

ID: W1608531910

TITLE: Patterns and controlling factors of species diversity in the Arctic Ocean

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ABSTRACT:

**Abstract Aim** The Arctic Ocean is one of the last near-pristine regions on Earth, and, although human activities are expected to impact on Arctic ecosystems, we know very little about baseline patterns of Arctic Ocean biodiversity. This paper aims to describe Arctic Ocean-wide patterns of benthic biodiversity and to explore factors related to the large-scale species diversity patterns. **Location** Arctic Ocean. **Methods** We used large ostracode and foraminiferal datasets to describe the biodiversity patterns and applied comprehensive ecological modelling to test the degree to which these patterns are potentially governed by environmental factors, such as temperature, productivity, seasonality, ice cover and others. To test environmental control of the observed diversity patterns, subsets of samples for which all environmental parameters were available were analysed with multiple regression and model averaging. **Results** Well-known negative latitudinal species diversity gradients (LSDGs) were found in metazoan Ostracoda, but the LSDGs were unimodal with an intermediate maximum with respect to latitude in protozoan foraminifera. Depth species diversity gradients were unimodal, with peaks in diversity shallower than those in other oceans. Our modelling results showed that several factors are significant predictors of diversity, but the significant predictors were different among shallow marine ostracodes, deep-sea ostracodes and deep-sea foraminifera. **Main conclusions** On the basis of these Arctic Ocean-wide comprehensive datasets, we document large-scale diversity patterns with respect to latitude and depth. Our modelling results suggest that the underlying mechanisms causing these species diversity patterns are unexpectedly complex. The environmental parameters of temperature, surface productivity, seasonality of productivity, salinity and ice cover can all play a role in shaping large-scale diversity patterns, but their relative importance may depend on the ecological preferences of taxa and the oceanographic context of regions. These results suggest that a multiplicity of variables appear to be related to community structure in this system.

SOURCE: Journal of biogeography

PDF URL: None

CITED BY COUNT: 44

PUBLICATION YEAR: 2012

TYPE: article

CONCEPTS: ['Arctic', 'Biodiversity', 'Foraminifera', 'Benthic zone', 'Latitude', 'Ecology', 'Oceanography', 'Geography', 'Arctic vegetation', 'Ecosystem', 'Species diversity', 'Environmental science', 'Biology', 'Tundra', 'Geology', 'Geodesy']