

Freshwater input variability and water mass distribution in the system of fjords in the Ummannaq area, Western Greenland

Ponsoni Leandro, Ollevier Anouk, Develter Roeland and Boone Wieter

Flanders Marine Institute (VLIZ), Jacobsenstraat 1, 8400 Oostende, Belgium

E-mail: leandro.ponsoni@vliz.be

The climate is rapidly changing in the Arctic, where global warming is reported to be about up to four times the global average in the last two decades (Chylek *et al.*, 2022). Aligned with this Arctic Amplification, other Climate-related phenomena are also changing (or are bound to change) on a regional scale. For instance, the accelerated glaciers' melting (e.g., Shepherd *et al.*, 2012) is promoting a transition of some glaciers from marine- to land-terminating systems and, therefore, impacting the balance of freshwater input into the oceans. As consequence, other ocean climate-related processes (e.g., water masses (trans)formation, baroclinicity of geostrophic currents) are expected to be impacted.

Within this context, and as part of the "Innovative study on regional high-resolution imaging of glacier induced plankton dynamics in West-Greenland fjords (IOPD)" project, we visited the fjord system in the Ummannaq area, off Western Greenland, aboard the R/V Sanna, from 28/Jun to 10/Jul/2022. In this region, fjords are marked by both land- and marine-terminating glaciers. During the cruise, we performed 47 hydrographic stations of the entire water column into five different fjords - from their mouth to the innermost accessible location. These stations are complemented by an offshore transect from the fjord mouth to the shelf edge.

Based on the in-situ measurements described above, complemented by other historical oceanographic measurements and state-of-the-art datasets for solid and liquid freshwater input provided by the Geological Survey of Denmark and Greenland (GEUS), we aim at characterizing the fjord system in the Ummannaq area in perspective of the ongoing climate changes.

More specifically, this work addresses the following questions:

- What are the long-term and recent freshwater inputs to the region? And, is this input undergoing changes in the latest years?
- How are the water masses quantitatively distributed within the fjords and adjacent continental shelf? Are there differences between fjords? And, how do the connections with the adjacent continental shelf take place?
- Are there differences between marine- and land-terminating systems in terms of (solid and liquid) freshwater input and water mass distribution in the region? If so, what are these differences?

Keywords

Marine-Terminating Glacier; Land-Terminating Glacier; Freshwater Input; Water Masses; Northwest Greenland