



Changes in extreme precipitation events in Romania due to anthropogenic forcing

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A conditional stochastic model was developed to generate daily precipitation time series at four stations in Romania, based on the output from a global climate model. For this objective, the outputs of the Hadley Centre coupled ocean-atmosphere model HadCM3, under the IPCC A2 scenario, were considered. The extreme precipitation indices refer to the expected maximum duration of wet and dry intervals, expected maximum daily precipitation and frequency distribution of extreme daily precipitation. Changes of these indices were estimated for the period 2071-2100, compared to 1975-1999. The stochastic model is a mixture between a 2-state first-order Markov chain and a statistical downscaling model based on the canonical correlation analysis (CCA). The CCA model links the large-scale circulation, represented by the European SLP field, with the four precipitation distribution parameters: i.e. 2 transition probabilities and 2 gamma distribution parameters. Two experiments were considered to construct the CCA model. Firstly, the CCA model was constructed separately for each of the four parameters considered simultaneously at the four stations. Secondly, the four parameters were considered together but for each station separately. The model is fitted over the 1974-1999 interval and validated over the independent data set 1951-1974. The performance of the conditional stochastic model is analyzed in two steps. Firstly, the skill of the CCA model in estimation of the four precipitation distribution parameters is assessed. Secondly, the performance of stochastic model in reproducing the extreme precipitation indices is analyzed. In this paper the results for winter season are presented. An ensemble of 1000 simulations was generated for the conditional stochastic model and the statistical parameters listed above were expressed as ensemble means with their 90% confidence intervals. The CCA model is most skilful for the transition probabilities and for stations placed in the southwestern region that is most affected by the southwesterly circulations. The highest skill is obtained for the first ex-

periment presented above. The climate change scenarios constructed by applying the conditional stochastic model to the SLP anomalies simulated by the HadCM3 model under A2 scenario, show that significant changes are expected in maximum duration of dry/wet intervals (increase for southwestern stations and decrease for central ones). For the frequency of daily extreme precipitation no significant changes were found.