



Precipitation characteristics for the Slovak republic and their link to the atmospheric circulation

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Slovak Republic is situated in the centre of Europe. Its terrain is rugged and altitude increases from the southern lowlands to mountains in the northeastern and northern parts of the region where it reaches more than 2000 m a. s. l. Precipitation in this region is affected by atmospheric systems coming from the Atlantic ocean (western direction) on one hand and from the Mediterranean on the other hand (southern direction). However cyclones passing the Baltic Sea play a significant role determining precipitation occurrence and amounts as well. All these factors together with local effects lead to three different precipitation regimes in Slovakia: (i) Continental (with low precipitation in winter and the highest in summer), (ii) Atlantic (with equally distributed precipitation all year round) and (iii) Mediterranean (with highest precipitation in June or May and secondary maximum in October-December). The Mediterranean regime is more pronounced in the southern part of Central Slovakia while the Continental in the northeastern Slovakia.

In the contribution we focus on distribution of precipitation amounts during the year and on trends in occurrence of extreme precipitation and droughts. Series from 50 meteorological stations in the Slovak Republic from the period 1951, resp. 1961-2010, are used. The sub-regions with typical annual courses of precipitation are identified using cluster analysis. The temporal behaviour of mean precipitation totals during the second half of the 20th century is characterized by a significant decrease until the mid-1990s followed by an increase up to the present. The increase of precipitation totals is registered mainly in winter, and partly also in spring and autumn. Nevertheless the increase is not regular; short periods with heavy precipitation as well as longer and more severe drought spells have occurred more frequently in two recent decades.

In the second part of this work, the influence of atmospheric circulation on precipitation is described through correlations between precipitation characteristics and modes of low-frequency circulation variability. The circulation variability modes in the level 500-hPa heights are derived from the Northern Hemisphere NCEP /NCAR reanalysis for the period 1958-1998 using the orthogonal rotated principal component analysis in each season. Four modes play an important role in shaping precipitation in Central Europe in all seasons. The character of the modes and the position of the action centers are essential for the sign and magnitude of the correlations with precipitation amounts and occurrence. However, the orographic effects coupled with the rugged terrain reflect in the correlations as well.