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Uncertainty analysis in future extreme flow projections in Jinhua River Basin, East China

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Uncertainties in extreme high flows originating from greenhouse gas emission scenarios, hydrological model structures and their parameters for the Jinhua River basin, East China are assessed. The baseline (1961-1990) and future (2011-2040) climates for A1B, A2 and B2 scenarios are downscaled from the General Circulation Model (GCM) using the PRECIS Regional Climate Model with a spatial resolution of 50km×50km. A distribution-based bias correction method is applied to bias correct the PRECIS -derived temperature and precipitation. The bias corrected precipitation and temperature are then used as inputs for three hydrological models (GR4J, HBV and Xinanjiang) to simulate extreme high flows in the study area. The parameter uncertainty is quantified by means of the Generalized Likelihood Uncertainty Estimation (GLUE) method for each hydrological model for three emission scenarios. It is found that compared with the baseline period, the extreme high flows tend to decrease under scenario A1B, A2 and B2. The largest uncertainty is observed in the HBV model and the GR4J model has the smallest uncertainty. It is found that the major source of uncertainty in this study is from parameters, followed by the uncertainties from the hydrological model structure and the emission scenarios have the smallest uncertainty contribution to extreme high flows in this study.