INSAT-3D vertical profile retrievals at IMDPS, New Delhi: A preliminary evaluation

India Meteorological Department, New Delhi – 110 003, India
*Department of Mathematics, Jadavpur University, Kolkata – 700 032, India
(Received 13 February 2015, Modified 7 July 2015)
e mail: scbhan@yahoo.com

ABSTRACT. Successful launch of indigenous geostationary satellite INSAT-3D on 26 July, 2013, with advanced meteorological payloads onboard, has provided a new opportunity to the Indian meteorologists. A new payload, atmospheric sounder, has been launched for the first time in Indian satellite to provide the vertical profiles of temperature and humidity in the atmosphere. It is possible to obtain continuous upper level temperature and moisture profiles with a spatial resolution of 30 × 30 km and temporal resolution of one hour. The INSAT-3D temperature and moisture retrievals derived from routine application of sounder data processing algorithm installed at INSAT Meteorological Data Processing System (IMDPS), New Delhi were compared with collocated GPS sonde observations (GPOB), and National Oceanic and Atmospheric Administration (NOAA) polar orbiting satellites (N-18 and N-19) derived profiles to assess retrieval performance. The INSAT-3D temperature profiles show the positive bias throughout from surface to 30 hPa against the GPOB. The overall temperature between retrievals exhibited a systematic bias error at almost all the levels. Bias ranges from 2 to 4 °C between 1000 to 100 hPa levels. The levels of maximum positive bias, where INSAT-3D values are too warm, are near the surface and 100 hPa. This can be attributed to the inability of the retrieval scheme to precisely locate the change in the lapse rate associated with the tropopause due to general disagreement at higher levels. However, the moisture profiles showed somewhat lower accuracy against the GPOB. INSAT-3D and GPOB derived Total Perceptible Water (TPW) were also compared and showed that correlation of INSAT-3D TPW agree well with GPOB TPW to some extent than the level specific LI.

Key words – INSAT-3D, Radiosonde, GPOB, Vertical profile.