



## Updated “climate factors” for use in planning and design of infrastructure in Norway

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Changes in precipitation design values are often referred to as “climate factors”, and are computed for different durations and for different return periods. The background for developing climate factors for precipitation is the need for planning and designing infrastructure lasting decades into the future. According to climate model projections we can expect an increase in the frequency and intensity of heavy rainfall events in Norway (e.g. Hanssen-Bauer et al, 2015), which may lead to more river- and urban flooding. The widespread use of Intensity-Duration-Frequency (IDF) rainfall values in design of urban water management systems, roads and railways, and other important infrastructure, necessitates the use of climate factors incorporating the expected change in heavy precipitation.

In a new study of climate factors in Norway, we have found that climate factors increase with shorter durations and with longer return periods (Dyrørdal & Førland, 2019). This means that the most intense events, typically from convective summer showers, will increase the most. For the 5-year return period we found a mean climate factor for Norway of 1.42 for hourly precipitation, while the factor is 1.26 for daily precipitation. For the 200-year return period, which is the recommended criteria for flood planning in Norway, we found a mean climate factor for Norway of 1.54 for hourly precipitation and 1.30 for daily precipitation.

We found that climate factors vary in space, with higher values in dryer areas such as the inland areas of Southern Norway and in the far north. As a result, we decided to incorporate spatially varying climate factors in the new recommendations, based on the local 5-year return value. Pixel-based climate factors were not considered robust, due to the large uncertainties associated with the relatively low ensemble of projections, and the particular difficulty in modeling short duration precipitation correctly. New recommendations will be presented at the Norwegian Centre for Climate Services (NCCS) website ([klimaservicesenter.no](http://klimaservicesenter.no)), along with station and gridded design values for precipitation.

### References:

- Dyrørdal, A.V. and Førland, E.J., 2019: Klimafaktorer for korttidsnedbør -Anbefalte verdier for Norge (In English: Climate factors for short duration precipitation -Recommended values for Norway). NCCS report 5/2019.
- Hanssen-Bauer, I., et al., 2015: Klima i Norge 2100 Kunnskapsgrunnlag for klimatilpasning oppdatert i 2015. NCCS report 2/2015, NCCS, Oslo, Norway: 203.