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Impact of methodological choices in the portrayal of hydrological impacts of climate change

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Hydrologic modeling often requires downscaled climate model data for model forcing. Statistical downscaling is attractive because of its lower computational cost, whereas much more computationally expensive dynamical methods produce more physically consistent meteorological patterns. Likewise, higher resolution data results in more computational expensive hydrologic simulations, though there is an assumption that higher resolution climate forcing generates more accurate hydrologic simulations. This study examines how meteorological representations derived by statistical and dynamical downscaling methods and at different spatial resolutions translate into the portrayal of the hydrological impact of climate change. Hydrologic simulations were performed with process based hydrologic models forced by multiple sets of downscaled climate dataset over the western United States. The forcing datasets include climate data downscaled from the NCEP-NCAR reanalysis data – based on four statistical downscaling methods (bias-corrected spatial disaggregation, bias-corrected constructed analogue, and statistical asynchronous regression) at two spatial resolutions (6-km and 12- km). This presentation will compare results across downscaling methods and resolutions to identify the sensitivity of the portrayal of hydrological impacts of climate change to methodological choices, and provide guidance on appropriate methodological choices for upcoming climate impact studies.