Differences in communities of gelatinous zooplankton in the water masses in the Faroe-Shetland Channel

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Background

The Faroe-Shetland Channel is characterized by different water masses (figure 1). The surface layers carry warmer waters from the Atlantic, while the deeper layers are influenced by Arctic currents.

Hosia et al (2008) studied the species composition of gelatinous zooplankton along the Mid-Atlantic Ridge, with similar stratification of water masses, and saw differences according to depth.

The distribution of gelatinous zooplankton can help us get a better understanding of how the different water masses influence the marine ecosystems across the water column.
In this project we aim to get a better understanding of the abundance and distribution of gelatinous zooplankton in these water masses.

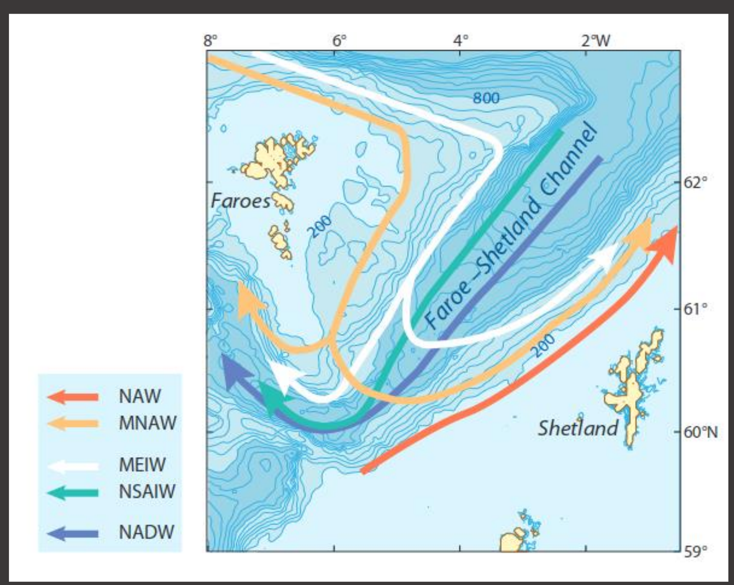


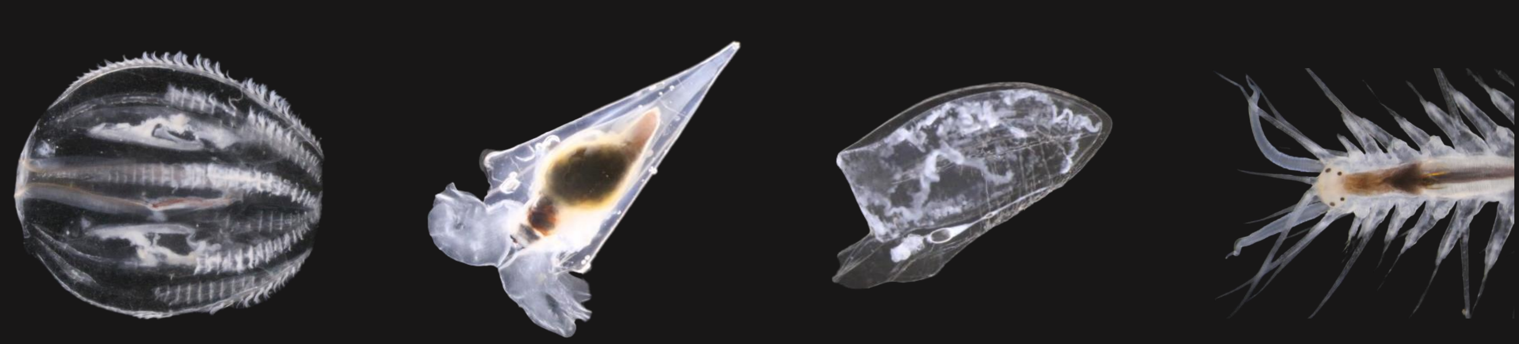
Figure 1: Water masses in the Faroe-Shetland channel. From Brex, (2012)

Methods

We determined the depth of the different water masses using oxygen, temperature, and salinity data from a CTD (conductivity, temperature and depth) with definitions by Hansen and Østerhus (2000). We sampled the whole water column using a multinet that sampled with different nets in the different water masses. Onboard the boat, the gelatinous zooplankton were identified and counted. The rest of the plankton samples were dried and weighed.

Table 1: Sampled watermasses and their cut offs

Water mass	Defined cutoff
Surface Water	Changes in salinity, fluorescence and oxygen visible
Modified North Atlantic Water (MNAW)	S ≥ 35.1 PSU
Modified East Icelandic Water (MEIW)	Salinity minimum, Oxygen maximum
Intermediate Layer	T ≥ 0 °C, Salinity rising
Arctic-Influenced Water	T ≤ 0 °C



Results

All sampling stations showed a similar distribution of water masses with most variation close to the surface. The expected water masses like Modified North Atlantic Water, Modified East Icelandic Water, Norwegian Sea Arctic Intermediate Water, and Norwegian Sea Deep Water are all present in the water column.

Most of the identified species showed low densities in all water masses. *Lensia conoidea*, Chaetognaths, *Aglantha digitale* and *Agalma elegans* showed the highest abundances (figure 2). *L. conoidea* and *A.elegans* had a higher abundance in the warmer layers while *A. digitale* and Chaetognaths showed abundance maxima in the colder intermediate layer.

The non-metric multi-dimensional scaling analysis, doesn't have clear clusters, but seems to be a pattern, where the more Arctic water masses are in the top half of the plot, and the more Atlantic in the bottom (figure 3). The Western station also seems to be laying at the right side of the plot. The analysis gives significant p-values for both station and water mass as a predictor.

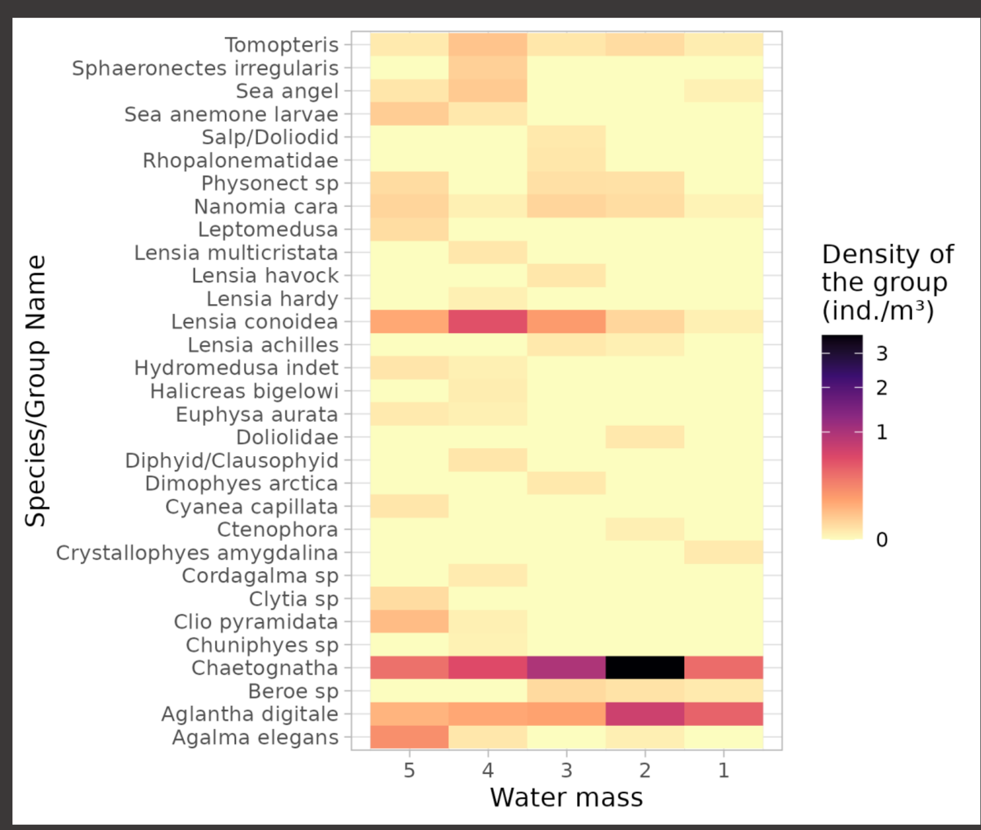
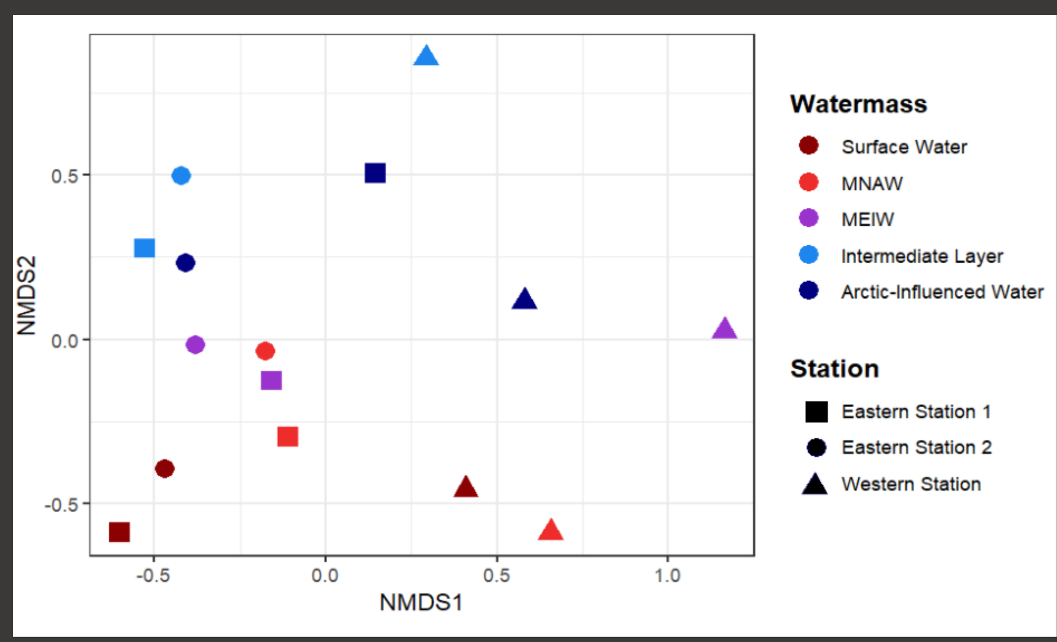


Figure 2: Heat map showing density of the species in the different water masses

Figure 3: non-metric multi-dimensional scaling analysis



Conclusion

Our study showed that the jelly communities in the Faroe-Shetland Channel differ both by the present water masses and by the sampling station.

The multivariate analysis and present indicator species shows that the upper layers (Surface, MNAW, MEIW) and the lower layers (Intermediate, Arctic-influenced) are similar among each other but different from one another.

To get a clearer picture of the influence of the sampling sites on species composition, more samples will be necessary.

The influence of climate change and Atlantification on ecosystems with both warm and cold water masses such as in the Faroe-Shetland Channel should be investigated further.

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