

Enhancing ECMWF and GEFS short to medium range reference evapotranspiration forecasts in India

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ABSTRACT

The study aims to enhance the accuracy of the European Centre for Medium-Range Weather Forecasts (ECMWF) and Global Ensemble Forecast System (GEFS) reference evapotranspiration forecast at short to medium range (1-7 days) using the post-processing methods: Analog technique (AN) and Simple Linear Regression (LR) over the Indian subcontinent. The FAO, Penman-Monteith (PM) equation, is used for the estimation of reference evapotranspiration (ET_0) reforecasts from meteorological reforecasts from ECMWF and GEFS models. The post-processing technique AN and LR was applied to the ET_0 reforecasts and compared against the ET_0 estimated using observed and reanalysis dataset. The deterministic evaluation metrics, such as Root Mean Square Error (RMSE) and Correlation Coefficient (R), were used for the performance assessment of raw ET_0 forecast and post-processed ET_0 forecasts. Results showed that short to medium range ET_0 forecasts improved substantially using AN and LR post-processing methods over the Indian region. Assessment across the different climatic zones in India showed that raw and post-processed ET_0 forecasts in the Tropical climate zone are more skillful than in the other climatic zones. A comparison of raw and post-processed ET_0 forecasts across different seasons in India showed that model forecasts are more skillful during the winter season compared to the rest. Intercomparison of the models also show that overall the raw and post-processed ET_0 forecasts from ECMWF are better than GEFS. Results emphasize the use of post-processing methods to enhance the skill of ET_0 forecasts over the Indian subcontinent before their application in irrigation scheduling and water demand estimation purposes.

Keywords: GEFS, ECMWF, Evapotranspiration forecast, post-processing, Analog technique, Linear Regression, Reference Evapotranspiration