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Evaluation of Various Linear Regression Methods for Downscaling of Mean Monthly Precipitation in Arid Pichola Watershed

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ABSTRACT

In this paper, downscaling models are developed using various linear regression approaches namely direct, forward, backward and stepwise regression for downscaling of GCM output to predict mean monthly precipitation under IPCC SRES scenarios to watershed-basin scale in an arid region in India. The effectiveness of these regression approaches is evaluated through application to downscale the predictand for the Pichola lake region in Rajasthan state in India, which is considered to be a climatically sensitive region. The predictor variables are extracted from (1) the National Centers for Environmental Prediction (NCEP) reanalysis dataset for the period 1948–2000, and (2) the simulations from the third-generation Canadian Coupled Global Climate Model (CGCM3) for emission scenarios A1B, A2, B1 and COMMIT for the period 2001–2100. The selection of important predictor variables becomes a crucial issue for developing downscaling models since reanalysis data are based on wide range of meteorological measurements and observations. Direct regression was found to yield better performance among all other regression techniques explored in the present study. The results of downscaling models using both approaches show that precipitation is likely to increase in future for A1B, A2 and B1 scenarios, whereas no trend is discerned with the COMMIT.

KEYWORDS

Backward, Forward, Precipitation, Regression, Stepwise

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