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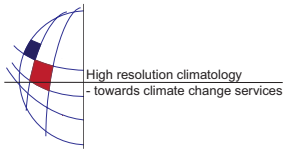

Heavy Precipitation Events in Lithuania

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Analysis of heavy precipitation events in Lithuania is presented in this work. Research was divided into two parts. Spatial distribution and dynamic of heavy precipitation events in Lithuania during observation period (1961-2008) is presented in the first part and climate predictions for XXI century according to outputs of CCLM model are in the second. Daily data from 17 meteorological stations were used for the analysis of heavy precipitation events in Lithuania. Research covers period from 1961 to 2008. Annual and seasonal heavy precipitation values and the recurrence of extreme daily and 3-day precipitation events were analyzed. Spatial distribution of heavy precipitation events in Lithuania was determined; the trends of such precipitation recurrence were identified. Also, daily and 3-day annual maxima probabilities were calculated using the Generalized Extreme Value (GEV) distribution. 10, 30 and 100 years return period was analyzed. Finally, atmospheric circulation processes during heavy precipitation events were described using the adapted Hess & Brezowski macrocirculation form classification

Predictions of changes of heavy precipitation recurrence in Lithuania are also presented in this study. Output data of the regional climate model CCLM (COSMO – Climate Limited-area Model) for the period 1971–2100 were used. Predictions were based on A1B and B1 emission scenarios.

Despite of relatively small area and quite negligible differences in altitude there are significant unevenness in spatial distribution of heavy precipitation events in Lithuania. The mean annual number of cases when daily precipitation amount exceeded 10 mm fluctuates from 12.4 to 21.9 and from 5.3 to 10.5 when 3-day precipitation exceeded 20 mm.

The probability of maximum precipitation amount for 10 year return period appears very familiar to spatial distribution of heavy precipitation recurrence: the highest values can be expected in the western part (55–60 mm daily and 75–85 mm in 3-days), the smallest in the Middle Lithuanian plain (45–50 mm and 60–70 mm accordingly). Seasonal distribution of heavy precipitation events differs in Lithuanian regions. In the western part due to impact of warm Baltic sea the highest recurrence of heavy precipitation events was observed during late summer and autumn, meanwhile in other parts of Lithuania such events were more common only for summer months.

More than one third of heavy precipitation events were observed during zonal atmospheric circulation mode. Location of central part of cyclone over Lithuania is the most common synoptic situation during heavy precipitation. Under such conditions record high of daily precipitation amount was observed (103,8 mm in Telšiai).

Annual precipitation amount will increase (up to 22%) in 21st century according CCLM outputs. Number of days with precipitation will rise (up to 5% until the end of 21st century). Especially significant changes will be observed in spring (up to 10%).

Heavy precipitation recurrence will also increase in Lithuanian territory. Number of one day heavy precipitation cases will be mostly altered in the Žemaičiai Highlands and coastal lowlands (>30%). Larger changes in almost whole territory are predicted under A1B emission scenario and only in northern part changes will be greater according to B1 emission scenario. In western part changes will be most significant in autumn, while in the east Lithuania in winter.

Daily and 3-days precipitation amount probability for 10-year and a 100-year return period will increase in western part of Lithuania according to A1B scenario. Meanwhile modelling based on B1 scenario predicts decrease of probability of precipitation amount in this area for both analyzed return periods. Other parts of Lithuania will experience similar but less significant changes to compare with observation period of 1971 2000.

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