Oceanic drivers, nutrient dynamics and plankton communities in West-Greenland's fjord system: A multidisciplinary study

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The West Greenland marine ecosystem forms a complex interaction between the marine areas along the West Greenland banks and the numerous fjords that drain melt water from the Greenland Ice Sheet to the ocean. The freshwater discharge from land creates a gradient in freshwater content from the inner parts of the fjord systems to the shelf area dominated by the relatively warm and saline West Greenland Current (Mortensen *et al.*, 2011), shaping and separating zooplankton communities in the offshore region and within the fjords (Dünweber *et al.*, 2010). But also within the fjords, marine ecosystem productivity is very differently regulated based on whether the fjord is influenced by either land-terminating or marine-terminating glaciers. Rising subsurface meltwater plumes originating from marine-terminating glaciers entrain large volumes of deep water to the surface. The resulting upwelling of nutrient-rich deep water sustains a high phytoplankton productivity throughout summer in the fjords with marine-terminating glaciers. In contrast, fjords with only land-terminating glaciers lack this upwelling mechanism, and are characterized by a lower productivity (Meire *et al.*, 2017). Due to the melting of the Greenland Ice Sheet, the fjords dominated by marine-terminating glaciers are expected to shift to systems with land -terminating glaciers. By sampling these two types of fjords, a proxy of the consequences of climate change on the plankton community and marine ecosystem can be achieved.

To do so, a multidisciplinary research cruise was conducted in Uummannaq, West Greenland in June-July 2022 to study the link between oceanic drivers, nutrient dynamics, and plankton communities. The main aim was to examine how plankton is distributed along a fjord-shelf gradient and to research the food web composition between two fjord systems to understand the possible impact of climate changes. During the research cruise two different fjord systems (five fjords in total) and the connecting shelf area were sampled. The team of researchers sailed from the shelf edge towards the head of the fjords or until icebergs blocked the way. To achieve their goals, proven oceanographic equipment was used such as conductivity-temperature-depth (CTD) profilers, microstructure turbulence profilers, plankton nets, Niskin bottles for water samples to sample the physical, chemical and biological parameters in the water column. In addition, they made use of emerging technologies such as a Fast Repetition Rate Fluorometers, as well as towed plankton imaging sensors including a Video Plankton Recorder (VPR) to get high spatial resolution images of the plankton community composition.

In this work, we present some preliminary results from this multidisciplinary study. A first correlation between the water masses and the VPR images are provided to establish whether and how the plankton communities are influenced by shelf-fjord water masses' gradients.

References

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