

Statistical Analysis of Comparison of IRI Model with GPS-TEC Observations over Indian Region

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ABSTRACT

There are many ionospheric TEC models developed by scientists for use in satellite navigation. Out of this, International Reference Ionosphere (IRI) is the most popular one. It is widely used as a standard for the specification of ionospheric parameters and is recommended for international use by the **Committee On SPace Research (COSPAR)** and the International Union of Radio Science (URSI). Airport Authority of India (AAI) in collaboration with Indian Space Research Organization (ISRO) is planning to demonstrate Space Based Augmentation System for safe and precise navigation and landing of aircrafts in Indian Airspace under the project named GAGAN. A network of GPS dual frequency receivers (TEC and Scintillation monitor) is set up at 18 airports spread all over India to study the ionospheric behavior. In this study, we have compared the observed TEC from GPS Silicon Valley Ionospheric Scintillation Monitor (ISM) with the TEC from IRI Model. The comparison was done at almost all stations using data from year 2004 to 2006. It is observed that in general IRI overestimates TEC over many of the locations in India.

We have compared the diurnal variation of vertical TEC over the stations- Ahmedabad, Bhopal, Raipur, Kolkata and Aizwal, which lie along the same latitude belt of Equatorial Appleton Anomaly region, where maximum TEC is observed over Indian region. Comparison was done during all seasons over these stations for the year 2004 and 2006. The effect of solar activity on TEC has also been observed as data sets used have difference of two years. The IRI model is found to be more close to the observations in eastern longitudes than over western longitudes of India. Similar comparison has been done over the stations lying on same longitude belt - Shimla, Delhi, Bhopal, Hyderabad, Bangalore and Trivandrum. The detailed results as well as the methods to improve the IRI model will be discussed and presented in the paper.