

Post-processing of climate projections for hydrological impact studies: how well is the reference state preserved?

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Abstract Evaluations of the output of regional climate models (RCMs) used to simulate impacts of climate change on hydrology show strong biases for present climate, particularly for precipitation. Various methods are often used to correct these biases prior to any hydrological impact studies where RCM data are used to force a hydrological model (HM). Bias correction (BC) is considered a preferred method for interpreting climate change results because it conserves the changes in variability of precipitation predicted by the RCMs, while retaining a realistic representation of the volume. But, even though the RCM outputs are adjusted to match a reference dataset, the resulting outputs from a HM will not necessarily retain this close match. Traditionally, BC methods are validated in HMs by their ability to reproduce discharge and little work has been done to assess internal variables. This study addresses this by comparing how well a number of hydrological variables can be reproduced by a HM using bias-corrected forcing. The results showed that while BC succeeded in reproducing simulated runoff similar to the reference dataset, other variables including soil moisture, surface runoff, and snow depth and duration could not be reproduced.

Key words RCM; bias correction; downscaling; distribution-based scaling; hydrology