



Trends in solid, mixed and liquid precipitation in the changing climate of the Atlantic sector of the Arctic

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Being relatively low due to cold air which is unable to hold a great deal of water vapour, precipitation is an important element of the Arctic climate system and plays an important role in many environmental processes. Rapid increase in the Arctic air temperature which has been found since the mid of the nineties, is likely to cause the significant changes both in the frequencies and totals of precipitation phases.

This paper concerns relations between air temperature and precipitation phases and aims at recognition trends in the frequency and totals of solid, liquid and mixed precipitation at selected stations in the Atlantic sector of the Arctic. Daily precipitation data from Hornsund, Svalbard-Lufthavn, Ny-Alesund, Hopen, Bjornoya and Jan Mayen were used to recognize and select days with solid, liquid and mixed precipitation. Different time-frames were used depending on the data availability. The analyses were performed on annual and seasonal scales.

Daily air temperature ranges with the highest probability of particular precipitation phases were possible to identify. For example at Hornsund station liquid precipitation was the most probable to occur at daily temperatures between $+3^{\circ}\text{C}$ and $+7^{\circ}\text{C}$ while mixed and solid precipitation could be expected the most at days with air temperature between 0°C and $+2^{\circ}\text{C}$ and between -1°C and -11°C , respectively. Increase in air temperature resulted in significant trends in precipitation phases. Frequency of liquid precipitation was to increase while frequency of solid precipitation was to decrease at considered station within the research period. Direction of significant trends in mixed precipitation varied depending on season. Liquid and solid precipitation characteristics were found to be relevant indicators of current climate change. More rainfalls are very important for hydrology of polar basins, mass balance of glaciers, geomorphic processes and terrestrial ecology issues.