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Quantifying uncertainties in observational datasets over the Carpathian region

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Gridded observational datasets are often used for the evaluation of climate simulations. However, uncertainty originating from the selection of observations is as important as the uncertainty of regional climate models. In this study, we introduce a novel evaluation method assessing the uncertainty of observational datasets. For this, various metrics i.e. relative difference and root-mean-square error are also used, and statistical techniques i.e. correlation analysis and permutation test were carried out. We focused on the Carpathian region, which is located in eastern-central Europe. The method is applied to the observational datasets CarpatClim and E-OBS for 2010 – the wettest year in the region since the beginning of the regular measurements. For the comprehensive analysis, not only precipitation and temperature were used, but also geographic variables (elevation, the variability of elevation, and the effect of station density). The evaluation method can be applied to other datasets, different time periods and geographical areas, moreover, it is also appropriate to find errors and shortcomings in the datasets. Based on our findings, CarpatClim is wetter over the whole region (mostly over mountains) than E-OBS. The temperature fields are similar in the two datasets, however, E-OBS is a little warmer than CarpatClim over the mountainous areas. The results show that precipitation depends on station density, while the most important variable for temperature is elevation. The study points out that the choice of reference could have an important effect on the validation of climate simulations and therefore it is essential to take observational uncertainty into account.