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Homogenization of Norwegian monthly precipitation series

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Climate normals play an important role in weather and climate studies and therefore require high-quality dataset that is both consistent and homogenous. The Norwegian observation network has changed considerably during the last 20-30 years, introducing non-climatic changes such as automation and relocation. Homogenization was therefore necessary and work has been done at the Norwegian Meteorological Institute to establish a homogeneous precipitation reference dataset for the purpose of calculating the new climatological standard normals for the period 1991-2020.

The homogenization tool Climatol was applied to detect inhomogeneities in the Norwegian precipitation series, for the period 1961-2018. 370 series (including 44 from Sweden and one from Finland) of monthly precipitation sums, from the ClimNorm precipitation dataset were used in the homogenization analysis. ClimNorm is an international network activity under the Nordic Framework for Climate Services covering six countries in the Nordic region (Denmark, Estonia, Finland, Latvia, Norway and Sweden) with an objective that includes sharing data, methods and experiences in preparing a data basis as good as possible for calculation of new climate normals.

Results from homogeneity testing found inhomogeneities in 95 (29 %) of the 325 Norwegian precipitation series. However, only 81 (25 %) of the series were classified as inhomogeneous after conferring with metadata and therefore adjusted. Relocation of the precipitation gauge and automation were the main causes of all the inhomogeneities in the Norwegian series, explaining 71 % and 12 % respectively of all detected breaks. All but one of the accepted inhomogeneities could be confirmed with metadata. Inhomogeneities found in the Swedish and Finnish series were adjusted without metadata. Results further showed benefits of incorporating metadata to the automatically detected inhomogeneities. Linear trend analysis showed increasing trends in the period 1961-2018 except in autumn where a decreasing trend was observed. The homogeneity analysis produced a 58-year long homogenous dataset for 325 monthly precipitation sum with regional temporal variability and spatial coherence that was significantly better than that of non-homogenized series. The homogenized dataset is more reliable in explaining the large-scale climate variations and was used to calculate the new climate normals in Norway.