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# Future changes in precipitation indices in Western Romania

Gabriela Harpa<sup>\*†</sup>, Csaba Horvath<sup>1</sup>, Florina Rosca<sup>1</sup>, Andreea Scripca<sup>1</sup>, and Traian Tudose<sup>1</sup>

<sup>1</sup>Babes-Bolyai University – Romania

## Abstract

Many regions worldwide experienced significant variations in climate extremes during the last few decades. Changes in precipitation extremes were considered as one of the most important topics in global climate change, mostly because of the negative impacts on both natural and anthropic systems. One of the most important direct impacts can be observed on vegetation and ecosystems, while indirect impacts apply to agriculture, watersupply and management, in human welfare, and so on.

The main goal of this paper was to find out changes in extreme daily precipitation in Western Romania using a set of 13 indices: number of precipitation days (R0.1), moderate precipitation days (R5), heavy precipitation days (R10), very heavy precipitation days (R20), extremely heavy precipitation days (R30), consecutive dry days (CDD), consecutive wet days (CWD), very wet days (R95p), extremely wet days (R99p), maximum 1-day precipitation amount (Rx1day), maximum 5-day precipitation amount (Rx5days), simple daily intensity index (SDII) and annual total wet-day precipitation (PRCPTOT).

We investigated the changes produced both in the present and future climate based on historical and projected daily precipitation datasets. For a more detailed analysis, we compared the historical period (1981-2010) with three future subperiods (2021-2040, 2041-2070 and 2071-2100). For the historical period, climate observed data from five weather stations were used, while for the future climate, data extracted from six regional climate models outputs (ALADIN, CCLM, RACMO22E, RCA4, REMO2009, and WRF331F) under RCP4.5 scenario were employed. In order to calculate the precipitation indices, ClimPACT2 software was used.

The results show important changes for the three future subperiods for all the six regional climate models outputs, compared to the historical one. Regardless of what the precipitation index refers to, be it length, intensity or quantity, the period 2071-2100 shows the highest changes in the indices' average values compared to both the historical one and the other two future subperiods (2021-2040 and 2041-2070).

**Keywords:** precipitation indices, projected data, Western Romania

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\*Speaker

†Corresponding author: harpa\_gabriela@yahoo.com