35/0387

Hotspots of benthic biodiversity and productivity in Antarctic fjords: will they be snuffed out by climate warming?

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Abstract

The rapidly warming West Antarctic Peninsula (WAP) contains numerous glacier-fed, polar fjords supporting important pelagic functions including phytoplankton blooms, krill aggregations, and foraging whales. However, benthic ecosystems in these fjords remain poorly studied. We evaluated mega-/macrobenthic abundance and community structure in 450-600-m deep basins in four WAP fjords (Hughes, Flandres, Andvord and Barilari Bays) using high-resolution digital photography and megacores. Megabenthic abundance was extraordinarily high in fjords (5.6-47.5 m-2), i.e., 4-32-fold greater than comparable depths on the open shelf. Megabenthic species richness in single fjords exceeded 70, while individual shelf stations yielded only ~50 species. Furthermore, 47 species were restricted to fjords. Fjord macrobenthic communities were also characterized by high biomass, body sizes and fecundity. Species assemblages varied markedly between fjords possibly due to differing environmental conditions and/or hydrographic isolation. We postulate that WAP fjords are hotspots of benthic biodiversity, production, and fecundity, contributing fundamentally to regional beta diversity. WAP fjord benthic communities contrast sharply with low diversity assemblages in Arctic fjords, where warmer conditions and greater meltwater/till input reduce water-column productivity and enhance burial disturbance. Because melt-water and till inputs are increasing in WAP fjords with warming, these "hotspots" may be deleteriously impacted by climate change.

35/0487

How well do we know the Ross Sea mollusc fauna? Fine-meshed trawling shows substantial biodiversity underestimation

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Abstract

Antarctica is the harshest place in the world to study marine assemblages. Until recently, most of our species distribution knowledge was based on 'old' datasets obtained by historical sampling. Their species records were extrapolated and used to address studies of diversity and distribution of taxa. Few of these studies have a balanced design or a number of replicates adequate to unravel basic issues of spatial variability across scales. Moreover, a variety of sampling gears have been deployed, preventing direct comparisons. In this contribution we have re-analyzed the Ross Sea molluscan fauna, from the earliest scientific explorations to today, and compared former data with those obtained in the framework of recent voyages with RV *Tangaroa* and RV *Italica* expeditions in 2006/2008. For the first time these voyages deployed fine, 0.5 mm-meshed towed gear on the shelf and slopes of the Ross Sea. An unexpected, high proportion of new species records has been found, suggesting that most of the molluscan diversity of the Ross Sea has been overlooked in the past. Considering the amount of new records added to the 'old' data set it seems that the 'real' sampling and assemblage assessment has just begun with the use of fine-meshed gear

35/0489

Diversity of crinoid evolutionary patterns in the Southern Ocean

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Abstract

More than 45 species of crinoids are known from the Southern Ocean. The greatest diversity is reported from the Weddell Sea and the Peninsula. 50% of the crinoid species are brooders. A few species are very abundant and represent over 80% of the total biomass. Among these, the majority are broadcasters and are circumpolar in distribution, others (like *Notocrinus virilis*) are brooders. A total of 3000 DNA extractions were made for twelve species: *Anthometra adriani*, *Bathycrinus australis*, *Eometra* sp., *Eumorphometra* sp., *Feracrinus heinzelleri*, *Florometra mawsoni*, *Isometra* sp., *Notocrinus virilis*, *Promachocrinus kerguelensis*, *Ptilocrinus amezianei*, *Tonrometra* sp. and *Solanometra antarctica*. Cytochrome Oxidase I (COI) was sequenced for each specimen and barcoding and phylogeographic tools were used to delimit species clusters and describe the diversification patterns. To replace these species in the crinoid phylogeny a specimen per cluster was sequenced for the 16S, 18S and 28S as well as a specimen per crinoid family or subfamily. Results show that 1/ crinoids colonized the Southern Ocean at different points in time; 2/ brooders displayed cryptic clusters geographically structured; 3/ some broadcaster species also displayed cryptic clusters geographically structured or not; 4/ some broadcaster species are still in expansion whereas others are genetically homogeneous.

35/0495

Diversity and evolution of the species complex *Promachocrinus "kerguelensis"* in the Southern Ocean

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Abstract

The comatulid *Promachocrinus kerguelensis* is one of the most abundant crinoids in the macrobenthos of the Southern Ocean. It is a broadcaster that is able to swim actively. Promachocrinus kerguelensis is thought to show great dispersal capabilities because it produces buoyant pelagic lecithotrophic larva. This species is known to have great morphological variability (size, colour patterns, number of arms, etc.) and a high genetic variability among specimens from the Atlantic sector of the Southern Ocean. That variability was interpreted as the result of cryptic speciation, which we now test in the current study.
We sampled nearly 1500 specimens of *Promachocrinus kerguelensis* in the Southern Ocean and sequenced Cytochrome Oxidase I (COI) to understand phylogeographic patterns. We then selected one specimen from each of the 25 most common haplotypes and sequenced additional mitochondrial and nuclear genes (Cytb, 16S, ITS1&2, 5.8S and 28S) for phylogenetic analyses. Results show that *Promachocrinus kerguelensis* is a complex of at least five circumpolar cryptic species, without clear geographical and bathymetrical structure. However, only clade A is found in the sub-Antarctic sector. These results fit recent models that predict high dispersal species to expand previously contracted distributions in interglacial periods.

35/0530

Testing the occurrence of marine benthic species flocks of the Antarctic shelf

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Abstract

The Antarctic shelf has been described as having the physical criteria to promote species flocks. As an example, Eastman & McCune presented the benthic teleost fish of the suborder Notothenioidei as a marine giant species flock according to five criteria. The present contribution evaluates to what extent these five criteria can be used for other presumed benthic species flocks among crinoids, echinoids, crustaceans, and benthic teleosts of the shelf. Ascidians and molluscs are also considered. We describe diverse situations, from the true species flock that fits to the five criteria to taxonomic entities that were initially suspected to contain a flock but actually does not. Intermediate situations indicate that historical criteria should keep the priority over ecological criteria to define a flock. Evolutionary significance of flocks are discussed through the timing of climatic events and through comparison of the dispersive capacities of species with their genetic structure.

35/0548

Megafaunal assemblages in the Amundsen Sea, Antarctica

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Abstract

Little is known about the benthic fauna of the Amundsen Sea (AS) due to its remoteness and extensive sea ice cover inhibiting ship access. Bathymetric maps of the AS continental shelf show several over-deepened troughs and basins which were formed during past ice ages, reach more than 1600 m in depth and experience intrusions of relatively warm Circumpolar Deep Water that is then trapped in over-these. These intrusions could potentially transport deep-sea species onto the shelf and into the troughs and basins. In 2008 the BIOPEARL II expedition on board of RRS James Clark Ross sailed to the eastern AS embayment and Pine Island Bay (PIB). A total of 37 Agassiz trawls were deployed in transects of 500 m, 1000 m and 1500 m depth along the continental AS slope, on the southern and northern slopes of the over-deepened PIB basin, and in the adjacent Bellingshausen Sea (500 m) and the deep sea at 2000 m and 3000 m. The megafaunal assemblages were dominated by echinoderms and clearly different to the assemblages in the Weddell and Ross seas. Here we present the assemblage structure, its species richness and the presence of several species new to science.