The role of sea ice habitats in structuring the under-ice community during Antarctic winter

Carmen David1,2, H. Flores1,2, B. Lange1,2, F. Schafsm1,2, J. van Franeker2

1 Alfred Wegener Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Am Handelshafen 12, 27570 Bremen, Germany
2 University Hamburg, Zoological Institute and Zoological Museum, Martin-Luther-king-Strasse 3, 20146 Hamburg, Germany

INTRODUCTION
Sea ice habitats are changing in some parts of the Antarctic Ocean. Sea ice hosts a specific algal community that can serve as a critical carbon source for juvenile krill Euphausia superba and other species during winter. Therefore, changes of sea ice habitats can have a significant impact on ecosystem functioning. During a winter expedition in the Weddell Sea in 2013, we studied the community composition of under-ice fauna using a Surface and Under-Ice Trawl (SUIT) (in the upper image) equipped with a bio-environmental sensor array (CTD, altimeter, ADCP, video camera, two Hyperspectral radiometers).

UNDER-ICE FAUNA
Abundance and biomass differentiated 3 ecotypes:

- Ecotype I: Dominance of krill
  - Low Biomass
  - High Abundance

- Ecotype II: High Abundance
  - Variable Biomass
  - High Diversity

- Ecotype III: Low abundance
  - Low biomass

SEA ICE HABITATS
Ice conditions varied spatially and seasonally. Higher ice concentration, thickness and roughness were encountered at the first stations and decrease to left on the PCA ordination (Fig.3). Snow thickness differentiates within groups stations ecotype II and ecotype III.

CONCLUSION
- Differences in community are dictated by sea ice properties, with a strong seasonal signal
- Antarctic krill (predominantly larvae) are associated with higher sea ice roughness
- Higher species diversity is associated with thicker ice

Fig.1 SUIT stations map. Sea ice concentration acquired from Bremen University (http://www.iup.uni-bremen.de/884/amr/); sampling was performed from west to east, from August to October 2013; stations color code correspond to the three ecotypes described on the left.

Fig.2 Cumulated abundance and biomass (dry weight) of the taxonomic groups in the SUIT stations.

Fig.3 Principal component analysis on sea ice properties describing the under-ice habitats; stations color code correspond with the 3 ecotypes described above.

Fig.4 Sea ice thickness profiles of two SUIT hauls; photo made during trawling with the video camera attached to SUIT frame.