



Relation between temperature indices and circulation types in Europe

E.J.M. van den Besselaar, A.M.G. Klein Tank, and G. van der Schrier

Royal Netherlands Meteorological Institute (KNMI), De Bilt, Netherlands (besselaar@knmi.nl)

The aim of this study is to determine the influence of atmospheric circulation on the recent changes in the number of warm days and cold days in Europe. This influence was modelled with a multi-regression fit over the period 1947-1974 and tested for the period 1974-2000. The temperature series for stations in the European Climate Assessment and Dataset project (eca.knmi.nl) and the GrossWetterLagen (GWL) were used as input. These temperature series were first adjusted for global warming before determining the cold day and warm day indices. The 29 GWLs were grouped in ten circulation types. Then the number of days a certain circulation type occurred during the winter period was determined for each year. The difference between the observed indices and the calculated indices, based on the regression with circulation types, in the second period indicates a warming effect, which is unaccounted for by the global warming trend. One hypothesis for this might be that the influence of each circulation type (or at least a few) has changed in recent years, i.e. the same circulation type brings more warm or cold air to Europe than in the past. For example, changes in the snow cover extent over Europe might change the influence of circulation types bringing air from the North or the East. These results have important implications not only for understanding the observed changes in the past, but also for evaluation of future climate projections of extremes. Only if the climate models succeed in reproducing the observed relations, we can have confidence in the projected future changes in extremes.