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Inter-comparison of statistical downscaling methods for projection of extreme precipitation in Europe

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Information on extreme precipitation for future climate is needed to estimate changes in the frequency and intensity of flooding. Climate models are the primary source of information in climate change impact studies. However, due to the coarse resolution and biases in these models, they cannot be directly used in hydrological models. Hence, statistical downscaling is necessary to address climate change impacts at the catchment scale.

This study has been carried out within working group 4 in the FloodFreq COST Action. It compares eight statistical downscaling methods often used in climate change impact studies. Four methods are based on change factors and four are bias correction methods. The change factor methods perturb the observations according to changes in precipitation properties estimated from the Regional Climate Models (RCMs). The bias correction methods correct the output from the RCMs. The eight methods are used to downscale precipitation output from fifteen RCMs from the ENSEMBLES project for eleven catchments in Europe. The performance of the bias correction methods depends on the catchment, but in all cases they represent an improvement compared to RCM output. The overall results point to an increase in extreme precipitation in all the catchments in winter and in most catchments in summer. For each catchment, the results tend to agree on the direction of the change but differ in the magnitude. These differences can be mainly explained due to differences in the RCMs.

Keywords: climate change, extreme precipitation, statistical downscaling, inter-comparison, Regional Climate Model

