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Detecting changes in hourly precipitation extremes in Hungary

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The impacts of climate change on society come forward mainly through extreme weather and climate events. The warming climate evokes increasing frequency of extreme precipitation in some region. The heavy rainfall could trigger floods on rivers and flash flood on drainage systems, moreover rainfall is one the main drivers of soil erosion. It is not fully clear that how the hydrological extremes will change due to global warming. Better understanding of the processes that cause extreme precipitation events under the current climate could support the climate projections. The investigation of the sub-daily precipitation can help understanding of the nature and drivers of precipitation extremes.

A set of hydroclimatic indices have been produced in the INTENSE project is in correspondence with the World Climate Research Programme (WCRP)'s Grand Challenge on 'Understanding and Predicting Weather and Climate Extremes' and the Global Water and Energy Exchanges Project (GEWEX) Science questions. Some of the indices defined in INTENSE describes the maximum rainfall totals and timing, the intensity, duration and frequency of heavy precipitation, frequency of rainfall above specific thresholds and some of them is related to diurnal cycle. A few of these indices is produced for Hungary in this work. The preliminary results are introduced in this paper.

Automatic stations replaced the ombrographs in many places in Hungary particularly from the late 1990s. According to recent practice at the Hungarian Meteorological Service the amount of precipitation is stored in the meteorological database in every ten minutes. About 20 years long data series for almost 100 locations are available to analyse the behaviour of the sub-daily precipitation.

We used 1-hour precipitation data coming from automatic measurements to derive monthly maximum indices, such as monthly maximum 1-hour, 3-hour, 6-hour precipitation. Monthly likely wettest hour within a day is computed together with the simple hourly precipitant intensity index to describe the diurnal cycle. The trends are analysed and shown on graphs. The spatial distribution of the different sub-daily indices is presented on maps for Hungary.