

Impact study of integrated precipitable water estimated from Indian GPS measurements

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Abstract

The Global Positioning System – Integrated Precipitable Water (IPW) data from Indian stations namely Chennai, Guwahati, Kolkata, Mumbai and New Delhi have been assimilated in the National Centre for Medium Range Weather Forecasting's (NCMRWF) Global data Assimilation System (GDAS). Gridpoint Statistical Interpolation (GSI) Scheme of GDAS analysis is experimented with the global model T254L64. The analyses and forecasts are carried out at triangular truncation of wave number 254 and with 64 levels in vertical. Global analyses are carried four times (0000UTC, 0600UTC, 1200UTC and 1800 UTC) daily with intermittent time scheme. Model integrations are carried up to 168 hours. The present study examines the impact that integrated precipitable water has over various meteorological parameters. The study reveals that the assimilation of IPW data influences the analyses and corresponding forecasts of the weather model T254L64. This is an attempt of assimilation of IPW data of the aforesaid five Indian stations in the global model and examination of corresponding impact on various meteorological parameters over Indian region. It is seen that for the layers above 750hPa the zonal and meridional wind components for IPW analyses have less biases. Forecasts from IPW simulations are found to have consistently by lower 850hPa wind vector root mean square error (RMSE) where as at 250hPa, improvement in IPW runs are seen only for day-1 and day -4 forecasts. For temperature at 850hPa, IPW forecasts valid for day-4 & day-5 are better. At 250hPa, temperature RMSE for IPW runs is lower for day-1 forecasts. Mean error of IPW forecasts at 250hPa is lower for all the days of forecasts. Also, geo-potential RMSE for the IPW runs at 250hPa is lower for all the days of forecasts. Forecasts vs. analyses study shows positive impact of IPW assimilation on the anomaly and pattern correlations.

Key Words – IPW, GPS, Assimilation, GSI, GDAS, NWP, T254L64.