



Changes in winter warming events in the Nordic Arctic Region

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In recent years winter warming events are frequently reported from Arctic areas. Extraordinarily warm weather episodes, occasionally combined with intense rainfall, cause severe ecological disturbance and great challenges for Arctic infrastructure. For example, the formation of ground ice due to winter rain or melting prevents reindeer from grazing, leads to vegetation browning, and impacts soil temperatures. The infrastructure may be affected by avalanches and floods resulting from intense snowmelt.

The aim of our analysis is to study changes in warm spells during winter in the Nordic Arctic Region, here defined as the regions in Norway, Sweden and Finland north of the Arctic circle (66.5°N), including the Arctic islands Svalbard and Jan Mayen. Within this study area we have selected the longest available high quality observation series with daily temperature and precipitation. For studying future climate we use available regionally downscaled scenarios.

We analyse three time periods: 1) the past 50-100 years, 2) the present (last 15 years, 2000-2014) and 3) the future (next 50-100 years). We define an extended winter season (October-April) and further divide it into three subseasons: 1) Early winter (October and November), 2) Mid-winter (December, January and February) and 3) Late-winter (March and April). We identify warm spells using two different classification criteria: a) days with temperature above 0°C (the melting temperature); and b) days with temperature in excess of the 90th percentile of the 1985-2014 temperature for each subseason. Both wet and dry warm spells are analysed.

We compare the results for the mainland stations (maritime and inland stations) with the Arctic islands. All stations have very high frequency of warm weather events in the period 1930-1940s and for the last 15 years (2000-2014). For the most recent period the largest increase in number of warm spells are observed at the northernmost stations. We also find a continuation of this pattern with a strong increase in warm spells for the next 50 years.