Bastianini, Mauro; Bernardi Aubry, Fabricio; ISMAR Istituto di Scienze Marine, CNR Consiglio Nazionale delle Ricerche, Italy
Solidoro, Cosimo; Bandelj, Vinko; Istituto Nazionaledi Oceanografiae di Geofisica Sperimentale, OGS, Italy

Ecological theory and numerical models assume the existence of relations between species succession and environmental conditions. This aspects have important implications in the studies concerning the possibility of using information on presence-absence of given species as indicators of ecological status. However, the research of experimental evidence in support of these assumptions is elusive. Life cycles and 'internal clocks' might be as important as the environmental conditions in regulating structure and dynamic of plankton community. Here we present analysis from two different datasets from the north Adriatic basin. Our analysis suggests that life cycles and 'internal clocks' might be as important as the environmental conditions in regulating structure and dynamic of plankton community. While environmental conditions can explain variability of total abundances, the importance of time (life cycle) grows larger and larger when moving to groups or species level. As a consequence robust patterns in biological structure (seasonality) do persist in spite of large variations in environmental conditions, whereas environmental conditions by themselves hardly explain large  fractions of the variability observed in plankton communities.

## Session 2.3 Ecosystem Functioning and Biodiversity Science in the Deep sea

Chairs: Inge Jonckheere; Françoise Gaill; Eva Ramirez-Llodra; Michail Yakimov; Christian Stenseth; Lisandro Benedetti-Cecchi

THE ESF EURODEEP PROGRAMME- ECOSYSTEM FUNCTIONING AND BIODIVERSITY IN THE DEEP SEA

Jonckheere, Inge, LESC, European Science Foundation (ESF), France

The deep sea as the largest environment on the planet, is the least well known and one of the least studied. It contains extremely large, continuous habitats such as the millions of km2 of abyssal plains and the 65,000 km long mid-oceanic ridge system. At the same time, it encloses relatively small localised geological features such as canyons, seamounts, deep-water coral reefs, hydrothermal vents and fluid seepages on mud volcanoes, pockmarks, which support unique microbial and faunal communities. What little we know about deep-sea ecosystems supports the hypothesis that more species occur in the deep sea than anywhere else on Earth. As much as 90% of species collected in a typical abyssal sediment sample are new to science. EuroDEEP is a European Collaborative Research Programme (EUROCORES) in deep sea biodiversity science that brings together more than 25 research groups from 10 countries. After the Call for Proposals, four multidisciplinary collaborative research projects have been launched in the EuroDEEP programme framework in June 2007. EuroDEEP aims at the exploration and identification of the different deep-sea habitats, assessing both the abiotic and biotic processes that sustain and maintain deep-sea communities in order to interpret variations of biodiversity within and between deep-sea habitats and the interactions of the biota with the ecosystems in which they live. The resulting scientific data are a prerequisite for the sustainable use and the development of management and conservation options aiming at the sustainable use of marine resources that will benefit society as a whole. The EuroDEEP programme fosters pan-European collaborative research, networking and training as well as dissemination of scientific results and activities developed in the frame of the programme.

NEW INSIGHTS ON RIMICARIS EXOCULATA BACTERIAL ECTOSYMBIOSIS: A MOULT CYCLE RELATED PERSPECTIVE

Corbari, Laure; Compère, Philippe; University of LiègeLab. morphologie fonctionnelle et évolutive - Morphologie Ultrastructurale, University of Liège, Belgium
Cambon-Bonavita, Marie-Anne, 2Laboratoire de Microbiologie et Biotechnologie des Extrêmophiles, Ifremer, France
Long, Gary J., Department of Chemistry, Missouri University of Science and Technology, USA
Grandjean, Fernande, Department of Physics, University of Liège, Belgium
Zbinden, Magail; Gaill, Françoise; UMR CNRS 7138 Systématique, Adaptation et Evolution, University Pierr et Marie Curie, France

The Rimicaris exoculata shrimp is considered as the primary consumer dominating the fauna of Mid-Atlantic Ridge (MAR) hydrothermal vent ecosystems. In their gill chambers, these shrimps harbour an important ectosymbiotic community of chemoautotrophic bacteria associated with iron oxide deposits. The periodic bacterial re-colonisation of the gill chamber and the deposition of mineral have been related to the stages of the moult cycle and to the external colour exhibited by the shrimps, providing at least a relative time scale for the development of the bacterial symbiotic community. Bacteria and mineral were characterised in shrimps of different moult stages from two vent fields, Rainbow (36°14.0'N) and TAG (26°08.0' N), by use of light microscopy, electron microscopy (SEM, TEM, STEM), X-ray microanalysis (EDX) and Mössbauer spectroscopy. This multidisciplinary approach has revealed the rapid development of the bacterial community in 5 successive steps that end at formation of a thick mineral crust of heavy iron oxide concretions that consist in nanoparticles of two-line ferrihydrite intermixed with minor ligands (Silica, Ca,Mg-phosphate). Observations of the bacteria-mineral interactions suggest the biogenic origin of the iron oxide deposits.


## EXPLORING PATTERNS OF BIODIVERSITY, FUNCTION AND EXTERNAL FORCING IN A GULF OF MAINE LANDSCAPE

Ellis, Sara; Incze, Lewis; Wolff, Nicholas; Gulf of Maine Area Census of Marine Life, University of Southern Maine, USA
Auster, Peter, University of Connecticut, USA
Lawton, Peter, St. Andrews Biological Station, Canada

We are using a landscape ecology approach and high-resolution multi-beam mapping to partition the environment of Stellwagen Bank (southwestern Gulf of Maine) and its immediate surroundings into habitat types determined by depth and bottom substrate characteristics. Additional characteristics (such as light and bottom stress) are used as modifiers, rather than subdividing the habitats into finer classifications. All space is divided into 30 x 30 m "cells" that represent opportunities for observation, experimentation and replication, though the vast majority remains unsampled. We are populating the landscape/cells with data from photographic, benthic grab, trawl, water column, model and satellite databases. A model of ocean circulation is used to determine seasonally averaged regions of input and output to and from the system (e.g., nutrients, particulate material and planktonic organisms) over various periods of time (days to months). Seasonally migrating biomass (fish, mammals, birds) provides inputs to the system that are subsidized elsewhere; likewise some of the local seasonal growth moves off the bank. Our objective is an assessment of ecosystem services provided by the bank (locally and exported), and the local and external drivers of those services. Even in a comparatively well-studied system, data and information density is low, which greatly constrains calculations. EAM (Ecosystem Approaches to Management) must consider multiple, nested levels of detail that allow for study and management across multiple size scales. We are using Stellwagen Bank as a mid-sized (2,200 km2) pilot study of biodiversity, function and larger ecosystem linkages to evaluate model performance and future information needs.


## THE STRUCTURAL AND FUNCTIONAL BIODIVERSITY OF THE MEIOFAUNA IN RELATION TO GEOCHEMICAL CONDITIONS ON THE DARWIN MUD VOLCANO IN THE GULF OF CADIZ

Pape, Ellen; Bezerra; Vanreusel, Ann; Tania Nara; Marine Biology Section, Ghent University, Belgium
Heeschen, Katja, Geochemistry research Group, National Oceanography Centre, UK
Moodley, Leon, Ecosystem Studies, Centre for estuarine and marine ecology (NIOO-KNAW), Netherlands

As all cold seeps, mud volcanoes (MV) are characterized by strong gradients and a high variability in biogeochemical conditions in the sediment on a relatively small scale. The Darwin mud volcano in the Gulf of Cadiz (1100 m) was sampled for meiofauna and pore water geochemistry (nutrients, sulphide, methane amongst others) along a gradient from the centre of an active area on the rim of the crater towards the slope. The combined analysis of meiofaunal community structure and geochemistry on the same cores allows unraveling fine scale variation in the micro- and macrohabitats and its associated fauna. More specifically, we were able to get a better understanding of changes in meiofaunal community structure (1) from the MV centre towards the edge in relation to increasing cover of hemipelagic sediment on top of mud breccia and (2) from the sediment surface to the deeper sediment layers in relation to vertical geochemical sediment profiles. Besides community analysis, we investigated whether the meiofauna relies upon thiotrophically, methanotrophically or photosynthetically derived food sources by applying fatty acid analysis and compound-specific stable isotope analysis.


## ARE DEEP SEA COMMUNITIES CONTROLLED BY SURFACE WATER PRODUCTIVITY: A TALE OF TWO SEAS?

Jeffreys, Rachel; Lavaleye, Marc; Duineveld, Gerard; Marine Ecology, NIOZ, Netherlands