

Air temperature and humidity diversity in the Hornsund fjord area (Spitsbergen) in the period 1 July 2014 – 30 June 2015

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The article presents preliminary results of studies into the spatial diversity of air temperature and relative humidity (overground layer, 2 m a.g.l.) in the area of the Hornsund fjord (S Spitsbergen, approx. 77°N), based on data collected between 1 July 2014 and 30 June 2015.

The Hornsund fjord runs latitudinal along approx. 40 km and its average width is about 10 km. Numerous glaciers flow into the fjord and the mountain ridges around it often exceed 700 m a.s.l. Data series obtained from 11 sites equipped with automatic weather stations (Vaisala, Campbell, Davis) or HOBO temperature and humidity sensors were used. Two sites (Hornsund HOR and the Hans Glacier HG4) have been operating for years, whereas 9 new ones (Bogstranda BOG, Fugleberget FUG, Gnålodden GNA, Gåshamnoyra GAS, Hyttevika HYT, Lisbetdalen LIS, Ostrogradskijfjella OST, Treskelodden TRE and Wilczekodden WIL) were established within the Polish-Norwegian AWAKE-2 project. Three of the sites (BOG, GAS and OST) were damaged by polar bears, hence their measurement series are shorter.

A substantial spatial diversity was found in the air temperature and relative humidity in the area, mostly influenced by elevation, type of surface and distance from the Greenland Sea's open water.

During the year (July 2014 – June 2015), the areas of HYT (-1.1°C) and WIL (-1.9°C) were the warmest. Both sites are located on the west coast of the fjord. The HYT demonstrates the most favourable temperature conditions, being orographically sheltered from the east and its cold and dry air masses. The coldest sites were the mountain-top site of FUG (-5.9°C) and the glacier-located HG4 (-4.3°C). The low temperature at FUG resulted from its elevation (568 m a.s.l.), whereas at HG4 (184 m a.s.l.) the glaciated surface also added up to the result. In the analysed period, the annual course of air temperature in the area had a clear minimum in February, when the lowest mean monthly values ranged from -9.4°C at HYT to -15.1°C at FUG. The highest temperature was recorded at all the sites in July, when its highest mean values were observed at GAS and HYT (6.1°C and 6.0°C, respectively), while the lowest occurred at FUG (2.4°C) and HG4 (3.1°C).

The other meteorological element considered was relative humidity, which positively correlates with the course of air temperature. During the year, the most humid sites were those located at the mountain top (FUG) and on the Treskelen peninsula (TRE), towards the end of the fjord (94% and 91%, respectively). The lowest RH values were measured at HOR and HYT (80% in both). In the annual course, the lowest RH was observed in February with the lowest mean monthly values (74%) at HOR and HYT, and the highest at FUG (88%) and TRE (87%). As with air temperature, the highest relative humidity occurred in July. Its lowest mean values were recorded at HOR (87%), and the highest – at FUG (96%).