COMARGE

- COntinental MARGin Ecosystems on a worldwide scale -

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1 2008 ACCOMPLISHMENTS & SCIENTIFIC HIGHLIGHTS

1.1 Workshops

In 2008, COMARGE activities were in the line of the scientific questions addressed by the project and the themes defined in 2005, in particular:

- The Large scale biodiversity patterns and processes on continental margins
- The relationship between habitat heterogeneity and diversity

Two synthesis workshops supported by COMARGE worked on these themes, in two different ways. The first one, organized by Ann Vanreusel, was taxa-specific. Its purpose was to analyzed available data on nematodes to address these two questions. The second one, organized by Lisa Levin, specifically focused on the roles of habitat heterogeneity in generating and maintaining continental margin biodiversity. Both workshops will contribute data to COMARGIS and OBIS. With COMARGIS, the COMARGE Information System, data will be integrated with information regarding habitats, substrates and environmental parameters when available in order to support the meta-analyses needed to undertake the syntheses COMARGE is aiming for.

1.1.1 Workshop on large-scale patterns in bathyal free-living nematodes, 28 January – 1 February 2008, Ghent University, Belgium – Dr. Ann Vanreusel

Workshop participants

Sharing 60 datasets, the 25 participants in the workshop developed consensus on major nematode distribution, abundance and diversity patterns at the generic level. Preliminary results show that the first order discrimination for nematode communities is their geographical location, which can be largely explained by variations in densities and ultimately primary production. The diversity of nematodes varies from one ocean to another. Basin age appears to be a factor with the SW Atlantic and the W. Indian Ocean having higher diversity than younger basins like the NE Atlantic and the Mediterranean Sea. At habitat-scale, communities associated with corals, canyons and seeps have been analysed and found to harbour distinct assemblages. The diversity is higher on corals followed by canyons, while the diversity at seeps is low.

1.1.2 Workshop on the roles of habitat heterogeneity in generating and maintaining continental margin biodiversity, 8-12 September, Scripps Institution of Oceanography, USA – Dr. Lisa Levin

Workshop participants

From 8 to 12 September, 34 scientists met at the Scripps Institution of Oceanography (La Jolla, California, USA) to work on the roles of the habitat heterogeneity in generating and maintaining continental margin biodiversity. For this workshop, organized by Dr Lisa Levin, all participants had provided an extended abstract of a case study illustrating one or several of the six sets of questions addressed by the workshop:

(1) What are the sources of heterogeneity on the margin that affect diversity? What is the nature of the relationship between margin habitat heterogeneity and biodiversity on local scales? What are the underlying mechanisms?

(2) Do habitat heterogeneity-diversity relationships vary as a function of regional setting, or regime? Water depth? As a function of taxon, size class, or life-history characteristics? Over what space and time scales?

(3) What theory or concepts can be brought to bear to explain the relationships? Are there experimental approaches that have revealed these relationships?

(4) How does local heterogeneity influence regional-scale diversity? Does this drive key biogeographic, depth or latitudinal patterns?

(5) Does habitat heterogeneity-driven diversity affect ecosystem function? Can habitat heterogeneity be used as a proxy for diversity and function? For detecting temporal change in ecosystem functions? What are the conservation and management implications?

(6) How can heterogeneity-diversity relationships be assessed? What sampling plans or experiments are needed to fill our knowledge gaps? Which measures? Over what spatial and temporal scales?

On the first day, for each of these set of questions, a summary of the extended abstracts was prepared and presented respectively by Drs Andrew Gooday, Ann Vanreusel, Lisa Levin (on behalf of Ron Etter), Angelika Brandt, Roberto Danovaro and Craig Smith. These talks and the discussions that followed set the stage for the following four days, which were dedicated to discussion and synthesis on the known and unknown related to these questions.

The questions were addressed in breaking groups in two different ways, either individually and across habitats or collectively within five major habitats: open slope, canyons, cold seeps, oxygen minimum zones and biogenous structures (e.g. coral reefs). Each day, plenary sessions allowed discussing and synthesizing the progress made in breaking groups.

The workshop highlighted the need for new analytical tools and meta-analyses both within habitats across regions and between habitats. The workshop thus is going to foster and speed up the process of data integration for COMARGE.

Finally, the workshop ended with clear plans for about 30 papers. A special issue of Marine Ecology edited by Lisa Levin and Myriam Sibuet, to be issued in 2009, will gather 20 individual papers and 5 synthesis papers, one for each of the major habitats defined during the workshop. These synthesis papers will, for some of them, be an overview of larger reviews that will be submitted in 2009. Additionally, two papers on methods have been discussed, one introducing a new method for assessing the relationship between habitat heterogeneity and diversity, the second one reviewing the methods used to asses habitat heterogeneity, diversity and the relationship between the two. Finally, an overview paper of the outputs of the whole workshop will be prepared and submitted to a highly ranked journal.

1.2 Affiliated projects and cruises

In parallel to the syntheses on continental margin biodiversity, and to increasingly support these efforts with new data, COMARGE carried on with the census of ongoing projects relevant to its scientific questions. A significant contribution is coming from Europe with its three integrated research programmes HERMES, BIOFUN and PROMOTEO but the geographical coverage is global with ongoing projects in the North Western Atlantic, Eastern and Western Pacific, North and Eastern Indian Oceans.

1.2.1 European canyons

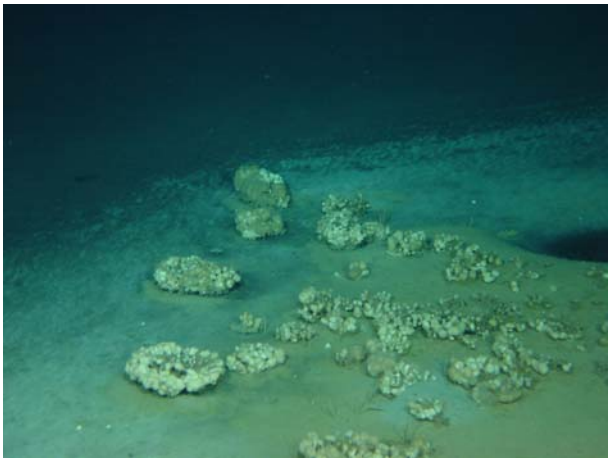
In May/July 2007, in the framework of the EU-funded program HERMES (Hotspot Ecosystem Research on the Margins of European Seas), The UK's new research vessel RRS James Cook undertook a tour of duty along the European margin, visiting canyons off Portugal among other deep-sea habitats. Deep-sea submarine canyons present one of the most formidable challenges to marine scientists today. Hidden by the ocean, and covered in a drape of sediment, they have been largely ignored because of the difficulties in exploring their complex terrain. However, advances in technology, notably Remotely Operated Vehicles (ROVs), are opening up these frontier features leading to new insights into canyon life and processes. Canyons that are situated in close proximity on a margin often have quite different fauna depending on the recent environmental history of the canyon and its physiographic setting. Off Portugal, CoML scientists found that species richness is almost double in the more active Nazaré Canyon than in Lisbon Canyon, despite the connection of Lisbon Canyon to a river supply and hence, potentially, a large source of riverborne organic matter.

Filter-feeding organisms, brisingid asteroids, benefiting from the enhanced current speeds and suspended particulate matter concentrations in Nazare Canyon (~ 1000 m water depth), NW Iberian Margin. © National Oceanography Centre, Southampton

Contact: Abigail Pattenden and Paul Tyler, National Oceanography Centre, Southampton, UK.

1.2.2 Mediterranean hotspots

In the framework of the EU-funded program HERMES (Hotspot Ecosystem Research on the Margins of European Seas), the Medeco cruise crossed the Mediterranean Sea from West to East in October/November 2007 in search of the diversity of animals that can be observed at great depth. In the food poor Mediterranean Sea, dives of the ROV Victor, onboard Ifremer's R.V. *Pourquoi pas ?*, did not reveal an exuberant biota. However, they did highlight a variety of habitats, like this strange garden of sponges around a brine lake. This species, likely *Rhizaxinella pyrifera*, is a refuge in itself, harbouring lots of small polychaete worms. Although the species has already been observed in the deep Mediterranean Sea, these specimens reach an exceptional and yet unseen size according to Jean Vacelet, a specialist of sponges of the University of Aix-Marseille.



Large sponges around a brine lake on top of a large mud volcano in the deep Mediterranean Sea © Ifremer-Victor/Medeco cruise 2007

Contact: Jozée Sarrazin, Ifremer, France

1.2.3 Biodiversity and Ecosystem Functioning in Contrasting Southern European Deep-Sea Environments (BIOFUN)

BIOFUN is a collaborative project of the Eurocores EuroDEEP, a programme for the study of deep-water ecosystems biodiversity and functioning. The project started in September 2007. It aims at studying biodiversity and ecosystem functioning in contrasting Southern European deep-sea environments. Two main regions have been selected: the Galicia Bank in the Atlantic and the Mediterranean Sea. In each region, the bathyal (1200 m depth) and abyssal (3000 m depth) ecosystems will be studied, from viruses to megafauna and in relation to environmental characteristics. In the Mediterranean, the NW and Central Mediterranean will be studied by all partners for all analyses. Further sampling may be conducted in the Eastern Mediterranean.

Cruises: On the Galicia bank, two cruises in June and September-October 2008 allowed sampling the meio-, macro- and megafauna as well as implementing *in situ* experiments. In the Central Mediterranean Sea, sampling for viruses, microbes, meio, macro and megafauna, as well as water column study and in situ experimentation were done during one cruise in June 2008. Seven more cruises are planned in the framework of the project between the end of 2008 and 2009.

Training: Four PhD students and two post-dos are working on the project.

Contact: Eva Ramirez, Institut de Ciències del Mar, Spain

1.2.4 PROMETEO

The PROMETEO project aims at performing multidisciplinary research in the deep canyons and slopes of the North-western Mediterranean in order to understand the combine roles of abiotic and biotic factors in defining essential habitats, a key concept for the project. The objectives of the project specifically are:

(1) To characterize the abiotic conditions;
(2) To establish 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) To assess anthropogenic impacts, both because of extractive activities and pollution, that affect such essential habitat.

The research effort will focus in the Blanes Canyon and adjacent slope. The integrated study of this essential habitat indeed is crucial to describe the biodiversity of the Mediterranean deep ecosystem, to evaluate its fragility and promote the sustainable management of its resources in relation, for example, with the preservation of the red shrimp fishery.

Cruises: The first of a series of 4 seasonal cruises is planned from 22 October to 2 November. Beside this seasonal study, three additional cruises will complete the characterization of abiotic conditions like seabed mapping and seismic surveys.

Training: Two PhD students are currently involved in the project.

Contact: Joan Batista, Institut de Ciències del Mar, Spain

1.2.5 SIGSBEE deep sea cruises

The SIGSBEE cruises support the Long Term Ecological Research Project "Factores que definen la variabilidad de la diversidad biológica y biomasa béntica en el mar profundo del Golfo de México" (Factors that define the variability of the biodiversity and benthic biomass in the deep-sea Gulf of Mexico). These cruises have been carried out for the last 11 years and include the monitoring of a time series station. The results obtained so far, at depth ranging from 200 up to 3000 m, question some of the established diversity patterns in the deep-sea. Results from cruises in 2004 and 2006 have recognized the important of local deep sea infiltration of methane oil. With support of moored sediment trap samples placed 500m above seafloor we have been able to evaluate the seasonal input of biogenic material of photoautotrophic origin aggregated and exported to the sea-floor. The moorings are part of an ongoing collaboration among UNAM, IfM GEOMAR and CICESE. The research is hypothesis oriented trying to understand the effect of escarpments, knolls and canyons on biodiversity patterns.

With the results of these past cruises we have been able to establish changes in the species richness, abundance and biomass that respond to pulses of food supply on a year to year basis, we have been able to detect the negative effect on both slope and continental rise by hurricanes. These natural events affect the seafloor communities by destabilizing the slope sediment and generating turbidity currents and sediment transport affecting biodiversity. SIGSBEE cruises will continue to have a better evaluation of the deep sea biodiversity in the long term. These have been carried as part of collaborations with Texas A & M University, RCOM and we expect to collaborate in 2009 or 2010 with the Spanish research group lead by Joan Cartes. Contributions from this effort have lead to undergraduate and graduate students from UNAM and several publications in peer review journals and book chapters. Mexican financial support from UNAM and CONACyT is defraying the cost of these expeditions. Additional financing has been contributed by each participating group in the aim to better understand the GoM benthic variability.

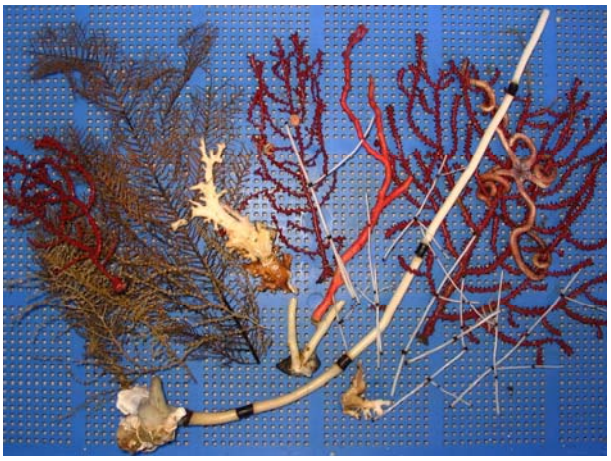
Contact: Elva Escobar, Universidad Nacional Autónoma de México

1.2.6 Species' range size along the Western American margin

Dr David Thistle (Florida State University) was funded by the U.S. National Science Foundation to study species' range sizes in the deep sea using harpacticoid copepods as the study group. He and his

team will use morphological methods to group individuals that appear to be conspecific and will then use gene-sequence analysis to test these taxonomic hypotheses. To obtain material, they will make seven multiple-corer lowerings at each of eight stations during a 21-day cruise on the RV *Point Sur* in September and October, 2008. The stations will be at 2700 m and 3700 m depth at 32.80° N, 36.75° N, 40.00° N, and 44.00° N (off San Diego, Monterey, Oregon, and Washington). Each multiple-corer lowering will collect eight 78-cm2 cores. Seven will be used for the biogeography study. The eighth will be used to measure granulometry and the abundance of bacteria, bioavailable protein, chloroplastic pigments, organic carbon, and organic nitrogen. It will also provide specimens of deep-sea nematodes for a phylogenetic study by a colleague from the University of Southampton (UK).
Training: Graduate students from Florida State University and Texas A and M University will receive first-hand experience of sampling the deep sea, and two of the FSU students will use the samples for their doctoral research.
Outreach: A scientific publicist will join the cruise. He will post a blog while at sea. When he returns, he will write popular articles about the work.
Contact: David Thistle, Florida State University, USA

1.2.7 Chilean hotspots



Fishermen know good spots: Discovery, near a fishing ground of the Patagonian Tooth-fish of a rich community of cold-water corals living on carbonate rocks from methane seepage. Courtesy of Dr. Javier Sellanes (*Universidad Católica del Norte, Facultad de Ciencias del Mar).*

On the Chilean margin, evidence of the presence of cold seep megabenthic communities can be tracked back to 1988 but active methane seepages always proved difficult to localize. One way to target on these particular geological structures is to deploy highly sophisticated and expensive technologies but, during a cruise in October 2007, Chilean scientists from the *Centro de Investigación Oceanográfica en el Pacífico Sur-Oriental* (COPAS) and *Universidad Católica del Norte, Facultad de Ciencias del Mar* rather got interested in known locations for fishing grounds of the Patagonian Tooth-fish (*Dissostichus eleginoides*). Indeed, they had previously found lost fishing hooks in trawls where they also caught chemosymbiotic faunas and suspected that the deep-sea fish aggregated near methane seeps. And they got right. Most fishing grounds turned out to be associated with hard grounds, some of them corresponding to carbonates associated with methane seepages. In most cases, those hard grounds depicted an outstanding sessile fauna dominated by rich assemblages of cold-water corals, including many species of gorgonaceans, black corals, and stony corals.

Contact: Javier Sellanes, Universidad Católica del Norte, Chile.

1.2.8 Philippines deep-sea biodiversity

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 and LUMIWAN 2008 expeditions, 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, Belgium, Russia) and the U.S. The two expeditions were made possible by grants from the Lounsbery Foundation and an anonymous U.S. Foundation.

Discovery. In 2007, the Aurora 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 mollusc species were sampled for barcoding, and some 320 decapod crustaceans were photographed alive on fresh colors. This would seem a bounty in the North Atlantic or North Pacific; this is actually poor by Philippines standards! A year later, in exploring the Philippines margin of the South China Sea, between 100 m and 2200 m depth, the 44 researchers who took part in the Lumiwan cruise were continuously amazed by unexpected discoveries. Among these are the first Philippine record of the deep-water stony coral Lophelia pertusa, the first living specimen of Acharax bartschi, a large bivalve living in symbiosis with chemoautotrophic bacteria, rare deep-water snails living on a dog skull but usually associated with whale bones and last but not least, a likely new species of shrimp, belonging to a group only known from hydrothermal vents, collected in a trawl full of lightweight plastic bags!

Capacity Building. Twenty researchers, technicians and students from Philippines institutions took part in the expeditions, 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 Aurora expedition, extra care was given to preserving spectacular specimens for the exhibit Abyss, a sequel to Claire Nouvian's book of the same title.

This blind lobster with bizarre chelipeds belongs to the very rare genus Thaumastochelopsis, previously known only from four specimens of two species in Australia. The specimen collected during AURORA 2007 from about 300 m is a new species. Courtesy of Tin-Yam Chan (National Taiwan Ocean University, Keelung)

Contact: Philippe Bouchet, Museum National d'Histoire Naturelle, France.

1.2.9 Indian Margin

To investigate the benthic biodiversity across the Indian Margin, a deep-sea cruise was conducted in August 2007 on board ORV *Sagar Kanya* (cruise no. SK 237) on the western margin between 11° to 15°N. Plankton, benthic and water column sampling were conducted on four different transects perpendicular to the coast at depth ranging from 40 to 3000 m. Sediment samples were collected with

spade box corer, plankton by the Multiple plankton net and environmental data was collected with the help of CTD rosette. Nematode data have already been used for the COMARGE funded nematode synthesis workshop and other macrofaunal data are shared for Habitat Heterogeneity workshop. One Ph.D. student is working on the interaction between demersal fishery and benthic processes.
Contact: Baban Ingole, National Institute of Oceanography, India

1.2.10 Voyages of the discovery off Western Australia

First results from the "Voyages of Discovery" expeditions by Australia's CSIRO Marine and Atmospheric Research (CMAR) and Museum Victoria to the deep continental shelf and slope in Australia's south west region are now being reported. The expeditions aim to map benthic ecosystems and test hypotheses on the evolution and biogeography of Australia's biodiversity, refine methodology for mapping deep water benthic ecosystems, document benthic biodiversity and identify areas of high conservation values. A first report dealing only with the crustacean Order Decapoda, crabs, shrimps, prawns, lobsters and the like, has now been published. The discovery of 524 species is surprising because of the high fraction of new species and the unexpected influence of a tropical component. Thirty-three per cent of all species are suspected to be new species, eight per cent are new records for Australia, and a quarter new to the region.

An undescribed species of crab from Southwestern Australia. Courtesy of Karen Gowlett-Holmes, © Commonwealth Scientific and Industrial Research Organisation (CSIRO).
Courtesy of Karen Gowlett-Holmes, © Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Contact: Gary Poore, Museum Victoria, Australia.

1.2.11 The SONNE survey of the Western Australian margin

Geoscience Australia will be undertaking a survey of the Western Australian margin Oct 08 – Jan 09. The overall scientific aim is to collect geophysical and biophysical data for the Zeewyck and Houtman sub-basins (Perth Basin), Exmouth Sub-basin (Carnarvon Basin), and Wallaby Plateau areas. Data from these regions will assist in understanding their geological setting, environmental significance, and resource prospectivity. Study areas will be mapped using multi-beam, sub-bottom profiler, magnetic and gravity instruments; and samples and environmental data will be collected via a CTD, camera tows, gravity cores, boxcores, grabs, a benthic sled, and a rock dredge. This expedition is part of the Offshore Energy Security Program of the Commonwealth Government of Australia.
Contact: Rachel Przeslawski, Geoscience Australia.

1.3 Publications

1.3.1 Catalogue of squat lobsters of the world

Squat lobsters are colorful decapods, which feature in many still photographs and movie film of the seabed taken by submersibles. They can be found in all oceans, at all depths and in all marine habitats but are especially abundant on continental margins. Following a workshop sponsored by COMARGE in September 2007, the participants are publishing the complete list of the 870 known species of squat lobsters. They found that the description of new species has increased exponentially from the beginning of the 19ie century to nowadays and is still not leveling off. Many new species thus remain to be discovered. If fact, those taxonomists already have in hands hundreds of likely new species waiting to be described and named.

Reference: Baba, K., Macpherson, E., Poore, G.C.B., Ahyong, S.T., Bermudez, A., Cabezas, P., Lin, C.-W., Nizinski, M., Rodrigues, C., Schnabel, K., accepted. Catalogue of squat lobsters of the world (Crustacea: Decapoda: Anomura - families Chirostylidae, Galatheidae and Kiwaidae). Zootaxa.

An undescribed species of squat lobster from Southwestern Australia. Courtesy of Karen Gowlett-Holmes, © Commonwealth Scientific and Industrial Research Organisation (CSIRO).

1.3.2 The Deep Gulf of Mexico Benthos Program

The Deep Gulf of Mexico Benthos Program (DGoMB) investigated the structure and function of sea floor biota on the continental slope and abyssal plain of the Gulf of Mexico. Supported by the Minerals Management Service of the U.S. Department of the Interior, DGoMB's purpose was to gain better understanding of how oil and gas exploration and production might affect the ecosystem and its natural inhabitants. The goal of assessing both community structure (abundance, biomass and species composition) and biogeochemical processes (community function) was unique, because traditionally such studies have been independently investigated.
The results of this program are the subject of special issue of Deep-Sea Research II, 17 papers are in press.

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 Océnographique 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, COMARGE has formalized the links with associated projects and associated members. Up to now, 20 deep-sea biologists, among the most active within their institution or country have joined COMARGE as associated members.

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.

3 2007 EDUCATION & OUTREACH EFFORTS

3.1 Deeper than Light: a cooperative effort

Working with the DEep Sea Education & Outreach group (DESEO), an educational and richly illustrated book on deep-sea ecosystems was published in November 2007 supported by a grant of Foundation Total to COMARGE and ChEss. The level of the text is intended to be accessible for the educated public, especially young people. The illustrations make it interesting for all. The book was previewed during the All Program Meeting in Auckland. Beside the English version, the book has been translated in French, German, Norwegian and Spanish. COMARGE has been in charge of editing the French version. In the course of 2008, the book became available in the 5 languages. The Euro-CoML is now setting a secured payment on its website so that it will be possible to order the book, whatever language, on the internet.
The title of the book is an eponym of the exhibition developed by MAR-ECO, which is the focus of the DESEO activities. A “Deeper than light” calendar of the year 2009 has been produced, featuring pictures from the book as well as new pictures. Under the leadership of Dr Maria Baker (ChEss), all members of the DESEO group provided pictures and caption for this calendar. The calendar has been produced at 1800 copies, 600 will be freely distributed during the World Conference on Marine Biodiversity in Valencia (11-15 November). The reminder will be distributed by each of the projects involved.
In the upcoming months, cooperation and shared funding will continue with DESEO. As both a contribution to the grand finale in 2010 and a legacy of the CoML deep-sea field projects, the DESEO group plans to expand the exhibition with new material from all deep-sea projects and to find a location to display the exhibition in London in October 2010.

3.2 COMARGE website

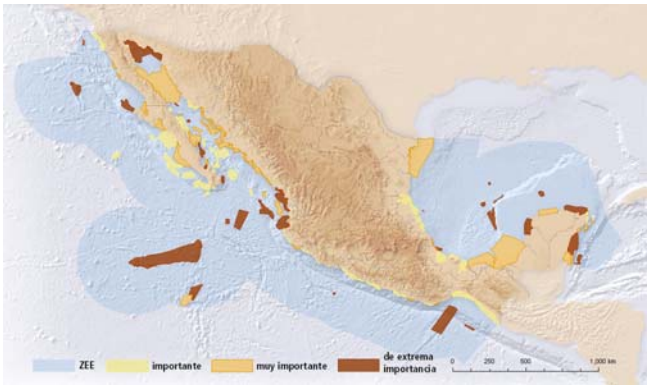
The website of the project will be re-looked and improved by the end of 2008. Developed with a Content Management System, the site will be easier to update and more lively. The site architecture will be rethought and the content enriched both on science and public sides in order to increase the visibility and usability of the web pages.

On the science side, more emphasis will be placed on ongoing research projects on continental margins and a larger visibility for associate members. A searchable bibliographic database will be set up. The goal is to provide a portal for resources on continental margin research.
On the public side, new functionalities will be added like Google Maps, video streaming or a gallery of images.

4 SOCIETAL BENEFITS, IMPACT & APPLICATIONS

Continental margins are a reservoir for new living and mineral resources, which in many cases are included in national EEZ. As an example, up to a fourth of oil and gas resources remaining on earth could be lying at water depth deeper than 300 m, including huge reservoirs of methane hydrate. Deepwater oil and gas activities are expected to grow until at least 2012, when expenditures could reach US$24.6 billion.
Over the last two decades, the exploitation of these resources has considerably grown on deep continental margins and so has the need for scientific expertise on their environmental consequences. In 2008, the expertise of COMARGE and the members of its network has been useful for:

- Oil Companies: in the framework of the European Sea Floor Observatory Network (ESONET), COMARGE members are involved in the writing of recommendation for long term observatories of the effect of oil & gas activities on the deep-sea floor.
- National agencies: in Mexico, expertise provided to CONABIO for its "Analysis of gaps and omissions in Marine Biodiversity in Mexico and in France, expertise provided to the new Agency for Marine Protected Areas.



From CONABIO 2008, *Analysis of gaps and omissions in Marine Biodiversity in Mexico*.

5 PARTNERSHIPS & COLLABORATION

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

Organization Name	Point-of-Contact (Name)	Nature of Relationship
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. Affiliated project
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 2010 (P.I. Lisa Levin) Associated projects
US Mineral Management Service	Dr Gilbert Rowe	Funding of the Deep Gulf of Mexico project. Data provider for OBIS. Associated project
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 iNdustrial Technology.
REVIZEE Programme	Dr Helena P. Lavrado	Data provider for 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
ESF-Eurocore BIOFUN	Dr Eva Ramirez	Affiliated project
ESF-Eurocore CHEMECO	Dr Françoise Gail	Affiliated project
Instituto Español de Oceanografia	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

Organization Name	Point-of-Contact (Name)	Nature of Relationship
NSF-funded project "Structure, Function and Evolution of Authigenic, Methane-Derived Carbonate Ecosystems"	Dr Lisa Levin	Affiliated project
SIGSBEE cruises Long Term Ecological Research Project "Factores que definen la variabilidad de la diversidad biológica y biomasa béntica en el mar profundo del Golfo de México"	Elva Escobar Briones (ICML UNAM)	Financially supported by: PAPIIT UNAM, CONACyT, CONABIO Affiliated project: 1. ICML UNAM 2. Red Mex-LTER http://www.mexlter.org.mx/ 3. Mexican Carbon Program http://cambio_climatico.ine.gob.mx/pmc/index.html
National institute of Oceanography (CSIR) Goa India	Dr. Baban Ingole	Affiliated Project
Instituto Espanol de Oceanographia	Ramos Martos, Ana	Associate member
National Oceanography Center, Southampton	Gooday, Andrew	Associate member
Institut de Recherche pour le Développement	Richer des Forges, Bertrand	Associate member
SAMS	Narayanaswamy, Bhavani	Associate member
University of Hawaii	Smith, Craig	Associate member
Florida State University	Thistle, David	Associate member
Universidad Nacional Autònoma de Mèxico	Escobar, Elva	Associate member
Institut de Ciències del Mar	Ramirez, Elva	Associate member
Université Pierre et Marie Curie	Gail, Françoise	Associate member
Institut de Ciències del Mar	Company, Joan	Associate member
University of Iceland	Svavarsson, Jorundur	Associate member
University of Aveiro	Cunha, Marina	Associate member
National Oceanography Center, Southampton	Tyler, Paul	Associate member
Museum National d'Histoire Natuelle	Bouchet, Philippe	Associate member
Polytechnic University of Marche	Danovaro, Roberto	Associate member
Hellenic Centre for Marine Research	Tselepides, Tassos	Associate member
Hellenic Centre for Marine Research	Lampadariou, Nikos	Associate member

Organization Name	Point-of-Contact (Name)	Nature of Relationship
National Oceanography Center, Southampton	Hughes, Alan	Associate member
IFREMER	Olu, Karine	Associate member
Geoscience Australia	Przeslawski, Rachel	Associate member

6 LIAISONS

6.1 Links to Other CoML Ocean Realm Projects

Project Name	Cross-Over Person(s)	Nature of Relationship
ChEss	Dr Robert Carney	Steering Committee
	Dr Lisa Levin	Steering Committee
	Dr Elena Krylova	Taxonomic expertise
	Dr Elva Escobar	Participant, data provider
		Education and Outreach
		The squat lobster workshop organised generated interest from ChEss
		Co-support of RENEWZ proposal
CeDAMar	Dr David Billett	Steering Committee
	Joëlle Galéron	Steering Committee
	Myriam Sibuet	Steering Committee
	Dr Baban Ingole	Participant, data provider
		Education and Outreach
MAR-ECO		Education and Outreach
CenSeam	Dr Baban Ingole	Steering Committee
		Education & Outreach
ArcOD	Dr Elena Krylova	Project participant
NaGiSa	Dr Baban Ingole	Participant, data provider

6.2 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
India	Dr Baban Ingole	Node-manager IndOBIS & Associated with IOCoML
Caribbean CoML – Obis regional node	Dr Elva Escobar	Participant, data provider

6.3 Liaisons to CoML Cross-Cutting Groups

CoML Group	Liaison / Primary Point of Contact	Email
Synthesis	Dr Myriam Sibuet	Myriam.sibuet@wanadoo.fr
OBIS	Dr Lenaïck Menot Dr Baban Ingole (IndOBIS)	Lenaick.menot@ifremer.fr baban@nio.org
E&O	Dr Lenaïck Menot	Lenaick.menot@ifremer.fr
Barcoding	Pr Philippe Boucher	pbouchet@mnhn.fr
Mapping & Visualization	Dr Robert Carney	rcarne1@lsu.edu