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Projected changes of precipitation and extreme precipitation events for Slovenia over the 21st century

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As a part of project OPS21, The estimation of the average and extreme meteorological and hydrological conditions in Slovenia over the 21st century, we have analysed error-corrected regional climate model simulations ensemble from the project EURO-CORDEX, based on different RCP (Representative Concentration Pathways) scenarios: RCP2.6, RCP4.5 and RCP8.5.

From daily data, we calculated average annual and seasonal amount of precipitation in three 30-years periods (2011–2041, 2041–2070 and 2071–2100). Then we calculated relative change according to the reference period (1981–2010). These were made for each of the selected model simulations. In the end, we merged the results of all models for selected scenario, and calculated median, maximal in minimal values of these changes to represent the uncertainty of the results.

On annual basis, the amount of precipitation would increase, especially in NE part of Slovenia. The biggest change would be in winter, while in summer signal is mixed and thus unreliable. For example, in scenario RCP4.5 amount of precipitation would decrease in the second projection period and then it would increase in the last projection period, in scenario RCP8.5 the course of events would be the exact opposite In the last projection period for both scenarios models results are inconsistent. Some are dry others are wet, leading to the high uncertainty of the results. For this purpose, a test was preformed to assess whether the simulated changes are reliable, unreliable or show no change with respect to the reference period.

Changes in extreme precipitation events were calculated for one-, three- and five-day extreme precipitation and analysed with non-stationary generalized extreme value (GEV) theory. The results were estimated linear trends in extremes for the period from 1981 to 2100 and their uncertainty. We used the same reliability test as we did for the amount of precipitation.

Extreme precipitation events would change the most in winter and on annual basis when these changes are most reliable. The biggest changes are expected in case of RCP8.5, a bit smaller in RCP4.5, while in case of RCP2.6 there would be no significant changes in extreme precipitation.