WORK IN PROGRESS

Benthic spatial biodiversity patterns in the seas of the Arctic Siberian shelf

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Background

Siberian shelf seas and their bottom fauna are under pressure by the pronounced consequences of climate change. Benthic communities, food webs and ecosystem functions are influenced by minor changes of environmental parameters. Yet, little is known about the response of benthic communities towards these changing environmental conditions.

Approach

Using recent multi-species distribution models to up-scale Arctic Siberian benthos analysis.

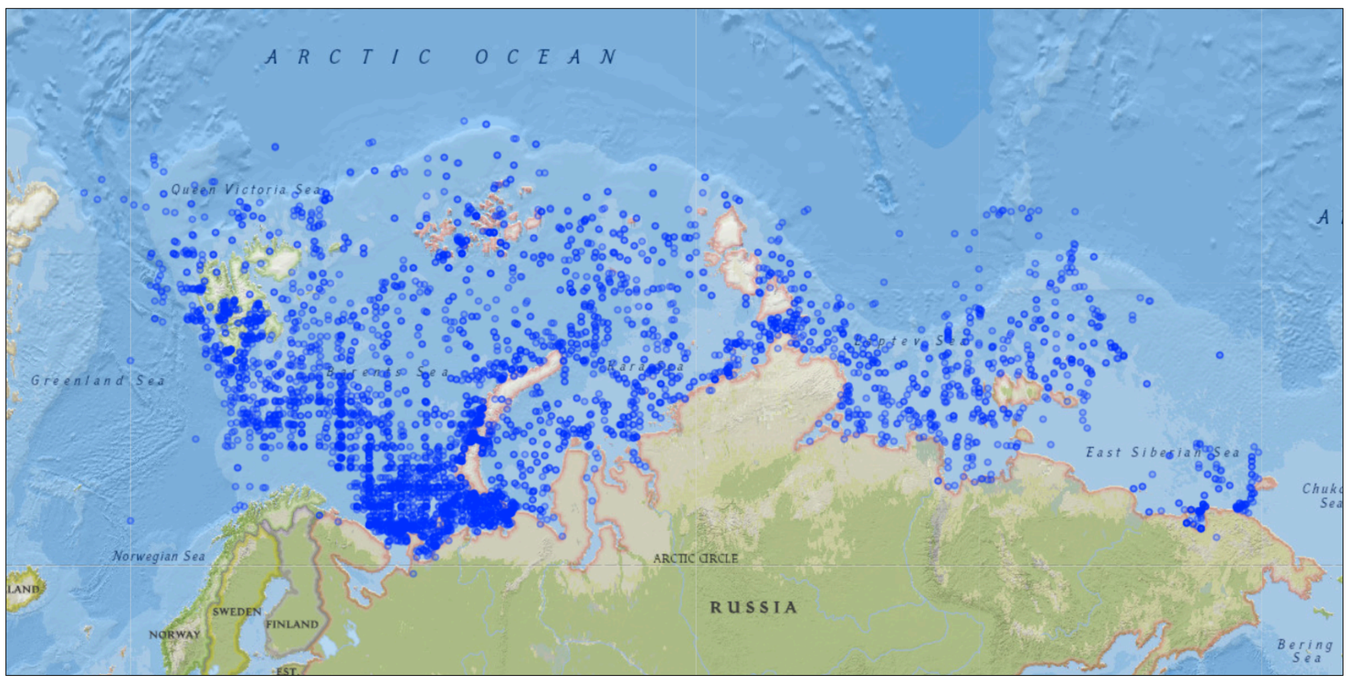

Figure 1: Stations in the Siberian Arctic shelf sea with available ecological data (Piepenburg *et al*. 2011)

Work flow

- Benthic data collection ✅
- Cleaning and harmonizing
- Preparing for analysis

- Piepenburg et al. (2011) Marine Biodiversity 41: 51-70
- Transdrift/CATS-data
- ~6000 stations
- ~400 species

Models

1. Spatial variation in community composition: Moran's eigenvector mapping (MEM)
2. Species-clustering according to their environmental responses: Species archetype models (SAMs)
3. Investigation of spatial patterns in functional redundancy

Figure 2: Arctic benthos (Picture: Dieter Piepenburg, 1985)

1

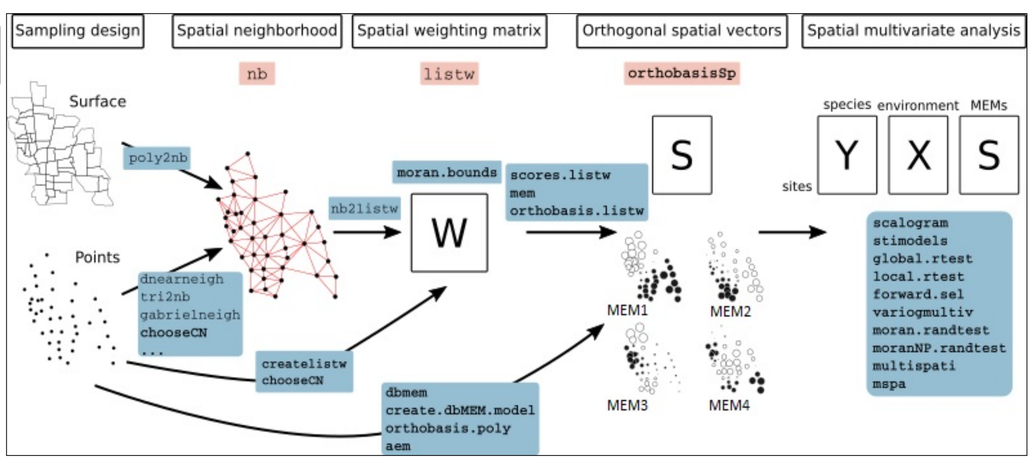

Figure 3: Example – Workflow of MEM analysis (Dray 2017)

2

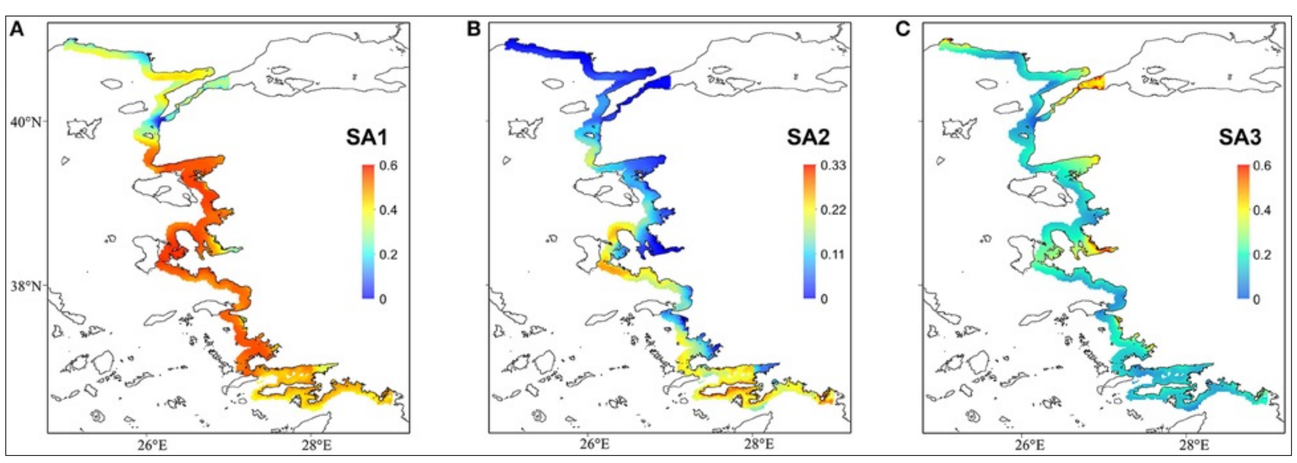

Figure 4: Example - Polychaete-archetypes probability of occurrence along the Aegean coast (Galanidi *et al.* 2016)

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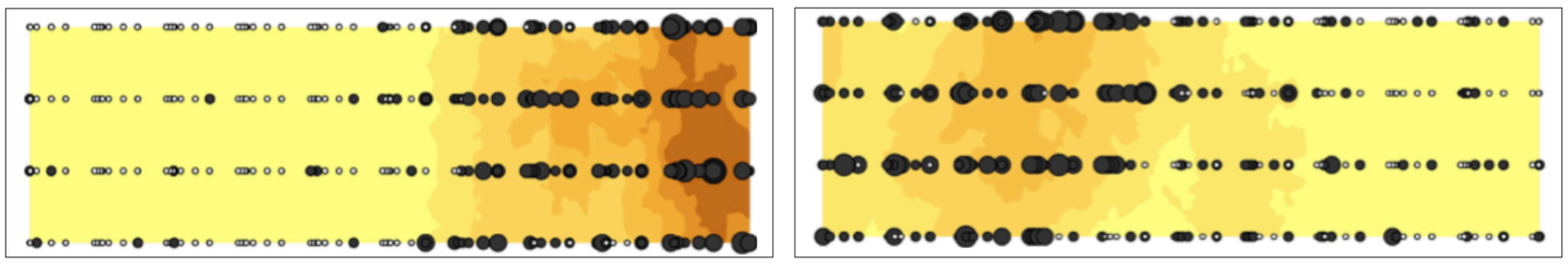

Figure 5: Example - Functional groups with different distributions (scaled points: *n* species; warmer colors indicate higher abundance) (Greenfield *et al.* 2016)

References:

[1]Christian Albrecht University of Kiel, [2]Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), [3]Helmholtz Institute for Functional Marine Biodiversity at the University of Oldenburg (HIFMB)

Dray S (2017). Moran's Eigenvector Maps and related methods for the spatial multiscale analysis of ecological communities. *R-Tutorial*. URL: https://cran.r-project.org/web/packages/adespatial/vignettes/tutorial.html (01.12.2017)

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Greenfield B *et al*. (2016). Mapping functional groups can provide insight into ecosystem functioning and potential resilience of intertidal sandflats. *Marine Ecology Progress Series* **548**: 1-10.

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