B01-P01

AIR TEMPERATURE AND PRECIPITATION ON THE KAFFIØRA PLAIN AND THE WALDEMAR GLACIER (NW SPITSBERGEN) FROM 1978 TO 2014

Rajmund Krzysztof Przybylak *(Nicolaus Copernicus University, Department of Meteorology and Climatology, Poland)*
Andrzej Arazny *(Nicolaus Copernicus University, Department of Meteorology and Climatology / Institute of Geophysics PAS, Poland)*

rp11@umk.pl

Air temperature and precipitation in the Arctic, including Spitsbergen, are very important to both the biosphere and the mass balance of glaciers. The main aim of this paper is to describe the principal features of the summer climate (21st July-31st August) and its changes in the Kaffiøyra region (NW Spitsbergen) based on data from the years 1978-2014. The analysis includes two diametrically opposed natural environments: the non-glaciated coastal part of the Kaffiøyra Plain and the glaciated part, represented by the Waldemar Glacier. Three sets of meteorological data have been used, taken from a located near the Nicolaus Copernicus University Base Station (KH), and from two sites located on the Waldemar Glacier - in its firn field (LW2) and immediately at its front (LW1). For the study area, air temperature and precipitation are available for 19 and 15 summer seasons, respectively.

Air temperature decreases as altitude increases and with changes of surface (from non-glaciated to glaciated). The highest mean summer air temperature (5.0°C) in the Kaffiøyra region was recorded at the KH station, located near the coast of the Greenland Sea. At this station, the warmest summer (6.3°C) occurred in 1998, while the coldest (3.3°C) was in 1982. Rising temperatures in the study period can be clearly seen. On the Waldemar Glacier, the mean air temperature in its marginal zone (LW1) was 4.2°C, which was greater than in the firn field (LW2) by 1.5°C. Mean lapse rates of air temperature oscillate from 0.61°C /100 m to 0.65°C /100 m between KH and LW2 and KH and LW1, respectively. The lapse rate between stations located on the Waldemar Glacier (LW1 and LW2) is 0.59°C /100m.

The average summer precipitation total in the Kaffiøyra Plain, calculated from 15 expeditions was 44.8 mm. The season-to-season variability of summer precipitation totals is very large. For example, at KH, the highest precipitation (141.4 mm) occurred in 2013, while the lowest (8.5 mm) in 2010. It is well known that precipitation is usually greater in the inner mountain (glaciated) parts of Spitsbergen than in the tundra areas. For example, mean summer precipitation totals at LW1 and LW2 were greater than at KH by 18.2 and 50.2 mm, respectively. The greatest differences occurred in 1980, while the lowest were in 2007, when even LW1 precipitation was lower than at KH. The lapse rates of precipitation in the Kaffiøyra region are greatest between tundra and glaciated areas (oscillating from 13.8 mm/100 m to 15.3 mm/100 m between KH and LW2 and KH and LW1, respectively. The precipitation lapse rate is lowest (13.1 mm/100 m) between glacier stations.