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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Homogeneity of precipitation series in the Netherlands and their trends in the past century

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The historical daily precipitation observations before 1951 in the Netherlands were digitized recently, so that all data from 1850 onwards are available in computer readable form now. The homogeneity of the precipitation series was tested by pairwise comparisons of the monthly totals using an algorithm of Menne and Williams (Journal of Climate, 2009) that was originally applied to monthly temperature data. Forty percent of the precipitation series were indicated as inhomogeneous if the algoritm was applied to the untransformed monthly totals. The use of a square-root transformation to reduce the skewness was only successful in an application to the data for the 1951-2009 period. For older precipitation data such a transformation turned out to be inappropriate due to the lower quality of these data. Changes in the annual precipitation amounts, the precipitation amounts in the winter and summer halves of the year, the number of days per year with a precipitation amount greater than 20 mm or 30 mm, and the 5-day annual maximum precipitation amount were explored both for the period 1951-2009 using the data from 240 stations and the period 1910-2009 with the data from 102 stations. Significant increases were found for all six indices. The centennial increases in mean annual, winter and summer precipitation are 25%, 35%, and 16%, respectively. The exceedance frequency of the 30 mm threshold almost doubled during the 1910-2009 period. Much attention is given to the field significance of trends, the statistical significance of regional differences in trends and non-linearity of trends. In contrast to the increase in mean winter precipitation, which is statistically significant for the majority of the rainfall stations, the increase in mean summer precipitation is mainly restricted to coastal regions. The mean summer precipitation and the exceedance frequencies of the 20 mm and 30 mm thresholds show a relatively strong increase from the beginning of the 1980s.