

Changes of drought characteristics in small Czech and Slovakian catchments projected by the CMIP5 GCM ensemble

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Abstract Simulations of global climate models (GCM) available from the CMIP5 project are used to develop climate change scenarios for four small catchments in the Czech and Slovak Republic with an advanced delta change method. This method applies a nonlinear transformation to precipitation in order to match projected changes in precipitation variability as well as changes in mean precipitation from the GCM simulation considered. However, the precipitation above the 95th percentile is transformed linearly to avoid occasionally very large values of daily precipitation occurring as a consequence of the nonlinear transformation. Similarly, temperature is transformed considering the changes in mean and variability. Simulations for different RCP scenarios are considered. The impact of climate change on hydrological balance is assessed, as well as changes in drought severity. For the latter the deficit volumes are considered. Projected changes in deficit volumes are evaluated with a simple statistical model which assumes that deficit volumes for each basin follow a general extreme value (GEV) distribution. The differences in deficit volumes and their changes between basins and GCM simulations can then be summarized by the changes in the GEV parameters. The results show an increase in the number of minor droughts and an increase in the most severe droughts. There are clear differences in the changes of drought characteristics related to the dominant runoff regime in a catchment.

Key words climate change; CMIP5; drought; deficit volume; GEV model