EMS Annual Meeting Abstracts
Vol. 15, EMS2018-53, 2018

Qualitative climatological features of observed intense precipitation extremes over Western and Northern Europe

Hans Van de Vyver, Bert Van Schaeybroeck, and Rafiq Hamdi
Royal Meteorological Institute of Belgium, Research and development, Brussels, Belgium (bertvanschaeybroeck@gmail.com)

Due to the surface impermeability, urban areas are strongly susceptible to intense precipitation events that cause floods with high societal impact. In order to study the features of heavy precipitation, long time series of sub-hourly observations are required. Moreover, estimating the impact of climate change on these extremes requires the availability of sub-hourly data from convective-permitting model runs. All these data, however, are scarce and this contributes to large uncertainties. In the context of the URCLIM project, the goals is to quantify different uncertainties related to extreme precipitation and their projections. As a first step to achieve this goal, we present an overview of different qualitative features that characterize extreme precipitation using a variety of observational records across Western and North Europe. These features include the multi-scaling characteristics of Intensity-Duration-Frequency (IDF) curves and the relation between extreme rainfall and associated temperatures. More specifically the IDF uncertainties are characterized using a Bayesian approach (Van de Vyver, 2015, 2018). Also, different statistical relationships between hourly precipitation extremes and two-meter temperature or dewpoint temperature are tested based on information criteria using quantile regression. This is done in the context of the Clausius-Clapeyron (CC) relation based on which it is expected that extreme precipitation increases relatively proportionally with temperature. Recent studies using hourly precipitation observations, however, demonstrated that for temperatures above 10 degrees, one-hour precipitation extremes increase approximately twice as fast as the CC relation. The cause of this scaling is not yet well-understood and to date remains subject of intense ongoing debate.