

Ocean and glaciers interactions in Svalbard area

Waldemar Walczowski (1), Małgorzata Błaszczuk (2), Tomasz Wawrzyniak (3), and Agnieszka Beszczyńska-Möller (1)

(1) Institute of Oceanology PAS, Physical Oceanography Department, Sopot, Poland (walczows@iopan.gda.pl), (2) Silesia University, Sosnowiec, Poland, (3) Institute of Geophysics PAN, Warszawa, Poland

Arctic fjords are a link between land and ocean. The inshore boundary of the fjords system is usually dominated by the tidewater glaciers and seasonal freshwater input while its offshore boundary is strongly influenced by 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 and interactions between them. 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 ocean, atmosphere and cryosphere.

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, AW releases a large amount of heat to the atmosphere. 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. 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. 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, the adjacent shelf and ocean.