

# Radar-Derived Climatology of Precipitation Intensities in Czechia: improvement due to daily totals from rain gauges

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Radar-derived precipitation estimates play a crucial role not only in meteorology but also in climatology and hydrology. In combination with rain gauge measurements they can be considered as the most accurate precipitation product with a high horizontal and temporal resolution. However, the main limitation is that radar data are available for the past few decades only and are completely missing for historical precipitation events, which restricts some climatological applications.

The contribution will evaluate a 17-year period of adjusted radar-derived precipitation estimates in the warm parts (April-October) of the years 2002-2018 on the area of the Czech Republic (CR). The rain rates will be calculated using radar reflectivity data at 2 km above sea level (CAPPI 2 km) estimated from weather radar measurements performed by two Czech C-band Doppler radars (Brdy, Skalky) every 5 or 10 minutes in 1 km by 1 km square boxes over the whole area of the CR. Radar-derived daily precipitation will be merged with daily rain gauge measurements and resultant adjusted daily sums of precipitation will be divided into 10-min precipitation in the ratio of 10-min radar-derived precipitation. Subsequently, 10-min precipitation estimates will be accumulated in various lengths ranging from 30 min to 24 hours.

For climatological purposes seasonal as well as monthly precipitation sums will be corrected by a simple correction method (Fairman et al., 2015). The method is based on multiplication of accumulated sums by a ratio between the number of all theoretically possible 10-min measurements and all available 10-min precipitation measurements in order to take into account a number of missing values that can reach approximately 15-20 % in average. With respect to the spatial distribution a probability of precipitation greater than a given threshold will be calculated for every pixel as a seasonal and monthly average during the whole period. An example of monthly precipitation sums averaged over 10 years (2002-2011) for summer months (June-August) is depicted in Figure 1.

The accumulation and average of adjusted radar-derived precipitation and interpolated values of precipitation measured by rain gauges will be compared and their difference will be expressed by various verification techniques (e.g., RMSE, BIAS, etc.). Besides precipitation totals accumulated over longer period, attention will be also paid to the analysis of extreme sub-daily precipitation events due to their high variability in space and time. Gridded information based on adjusted radar-derived precipitation will be validated with independent 1-h rain rate records at selected stations and for selected precipitation extremes.

Figure 1: Monthly precipitation sums averaged over 10 years (2002-2011) for summer months (July-August) calculated from adjusted radar-derived precipitation estimates and corrected for missing values [expressed in mm] (Bližňák et al., 2018).

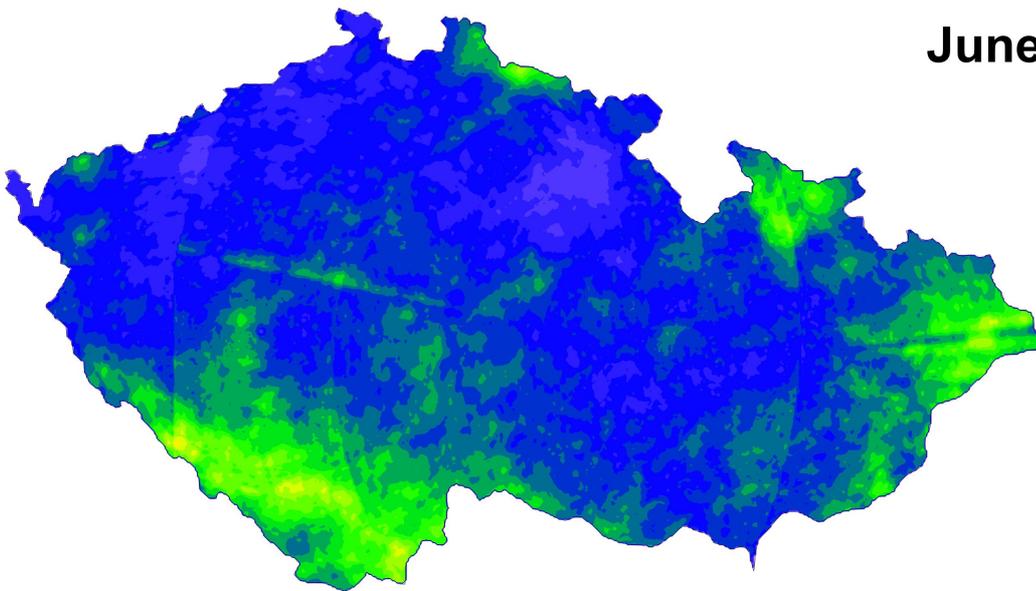
References:

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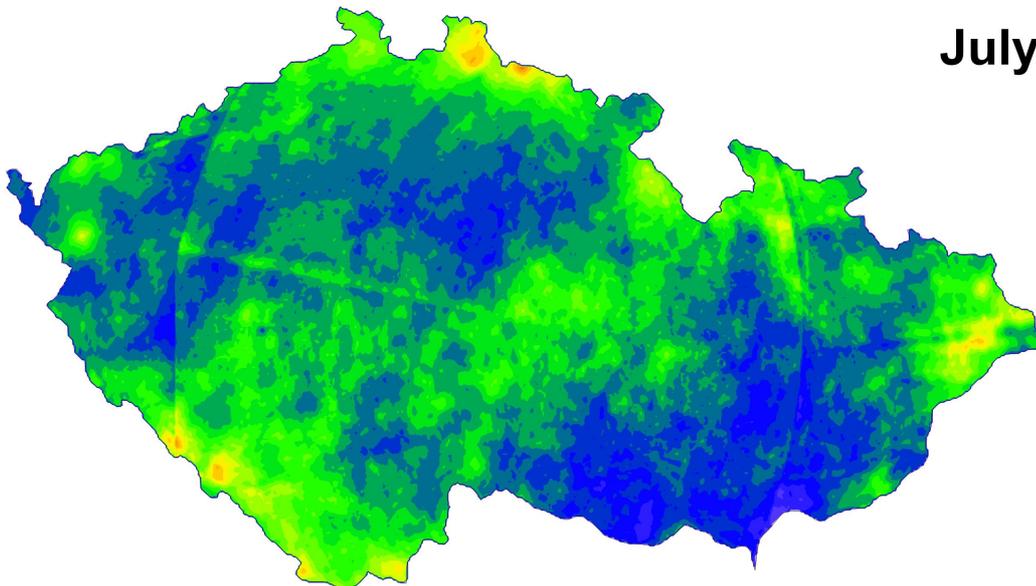
Fairman JG, Schultz DM, Kirshbaum DJ, Gray SL, Barrett AI. 2015. A radar-based rainfall climatology of Great Britain and Ireland. *Weather*, **70**, 153–158.

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**June**



**July**



**August**

