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Heavy Precipitation and it causing Atmosphere Circulation Processes in Lithuanian River Basins

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Heavy precipitation information is of interest for a variety of purposes, including public safety, agriculture, water supply, dam design and operation, and transportation planning. The article presents empirical probabilities of heavy precipitation in 4 Lithuanian River basin regions and baric situations which cause heavy precipitation ($\geq$ 50 mm)during 1-3 days. In the study the data of 16 meteorological stations were used. The annual daily precipitation maximum probabilities were calculated using the Generalized Extreme Value (GEV) distribution while atmospheric circulation has been analyzed by COST733 GWT GrossWetterTypes)circulation form classification.
It was found that the largest empirical probabilities of daily heavy precipitation were in Nemunas River basin (0.30 cases), during 2 days and 3 days – in Venta basin (0.64 and 1.64 cases). It was also found that annually the rainfall larger than 50 mm per day and within 2 days does not occur in any of River basins, while in 3 days such rainfall annually occurs only in Nemunas (1.34 cases) and Venta (1.64) cases River basins.
We show that probabilities of annual daily precipitation estimated from GEV distribution at 95 procentile values in all River basins were exceeded. The highest probability of annual daily precipitation at 99 procentile was in Venta River basin (104.9 mm), but in some meteorological stations of Nemunas River basin the 99 procentile values were exceeded.
The analysis done in the research showed that during the period of 1961–2002 the precipitation mostly larger than 50 mm per day (according to the types of GWT) occurred when at 700 hPa of isobaric level over Lithuania there were the southwestern part of cyclone (the centre is over Leningrad oblast) and the southeastern part of cyclone (the centre is over Gulf of Botnia) (both 14.04 %). It has also been found, that at the level of 700 hPa the cyclonic circulation (according to the GWT) in all cases stood at 52.64 %, while the anticyclone circulation – at 29.82 %, deformation field was 14.03 %, and the weak system was 3.51 % in all the cases. While analyzing the weather maps it has been obtained that the heaviest precipitation was associated with the central part of the cyclone. At the same time, the cold atmospheric front was the most common atmospheric front, leading to the precipitation rate exceeding 50 mm/day in both cyclonic and anticyclone circulations.