Marine protist diversity and community structure at the West Antarctic Peninsula

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Introduction

The Western Antarctic Peninsula is climatically extremely variable and belongs to the fastest warming regions on earth. Recent changes in the phytoplankton community composition, from large diatoms to small flagellated cryptophytes have been associated with regional climate change and are potentially inducing further shifts in the dominance of major grazers in this region, i.e. Antarctic krill (Euphausia superba) and salps (Salpa thompsonii).

In order to enhance our understanding of these changes, compiling a comprehensive dataset characterizing the regional plankton community structure and potential environmental drivers is crucial.

Methods

Samples were taken with a CTD at ten different stations and four different depths during the RV Polarstern cruise PS112 in late summer/autumn (March - May 2018) to the South Shetland Islands and the Antarctic Peninsula.

We used illumina sequencing, targeting the 18S rDNA V4 region, to investigate the protist community. The bioinformatic processing of the sequences was performed with a custom-made pipeline (Q-zip, Silva.v132) served as main reference for taxonomic annotations.

Community Composition

Quality control and filtering resulted in a diverse range of more than four million protist sequences and roughly 13 thousand operational taxonomic units (OTUs).

Compositional Dissimilarity

Temperature was the main factor contributing to the first axis (CAP1) and separated the Antarctic Sound (AS) samples from other regions.

The dissimilarities along the second axis (CAP2) were mainly correlated to depth and led to a gradual clustering of South Shetland Island (SSI), Elephant Island (EI) and 200m samples.

Drake Passage samples displayed a clear separation of deep and shallow depths.

Dissolved silica (Si) and salinity also contributed significantly to the dissimilarity of samples with lower correlation to the ordination axes.

Conclusions

We observed a highly diverse assemblage of protists at the WAP. Community structure showed distinct differences among regions and depths, which were mainly determined by temperature, depth, dissolved phosphate and latitude.

Outlook

This study is part of the project POpulation Shift and Ecosystem Response - Krill vs. Salps (POSER). The presented results will be complemented by further analyses, including microscopy, 16S sequencing, pigment analysis and flow cytometry. Furthermore, they will serve as basis for the analysis of experiments conducted on board that aimed at estimating the possible consequences of a shift from the currently still predominant krill population to an increasing occurrence of salps.