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PRECIPITATION EXTREMES FROM DIFFERENT DATASETS ACROSS SPACE-TIME SCALES

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Résumé :

Ongoing and projected changes in continental water cycle are closely connected with extreme events which provide specific mechanisms of water cycle changes. This is especially true for Europe influenced by frequent floods and droughts some of which had hazardous impacts over the last years. We address observed variability and change in continental water cycle over the Northern Eurasia in the context of precipitation extremes using rain gauge observations from different national and international collections of in-situ precipitation measurements (E-OBS, DWD, RHMC) and modern satellite products (GPCP, TRMM, PERSIANN). We present a concept for statistical modeling of extreme precipitation which includes estimation of absolute extremes and relative extremeness as well as the analysis of temporal structure of precipitation or precipitation timing. We provide pan-European estimates of all precipitation statistics, including characterization of extremes in the context of special and temporal scaling of precipitation for what selected subsets of hourly and higher resolution precipitation data for the last 2 decades were used. This allowed for the derivation of scaling parameters for precipitation extremes in the range from hours to days. In many regions climate variability of extreme precipitation over Eurasia is characterized by seasonality with different signs of linear trends being identified for the warm and sold seasons. Considering precipitation timing over last several decades both wet and dry periods have become longer in several large European regions, specifically in Central and Eastern Europe. This effect is not associated with changes in the number of wet days but, rather, with the grouping of wet days into prolonged wet and dry periods, increasing the likelihood of floods and droughts, respectively. Comparative assessments show that while climatological distributions of precipitation totals and to some extent of intensities were found to be in a qualitative agreement between station and satellite data, characteristics of precipitation extremes are poorly captured in satellite products, especially in summer. Specifically, PERSIANN data also locally demonstrate significant disagreement with station data in quantifying multidecadal trends in precipitation characteristics. Results of evaluation are discussed in terms of the uncertainties of co-location of different data and the density of the rain gauge networks used for comparison.

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