



Will climate change affect weather types associated with flooding in the Elbe river basin?

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This study investigates the effects of anthropogenic climate change on weather types associated with flooding in the Elbe river basin. The study is based on an ensemble of 3 simulations with the ECHAM5 MPIOM coupled model forced with historical and SRES A1B greenhouse gas concentrations.

Relevant weather types, occurring in association with recent flood events, are identified in the ERA40 reanalysis data set. The weather types are classified with the SANDRA cluster algorithm. Distributions of tropospheric humidity content, 500 hPa geopotential height and 500 hPa temperature over Europe are taken as input parameters. 8 (out of 40) weather types are found to be associated with flooding events in the Elbe river basin. The majority of these (6) typically occur during winter, while 2 are warm season patterns. Downscaling reveals characteristic precipitation anomalies associated with the individual patterns.

The 8 flood relevant weather types are then identified in the ECHAM5 simulations. The effect of climate change on these patterns is investigated by comparing the last 30 years of the previous century to the last 30 years of the 21st century. According to the model the frequency of most patterns will not change. 5 patterns may experience a statistically significant increase in the mean precipitation over the catchment area and 4 patterns an increase in extreme precipitation. Persistence may slightly decrease for 2 patterns and remain unchanged for the others. Overall, this indicates a moderate increase in the risk for Elbe river flooding, related to changes in the weather patterns, in the coming decades.