EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-33, 2009
9th EMS / 9th ECAM

9th EMS Annual Meeting
9th European Conference on Applications of Meteorology
High resolution meteorology
- applications and services

The evaluation of extreme precipitation and temperature indices based on regional climate models at the Hungarian Meteorological Service

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More and more studies are focusing on meteorological and also hydrological extreme events in connection with climate change. Observational studies showed that in many areas changes in precipitation and temperature are amplified at the tails of the distribution functions. One of our objective, while focusing on the extremes is to compare our model outputs (ALADIN-Climate and REMO) with a gridded data set based on Hungarian observations (1961-1990). The model outputs have also been analyzed for the projections: we have two available slices for the future in case of ALADIN-Climate (2021-2050 and 2071-2100) and the REMO has a transient run for the period of 1951-2050.

The ALADIN-Climate model was developed by M[U+FFFD]o France (based on the short range numerical weather prediction model ALADIN, which is developed in an international cooperation) and has both 10 km and 25 km of horizontal resolution (the latter is used just for the experiments for the past). The REMO model developed by Max Planck Institute for Meteorology is available on 25 km horizontal grids. Both models are driven either by ERA-40 reanalysis data set or by GCMs (ARP[U+FFFD]E-Climat for ALADIN-Climate and ECHAM for REMO). In this study we analyze several climate extreme indices (daily maximum-, minimum-, average temperature, daily precipitation) for the Carpathian Basin based on definitions of the WMO-CC1/CLIVAR Working Group. The results are complemented with significance tests (using t-tests and Welch-tests), which indicate whether the deviations with respect to the observed climate and with respect to the future climate simulations are considered to be significant or not.