

Title

Multiscale spatial distribution of macrofauna response to fishery pressure

Authors

Dario Fiorentino¹, Casper Kraan^{1,2}, Jennifer Dannheim^{1,2}, Shahin K. Badesab¹, Werner Armonies³, Ulf Gräwe⁴, Thomas Brey^{1,2},

- 1 Helmholtz Institute for Functional Marine Biodiversity at the University Oldenburg, Oldenburg, Germany
- 2 Alfred-Wegener-Institut Helmholtz Zentrum für Polar- und Meeresforschung, Functional Ecology, 12 Am Handelshafen 12, 27570 Bremerhaven, Germany
- 3 Alfred-Wegener-Institut Helmholtz Zentrum für Polar- und Meeresforschung, Coastal Ecology, Hafenstrasse 43, 25992 List, Germany
- 4 Leibniz-Institut Institut für Ostseeforschung Warnemünde, Seestrasse 15, 18119 Rostock, Germany

Abstract

Trawling is one of the most damaging activities for fauna living at the ocean resulting in simultaneous pulse and chronic impacts on benthic communities on multiple spatio-temporal scales. Recently, high quality Vessel Monitoring by Satellite (VMS) data provides spatio-temporal information of swept area by fishery trawlers. Using this huge amount of information in combination with about 20 environmental descriptors, we aim to tease apart the effect of species endogenous features (i.e. dispersal capability) and exogenous factors (i.e. environmental conditions) on the fauna responses to fishery and its related spatial scales.

We analyse data of 300 grab-samples taken in the German Bight (North Sea), encompassing 140 macrobenthic species collected on a regular grid over an area of about 8000 km². We use Moran Eigenvector Maps to model patterns of potential connectivity between locations and shed light on which spatial scales fisheries, environmental characteristics, and macrobenthos are linked. Finally, we show maps of fauna response to fishery.

We argue that despite the importance of proper quantification of fishing pressure and other human activities, shedding light on the effects and response to such activities is crucial for a sound understanding of the processes that shape ecosystems and diversity distribution.

Key words

spatio-temporal scales, fishery pressure, benthos response, North Sea

Short description

Spatial approach to link benthic macrofauna, fishery pressure and environmental conditions at multiple scales.