2012 Workshop: Equatorial PRIMO

Long title
Equatorial-PRIMO (Problems Related to Ionospheric Models and Observations)
Conveners
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Description

Two sets of ionosphere-plasmasphere models are participating: non self-consistent models including IFM, IPM, LLIONS, PBMOD, GIP, SAMI2 and self-consistent models including SAMI3, TIE-GCM, TIME-GCM, GITM and CTIPe. In the past two workshops, we have compared several ionospheric parameters in the Peruvian and Asia longitude sectors under Equinoctial conditions for an F10.7 cm flux value of 120 simulated by these two sets of models. The main conclusions were 1.) The non self-consistent models are in good agreement with each other in the daytime, 2.) The self-consistent models produce daytime Nmax values at the crests of the equatorial anomaly that are substantially lower than the non self-consistent model values, 3.) Different parameterizations and equations (e.g. photoionization, ion and electron temperatures, ion-neutral collision frequency) in models can cause significant differences among models. The workshop this year, we would like to (1) discuss current progress, results, and problems, (2) bring in different types of observations (satellites and ground-based), (3) discuss useful validation between model and observation.

Agenda

10:00 – 10:15 Current Progress of the Equatorial-PRIMO PRIMO current progress and discussions

10:15 – 10:35 Model Development and Update update from GITM

10:35 – 11:00 Open Discussion

11:00 – 11:15 Cesar Valladares (BC) – Introduction of LISN LISN

11:15 – 11:30 Jeff Klenzing (NASA/GSFC) – Performance of the IRI-2007 and SAMI2 Models during Extreme Solar Minimum IRI and SAMI2

11:30 – 12 :00 Open Discussion

Justification

We do not fully understand all the relevant physics of the equatorial ionosphere, so that current models do not completely agree with each other and are not able to accurately reproduce observations. To understand the strengths and the limitations of theoretical, time-dependent, low-latitude ionospheric models in representing observed ionospheric structure and variability under low to moderate solar activity and geomagnetic quiet conditions, in order to better understand the underlying ionospheric physics and develop improved models.

Summary

This is the 3rd year of our discussion in Equatorial-PRIMO. The comparisons of NmF2 and HmF2 among models will soon be published in AGU monograph. Various interesting questions are discussed this year, such as the topside plasma fluxes, lower boundary conditions, how does Te affect the O-O+ collision freq, compare the ionospheric conductivities among models, incoorporate more realistic drift and boundary conditions into models, E region density, factors that effect the PRE, and metrics for model comparisons, etc.

Following what we have discussed, we would like to first incorporate some magnetometer inferred vertical drifts into models and compare the simulated TEC with observed TEC. Since it is difficult to run all the models, we will start this task using the GIP. Essentially we are trying to see how different the results can be by using the realistic vertical drifts. Besides, we will conduct some test runs using the GIP and the TIEGCM by changing some factors, parametrization, and boundary conditions. Hopefully in this way, we will have better ideas about what causes the differences among models and provide useful information for the modeling community.

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