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On the Value of Climate Elasticity Indices to Assess the Impact of Climate Change on Streamflow Projection using an ensemble of bias corrected CMIP5 dataset

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Changes in two climate elasticity indices, i.e. temperature and precipitation elasticity of streamflow, were investigated using an ensemble of bias corrected CMIP5 dataset as forcing to two hydrologic models. The Variable Infiltration Capacity (VIC) and the Sacramento Soil Moisture Accounting (SAC-SMA) hydrologic models, were calibrated at 1/16 degree resolution and the simulated streamflow was routed to the basin outlet of interest. We estimated precipitation and temperature elasticity of streamflow from: (1) observed streamflow; (2) simulated streamflow by VIC and SAC-SMA models using observed climate for the current climate (1963–2003); (3) simulated streamflow using simulated climate from 10 GCM - CMIP5 dataset for the future climate (2010–2099) including two concentration pathways (RCP4.5 and RCP8.5) and two downscaled climate products (BCSD and MACA). The streamflow sensitivity to long-term (e.g., 30-year) average annual changes in temperature and precipitation is estimated for three periods i.e. 2010-40, 2040-70 and 2070-99. We compared the results of the three cases to reflect on the value of precipitation and temperature indices to assess the climate change impacts on Columbia River streamflow. Moreover, these three cases for two models are used to assess the effects of different uncertainty sources (model forcing, model structure and different pathways) on the two climate elasticity indices.