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Bioregions cannot reflect polychaete communities (functional and taxonomic groups) on the Weddell Sea Shelf

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Motivation

Infauna (living in the sediment) are an important but also highly unknown component for the benthic ecosystem and its function in the SO (Southern Ocean). Polychaetes are dominant, specious and functional diverse benthic taxa, which reflect a abundance and distribution pattern of the infauna community [1,2]. Changing sea-ice cover will affect these communities at the seafloor [3]. Establishing efficient and sustainable management strategies require to understand fauna spatial distribution patterns and diversity. Contrarily to the traditional biodiversity research the inclusion of functional traits provides a new perspective as insights of the ecosystem functioning.

Open questions

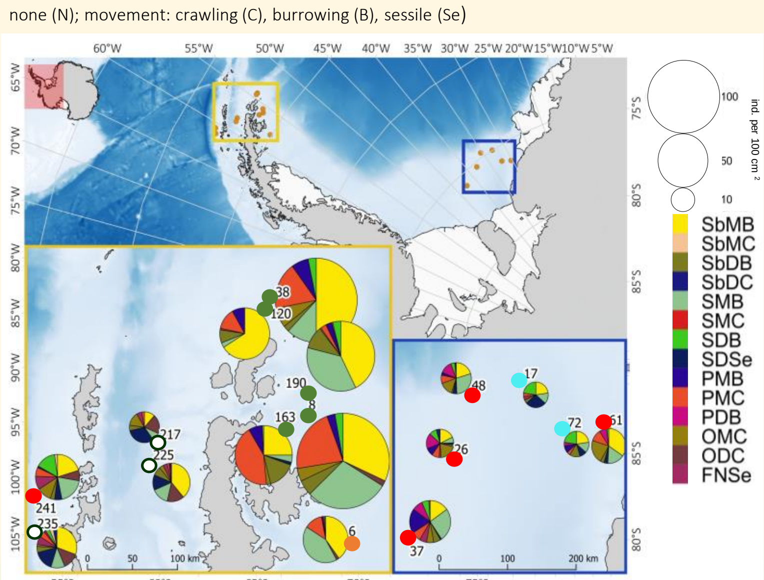
Which polychaete (functional and taxonomic) communities inhabit on the Weddell Sea Shelf?

Is it possible to predict polychaete distribution by modeling environmental bioregions in the Weddell Sea (WS)?

Polychaete communities

Functional community composition

Functional groups: Feeding type: omnivore (O), predator (P), surface deposit feeder (S), subsurface deposit feeder (Sb), filter feeder (F); mobility: motile (M), discretely motile (D), none (N); movement: crawling (C), burrowing (B), sessile (Se)



5 clusters: ○ ● ● ● ●

Highest functional & taxonomic diversity in Bransfield Strait , Drake Passage, station 37 (southeastern WS)

Filchner Trough (17, 72) dominated by surface & subsurface deposit feeders

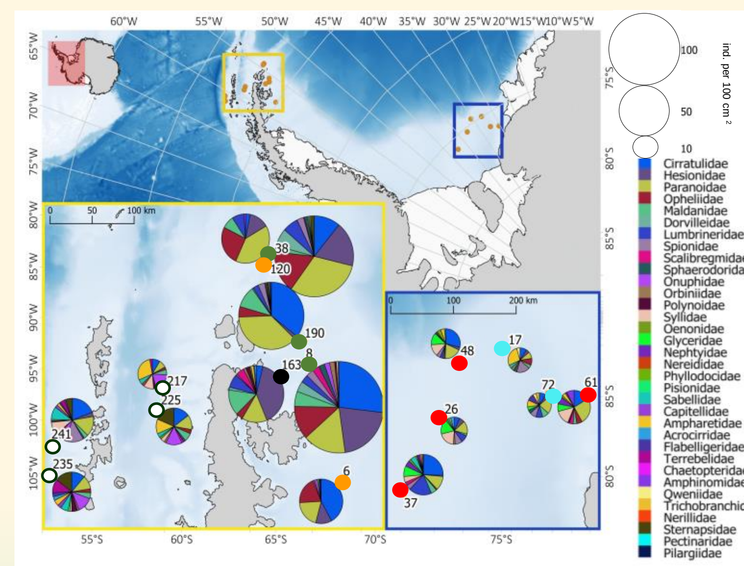
Clusters are distributed differently for functional and taxonomic groups (e.g. 163, 241)

Cluster analysis

(group average, similarity 50%)

Taxonomic community composition

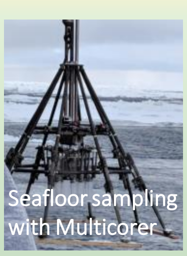
Identified to family level

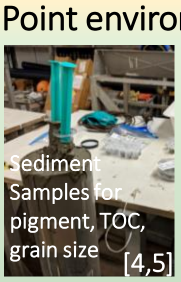


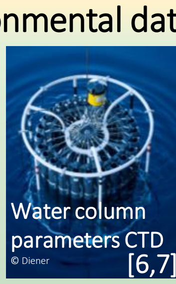
6 clusters: ○ ● ● ● ● ●

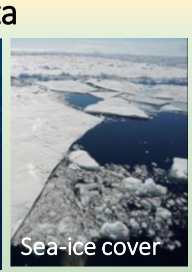
Habitat information

Point environmental data



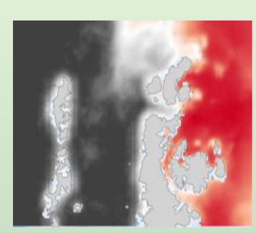






Determination of key environmental drivers through DistLM

Spatial environmental parameter layers



e.g., TOC, grain size, temperature, ice-cover variation (10-year), distance to coast,,current speed

raster standard derivation ice cover (10-year) (gray= 0, red = 45)

Conclusions

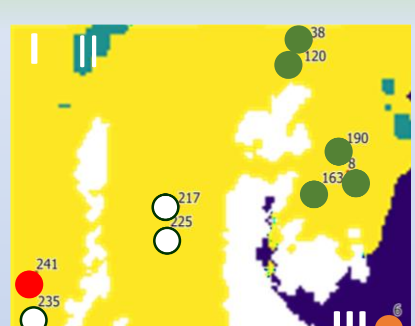
Prediction of polychaete community distribution based on habitat information was not suitable

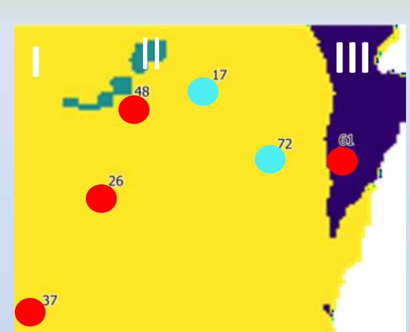
Sampling design in with clusters to improve knowledge of distribution patterns and conservation strategies

Determination of bioregions (*k-means*)

3 bioregions (I, II, II): all sampling sites within cluster I, except station 6 and 61 (cluster II)

Environmental bioregions neither reflect the functional nor the taxonomic clusters of polychaete communities





e.g. 5 clusters of functional community are shown within bioregions

Comparing bioregions with fauna clusters

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