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Abstract
Evapotranspiration (ET) is one of the major hydro-meteorological variables which intermix the energy as well as mass transfer between the lower atmosphere and Earth's surface. The accurate monitoring of ET is essential for the appraisal of precipitation, evaporation, soil moisture water resource management and irrigation scheduling in various agricultural operations. To measure the ET, we have used the Hamon equation. We have selected temperature from the National Centers for Environmental Prediction (NCEP) global analysis database and India Meteorological Department (IMD) observed temperature for ET calculation. The objective of the following study is the performance evaluation of temporal ET calculated using the Weather research forecasting (WRF) downscaled data, NCEP global data and IMD observed data. For the validation of the ET, we used the Moderate Resolution Imaging Spectroradiometer (MODIS) ET. The study is performed (2005 to 2012) over Koshi river basin, India. For Statistical performance analysis, correlation (r), Root Mean Square Error (RMSE) and Bias are selected. The result represents the ET calculated using the WRF downscaled data shows the highest correlation (r =0.96) than the MODIS (r=0.56). On the other hand, the ET derived from the NCEP data the correlation is higher (r=0.95) than IMD ET. Further, with bias and RMSE, the ET from WRF (Bias = 3.224, RMSE= 7.71) is showing the better performance than the ET from NCEP (Bias=-4.76, RMSE=8.13) and MODIS (Bias= -31.68, RMSE= 37.68). The Mann-Kendall (MK) is used to measure the trends and Sen's slope estimator for the magnitude of the slopes. MK test is showing the seasonal and annual variability in trends. Overall, the results indicate the good performance of NCEP global data and the effectiveness of the WRF model downscaling.
Keywords: WRF model, ET, MODIS16, NCEP, IMD, Koshi river basin