

Project Title

COMARGE - Continental Margin Ecosystems on a Worldwide Scale

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1. 2007 ACCOMPLISHMENTS & SCIENTIFIC HIGHLIGHTS

a. Workshops

Workshop on habitat classification and mapping on deep continental margins, 4 – 6 June 2007, Southampton, UK

Bathyal continental margins (200 to 3000 m water depth) occupy 17.8% of the World Ocean area and offer a wide variety of environmental conditions owing to differences in water depth, surface primary productivity, current activity, the topography of the seafloor, sediment characteristics, underlying geology, lateral and downslope sediment transport processes and the physical and chemical nature of the overlying water masses. All these factors are known to, or are suspected to, structure benthic communities thus creating a patchwork of habitats at various spatial scales on continental margins. Habitat heterogeneity enhances species turnover and regional scale diversity. Explanatory models for diversity patterns on continental margins should thus include references to habitat heterogeneity. Furthermore, habitat classification and mapping is increasingly demanded by governmental agencies, stakeholders or private companies for the purpose of resource management and conservation. However, the way habitats are defined, described and named is itself heterogeneous in the deep sea.

A multidisciplinary workshop, attended by 22 biologists and geologists, was held at the National Oceanography Centre in Southampton from 4 to 6 June 2007 in order to lay the basis of a habitat classification scheme for COMARGE. The talks given by participants gave a large overview of habitat classification and mapping issues including principles guiding a classification, methods in habitat mappings and case studies.

The discussions built on a review of existing classification schemes for the deep sea. None of the classification schemes proved to be fully satisfactory. A main issue was related to the different hierarchies adopted. The factors structuring benthic communities indeed act and interact at very different spatial scales. Though these scales are usually nested, their level of stratification may vary according to different contexts in such a way that any hierarchy is somehow artificial and unsuitable for all purposes. The group thus decided to rather describe habitats from a double entry table. One entry was defined by geological processes and features on the seafloor while the second relied mainly upon physical and chemical oceanography. The ongoing effort is to bring these two lists together that is to say to identify and describe interactions between physico-chemical factors and geological features that may affect benthic communities. We expect to build on this work to propose a classification of continental margin habitats to be published in the course of 2008.

Workshop on squat lobsters, 3-7 September 2007, Wellington, New-Zealand

Squat lobsters are dominant, numerous and highly visible crustaceans on seamounts, continental margins, many shelf environments, coral reefs at all depths, hydrothermal vents and cold seeps. Their abundance has stimulated considerable taxonomic research especially over the last two decades resulting in hundreds of new species being described and the older large genera subdivided into smaller ones.

Marine squat lobsters belong to three families, Galatheidae, Chirostylidae and Kiwaidae, all members of the superfamily Galatheoidea. Two other families of Galatheoidea, freshwater Aeglidae and porcelain crabs (Porcellanidae), are not dealt with. The most recent estimate of the number of genera is 38.

During the week 3–7 September 2007 ten crustacean taxonomists with varying experience with the taxonomy of squat lobsters met at the National Institute of Water and Atmosphere, Wellington, New Zealand. Their objectives were to compile taxonomic resources (species list, bibliography, electronic keys, electronic library) to publish on the web. During the five days of the workshop each participant

shared the results of their work but most of the work was devoted to compiling resources to share with future workers through the web.

A hierarchical list of the world's species, almost 900 species, was completed by building on a database compiled over recent years by Baba and Macpherson. The list with synonymies and distribution information will be completed and submitted for publication. With a little more work the list will be suitable to upload to marinespecies.org. This can be achieved by the participants by November 2007.

A bibliography of 877 citations in Endnote format was completed and pdfs of about 80% of these were linked to the bibliography. It is planned to submit these to the ATOL: Decapoda website before the end of 2007.

The workshop was able to update and complete dichotomous keys to species for most of the world's almost 40 genera. Good progress was also made on translating some of these to interactive keys in DELTA format. A promising start was made to electronic keys to families, to all genera, and to species of smaller genera. Participants in the workshop are optimistic that these can be completed within a year and published in various media but this objective requires considerable more work. Technical support in one of the key laboratories is needed to see this to completion.

Finally, the workshop provided an opportunity for those using molecular tools for taxonomic and phylogenetic research questions to compare successes and failures.

Both ChEss and CenSeam expressed an interest for this work. In the future, collaborations will be sought with these two projects in order to progress on an interactive taxonomic key for all known species of marine squat lobsters.

b. Affiliated projects and cruises

ORV Sagar Kanya cruise

From 2 to 18 August 2007, Dr Baban Ingole (NIO, India) conducted a cruise to study meio- and macrobenthic communities across the Oxygen Minimum Zone (OMZ) that impinged on Indian continental margin off Goa. Eight stations were visited, ranging from 25 m to 2500 m depth. The benthos was sampled by means of a Spade box corer and zooplankton by means of Multiple Zooplankton Net; Van veen grabs were used to collect sediment for further physico/chemical analyses and CTDs were deployed to characterize water column properties.

In the framework of COMARGE, the data provided by this cruise will be used for comparisons with a similar study carried out as part of the 1994 Indian Ocean Campaign of the UK National Environment Research Council in the eastern Arabian Sea as well as an upcoming Japanese cruise led by Dr Hiroshi Kitazato (JAMSTEC, Japan) to understand benthic activities and biogeochemical cycles at OMZ off Goa (see JAMSTEC cruises). COMARGE will support a workshop in 2008 to foster those comparisons.

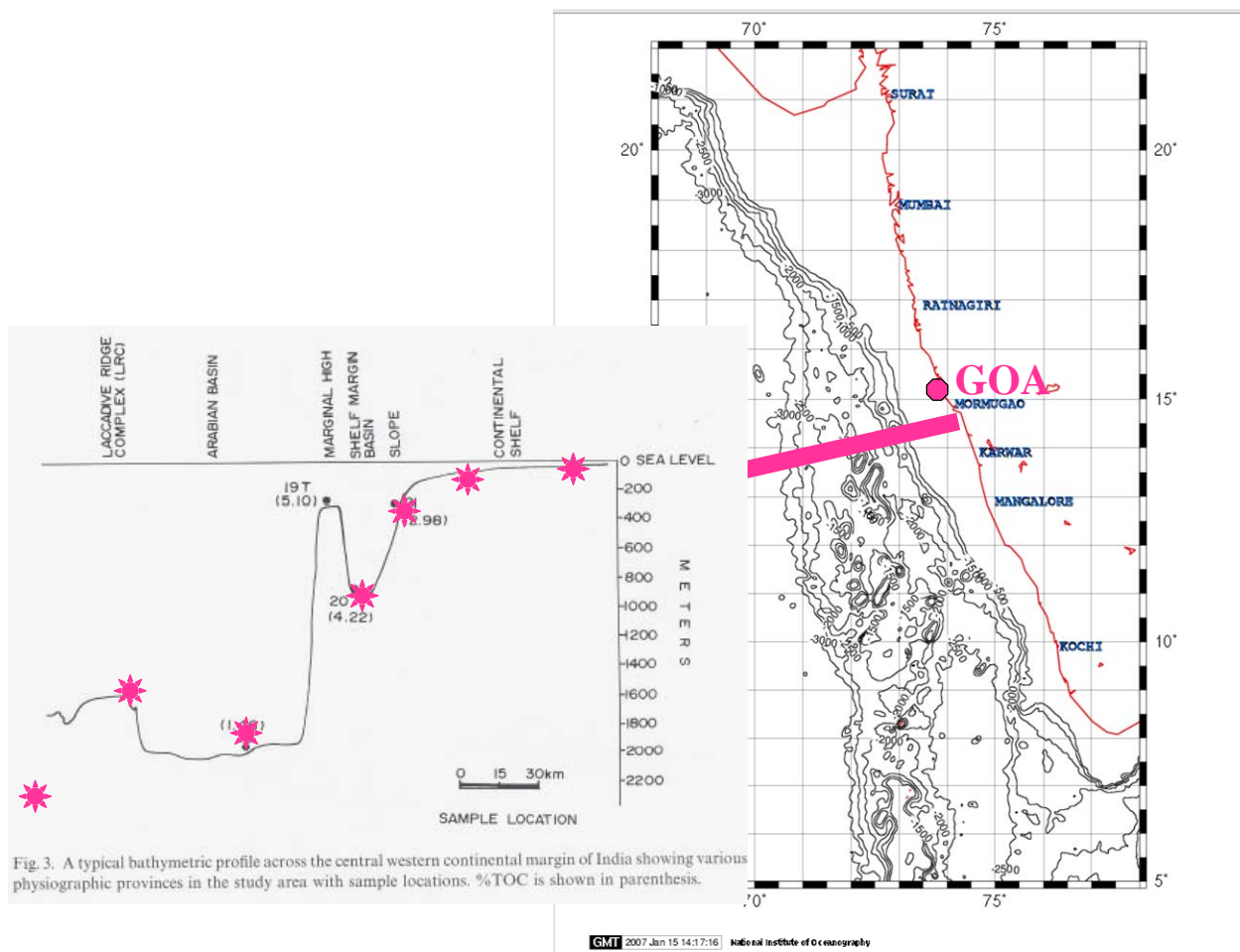


Fig. 3. A typical bathymetric profile across the central western continental margin of India showing various physiographic provinces in the study area with sample locations. %TOC is shown in parenthesis.

Location of site sampled during the ORV Sagar Kanya cruise across the oxygen minimum zone.

HERMES (Hotspot Ecosystem Research on the Margins of European Seas)

NOC Southampton cruise in the North East Atlantic

From 14 May to 7 July 2007, the UK's new research vessel, RRS *James Cook*, explored unusual deep-sea ecosystems along the European Atlantic margin, including mud volcanoes in the Gulf of Cadiz (in association with ChEss) and canyon ecosystems on the Portuguese and Irish margins .

Three mud volcanoes were studied at depths ranging from 300 m to 2400 m. On each mud volcano, high resolution mapping, video transects and sampling were carried out during dives of the ROV *Isis*. The three mud volcanoes showed various levels of activity and unique faunal compositions: fishes were dominant on Mercator Mud Volcano (MV) at 300 m depth, but chemosynthetic organisms were not found, despite evidence of gas emission. Deeper, at 1200 m depth, the Mercator MV seemed to be a mud volcano in decline with many dead mussel shells and only a few live mussels in the cracks between polygonal calcareous plates. The deepest mud volcano studied was the Carlos Ribeira MV at 2400 m depth. Holothurians were numerous in a mud flow emanating from the mud volcano and gorgonian and anthipatharian corals were common around the periphery of the volcano.

The canyon studies focused on the Nazaré, Setúbal and Cascais canyons off Portugal and the Whittard Canyon off Ireland. At 3500 m depth in the Nazaré Canyon, research focused on functional ecology with deployments of experimental devices to study benthic food webs. Deeper, in the canyon at c. 4300m a wide variety of filter feeders were found on exposed bedrock in the main channel of the

canyon (thalweg), including stalked crinoids, anemones and octocorals. In the upper parts of the Nazaré and Setúbal canyons at c. 500m brisingid sesters dominated

In the Whittard Canyon, *Isis* dives were mainly dedicated to observational work with dense populations of an ophiacanthid brittle star in the canyon axis..

Overall, whether on mud volcanoes or in canyons, the dives of the ROV *Isis* revealed a high level of faunal patchiness, highlighting the heterogeneity of habitats that may co-exist at a local scale on continental margins.

New species from the deep Gulf of Cadiz

In the deep Gulf of Cadiz, over 30 mud volcanoes lie between 200 m and 4000 m depth. The mud volcanoes expel mud pushed up from deep sediments by methane gas. The exploration of the deep Gulf of Cadiz during the UNESCO/IOC Training-Through-Research programme and the European Union project HERMES allowed the discovery of several new species:

- *Vulcanocalliax arutyunovi*. This new ghost shrimp (family Callianissidae) has been discovered in sediments from the outer rim of the crater of the Captain Arutyunov MV. Unusual morphological features of the new species also led to the creation of a new subfamily, the Vulcanocalliacinae. Among other characters, the new species is remarkable for its large size compared to other Callianassids (over 5 cm in length) as well as the large size and low number of embryos.

- *Tubiclavoides striatum* gen. nov., sp. nov. This new genus and new species of hydroid has been found to be common in the Gulf of Cadiz. Colonies were observed fixed on carbonate chimneys, coral debris, a polychaete tube, a sponge or another hydrozoan species. The widespread and frequent occurrence of this new species suggests that it is an important and regular faunal element of the deep-sea fauna of the North-East Atlantic.

Deep-oyster bank revealed

Within the framework of the EC FP6 project HERMES, Ghent University organised a research cruise to the La Chapelle continental slope with R/V *Belgica* in June 2006. Alongside the flanks of the newly mapped "Ostrea Spur", a dive of the Ghent University's ROV *GENESIS* revealed protruding banks with dense communities of giant oysters at a depth of 700 m. Although *Neopycnodonte cochlear* had already been reported in the Bay of Biscay based on dredges, it's the first time that this larger and deeper *Neopycnodonte* is observed alive on the eastern Atlantic margin. The species is an enigma for many years. Only a genetic study will be able to tell if this species is new to science.

ENVAR project

Within the framework of the HERMES work package on canyon systems, the ENVAR project, led by Dr Alexis Khripounoff (Ifremer, France), is monitoring the activity of the Var canyon (NW Mediterranean Sea, France) and its influence on benthic communities. Sediment traps, current meters and turbidimeters moored at various depths in the channel and on the western bank of the canyon have been visited twice each year, in April/May and August/September, since September 2005. During each of the bi-annual cruises, the meio and macrobenthos are sampled closed to mooring areas. ENVAR-6 was the last sampling cruise of the project (18-27 August 2007). All moorings will be recovered during the Medeco cruise in October 2007. Several dives of the ROV *Victor 6000* are also planned in the VAR canyon during this same cruise. The dives will allow studying megafaunal communities in and out of the canyon channel.

The ENVAR project has a major objective of describing and understanding the effects of pulse particle fluxes and currents on deep-sea benthic communities. In the wider framework of HERMES and

COMARGE, the ENVAR project will contribute to the description of canyon-associated faunas at a European scale and the contribution of the Var canyon to regional diversity in the Mediterranean Sea.

MEDECO cruise

From October to November 2007, the new French Research Vessel, N.O. *Pourquoi pas?*, will cross the Mediterranean Sea from West to East with ROV *Victor 6000* onboard. The first leg of the cruise is intended to successively explore and study the Var canyon off SE France, the Santa Maria di Leuca coral mounds off SE Italy, the Napoli mud volcano off Crete and the Amsterdam MV off Turkey. During the second leg, *Victor* dives will target on chemosynthetic ecosystems in the area of the Nile deep-sea fan.

At each site, the strategy is to implement multidisciplinary experiments and samplings in order to describe benthic communities, from bacteria to megafauna, and their trophic interactions in relation with food inputs, whether detritic or chemosynthetic. Experiments and samplings will be carried out at nested spatial scales, from local assemblages, characterized by one or a few abundant and structuring species, to larger geological features.

The Aurora cruise

The benthic fauna of the margins and interior basins of the South-East Asian archipelagoes remains a frontier in biodiversity exploration. Walking in the steps of the Albatross and Musorstom expeditions of the 1910s and 1970s, the AURORA 2007 expedition, on board the research vessel of the Philippines Bureau of Fisheries and Aquatic Resources (BFAR), brought together an international party of scientists from Asia (Philippines, Taiwan, Singapore, Japan), Europe (France, Sweden) and the U.S. The expedition, which carried a CoML COMARGE label, was made possible by a grant from the Lounsbery Foundation as a joint project between the French MNHN (PI: Philippe Bouchet), the US Smithsonian Institution (PI: Stephen Cairns), and the Philippines National Museum (PI: Marivene Manuel). In 18 days at sea in May 2007, the expedition accomplished a lot despite being limited to low-tech collecting approaches (dredging and bottom trawling). About one hundred hauls were accomplished at depths down to 2,300 meters.

Discovery. The cruise targeted the Pacific seaboard of the island of Luzon, a region never touched before by a marine biological expedition. About 300 fish and 400 mollusk species were sampled for barcoding, and some 320 decapod crustaceans were photographed alive on fresh colors. While this diversity would seem a bounty in the North Atlantic or North Pacific, it is actually poor by Philippines standards!

Capacity Building. Twenty researchers, technicians and students from Philippines institutions took part in the expedition, and made their first encounter with the deep-sea life of their country. Reference collections will be shared with the Philippines National Museum.

Outreach. During the expedition, extra care was given to preserving spectacular specimens for the exhibit *Abyss*, a sequel to Claire Nouvian's book of the same title, to open later this year.

AURORA 2007 will be followed in 2008 by an exploration of the Philippines margin of the South China Sea.

The RENEWZ cruise

Scientists from eight countries representing both the earth and biological sciences worked together to map, explore, observe and interpret New Zealand's cold seep communities for the first time. This endeavor is an excellent example of strong collaborations amongst CoML projects ChEss and COMARGE and the benefits of these alliances are the results of such high impact projects. The

scientists observed the bizarre deep-sea communities living around eight new methane seep sites (750 - 1050 m), around cold corals and canyon floor, highlighting the diversity of habitats and their faunas on continental margins. Many of the large species discovered are likely to be new to science. One of the seep sites, the 'Builder's Pencil,' covers about 180,000 square meters, making it one of the largest known seep sites in the world. The discovery of so many sites suggests that cold seeps are very abundant along New Zealand's eastern continental margin. However, this expedition also revealed the extent to which these communities may face serious threats from human activities. At all of the seep sites there was evidence of fishing damage in the form of trawl marks, lost fishing gear and extensive areas of deep-sea coral rubble. Any future mining of gas hydrates would likely also have a significant impact on the associated seep communities. There is hope that the simultaneous discovery of novel seep communities and extensive human impact will promote conservation efforts for these and similar habitats along the ocean margins.

Mapping benthic ecosystems on the deep continental shelf and slope in Australia's South West Region

CSIRO Marine and Atmospheric Research (CMAR) joined with taxonomists from Australian museums on two surveys along the margin of southwestern Australia in 2005 to understand the evolution and biogeography of the region and to support implementation of the SW Regional Marine Plan and Commonwealth Marine Protected Areas program. During the first survey, seabed habitats were mapped with multibeam sonar at scales of 100-1000s of sq km, and with cameras at scales of m to 10s m. During the second survey, almost 200 benthic samples were taken. Principal Investigators are Alan Williams, Rudy Kloser and Nic Bax (CMAR) and Gary Poore (Museum Victoria).

The program concentrates on the taxonomy and distribution of the larger invertebrates: decapod crustaceans, sponges, echinoderms, corals, larger molluscs, and ascidians, although a variety of minor taxa are also being worked up. Upgrading the field-based identifications is nearly complete for the major taxa, with putative species differentiated and distributions established. The exception is for the large collection of sponges which is about half completed.

All decapods have been sorted and identified, finding many more species than were anticipated. Few of the species are from the relatively well-known southern Australia fauna, but instead include new records of tropical species plus numerous new species. Of 520 species of decapods, 200 species or 40% are definitely new and undescribed species. The percentage of taxonomically difficult species is much higher than anticipated. Museum Victoria has catalogued all records which are fed to the On-line Zoological Catalogue of Australian Museums (OZCAM) from where they are uploaded to OBIS.

The echinoderms (excluding asteroids) collected by the SS10/2005 cruise comprised of approximately 800 records of 275 species, including approximately 60 (22%) that are undescribed. Provisional summaries for the other groups being studied are: soft-corals – 141 species of which 118 (80%) are believed to be new; large molluscs – 462 species of which 310 (67%) are believed to be new; and ascidians – 60 species of which 20 (30%) appear to be new. About 550 species of sponges were tentatively identified at sea; 70% of those examined so far are new. All taxa have been assigned unique numerical database codes in the national Codes for Australian Aquatic Biota (CAAB) system, facilitating the upload of distributional data to OZCAM and OBIS in due course.

These results, the first for the continental margin of the eastern Indian Ocean, would indicate an unexplored region inhabited by a high fraction of previously unencountered species in many taxa.

Another survey took place along the continental margin of north-western Australia in June-July 2007 using the same methods. Collections from this survey will be identified over coming months.

The Deep Gulf of Mexico Benthos Program

A new species of amphipod, *Ampelisca mississippiana* has been recently described by Yousria Soliman and Mary Wicksten from Texas A&M University. The new species inhabits the head of the Mississippi canyon by 460 m depth and was discovered as part of the Deep Gulf of Mexico Benthos program led by Gilbert Rowe (Texas A&M University) under a grant of the US Mineral Management Service. Although small, less than 6 mm in length, these tubicolous crustaceans carpet the seabed, with densities up to 12000 ind./m². Its abundance and the stabilizing effects on sediments of the tube mats likely confer *Ampelisca mississippiana* a great ecological importance.

JAMSTEC cruises

From 15 to 21 September 2007, the ROV *Hyperdolphin* onboard RV *Natsushima* will be used to deploy planar optodes and sample benthic fauna under different oxygen concentrations at 500 m, 1000 m and 2000 m depth on the continental slope off Northeast Japan (P.I.: Dr Kazumasa Oguri, IFREE/JAMSTEC, Japan).

In 2008, two additional cruises will allow to deploy and recover planar optodes for long term monitoring of oxygen penetration at sediment-water interface, together with faunal sampling, at two sites in Sagami Bay. A third cruise in 2008, onboard RV *Yokosuka*, support vessel of the submersible *Shinkai 6500* will be carried out in the Arabian Sea off Goa. A total of 43 dives are planned at five stations (500, 700, 900, 1100, 2000 m) across the OMZ (P.I.: Dr Hiroshi Kitazato). Detailed environmental and faunal changes across OMZ will be observed and monitored together with experiment carried out on the sea floor.

Instituto Español de Oceanografía – African deep-sea surveys

Dra Ana Ramos from the Instituto Español de Oceanografía has recently joined COMARGE network. Since 2002, the Spanish Institute has carried out several trawling surveys off Morocco (3 surveys, 288 stations, 200 to 2000 m depth), Namibia (3 surveys, 229 stations, 500 to 2000 m depth) and Mozambique (1 survey, 129 stations, 100 to 700 m depth).

During the last survey carried out off Mozambique in March-April 2007, about 86,000 demersal fishes and invertebrates were collected, belonging to ca 500 species. The Porifera and Echinodermata were dominant in terms of biomass and abundance. Diversity patterns were variable according to taxa and depth with the highest values usually observed on the deepest stations.

These surveys allow filling a gap in the scattered knowledge of deep African margins.

Cruise to study shelf and slope reducing settings off south-central Chile

A cruise oriented to the study of benthic habitats subjected to the influence of the Eastern Pacific Oxygen Minimum Zone (OMZ), methane seepage and probably a combination of both, will be carried out from September 27 to October 6, 2006 onboard the Chilean Navy oceanographic research vessel AGOR *Vidal Gormáz*.

This cruise is performed in the frame of the Fondef proyect D04I1111, whose aim is to assess the potential exploitation and production scenarios of submarine gas hydrates at the Chilean margin. The project is led by Dr. Juan Díaz-Naveas (PUCV) and connected with COPAS through Dr. Javier Sellanes (UCN and COPAS-RP5 Associate Researcher). Researchers from the Centro de Investigación en Ecosistemas de la Patagonia (CIEP), University of Magallanes (UMAG) and Scripps Institution of Oceanography will also join the expedition.

Target areas of the cruise will be a recently discovered methane seep area located off El Quisco (~33°S, 350 m depth), a couple of mud volcanoes and the Concepción Methane Seep Area CMSA; (~36°S, 700-1500 m depth) and to explore the vicinities of Mocha Island (~37°S, 1500 m depth) where the first specimens of chemosymbiotic clams were retrieved almost 20 years off Chile.

Due to its relative shallowness, there is a possibility that the site located off El Quisco is affected permanently or seasonally by the OMZ, and featuring thus very particular habitat conditions. Preliminary information for this site indicates the presence of a new species of the genus *Calyptogena* and a remarkable abundance of commercially valuable galatheid crustaceans. Of the southernmost and deeper sites, the CMSA is the best explored and several species new to science have been already described. It has been also observed that there is a link between areas of high capture per unit of effort of the highly valued Patagonian Toothfish (*Dissostichus eleginoides*) and methane seepage. During this cruise selected spots, basically sites where fish catches are higher, around Mocha Island will be explored for new seeps.

Expedition to the Deep Slope 2007

The 4th June 2007, the RV *Ronald H. Brown* explored hydrocarbon seeps and nearby communities at depths exceeding 1000 m in the Gulf of Mexico. Although focused primarily on seeps (ChEss), the “normal” margin fauna (COMARGE) was also studied. Sampling and image surveys included deep hardgrounds and their non-seep fauna. Even at seeps, vagrants such as lithodid crabs were sampled along with non-seep animals from adjacent areas. The intent is to better understand seep/background interaction.

Russian cruise

The P.P.Shirshov Institute of Oceanology (Moscow) will organize a research cruise to the Kara Sea on the R/V *Akademik Mstislav Keldysh* in September-October 2007. It is planned as a complex biological expedition to continue studies of the continental margin between 100 m and 500 m depth. Benthos will be sampled by trawls and grabs.

PROMETEO

PROMETEO is an integrated study of submarine canyons and slope in the deep Western Mediterranean Sea led by Miquel Canals (UB, geology) and Joan Baptista Company (ICM-CSIC, biology). This project has been funded by the Spanish Ministry of Science and Education. The project's objectives are:

- 1- Characterization of the abiotic conditions
- 2 - Establishment of the relations between abiotic conditions and the spatio-temporal structure of the meio, macro and megafauna populations, with special attention to the recruitment process of the deep red shrimp, *Aristeus antennatus*, and to the biomass maximum observed from some species of fishes typical of this habitat
- 3 - Assessment of anthropogenic impacts, both because of extractive activities and pollution

The studied area includes three canyons: Blanes, La Fonera and Cap de Creus. A set of four cruises are planned to monitor seasonal variations in 2008.

BIOFUN

BIOFUN stands for BIOdiversity and ecosystem FUNctioning in contrasting southern European deep-sea environments: from viruses to megafauna. This is one of the four Collaborative Research Projects of the EuroDEEP Eurocores, funded nationally with networking funds from ESF. Francesc Sardà and Eva Ramirez at ICM-CSIC are the project leaders for BIOFUN, with 7 individual partners and 3 associated partners (from Italy, Belgium, France, Netherlands, Ireland, Germany and Greece). The overall aim is to characterise under an ecosystem approach the mid-slope and abyssal plain habitats, from viruses to megafauna, to understand the linkages between biodiversity patterns and ecosystem functioning in relation to environmental conditions. Four sites of increased oligotrophy have been selected: the Galicia Bank (Atlantic), the Algero-Balearic basin (Western Mediterranean), the Ionian Sea (Eastern Mediterranean) and the Levantine basin (Eastern Mediterranean). The objectives of the project are:

1. To characterize the abiotic conditions
2. To describe multilayer biodiversity, from microbes to megafauna
3. To allocate carbon fluxes to archaea, bacteria and eukaryotes in an experimental approach using in situ enrichment with stable isotopes and biomarker analyses
4. To investigate the trophic linkages from the meio- and macrofauna to the megafauna
5. To study trophic interactions and life-history patterns in relation with environmental regimes
6. To identify temporal changes using historical data for particular areas, which will allow describing a scientific baseline for future long-term monitoring
7. To develop ecotrophic models

Four cruises should be carried out during the summer 2008.

2. PROJECT MANAGEMENT & INTERNAL COMMUNICATION

Myriam Sibuet at the Institut Océanographique in Paris and Robert Carney at Louisiana State University are the two co-chairs of COMARGE. The Institut Océanographique is in charge of the day-to-day project management as well as education and outreach while the Louisiana State University is in charge of budget management. Lenaick Menot is the project manager, in charge of the database management as well as education and outreach under the responsibility of Myriam Sibuet. Lenaick Menot is a CoML post-doc fellow employed by the Institut Océanographique but seconded to the Deep-Sea Department at Ifremer, which hosts the COMARGE-base and COMARGE website.

Scientific activities and the definition of budgetary priorities are discussed and endorsed by the Steering Committee, which meets twice a year. The Steering Committee is also regularly informed or canvassed by email concerning the advances made by the project or the need for inputs to answer CoML requests. The Steering Committee is composed of 13 members (see front page of this report).

In order to strengthen its network, the COMARGE SC decided in January, during its first 2007 meeting, at the National Museum of Natural History, Washington, to formalize the links with associated projects and associated members. Deep-sea biologists, among the most active within their institution or country have been invited to become COMARGE associate members. Up to now, 16 of them have positively replied to the invitation:

Associate members are expected to feed COMARGE network with information regarding new cruises and projects dealing with the ecology of margin ecosystems while COMARGE offers a way to disseminate the information, foster discussions and support collaborations.

COMARGE has identified four main issues to be addressed in order to provide a meaningful synthesis on continental margin ecology by 2010. These themes are reminded below, together with the leader for each theme. The leaders are in charge of workshop organization and reporting to meet the goals of the 2010 synthesis.

In order to help internal communication, a shared workspace had been setup on a Basic Support for Cooperative Work (BSCW) server at Ifremer. Several workspaces have been created for SC members, workshop participants and data providers. The workspaces allow sharing documents; forums can also be created to facilitate discussions regarding particular topics.

3. 2007 EDUCATION & OUTREACH EFFORTS

Education and Outreach activities in 2007 have been focused on editing a deep-sea guidebook and plan an exhibition on continental margin ecosystems.

a. Deep-Sea Guidebook by DESEO

The deep-sea guidebook is an initiative of the DESEO group, a collaboration between CeDAMar, ChEss, COMARGE, MAR-ECO and the Euro-CoML. The book has been written collectively by the E&O liaisons of each field project of the CoML. The topics covered include almost all major deep-sea ecosystems: continental margins including cold corals and canyons, abyssal plains, ocean ridges, chemosynthetic ecosystems as well as the deep pelagic realm. The book is divided into three parts. The first one is a journey along the bottom and across the deep waters of an Ocean that is intended to highlight the variety of oceanic habitats. The second part is made off short stories and amazing facts on the biology, ecology or ethology of deep-sea species. The third part describes the techniques used to study deep-sea ecosystems.

In the first place, the book is intended to provide the scientific background of MAR-ECO's exhibition "Deeper than Light", which is mainly visual. However, the book has been written as a stand alone popular document as well. The texts target an "educated" public but images, which make half of the book, are expected to be attractive for all publics.

COMARGE contribution to the book includes:

- A chapter on continental margin habitats;
- Three stories regarding the biology of deep-sea corals, bacteria in the deep biosphere and biodiversity in the deep-sea;
- An agreement with Ifremer to use images from deep-sea cruises to illustrate the book.
- Proof-reading and validation of the French translation.

The DESEO group anticipates having the first books published in English and German by 15th of October. Emphasis is placed on the German version to coincide with the opening of the exhibition "Deeper than Light" in Essen, Germany, 19 October 2007.

The publication of the book is funded by a grant of the Fondation Total to COMARGE and ChEss.

b. Exhibition on continental margin ecosystems

An exhibition is being prepared that will be displayed at the Institut Océanographique, Paris in 2008. The exhibition is intended to introduce a broad public to the deep ocean life with an emphasis on continental margin habitats.

The synopsis of the exhibit has been written in association with Claire Nouvian (the author of *The Deep: The Extraordinary Creatures of the Abyss*). The exhibit will be divided into three sections. The first one will introduce to the basics of geology, physical oceanography and biology in order to get background knowledge on the deep Ocean in general and continental margins in particular. The second section will present the Census of Marine Life, COMARGE and explain the importance of continental margins. The third section will show the different habitats co-existing on continental margins. This last section will largely benefit from videos and images. The exhibition will have three levels of reading in order to be attractive for a very broad public. An emphasis will be put on the younger public (from 6 to 10 years old) because the Institut Océanographique is quite often visited by primary schools.

Philippe Délis, a renowned French scenographer, will be in charge of the production of the exhibition, which opening is planned for mid-2008.

4. GEOGRAPHIC COVERAGE

The geographic scope of projects and cruises affiliated to COMARGE has been provided in June 2007.



Worldwide distribution of ongoing or recent projects affiliated to COMARGE

5. PARTNERSHIPS & COLLABORATION

a. Partnerships

Please identify any organizations, government agencies, science programs, and non-CoML projects with which your CoML project has an affiliation and briefly describe the nature of each relationship.

Organization Name	Point-of-Contact (Name)	Nature of Relationship
Fondation Total		Funding for science and Education and Outreach

Organization Name	Point-of-Contact (Name)	Nature of Relationship
Lounsbery Foundation The Census of Philippines Deep-Sea Biodiversity	Prof Philippe Bouchet	Funding of a cruise for the exploration of the Philippines deep-sea (P.I. Pr Philippe Bouchet, Museum National d'Histoire Naturelle, Paris, France) Affiliated project
HERMES	Dr. David Billett Dr Myriam Sibuet	Funding for European research teams, ROVs and cruises on canyons, cold seeps, anoxic microbial systems, deep-water corals and open slopes.
NOAA Ocean Explorer	Dr Robert Carney Dr Lisa Levin	Funding of a deep-sea cruise in the Gulf of Mexico (P.I. Robert Carney) Proposal for a deep-sea cruise off Chile in 2007 (P.I. Lisa Levin)
US Mineral Management Service	Dr Gilbert Rowe	Funding of the Deep Gulf of Mexico project. Provided data to OBIS.
Ifremer	Joëlle Galéron	Funding of deep-sea cruises Host for COMARGE database and website
Natural Environment Research Council	Dr David Billett	Core strategic funding for multidisciplinary deep-sea research (Oceans 2025).
Natural Environment Research Council	Dr Daniel Jones	DIEPS - Deep-water Industry, Environment, Policy and Science – Knowledge Transfer research grant.
Esme Fairburn Foundation	Dr Alan Hughes	DC-UK – Deep-sea Conservation for the UK. Outreach website
BP, Transocean, Statoil, Total, Wooside Energy Ltd, Chevron Texaco, Nexen Inc., Kongsberg Maritime, Subsea 7,	Dr Daniel Jones	SERPENT – Scientific and Environmental Rov Partnership using Existing iNdustry Technology.
REVIZEE Programme	Dr Helena P. Lavrado	Provided data to OBIS
PROMETEO	Dr Joan Batista	Affiliated project
CSIRO Marine Laboratories and Museum Victoria, Australia	Gary Poore (MV) Alan Williams (CMAR)	Voyages of Discovery, Affiliated project

Organization Name	Point-of-Contact (Name)	Nature of Relationship
BIOFUN	Dr Eva Ramirez	Affiliated project
RENEWZ	Dr Lisa Levin	Affiliated project
Instituto Español de Oceanografía	Dr Ana Ramos	Affiliated project – trawling surveys off Western and Eastern Africa
NSF-funded project on species' range in the deep-sea	Dr David Thistle	Affiliated project
CHEMECO	Dr Françoise Gail	Affiliated project

b. Links to Other CoML Ocean Realm Projects

Project Name	Cross-Over Person(s)	Nature of Relationship
ChEss	Dr Robert Carney Dr Lisa Levin Dr Elena Krylova	Steering Committee Steering Committee Taxonomic expertise Education and Outreach The squat lobster workshop organised generated interest from ChEss Co-support of RENEWZ proposal
CeDAMar	Dr David Billett Joëlle Galéron	Steering Committee Steering Committee Education and Outreach
MAR-ECO		Education and Outreach
CenSeam	Dr Mireille Consalvey	The squat lobster workshop organised generated interest from CenSeam, Mireille Consalvey addressed the meeting. Co-support of RENEWZ proposal
ArcOD	Dr Elena Krylova	Project participant

c. Links to CoML National and Regional Implementation Committees (NRICs)

NRIC	Liaison or Cross-over personnel	Nature of Relationship
Europe	Dr Bhavani Narayanaswamy	Associated member of COMARGE, participant of COMARGE workshop on habitat classification. Education & Outreach in the framework of the DESEO group
Japan	Dr Hiroshi Kitazato	Co-PI of CoML Japan
Arabian Sea (Oman workshop)	Dr Baban Ingole	

d. Liaisons to CoML Cross-Cutting Groups

Project Name	Liaison Name & Institution	Nature of the Relationship
OBIS	Dr Lenaïck Menot Dr Baban Ingole	Database manager for COMARGE Co-PI of IndOBIS
E&O	Dr Lenaïck Menot	E&O liaison