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Effect of Climate Change on Flood and Drought Risks in a Northern-Alpine catchment

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The Alps are particularly sensitive to climate change. Observations show that recent warming there has been roughly three times the global average. During the last decade, the northern parts of the Alps have been hit by three so-called century floods in 1999, 2002, and 2005.
In this study, the effect of climate change on the water cycle in the Northern-Alpine area is investigated. Our investigations focus on the Alpine catchment of the river Alz (2100 km^2) in Austria and Germany, including Lake Chiemsee. Climate simulation output from MM5 (1960-1990, 2070-99, SRES B2) and CLM (1960-2100, SRES A1B, B1) have been statistically analyzed. They show a significant increase in temperature >3°C until the end of the 21st century and a slight increase of annual precipitation, but also a changing seasonality increasing rainfall intensities. Precipitation has been bias-corrected using a method based on monthly correction factors. The Effective Drought Index EDI has been calculated using the corrected climate simulation precipitation output, showing that future drought risk increases maily in summer time.
The bias-corrected climate simulation data has been transformed and applied to the distributed water balance model WaSiM to investigate changes in water balance, e.g. in river discharge and evapotranspiration, and future flooding risk in the Alz catchment. The hydrological model has been driven on a 500*500 m^2 raster grid with a daily timestep. An increased large scale flooding risk in future times could not be detected. Nevertheless, the future increase in precipitation intensity may cause an increased risk of scale flooding due to storms.
Results from the MM5 and CLM climate simulations including drought risk are shown as well as results of the WaSiM water balance simulations including flooding risks.