



Sub-daily temporal reconstruction of historical extreme precipitation events using NWP model simulations

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Extreme precipitation events (EPEs) belong to the most studied natural hazards because of their extra high impacts on the human society. However, observational data with a high temporal and spatial resolution along with a sufficient level of accuracy is available for the last several years only and is completely missing for historical EPEs. The presented contribution will be aimed at the employment of high-resolution numerical weather prediction (NWP) model simulations and daily rain gauge measurements to create a temporal reconstruction of historical EPEs, which will enable us to evaluate the selected EPEs in terms of their sub-daily extremity. The selected EPEs will be simulated by the non-hydrostatic NWP model COSMO with a spatial resolution of 2.8 km and temporal step of 10-minutes and will be merged with daily rain gauge measurements. In the first step, precipitation sums from daily rain gauge measurement and model simulation in a corresponding grid point will be compared and obtained ratio will be then applied on each 10-minute model forecast. Rain gauge daily data will be then interpolated into a regular grid with the same resolution as the model simulation. Precipitation cores in both fields will be searched and an optimal shift of the prognostic data in respect to the daily rain gauge measurements will be assessed to adjust the NWP model forecasts. In the second step, measured daily totals will be divided into a sequence of 10-minute intensities according to the course of simulated precipitation in the respective grid point. The procedure will result into a set of 144 intervals per day represented by reconstructed 10-minute precipitation intensities at the gauge stations. Finally, the intensities will be interpolated into a regular grid with respect to the distribution of simulated precipitation intensities between stations. The verification of the suggested methodology will be performed with weather radar measurements of several recent EPEs using various categorical (e.g., Critical Success Index, False Alarm Rate, etc.), spatial (e.g., Fraction Skill Score) and/or object-based (e.g., SAL) verification scores.