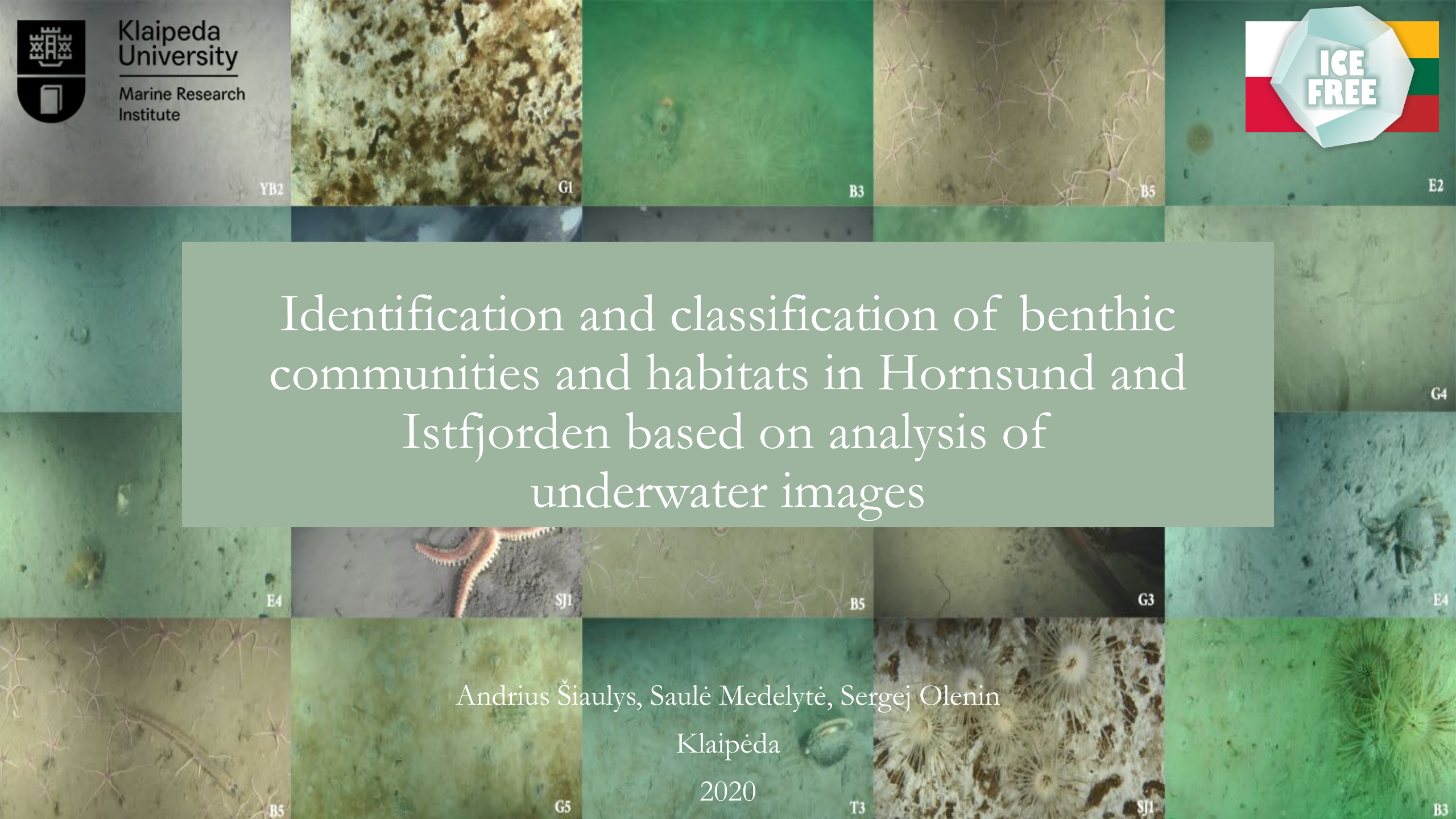

Klaipeda University
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ICE FREE

Identification and classification of benthic communities and habitats in Hornsund and Istfjorden based on analysis of underwater images

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Klaipėda

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Introduction

- The melting and retreat of Arctic glaciers are prime consequences of climate change in European Arctic, Spitsbergen. Deglaciation of Spitsbergen cause a formation of new habitats not accessible earlier on. Observed changes in increased biomass and biodiversity as well as sublittoral communities moving towards shallower waters, where ice scouring was a limiting factor. Yet, enhanced melting and retreat of the glaciers cause intensive sedimentation of mineral matter and fresh water inflow into the fjords. As a result, macrophyte expansion lowers as a euphotic zone decreases and larger sedimentation rates favours suspension feeding over deposit feeding organisms.
- The aim of this study was to compare the structure of benthic communities of upper sublittoral near the retreating glaciers with ice-free areas.

Study area

- An underwater video survey was carried out during 2018-2019 summer months in 4 bays: Adriabuka and Burgerbukta in Hornsund and Gipsvika and Borebukta in Isfjorden.
- In total, 2.8 hours of video material were collected
- Video footage was transformed into 148 video mosaics which were used for visual analysis.

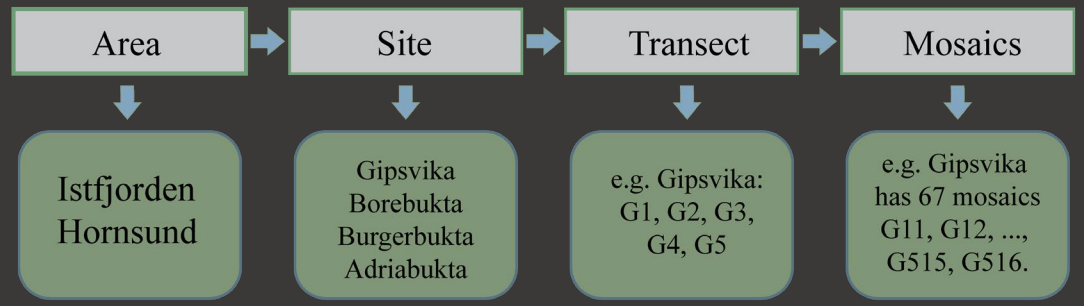


Fig. 2. Explanation of used definitions

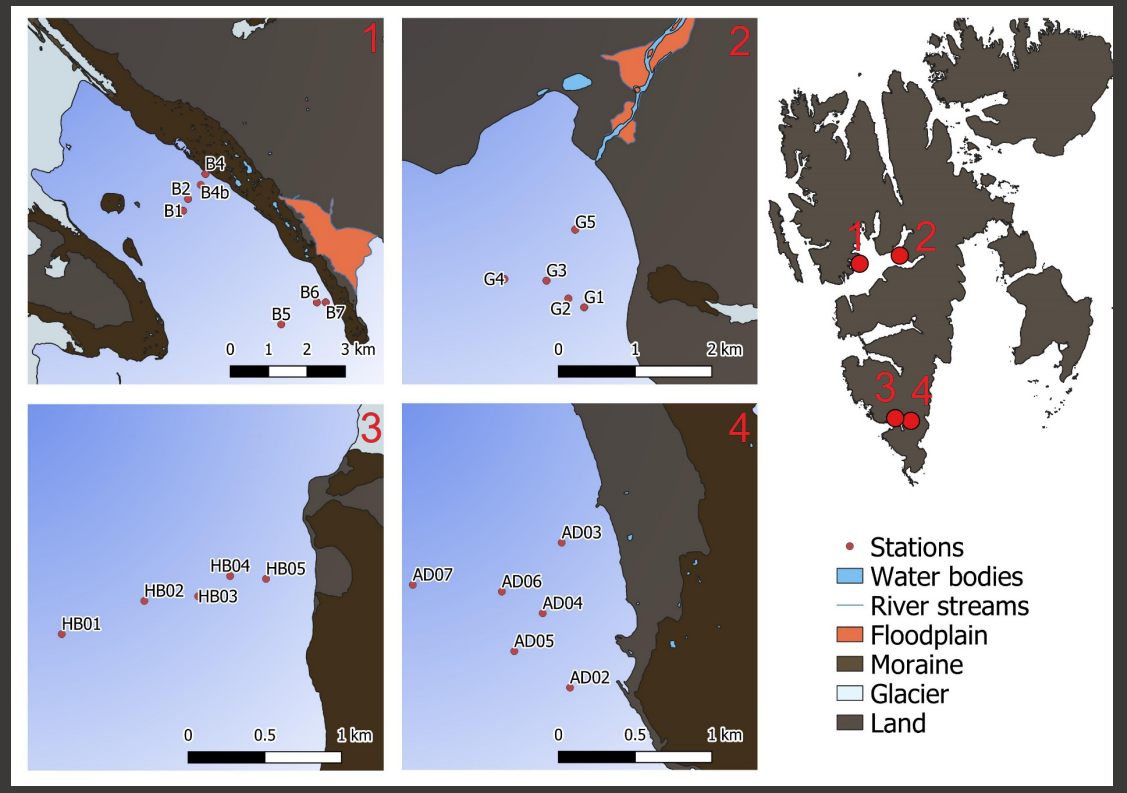


Fig. 1. Underwater video sampling sites in Svalbard. An underwater video survey was carried out during 2018-2019 summer months in 4 bays: Adriabuka and Burgerbukta, and Borebukta, Gipsvika

Results

- 43 biological features were identified to the lowest possible taxonomic level

Fig. 3. Photos of the most abundant features in the study sites taken from video camera during the surveys

Retreating glaciers

Ice free areas

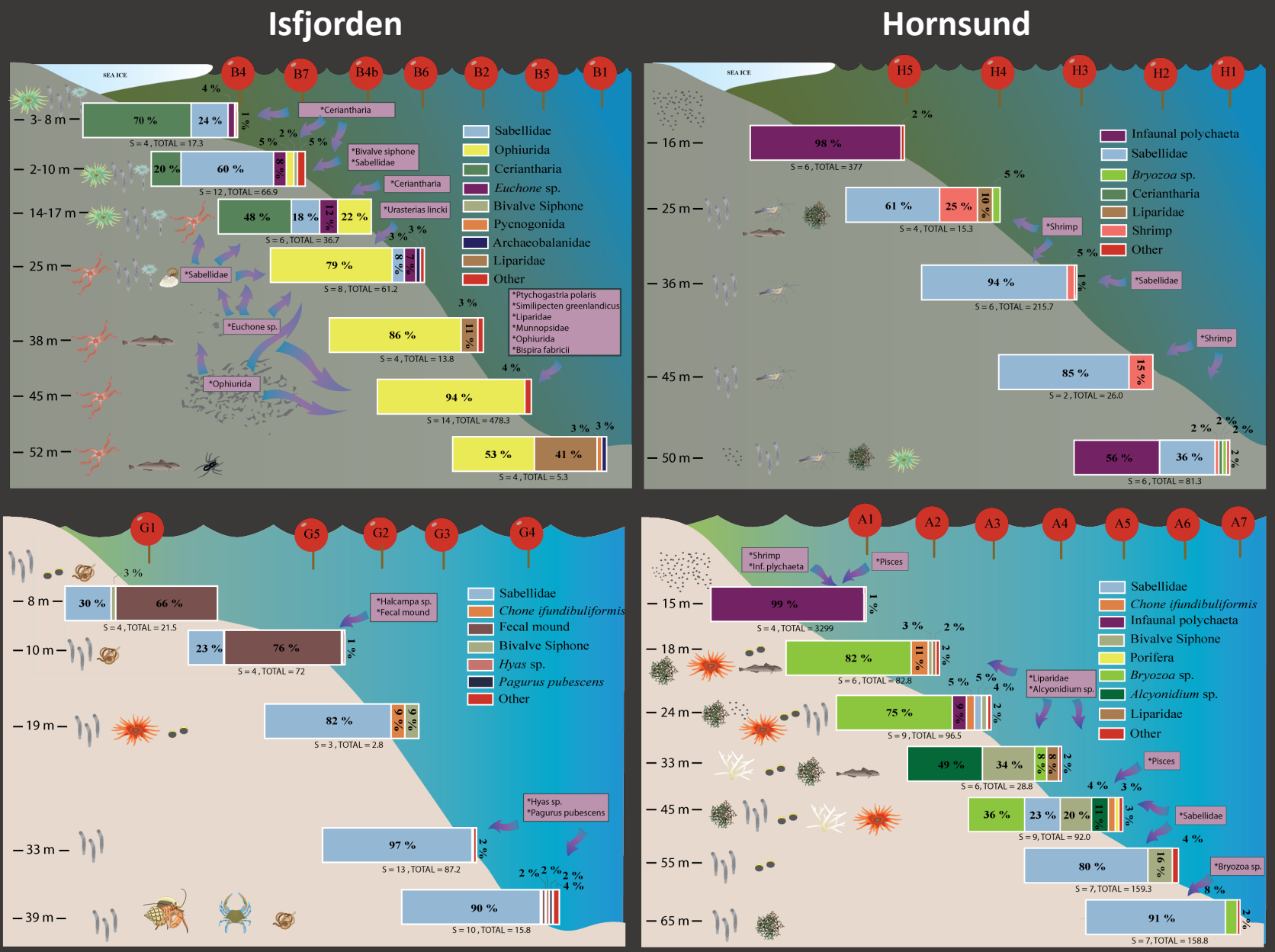


Fig. 4. An infographic showing species relative abundance on average in each transect in different bays. S - species richness, TOTAL - an average number of individuals in the transect mosaics. Species in pink boxes represent strongly associated species with a transect using Indicator Value aapproach (De Caceres et al., 2012).

Similarity of sites

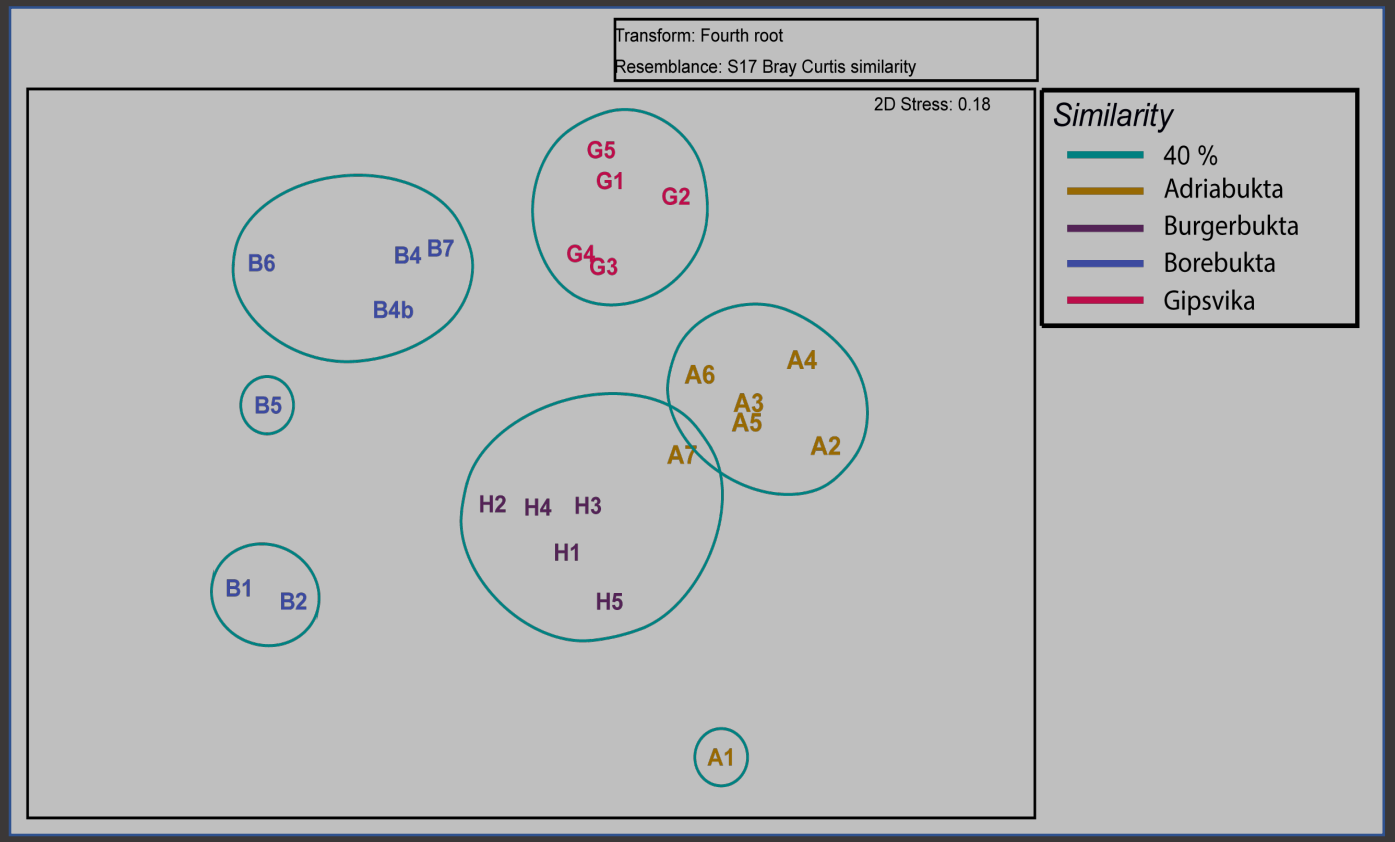


Fig. 5. MDS grouping plot of 24 transects acording to species abundance in 4 bays: Adriabukta, Burgerbukta (Hornsund) and Burgerbukta, Gipsvika (Isfjorden) as well as 40 % similarity between transects

Conclusions

1. In total 43 biological features were identified, 15 were the most abundant. Several e.g. *Ptychogastria polaris*, *Similipecten greenlandicus*, *Bispira fabrici*, *Urasterias lincki* etc., were less abundant, but especially unique to specific location.

2. There is evident geographical segregation by species abundance.

3. In Hornsund glaciated area mainly consist of tube dwellers and active mobile fauna with relatively low diversity, while in ice-free areas communities are more diverse and consists of mobile, sessile and burrowing benthos.

4. Benthic communities near the glacial in Isfjorden consist of tube dwellers in the shallower waters and mobile fauna in the deeper parts. Also species richness was lower closer to the glacier. In Gipsvika, which is considered as ice-free area, deposit suspension feeders and tube dwellers are the most common, mobile fauna shows up in the deeper layers.

Talking points for discussion

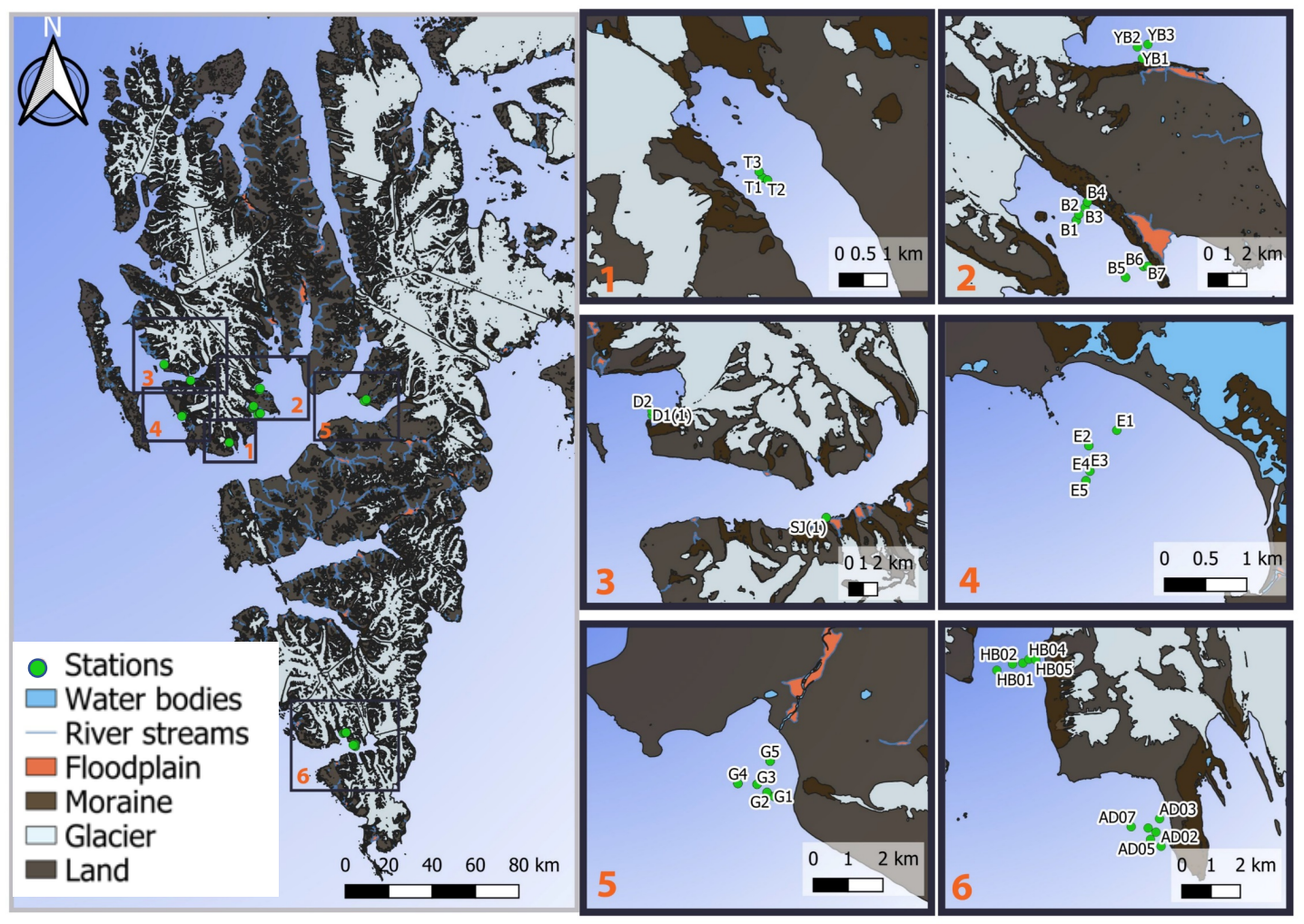
- Manuscript for the presented case study
- Issues with taxonomy levels
- Merging LT and PL video data
- Towards habitat mapping

Different levels of taxonomy

	Class	Order+	Family++	Genus/Species+++
No. of features	18	24+8	23+2+8	28+4+8
Total	18	32	33	40

- Which level to use for community analysis?
- Taxonomy vs. biological traits (feeding, mobility, etc.)?

All LT underwater video data



- 9 areas
- 3-65 m depths
- 217 minutes of video footage
- 204 video mosaics
- Only soft bottom

Polish data?

Towards habitat mapping

- Identification of habitats
  - Are benthic communities well represented by video data only?
  - Physical features (sediments, photic-aphotic zones)

- Habitat classification system
  - HELCOM HUB
  - EUNIS
  - MSFD broad habitat types

- Prediction of habitats
  - Bathymetry and sediment maps for Isfjorden and Honrsund
  - Other predictors (turbidity, suspended organic and inorganic matter, temperature, salinity, current velocity, wave exposure, ice, etc.).

Thank you