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OCEAN, SEA ICE AND GLACIERS INTERACTIONS IN SVALBARD AREA

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Being a link between a land and ocean, Arctic fjords are highly vulnerable to warming and are expected to exhibit the earliest environmental changes resulting from anthropogenic impacts on climate. In the Arctic, the inshore boundary of a fjord system is usually dominated by glaciers and seasonal freshwater input while its offshore boundary is strongly influenced by warm oceanic waters. Improved understanding of the fjords-ocean exchange and processes within Arctic fjords is of a highest importance because their response to atmospheric, oceanic and glacial variability provides a key to understand the past and to forecast the future of the high latitude glaciers and Arctic climate.

Rapidly changed Arctic climate requires multidisciplinary and complex investigations of the basic climate components; especially complicated interactions between them are still poorly understood. The aim of the Polish-Norwegian project 'Arctic climate system study of ocean, sea ice and glaciers interactions in Svalbard area' (AWAKE-2) is to understand the interactions between the main components of the climate system, i.e. ocean, atmosphere and ice, and to identify mechanisms of interannual climate variability and long-term trends.

The main oceanic heat source in Svalbard region is the West Spitsbergen Current consisting of multi-branch, northward flow of warm, Atlantic origin water (AW). During its transit through the Nordic Seas, Atlantic water releases a large amount of heat to the atmosphere. In Fram Strait and north of Svalbard, AW melts sea ice (Piechura, Walczowski, 2009). When entering the Western Svalbard fjords, AW modifies hydrographic conditions, reduces winter ice cover and directly influences tidewater glaciers.

An impact of the AW variability on atmosphere and sea ice is clearly visible with strong correlations between AW properties and air temperature or sea ice coverage (Walczowski et al., 2012). For tidewater glaciers these effects can be recognized but correlations are weaker due to different processes that influence the intensity of glaciers melting and calving (Błaszczyk et al., 2013).

The dedicated, multidisciplinary approach was adopted to achieve the AWAKE-2 project's aims by carrying out the coordinated meteorological, oceanographic, glaciological and geophysical observations in the Hornsund fjord (southwestern Svalbard) and at the adjacent shelf and open sea.

The measurement strategies, preliminary results of the project and plans for the future research will be presented and discussed.

References

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