

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 chemosynthetic bacteria associated with iron oxide deposits. The periodic bacterial recolonisation 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

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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 km<sup>2</sup>) 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

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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?

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