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Climate Change Impacts on Flooding in Southeastern Austria

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Floods in southeastern Austria can cause significant damage to life, property and infrastructure. These flood events are often the result of extreme precipitation from small-scale convective storms. In order to more accurately model the changes to flood magnitude and frequency, Regional Climate Models (RCMs) must be able to simulate small-scale convective storms similar to those that have been observed. Even as computational resources have increased, RCMs are just now achieving the high spatial and temporal scales necessary to physically resolve the processes that govern small-scale convection. With increased resolution, RCMs can rely on their internal physics to model convective precipitation and need not depend on parameterization. This study uses historical and future scenarios of Regional Climate Models (RCMs) run at a spatial scale of 3 km and temporal scale of 1 hr. In order to subsequently force a hydrological flood model, the sub-daily precipitation and temperature data from the RCMs are first bias corrected. A newly proposed bias correction method is presented and compared to the commonly used quantile mapping. The proposed bias correction method performs better in its ability to preserve the model projected climate change signal (measured by changes in mean and variance). Lastly, the changes in the quantity and frequency of projected extreme precipitation, at the watershed level, are analyzed with respect to the historic time period. With these improvements in dynamical modeling and bias correction methods, a clearer picture emerges revealing the more likely impacts climate change will have on floods in southeastern Austria.