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Sensitivity of observed and modelled precipitation to the land surface

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Significant increases in precipitation have been observed in the Netherlands over the last century. At the same time persistent spatial variations are apparent in areas of about 50x50 km. We have analysed these spatial patterns for the period 1951-2009 focussing on trends in means and extremes. Causes of spatial variations were investigated by dividing the country into different regions based on surface characteristics and on distance to the coast. Relative trends in daily precipitation are highest from February to April and lowest from July to September. In absolute terms the strongest and most significant increases were found along the coast; these are dominated by summer and autumn precipitation. Distance to the coast and height were found to be the major explanatory variables of spatial variability of precipitation in the Netherlands.

The West-coast of the Netherlands has been subject to high rates of urbanization since the 1950's. Modelling research has shown enhanced precipitation downwind of urban areas, but observational evidence is lacking. We continue to investigate the contributing factors of the coastal precipitation increase with the Weather Research and Forecasting (WRF) model. Using a European weather type classification, we select convective cases with little synoptic forcing and run a high-resolution (<2.5 km) WRF perturbed physics ensemble to assess model skill and select an appropriate set-up for further simulations. Model sensitivity to land cover is assessed by comparing conceptual and realistic land-use maps. Initial simulations show the largest sensitivity to the choice of (shallow) cumulus parametrization. Further results and a discussion on model input will be presented.