

south. Reef structure and damselfish communities of the northern Gulf of Suez are different from those of the southern Gulf which in turn are different from those of the Red Sea proper. The Red Sea proper had higher abundance and diversity of damselfishes than the Gulf of Suez. Planktivorous damselfishes were more abundant in the Red Sea proper, while herbivores were more abundant in the Gulf of Suez. Branching coral cover correlated significantly positively with the abundance of damselfishes. Reef morphology had greater influence on damselfish biodiversity than benthic composition.

## Parallel sessions

# Afternoon

## Red sea auditorium

### Session 1.3 Deep-sea and extreme environments: temporal and spatial patterns among species and ecosystems

Chairs : Pedro Martinez Arbizu; Andrew Gooday; Ana Colaco; Adrian Glover; Stefanie Keller.

15:00 – 15:15 BIODIVERSITY AND ECOSYSTEM FUNCTION IN THE ABYSS: SOURCE AND SINKS, GLOBAL WARMING AND IRON FERTILIZATION.

Smith Craig; DeLeo Fabio; Benardino Angelo; Sweetman Andrew, Oceanography, University of Hawaii at Manoa, USA.

Martinez Pedro, DZMB, Forschungsinstitut Senckenberg, Wilhelmshaven, Germany.

The abyss covers 54% of the Earth and yet the processes driving abyssal biodiversity and ecosystem function remain poorly evaluated. We synthesize developments in biodiversity and ecosystem function and explore how the abyss will respond to climate change and iron fertilization. It is postulated that abyssal biodiversity is driven by "slope-abyss source-sink" processes; we use hydrodynamic data and models to suggest that this hypothesis cannot explain abundance/diversity patterns in the vast Pacific which contains most of the abyss. Many aspects of abyssal ecosystem structure and function are strongly modulated by the quantity and quality of particulate organic carbon (POC) sinking from the surface ocean. Because deep POC flux is controlled by upper-ocean biogeochemistry, climatic and anthropogenic alterations of ocean biogeochemistry will propagate rapidly to abyssal habitats. Using data from synchronous studies of POC flux and ecosystem properties, we make quantitative predictions of changes in abyssal ecosystem structure and function expected from climate change and iron fertilization. These changes are profound and must be considered in assessments of environmental impacts of global warming and iron fertilization of the oceans.

15:15 – 15:30 GLOBAL PATTERNS OF ABYSSAL BIODIVERSITY.

Martínez Arbizu, Pedro, German Center of Marine Biodiversity Research, Senckenberg Research Institut, Germany.

Census of the Diversity of Abyssal Marine Life "CeDAMar" is an international program designed to study benthic biodiversity at greatest oceanic depths. The present contribution will review what is known about global biodiversity patterns in the abyss.

15:30 – 15:45 LONG-TERM RADICAL CHANGES IN DEEP-SEA ECOSYSTEMS - RESULTS FROM THE PORCUPINE ABYSSAL PLAIN SUSTAINED OBSERVATORY.

Billet, David; Lampitt R.S.; Bett BJ; Gooday AJ, Ocean Biogeochemistry and Ecosystems, National Oceanography Centre, Southampton, UK.

Kalogeropoulou V, Lampadariou L, Hellenic Centre for Marine Research, Heraklion, Crete, Greece.

Martínez Arbizu P, Senckenberg Institute, German Centre for Marine Biodiversity, Wilhelmshaven, Germany.

Paterson GLJ, Department of Zoology, The Natural History Museum Auditorium, London, UK.

Reid W, School of Marine Science and Technology, Newcastle University, Newcastle, UK.

Salter I, Ocean Biogeochemistry and Ecosystems, National Oceanography Centre, Southampton, UK.

Soto EH, Facultad de Ciencias del Mar y de Recursos Naturales, Universidad de Valparaíso, Viña del Mar, Chile.

Vanreusel A, Marine Biology Section, University of Ghent, Ghent, Belgium.

Wolff GA, Department of Earth and Ocean Sciences, University of Liverpool, Liverpool, UK.

Time series sampling from 1989 to 2005 on the Porcupine Abyssal Plain, NE Atlantic Ocean, 4850 m, has shown that abyssal communities change radically in abundance with time. Changes are seen in all size components of the benthic community, but are most apparent in the invertebrate megafauna. Some species have changed in abundance by over three orders of magnitude. Total megafaunal biomass, however, does not vary significantly. The increases in abundance in megafauna are of small, gelatinous species. They have a radical effect on how organic matter is processed at the sediment surface (because of their large numbers and high rate of activity) but do not lead to large-scale changes in biomass. Some elements of the macrofaunal and meiofaunal components, in contrast, show a smaller response in terms of abundance, and are likely to have a concomitant increase in biomass. The faunal changes may be related to variations in the downward flux of organic matter. Some rare species can become super-abundant with time posing questions about the functional significance of the many rare species in deep-sea ecosystems.

15:45 – 16:00      ECOLOGICAL CONNECTIVITY AMONG SEAMOUNTS: COMBINING HYDRODYNAMIC DISPERSAL MODELLING AND OCEANSCAPE GENETICS TO EVALUATE MARINE PROTECTED AREA DESIGN IN AUSTRALIA.

England, Phillip; Gunasekera Rasanthi, Marine & Atmospheric Research, CSIRO, AUSTRALIA.

Miller Keren, University of Tasmania, University of Tasmania, Hobart, Australia.

Slawinski Dirk, Marine & Atmospheric Research, CSIRO, Perth, Australia.

Audzijonyte Asta, MBARI, Moss Landing, USA.

One of the world's largest networks of temperate marine protected areas (MPA) has recently been established in south eastern Australia. These MPAs were in part designed to protect the many deepwater seamounts in the region under threat from trawl fishing. A large programme of biological dredge sampling and acoustic seafloor mapping provided an ideal opportunity to investigate spatial patterns of benthic seamount biodiversity at community and population levels. We used hydrodynamic modelling based on particle tracking in three dimensions to predict likely spatiotemporal patterns of larval dispersal in south eastern Australia. To test these predictions against observed, realised patterns of dispersal and connectivity we developed microsatellites to investigate fine-scale population structure among seamounts in three benthic invertebrates: two deep water corals and a decapod crustacean. Spatial individual-based simulation modelling parameterised with particle dispersal-based estimates of dispersal was also used to interpret observed population structure. We discuss our findings with reference to the likely adequacy of MPA size and spacing from the point of view of marine connectivity and marine biodiversity conservation in the deep sea.

#### Parallel Sessions

## Afternoon

### Museum auditorium

#### Session 1.10 Patterns and drivers in the distribution of marine biodiversity: in homage to John Gray

Chairs : Paul Somerfield and Richard Warwick.

15:00 – 15:15      HOW MANY HABITATS ARE THERE IN THE SEA (AND WHERE)?

Fraschetti, Simonetta; Terlizzi Antonio; Boero Ferdinando, Department of Biological Environmental Science and Technology, Laboratory of Zoology and Marine Biology, Italy.

Current policies of habitat conservation, recovery, and management are strongly biased in favour of terrestrial systems, being poorly applicable to marine environments. A sound habitat classification, leading to spatially explicit accounts on the distribution of marine habitats and communities, is crucial to identify conservation priorities aimed at preventing habitat loss. The ten major European marine habitat classifications have been here revised, and their major differences have been formally tested in terms of multivariate dissimilarity. Mediterranean-based classifications resulted rather uniform, their habitats forming a separate cluster from the rest of European ones;