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On the role of model output statistical post-processing methods in investigating projected changes of climate zones

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The possible effect of climate change on biosphere can be studied by using climate classification methods. Climate classification is a useful tool for communicating the results of climate change studies to the public by supporting climate services, not only with the general physical information from climate model outputs, but by providing a comprehensible picture of projected climate change impacts. It is important to note that raw model outputs cannot be used directly, because even the state-of-the-art models contain errors; therefore climate model outputs need to be adjusted with statistical methods. However, in most studies interpreting climate change via climate classification, only one statistical post-processing (bias adjustment) method is applied. At the same time, it is not clear to what extent the chosen statistical post-processing method influences the results. The aim of this study is to investigate how much the choice of statistical post-processing method adds to the uncertainty of projections for the Carpathian Basin. The first-phase EURO-CORDEX model outputs, which are the latest regional climate projections, are applied under RCP4.5 and RCP8.5 scenarios to create climate zone maps for the 21st century. Twenty-one RCM-GCM couples for domains with lower (EURO-44) and higher (EURO-11) resolution are statistically corrected using observation data taken from the CarpatClim dataset, which covers the Carpathian Basin (except the West-Hungarian Borderland). The CarpatClim is a unique product of the Hungarian Meteorological Service and other Central-European research institutions, with spatial resolution of 0.1˚ x 0.1˚ (about 10 km x 10 km). Generic climate classification methods are applied, in order to compare the obtained climate zone distributions using the adjusted climate model outputs. Koppen's scheme is the most widely used quantitative biophysical climate classification based on climate-vegetation relationships. Feddema revised the Thornthwaite classification to provide a simplified scheme by using precipitation and potential evaportranspiration. Preliminary results based on one EURO-CORDEX model output and four statistical post-processing methods show no major influence of chosen statistical method on the climate zone distribution.