

RADIOMETRIC UNIFORMITY AND STABILITY OF GROUND SITE CHARACTERIZATION FOR INSAT-3D

*Shailesh Parihar¹, R. Bhatla¹, A. K. Mitra²

1. Banaras Hindu University, Varanasi, India, 2. India Meteorological Department, New Delhi, India

Radiometric phenomena of Earth Observation Satellite sensors vary between ground pre-launch calibration campaign, after launch and over satellite lifetime due to launching vibration, eventual optical element misalignments, generally space harsh environment. One of vicarious calibration methods is the reflectance-based approach that is applied here to radiometric calibration of INSAT-3D visible channel. In-situ vicarious calibration method for radiometric calibration of visible (VIS 550–750 nm) sensor onboard geostationary satellite INSAT-3D has been carried out for characterizing the radiometric uniformity of the site at Bhuj, Gujarat. The measurements of ground reflectance (spectral range of 350–2500 nm), aerosol optical depth (AOD), total column ozone from Spectroradiometer (spectral range of 350–2500 nm), Sunphotometer, Ozonometer respectively and other meteorological variables were obtained from site during the field campaigns and calibration coefficients with bias and relative error for optical sensor of the INSAT-3D satellite is presented. Based on these measurements, simulations of radiance reaching at top of the atmosphere (TOA) were carried out using radiative transfer model 6S (Second Simulation of the Satellite Signal in the Solar Spectrum). The computed TOA radiances when compared with the sensor measured radiances for various dates and sites show an over-estimation of TOA radiance. The analysis suggested that Bhuj site has been preferred for post launch vicarious calibration of optical sensor of INSAT-3D satellite as well as upcoming geostationary INSAT satellite series.

Keywords: INSAT-3D, vicarious calibration, radiative transfer model 6S