

SPRING SNOW DISAPPEARANCE FROM VARIOUS TUNDRA TYPES – CASE STUDY FROM FUGLEBEKKEN CATCHMENT (SW SPITSBERGEN)

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ABSTRACT

Distribution and properties of snow cover have strong influence on Arctic environment, especially in unglaciated coastal areas. That is the place where snow persist during majority of the year affecting e.g. hydrological conditions and thickness of permafrost active layer. On the other hand, differences in length of snow cover persistence in polar regions have crucial meaning for plant development and growth.

Motivated by aforementioned information, we studied timing of Spring snow disappearance in small Arctic catchment during three years (2014-2016). Investigations were based on previously designated land cover types for that terrain and photos from time-lapse camera installed close to nearby Fugleberget summit (560 m asl) during the polish-norwegian SMACS (Snow Monitoring Using Automatic Camera Systems at Svalbard Key Sites) project. From pictures that were taken every hour, we chosen one for each day, starting from 8th, 23rd and 15th of April in, respectively, 2014, 2015 and 2016 year, till the complete disappearance of snow. Selected images were orthorectified in Matlab software and later classified into snow and snow-free surface in ArcGIS software, using the threshold value in blue band. Obtained daily snow coverage in the catchment were correlated with meteorological conditions from nearby Hornsund meteorological station (WMO number 01003). Classified snow images were superimposed onto map with tundra vegetation types, to try found the relationship between length of snow persistence and occurrence of specific vegetation groups in this region.

Presentation will focus on problems that may be encountered during the processing of oblique photos into source of valuable scientific data. Day by day snow coverage in lower part of catchment (area equal to 0.61 km²) will be presented and compared for 3 ablation seasons (2014, 2015, 2016) together with reference to meteorological background. For specific days showed will be differences in snow coverage for various tundra vegetation types.

Results showed that despite the major diversity in meteorological conditions between considered seasons, snow cover disappears in similar time on the tundra. Rapid decrease in snow cover extent had place in June in all 3 seasons. Rate of snow disappearance from various tundra vegetation types was not very diversified. Generally, the longest persistence of snow was observed in terrain not covered by any vegetation (“rock debris”). Visible was also slightly longer occurrence of snow on wet tundra types than dry ones.

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