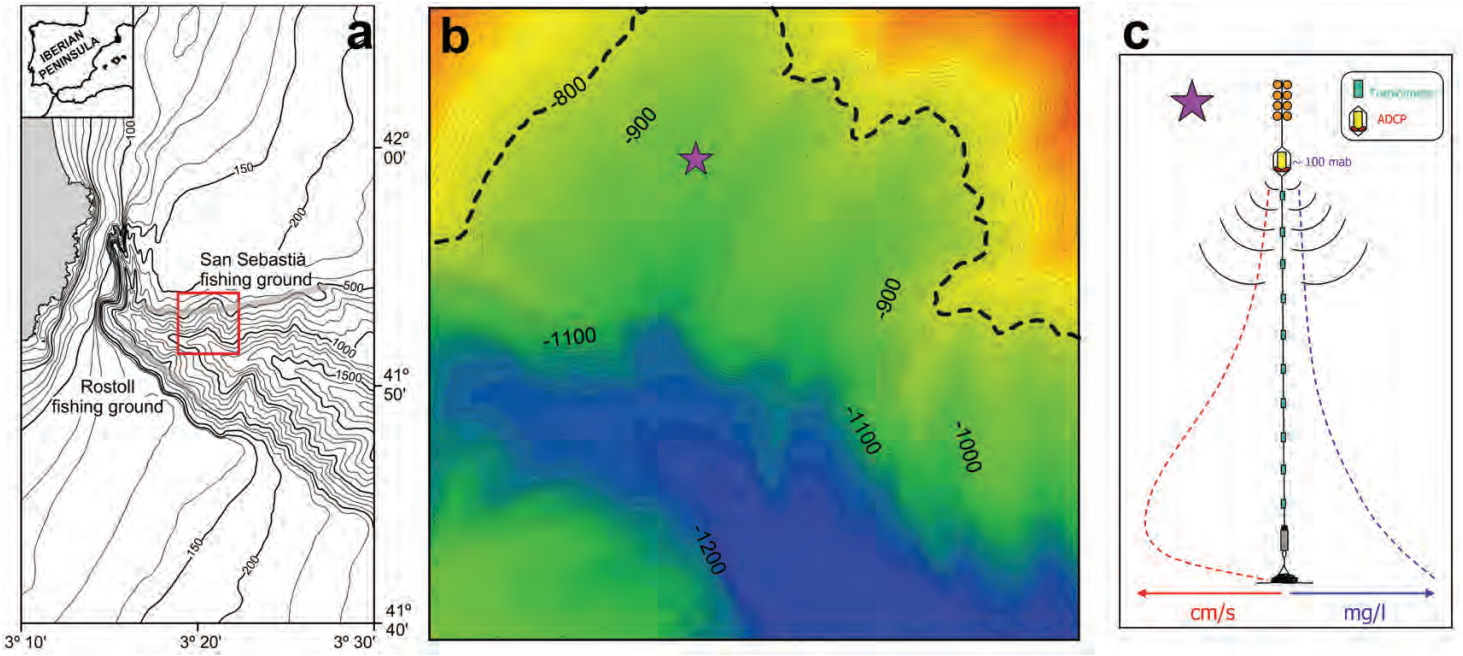


Figure 1. a) The Palamós submarine canyon with the main trawling grounds marked with light grey lines; b) Detail of the study area showing the location of the moored line. The maximum depth of trawling activities (800 m) is marked in bold dashed line. Bathymetry courtesy of University of Barcelona; c) Schematic view of the instrumented line.

To improve our knowledge of trawling-induced resuspension, on June 2010 we deployed a mooring array comprising a downward looking 600 kHz ADCP at 100 meters above the bottom (mab) and a chain of 10 turbidimeters (sampling rate = 1 min) distributed from 100 to 2 mab (Fig. 1c). The line was deployed at 960 m depth inside a lateral tributary (Fig. 1b) that is known to channel the gravity flows formed in the northern canyon towards the main canyon valley.

Unfortunately, the ADCP stopped recording soon after the deployment due to a firmware issue. Nonetheless, the

(Continued overleaf)

(continued from previous page)

turbidimeters worked satisfactorily and documented the thick turbid plumes caused by trawling activities with an unprecedented level of detail.

Figure 2 offers a snapshot of the turbidimeter time-series, comprising the first 10 days of data recording at 5 and 50 mab. During working days and during working hours, sediment plumes were clearly detected up to 100 mab. The absence of resuspension on weekends and holidays leaves no doubt about the origin of these episodes. In some instances, two turbid plumes are distinguishable for a given working day, corresponding to the two daily hauls carried out by the fishing boats: in an offshore

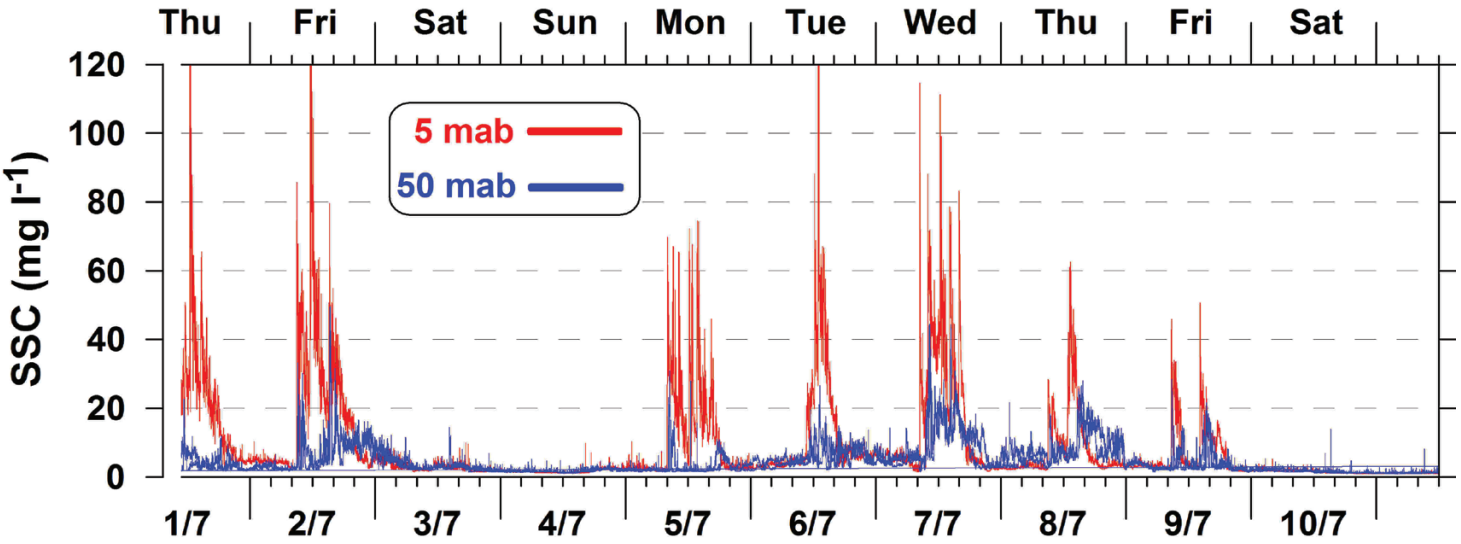


Figure 2: Time series of suspended sediment concentration at 5 and 50 meters above the bottom (mab) during the first days of the deployment (1-10 July 2010).

direction at around 9 AM and heading back to the port in the afternoon, respectively.

Suspended sediment concentrations inside these plumes (up to 150 mg l-1 near the bottom) are orders of magnitude higher than ambient values and comparable, among natural processes, only to major gravity flows.

It is worth to note that these impressive sediment plumes were observed over a total water depth ~960 m, that is 160 m deeper than the maximum working depth of commercial trawlers in this region (Fig. 1b). This emphasizes the idea that anthropogenic resuspension of bottom sediments, in particular commercial trawling, can be an overwhelming factor controlling sedimentary dynamics in certain deep-sea regions, and that the effects can be clearly felt far from the fishing grounds.

Further work planned for spring and autumn 2011 includes sediment coring to assess the geographical extension of the seafloor perturbations in the canyon associated to trawling and the re-deployment of the turbidimeter which, in combination with a fully operational ADCP, will allow to calculate the sediment transport involved in these trawling-induced resuspension events.

Right: deployment of a mooring array

References

Bailey, D.M., M.A. Collins, J.D. M. Gordon, A.F. Zuur and I.G. Priede. 2009. Long-term changes in deep-water fish populations in the northeast Atlantic: a deeper reaching effect of fisheries? Proc. R. Soc. B, 276, 1965–1969.

Collie, J.S., Hall, S.J., Kaiser, M.J. and Poiner, I.R. 2000. A quantitative analysis of fishing impacts on shelf-sea benthos. Journal of Animal Ecology, 69(5): 785-798.

Martín, J., Puig, P., Palanques, A., Masqué, P., García-Orellana, J., 2008. Effect of commercial trawling on the deep sedimentation in a Mediterranean submarine canyon. Marine Geology 252(3-4), 150-155.

Palanques, A., Martín, J., Puig, P., Guillén, J., Company, J.B. and Sardà, F. 2006. Evidence of sediment gravity flows induced by trawling in the Palamós (Fonera) submarine canyon (northwestern Mediterranean). Deep-Sea Res. I 53, 201-214.

THE MEDITERRANEAN BASIN: A CRADLE FOR DEEP-WATER CORALS AND COLD SEEPS

Fig. 3.

Lorenzo Angeletti and Marco Taviani, ISMAR-CNR, Italy

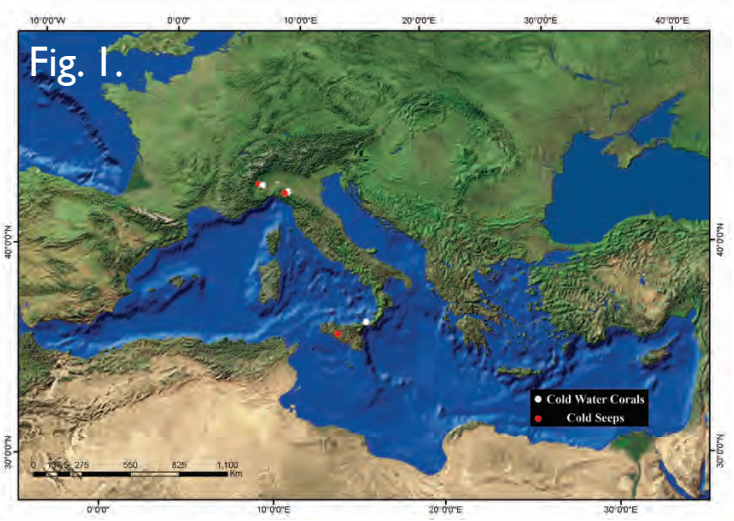


Fig. 1.

Deep-water coral and cold seep ecosystems are spectacular and widespread habitats of the aphotic ocean providing unique biodiversity hotspots that in the recent years are under the magnifying lens of the scientific marine community. New discoveries about distribution, functioning and oceanographic significance of these almost cosmopolitan habitats proceed at a fantastic rate. One fundamental issue for a more complete perception of their evolution and biogeography through time is quite obviously the knowledge of their past history, in other words, the search for their representatives in the fossil record. Their bathyal vertical range coupled with a rather patchy distribution, however, makes it somewhat problematic to trace back ancestors of former deep-sea coral and cold seep habitats. This is especially true for geologically younger counterparts; those that mostly share similar when not equal traits with extant communities. This legacy has to be searched for in those late Cainozoic marine sediments deposited at great depth and then strongly uplifted on-land, rather typically as a result of compressional tectonics or volcanic bulging. Not surprisingly, in the entire planet such types of deposits are rather uncommon and localized. In fact, as the modern ocean teaches, these peculiar habitats are far less common than 'normal' deep-sea environments better exemplified by the rather monotonous muddy bathyal to abyssal stretches. In this context, by exposing a variety of geologically young terrains in response to its effervescent geodynamic history, the Mediterranean basin plays a key role by being an invaluable laboratory for the evaluation of the space-time evolution of deep ecosystems. The Mediterranean basin is an extraordinary archive preserving the precious legacy of many past deep-sea coral and cold seep ecosystems as those targeted nowadays by HERMIONE and other international projects (Fig. 1).

Fig. 3.

Deep or cold-water corals are generally described as those azooxanthellatae colonial scleractinian (stony) corals more commonly distributed between ca. 200-1200 m in a temperature range of ca. 4-14° C (Freiwald et al., 2004; Roberts et al., 2009). Among the most relevant actors in promoting the growth of conspicuous structures are branching stony corals like Lophelia, Madrepora, Dendrophyllia, Desmophyllum and others. These corals may combine in forming true reefs in the aphotic depths of the Atlantic Ocean where they cover areas of

(Continued overleaf)

(continued from previous page)

tens of square kilometers and eventually build major carbonate mounds. They also occur nowadays in the Mediterranean Sea, although normally forming reefs of lesser magnitude than their NE Atlantic counterparts (Zibrowius, 1980; Taviani et al., 2005; Freiwald et al., 2009). In this basin, extant frame-building genera (i.a., Lophelia, Madrepora, Dendrophyllia, Desmophyllum) are documented, albeit intermittently, from the Miocene onwards, occurring for example in the Burdigalian sediments of Piedmont (Turin hill: Fig. 2), Apulia and Sardinia. On rare occasions, the fossil corals are exquisitely preserved keeping their original aragonitic fabric, thus allowing their use in geochemical-based paleoclimatic studies. Corals morphologically indistinguishable from Recent Lophelia pertusa, Madrepora oculata and Desmophyllum dianthus (= D. cristagalli) seem to have continuously settled the Mediterranean Sea from the early Pleistocene onwards as documented by fossil assemblages in southern Italy (Di Geronimo et al. 2005; Taviani et al. 2005), Rhodes (Titschack & Freiwald 2005) and submerged situations (see Taviani et al. 2005, for a review). The abundance of still-submerged dead (subfossil) deep-water corals scattered throughout the entire Mediterranean Sea has been considered as an indication that better conditions for the settlement and maintenance of Atlantic-type deep-water coral ecosystems did exist in the recent past. Carbon-14 and Uranium-series dating convincingly suggest that most subfossil coral occurrences are of late Pleistocene age either predating or postdating the last glacial maximum (McCulloch et al. 2010). The picture emerging from outcrop and submerged occurrences is that oceanographic conditions during cold phases of the Quaternary were more propitious for corals to thrive in the deep Mediterranean when compared to present times whose significant coral growth (especially Lophelia) is reduced.

Cainozoic deposits of peninsular Italy also preserve world-class examples of deep sea cold seepage habitats (Fig. 1) making the Mediterranean basin one of the most important site to scrutinize such past chemosynthetic habitats (Clari et al., 2004). This is by no means surprising considering that the troubled geologic evolution geology of this basin was conducive to a variety of situations promoting the formation and expulsion of geo-fluids enriched in hydrocarbons and hydrogen sulfide on the ancient seafloor (Taviani, 2001). The most spectacular examples of the fingerprints of such emissions occur in Miocene rocks and sediments of the northern Apennines (Fig. 3, 4), but also in Piedmont and Sicily (Fig. 5). Large methanogenetic carbonate bodies known as "Lucina limestone" (Calcare a Lucina) can be found associated with deep-sea turbidites (Fig. 5). Similarly to modern deep-sea chemosynthetic habitats, it is often possible to observe in these fossil rocks the presence of shells of large bathymodiolinid mussels, vesicomyids (Calyptogena), lucinids (Fig. 4) and solemyids, as well as vestimentiferan tubes and even bacteria like Beggiatoa (Peckmann et al., 2004). This fossil heritage is of prime importance to speculate on the biological evolution and biogeographic avenues of analogue modern biota inhabiting the adjacent Atlantic Ocean, like those from equatorial West Africa, northeastern Atlantic and Gulf of Mexico (Taviani 1994, 2011). It seems that the so-called Messinian Salinity Crisis at the end of the Miocene sealed the fate of most such ocean-type communities within the Mediterranean basin (Taviani, 2002). The very scant information available on deep-sea cold seep and reducing habitats in the Pliocene shows biota deprived of 'large' Miocene taxa (bathymodiolinids and large vesicomyids). Remarkably, these Pliocene habitats (Fig. 6) host the remarkable chemosynthetic bivalve Acharax (Fig. 7), and some small vesicomyids, lucinids and thyasirids, at places in strict adjacency with deep-water corals as in the Monferrato area of Piedmont (Fig. 8). Ideally, all HERMIONites interested in deep-sea corals and cold seeps should consider paying a visit to these remarkable outcrops, most of all easily accessible, and contemplate the ancestors of the recent habitats that they are studying in the ocean.

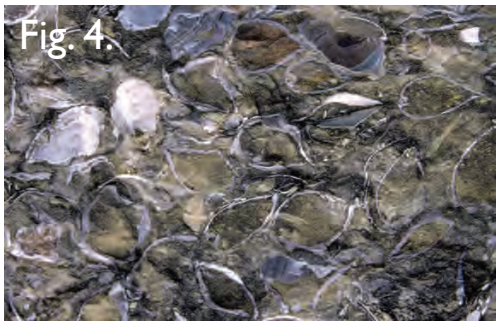


Fig. 4.


Fig. 5.


Fig. 6.


Fig. 7.

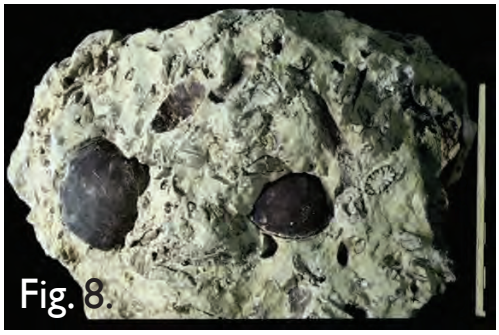


Fig. 8.

References: for a full list of references, please contact Lorenzo Angeletti

ABYSSAL LIGHTS IN THE DARK: THE EXHIBIT AT GENOA AQUARIUM

In October 2010 a new interactive exhibit, realized within the HERMIONE project, opened at Genoa Aquarium, Italy.

The aims of this initiative are:
- To widely advertise and promote the HERMIONE project
- To increase awareness amongst the general public of issues and challenges facing the deep-sea environment and associated ecosystems, and the importance of sustainable management of the oceans
- To provide resources and information on deep-sea ecosystems to the general public in an easily accessible format

In spite of the size and importance of deep-sea environments for the functioning of the entire planet, studies of this macro-ecosystem (covering over 60% of the surface of the planet and 90% of its volume) are still very limited.

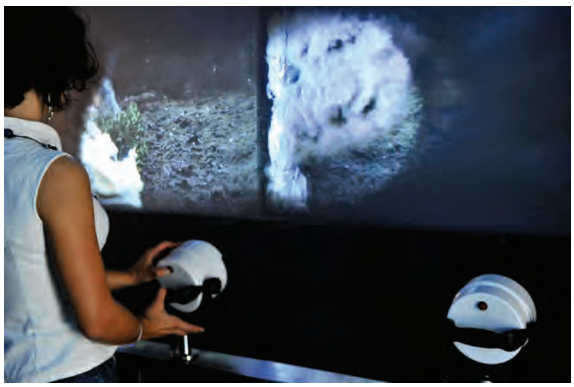
The large number of visitors to the Genoa aquarium offers the opportunity to raise awareness of the deep sea in 1,200,000 people each year. Through interactive and attractive devices, large numbers of people can see the alien creatures living in the abyss and discover some of their amazing adaptation skills.

This exhibit combines the information about life in the abyss with a new learning method, which promotes visitor interaction, so that the messages are absorbed and assimilated. The facility was designed and realized by N!03, studio ennezerotre, and features short documentaries, shot in the depths of the sea showing abyssal species. Visitors have four infrared lamps at their disposal: they can direct the lamps against a seemingly dark screen, which has the appearance of an exhibition tank dedicated to the abyss. Thanks to this "beam", some of the bizarre creatures that live in the abyss come out from the dark and come to life. Some of the footage shown and issues explained to the visitors are:

The abyssal angler fish: explaining how many predators have had to develop a surprising adaptation in order to swallow prey which are even larger than themselves, or in order to "stay in touch" with their partner in the vastness of the marine abysses.

The barrel - eye and tube eye fish: showing that many fish, living at great depths, have developed very big "tube" eyes that allow them to detect very weak luminescent glows.

Deep jelly fish and the comb jelly: explaining that 96% of deep-sea creatures are bioluminescent, and to show the iridescent end bioluminescent phenomena.



Hydrothermal vents: showing this amazing ecosystem and the multitude of creatures that are found nowhere else on earth.

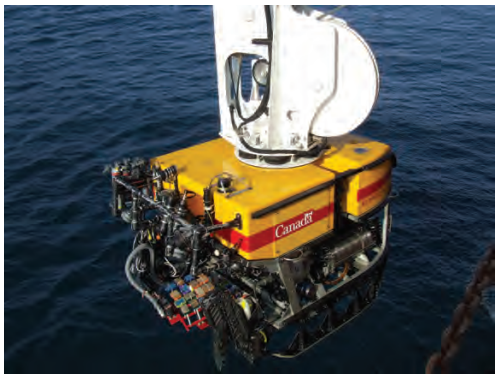
A big display is dedicated to the conservation message as well; two videos put out the message:" Deep oceans host incredible and delicate ecosystems that human activities, such as trawl fishing, pollution and exploitation of oil resources, risk endangering".

The exhibit seems to be much appreciated by our visitors: a large percentage of them stop to operate it, so we are satisfied that our objectives have been achieved!

Related projects

A HERMIONE Partner Across the Pond

From the glass sponge reefs of the Pacific deep sea, to the depths of the arctic seafloor, to the intertidal landscape of Halifax Harbour, researchers in the NSERC Canadian Healthy Oceans Network (CHONe) have gathered together to discover how marine biodiversity knowledge can advise conservation-based policy development in Canada.



Above: CHONe scientists use ROPOS ("Remotely Operated Platform for Ocean Science"), an ROV, to conduct research on the ecology of hydrothermal vents, sponge reefs and cold-water corals, and begin pioneering work on cabled deep-sea observatories. Photo Credit: CSSF/ROPOS

Launched in 2008, CHONe is an ongoing strategic partnership between Canadian university researchers and government scientists– predominantly Fisheries and Oceans Canada (DFO) – formed to develop research tools to aid decision-making for the sustainable usage of Canada's three oceans, the Atlantic, Pacific, and Arctic. Memorial University in St. John's, Newfoundland houses Network Director, Dr. Paul Snelgrove, Canada Research Chair in Boreal and Cold Ocean Systems, and the CHONe administrative team. CHONe is funded primarily by the Natural Sciences and Engineering Research Council of Canada (NSERC), with major ship time contributions from DFO and additional funds from Memorial University and the province of Newfoundland.

In 2010 CHONe entered into strategic partnerships with HERMIONE and several other international programs to enhance its training plan and science activities with the goal of improving existing and new tools for sustainable oceans and effectively communicating research findings to science and policy users in Canada and globally.

CHONe's research focuses on three central themes: marine biodiversity, ecosystem function and population connectivity. Researchers working in the marine biodiversity theme are linking functional and species biodiversity to habitat diversity in frontier areas such as the Arctic and deep water; they are also exploring diversity at multiple taxonomic levels (including cryptic diversity) and as a function of time. Through partnerships and collaborations, CHONe researchers have participated in cruises aboard the CCGS Amundsen and CCGS Hudson, and are using leading-edge tools, such as a large cabled seafloor observatory on Canada's west coast, a remotely operated underwater vehicle operating to depths of up to 5,000m, an ROV-mounted multibeam system and other remote sensing and sampling techniques. One key accomplishment is the recent completion of the first synthesis of benthic diversity knowledge in Canada's three oceans, which was published in collaboration with the Census of Marine Life.

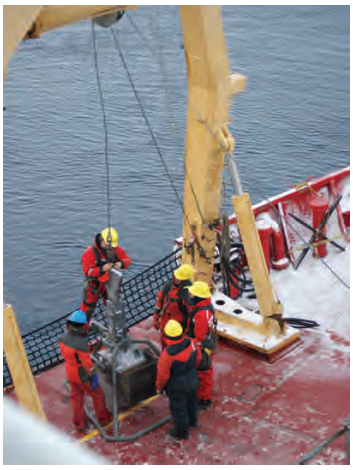
In the ecosystem function theme, CHONe researchers seek to understand and predict the role of biodiversity in marine ecosystem services by quantifying links between biodiversity and ecosystem function measures, and to provide predictive models to help minimize anthropogenic impacts on ecosystem services and health. Research will provide survey tools to collect data more efficiently and new tools for ecosystem modeling and design of conservation strategies. Researchers collected baseline data for benthic and suprabenthic organisms from intertidal habitats, shallow sub-tidal coastal areas and deep sea areas in Canada's three oceans. Efforts are underway to integrate biological datasets with GIS layers, stacking habitat layers on faunal data, to evaluate how seafloor characteristics influence biodiversity, and to develop a general meta-ecosystem modeling framework to predict responses of trophic compartments and species guilds to climate change and management scenarios at both metapopulation and metaecosystem levels.

Above: Dalhousie University/CHONe researchers Jon Grant, Mike Dowd, and Jeff Barrell use a helium-inflated blimp as an aerial photography platform for studying the spatial patterning of intertidal landscapes. Pangnirtung, Baffin Island, Nunavut. Photo Credit: Jeff Barrell

CHONE projects in the population connectivity theme are evaluating the role of larval dispersal in regional source-sink species dynamics using existing management areas as model systems, and comparing estimates of metapopulation connectivity of marine populations using different metrics of larval dispersal potential. Research focused on several ocean environments: the Saguenay St. Lawrence Marine Park in Quebec and the Strait of Georgia on the Pacific Coast to assess source-sink dynamics for three different groups of organisms with distinct life-history characteristics that share a planktonic

(Continued overleaf)

(continued from previous page)



component (zooplanktion, ichthyoplankton and benthic invertebrates). To compare estimates of population connectivity in different species using different metrics of dispersal, researchers have used several current methodologies to compare estimated rates of dispersal and combined studies of biology, physics, genetics and statistical modeling to understand metapolulation dynamics of key species, such as American lobster and blue mussels in Nova Scotia and Newfoundland.

In 2011 CHONE and HERMIONE will work together through joint sponsorship of a session at the World Conference on Marine Biodiversity, a planned workshop on deep-sea taxonomy, cross-fertilization at annual meetings, and potential lab exchanges. Collaborations will enhance CHONe and HERMIONE's network goals through the sharing of new research methods on predictive analysis and in decisional support. Together, HERMIONE and CHONe can facilitate the translation of their respective findings into policy application and provide students with the opportunity to participate in research exchanges.

Above: Université du Québec à Rimouski/CHONe researchers Philippe Archambault, Frédéric Olivier, Mathieu Cusson, Heike Link, Virginie Roy, Anne Fontaine, Mélanie Lévesque and Cindy Grant in collaboration with ArcticNet are taking benthic samples aboard the CCGS Amundsen to compare benthic biodiversity along the Arctic Corridor. Photo Credit: Frédéric Olivier

THE INTERNATIONAL NETWORK FOR SCIENTIFIC INVESTIGATIONS OF DEEP-SEA ECOSYSTEMS

Following in the footsteps of the International Census of Marine Life programme (2000-2010), INDEEP (the International Network for Scientific Investigations of Deep-Sea Ecosystems) is a newly-funded programme with a focus to determine the global biodiversity and functioning of deep-sea ecosystems in order to achieve a synthesis of sound knowledge that can be used in the formation of sustainable management strategies, bridging the gap between science and policy. During the initial 3 year phase, INDEEP will play a major role in bringing together efforts from across the globe and from a wide range of expertise in relation to investigation of the deep-sea ecosystems under 5 major themes:

1) Taxonomy and evolution;
2) Global biodiversity and biogeography;
3) Population connectivity;
4) Ecosystem functioning, and;
5) Anthropogenic impact and social policy.

Each theme will be addressed under a working group and researchers are invited to contribute.

INDEEP will lead to the development of new large-scale scientific proposals involving teams and infrastructure from different nations and provide the necessary framework for coordination of such large-scale efforts. It is the intention of INDEEP to capture the momentum of collaboration generated during the past 10 years of the Census to ensure it continues and grows in the long-term future and includes future generations of deep-sea scientists.

The programme was recently launched with a kick-off meeting held in New Orleans (8–10 December). The meeting was attended by 41 participants representing 16 different countries. The initial three-year programme (2011–2013) is funded by Fondation Total, and the meeting received additional financial support from the Census of Marine Life (CoML).

The INDEEP office will be managed by Maria Baker from NOC-Southampton, and Mireille Consalvey from NIWA. The INDEEP website (currently under development; www.indeep-project.org) will be hosted at NOC-Southampton.

For more information or to be added to the INDEEP mail list, please contact Dr Maria Baker (mb11@noc.soton.ac.uk) and Dr Mireille Consalvey (m.consalvey@niwa.co.nz).

Above: Cachet accepted by the Postal Authority and used in 2000 by a temporary post office to stamp postcards commemorating the 30th anniversary of the foundation of the Institute of Marine Geology in Bologna (now ISMAR), the ship in outline is RV Urania.

Below: Postcard commercially made in New Zealand dedicated to the 20th Italian Antarctic Project expedition.

Left: Official postal mail at sea (paquebot) recording various oceanographic missions

A POSTCARD FROM HERMIONE

Stamps, postcards and commemorative cancellations are one important way to record and often amplify to wider audience historical, political, artistic and scientific events well behind their spatial-temporal limits. They may drive a popular appreciation by casting an enduring advertisement that is first filed in the vast nebulose of collectors, but that will also flow into museum' archives and collections, catalogues, books and the like.

In a way, compared to other philatelic and postal themes (for example the history of flight), oceanography is only seldom portrayed in stamps or in commemorative cancellations. Regarding our present and past offshore research projects should them be somehow honoured in the mail and possibly remembered in the postal history? In consideration of its promotional value the answer is probably yes. Clearly, fostering such an activity requires the willingness to invest a little bit of time to design a project and pursue it. Some actions are easier than others, with complications increasing in a way directly proportional to the 'officiality' of the postal outcome. In other words, to stamp a postcard with a self-prepared cachet dedicated to the research vessel and/or to a specific mission (and eventually mailing it from a given harbour or town) is one thing; another story is to mail the same item on-board those ships that have the authorization to act as floating post offices in the high seas (generally indicated as 'paquebots'), to get an official cachet by the pertinent territorial postal authority, not to talk about having an approved stamp.

Here we present examples of some of these possibilities, all related to scientific seafaring or oceanographic research. The intent is to provide a stimulus to further expand this outreach activity that ideally could easily cover most if not all Hermione offshore expeditions or dedicated events, like workshops and the like.

Marco Taviani, CNR-ISMAR

Above: Two examples of self-produced postcards (pictures and cachet) to record specific events of cruise NBP0201 of the scientific icebreaker Nathaniel B. Palmer in Antarctica, posted in the expedition's last call port in Chile (March 2002).

Left: A series of postcards with self-produced unofficial cachets recording offshore European missions related to themes that are considered within the Hermione project

Above: Other examples of scientific self-produced (top, submersible Johnson Sea-Link in the Gulf of Mexico, 1992) and commercial privately issued (Antarctic touristic and scientific cruises) commemorative postcards and aerogramme.

CARRYING BEHAVIOUR IN THE DEEP-SEA CRAB Paramola cuvieri (NORTHEAST ATLANTIC)

Braga-Henriques A, Carreiro-Silva M, Tempera F, Porteiro FM, Jakobsen K, Jakobsen J, Albuquerque M, Santos RS (accepted). Marine Biodiversity.

Observations of large deep-sea homolids are becoming more common, due to ROV-based assessments of benthic communities that are currently being conducted in the high seas. Scientists from the University of the Azores, in collaboration with the Rebikoff-Niggeler Foundation and the Portuguese Task Group for the Extension of the Continental Shelf – EMEPC, have used video footage collected with the manned submersible 'LULA' and the 6000 m-rated ROV 'LUSO' to describe the carrying behaviour in Paromola cuvieri and to investigate the relationship between selected objects and surrounding habitat.

In this study 16 new in situ observations of this species at six benthic habitats within the Azorean region were reported. The biotopes where the crabs were found are priority habitats of conservation importance under OSPARCOM (the Convention for the Protection of the Marine Environment of the North-East Atlantic) and are known as coral gardens and deep-sea sponge aggregations.

More than 59 sessile megafauna taxa were recorded in the video footage analysed, including sponges, hydroids, corals, brachiopods, crinoids and deep-sea oysters. Sponges and gorgonian corals comprised 75% of the objects carried by the crabs, although these were not the most abundant taxa in many of the sites. These observations suggest that carrying is a more complex behaviour than previously thought. Morphology, size and weight of objects, as well as palatability seem to be more important in the process of selection, rather than their availability on the seabed.

Some crabs showed a common behaviour pattern in response to submersible floodlights, lowering the carried object to cover the carapace, thus producing a camouflage effect and object display, and remaining still for some time. Short video sequences illustrating this behaviour can be found in the electronic supplementary material.

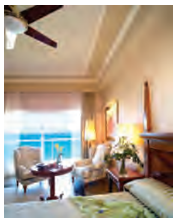
Above: Paromola cuvieri moving along the seabed while carrying a gorgonian Acanthogorgia hirsuta. Photo credits: Rebikoff-Niggeler Foundation.

HERMIONE Annual Meeting 2011

Registration for the HERMIONE Annual Meeting 2011 is now open! Visit http://www.eu-hermione.net/annual-meetings for more information and to register.

The second HERMIONE annual meeting will take place at the Gran Hotel Elba Estepona & Thalasso Spa, Malaga, 11-15 April 2011. All project participants are strongly encouraged to attend, in particular our young researchers and PhD students, who will find the meeting a friendly and constructive place to present and discuss their research and ideas. The meeting will comprise a series of plenary sessions, working groups and poster sessions, all structured using a multidisciplinary and integrated approach, in order to ensure good integration across the project, and to create an interesting and varied programme of talks. **Register now!**




Call for abstracts

We are pleased to announced that the call for abstracts for this year's meeting is now open. Log onto: http://www.eu-hermione.net/annual-meetings for full instructions for submission of abstracts and all the meeting logistics. **Deadline for abstracts: 4 March 2011**

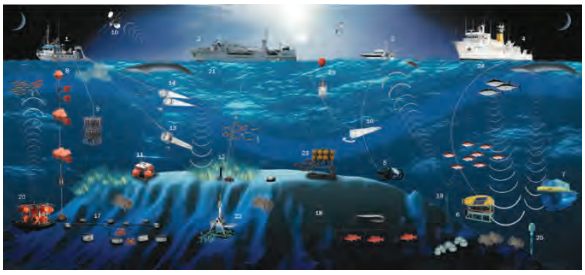
Training workshop: 9-10 April 2011

A 2-day training workshop will be held prior to the main meeting this year. The main focus of the course will be on media training, during which you will have the opportunity to explore the role of the media in science communication, what you can expect from journalists, and how journalists regard their own role in reporting science. You will also get the chance to practice your tv and radio interview skills.

The second part of the workshop will address science-policy interactions, and we have lined up some speakers from various NGOs to talk to you about the "other side of the science".

This workshop is a great opportunity to learn some new skills and more about important issues in HERMIONE science, whilst getting to know your peers better in a friendly environment. The workshop is free of charge and open to PhD students and post-docs. Places are limited to 25 - first come, first served! Sign up on the conference registration page.






Annual image competition

After the great success of last year's image competition, we will be holding the second annual HERMIONE image competition at this year's meeting. Take advantage of this opportunity to document the life of the project, and at the same time, share your best HERMIONE images with friends and colleagues and perhaps develop a sideline in photography! Entries are invited from the following categories:

1. Underwater images;
2. Technical underwater images;
3. Microscopic or specimen images;
4. Science in action;
5. New: Videos – 3 mins on any aspect of HERMIONE research!

For more information on entry formats, judging, etc., please visit: http://www.eu-hermione.net/annual-meetings