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Comparing and Advancing Approaches to Long-Term Flood Projection

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How should design flood magnitudes be estimated under climate change? Apart from assuming stationarity, the two main approaches are hydrologic simulation and informed-parameter, which is generally based on either trend or climate covariates. Here, we compare these approaches across a large set of hydro-climatologically diverse basins located throughout the contiguous United States, splitting the historic record into a calibration and validation time period. We evaluate performance when the approaches are forced with observed climate as well as simulated climate from general circulation models. We also investigate how the strengths of the climate informed and hydrologic simulation approaches can be combined to improve projections; here, we use the outputs of hydrologic simulation as covariates in the climate informed approach. The results provide a quantitative perspective on key long-term flood projection issues and provide a route forward to improving projections given the identified strengths and weaknesses of each approach.