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# Climate change impacts on flood seasonality in Norway

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The hydrological impacts of climate change on floods have been studied by ensemble based modeling in 115 catchments in Norway (Lawrence & Hisdal 2011). Despite of a considerable variation in the projections, consistent regional patterns of hydrological change are evident. Spatial patterns of directional change in flood magnitude allow for drawing conclusions about dominating flood-generating processes and for differentiating regions with similar flood regimes. Since the magnitude of floods results from the seasonality of precipitation, snowmelt/snow storage, and the preconditions in a catchment, seasonal flood frequency analysis can help to understand the influence of flood-generating processes under a changing climate.

Currently, regional patterns of flood regimes in Norway separate regions which are dominated by high flows during the spring and early summer snowmelt season (inland and northernmost regions) from regions where autumn and winter pluvial floods are dominant (western Norway along the coast). However, projected increase in winter temperature, reduced snow storage and earlier snowmelt will probably lead to a reduction in flood probability in inland and northern Norway. In western Norway and along the coast, the probability of large floods is likely to increase due to projected increases in seasonal and extreme rainfall. In addition, there are some areas which probably will be dominated by a mixed regime in the future where both snowmelt- and rainfall-dominated events will occur.

Based on an ensemble model approach in a subset of representative catchments, we study the role of seasonality contributing to flood hazards in Norway. Seasonal flood frequency analyses are used to explore changes in flood seasonality. Peak flow series are analyzed using a Peak Over Threshold (POT) approach, and changes in the return periods are estimated based on the Generalized Pareto Distribution (GPD). A model re-calibration is performed based on the series distance approach (Ehret & Zehe 2011) to adjust the HBV model for high flows. Several parameter sets are included in the ensemble approach for considering uncertainty that is introduced by the hydrological model parameterization. Uncertainties due to the differences between the climate model projections and local adjustment/bias correction techniques are considered by the ensemble approach itself.

References:
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