EMS Annual Meeting Abstracts
Vol. 15, EMS2018-435, 2018

Widespread and accelerated decrease of mean and extreme snow depth observed over Europe

Adria Fontrodona Bach (1,2), Gerard van der Schrier (2), Ryan Teuling (1), Lieke Melsen (1), and Albert Klein Tank (1)

(1) Wageningen University and Research, Wageningen, Netherlands, (2) Royal Netherlands Meteorological Institute, Climate Analysis, De Bilt, Netherlands (schrier@knmi.nl)

Accumulated snow impacts society in many ways and the amount of accumulated snow will change with the changing climate. Higher temperatures will increase both the moisture content of air, leading to more extreme precipitation, and snow melt. These competing effects make that the effects of a warming climate on snow depth and snow depth extremes are not straightforward.

In this presentation, in situ snowdepth obervations are analysed from a pan-European dataset.

Earlier modelling studies hypothesize that in future climates, using a strong warming scenario, contrasting responses to climate change are found between mean snowfall and extreme snowfall, with smaller changes in extreme snowfall than in mean snowfall. Here we show observational evidence from a pan-European in situ dateset that mean snowdepth and extreme snowdepth are already showing such contrasting trends, and that this contrast has increased in the recent decades. While widespread decreases in maximum and mean snow depth were found all over Europe - except in the coldest climates - the median of
the ratio of these two trends for all stations in Europe was 0.84 for trends calculated from 1951 onward while it decreased further to 0.70 for the period since 1981.

Estimates are given for the transition mean winter temperature where an increase to a decrease in mean snowdepth is found for European stations. The
threshold for extreme snow depth is higher than that for mean snow depth.

The observational evidence presented here make clear that for large parts of Europe, mean snowdepth is decreasing fast which has implications for the availability of fresh water in spring, while extremes in snowdepth, usually very disruptive to society, are decreasing much less fast.