Changes in heavy precipitation over the Nordic-Baltic region

Dyrrdal, Anita Verpe; Olsson, Jonas; Médus, Erika; Arnbjerg-Nielsen, Karsten; Post, Piia; Aņiskeviča, Svetlana; Thorndahl, Søren; Førland, Eirik; Wern, Lennart; Mačiulytė, Viktorija

Total number of authors:
12

Publication date:
2022

Document Version
Publisher's PDF, also known as Version of record

Changes in heavy precipitation over the Nordic-Baltic region

Session: UP3.1 Climate change detection, assessment of trends, variability and extremes

Authors: Anita Verpe Dyrrdal[1], Jonas Olsson[2], Erika Médus[3], Karsten Arnbjerg-Nielsen[4], Piia Post[5], Svetlana Aņiskeviča[6], Søren Thorndahl[7], Eirik Førland[1], Lennart Wern[2], Viktorija Mačiulytė[8], Antti Mäkelä[9], Johan Södling[2]

Affiliation of authors:

[1]Norwegian Meteorological institute, Pb. 43 Blindern, 0313 Oslo. Contact email: anitavd@met.no

[2]Research & Development (Hydrology), Swedish Meteorological and Hydrological Institute, Norrköping, Sweden

[3]Climate System Research, Finnish Meteorological Institute, Helsinki, Finland

[4]Department of Environmental Engineering, Technical University of Denmark, Lyngby, Denmark

[5]Institute of Physics, University of Tartu, Tartu, Estonia

[6]Forecasting and Climate Department, Latvian Environment, Geology and Meteorology Centre, Riga, Latvia

[7]Department of the Built Environment, Aalborg University, Aalborg, Denmark

[8]Institute of Geosciences, Vilnius University, Vilnius, Lithuania

[9]Weather and Climate Change Impact Research, Finnish Meteorological Institute, Helsinki, Finland

The Nordic-Baltic region has experienced numerous flooding episodes resulting from heavy rainfall. Such events are costly and may potentially threaten the safety of the population. As part of the cooperation in the Nordic Framework for Climate Services (NFCS), we here present results from two separate analyses of heavy precipitation in a large region covering Fennoscandia and the Baltics (Dyrrdal et al., 2021; Olsson et al., 2022).

In Dyrrdal et al. (2021), long-term (1901–2020) changes of annual maximum daily precipitation from 138 stations and short-term (1969–2020) changes from 724 stations were analyzed, along with their date of occurrence. Results show a majority of positive trends in daily annual maxima and the 5-year return level, with hotspots in southeast Norway, southern Sweden and southwest of Finland. Almost all stations with a statistically significant trend showed an increase in the intensity of annual maximum 1-day precipitation during the last 50 years. In the region as a whole, annual maximum precipitation events occur somewhat later in the year now compared to the beginning the last century

For urban flooding, the occurrence of short-duration rainfall is of special importance.
In Olsson et al. (2022), sub-daily rainfall observations from 543 meteorological stations in the Nordic-Baltic region were collected, quality controlled and consistently analyzed in terms of records, return levels, geographical and climatic dependencies, time of occurrence of maxima and trends. The results reflect the highly heterogeneous rainfall climate in the region, with longitudinal and latitudinal gradients as well as local variability, and overall agree with previous national investigations. Trend analyses in Norway and Denmark indicated predominantly positive trends in the period 1980-2018, in line with previous investigations.

References:

Dyrrdal, A.V., Olsson, J., Médus, E., Arnbjerg-Nielsen, K., Post, P., Aniskeviča, S., Thorndahl, S., Førland, E., Wern, L, Mačiulytė, V. and Mäkelä, A., 2021: Observed changes in heavy daily precipitation over the Nordic-Baltic region, Journal of Hydrology: Regional Studies, 38, 100965, ISSN 2214-5818, https://doi.org/10.1016/j.ejrh.2021.100965.

Olsson, J. …

Olsson, J., Dyrrdal, A.V., Médus, E., Södling, J., Aniskeviča, S., Arnbjerg-Nielsen, K., Førland, E., Mačiulytė, V., Mäkelä, A., Post, P., Thorndahl, S.L., and L. Wern (2022) Sub-daily rainfall extremes in the Nordic-Baltic region, Hydrol. Res., in press.