2014 Workshop: Equatorial PRIMO

Long title
Grand Challenge: Equatorial-PRIMO (Problems Related to Ionospheric Models and Observations)
Grand Challenge
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. The whole atmosphere models include WAM and WACCMx are also included in the project.

We will briefly describe and discuss our previous results 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. We also plan to (1) discuss current progress, results, and problems of individual model development, (2) compare model results with various types of observations (satellites and ground-based) for two particular periods in November 7-12,2012 and March 10-15,2013 at low-latitude region, (3) discuss the discrepancies between model results and observations, (4) organize an observational campaign to obtain sufficient observations to compare with simulated ionosphere and thermosphere.

Agenda

Introduction of Equatorial-PRIMO

Model Strengths and Weakness, Recent Developments

Discuss Results for Coupled Models

General Discussion and Future Plans

Justification

The theoretical models that are widely used in the CEDAR community have been developed and have evolved over the past few decades. Little effort, however, has been devoted to addressing the missing physics in models or to focuses on numerical schemes in models. Since we do not fully understand all the relevant physics of the equatorial ionosphere, current models do not show good agreement with each other under quiet-time conditions and are not able to accurately reproduce observations for certain events. The comparisons of simulated thermospheric and ionospheric conditions from the workshop will provide us with a better knowledge in the dynamics and coupling of ionosphere and atmosphere, which is one of the focuses in Decadal Survey. Improving simulation capability of current models and conducting observational campaigns to systematically analyze physical processes in the SAIR address the latest strategic plan of CEDAR.

(1) How the questions will be addressed: In this workshop, the physical processes for the low-latitude ionosphere that are implemented in theoretical models will be reviewed. We will demonstrate and discuss the large discrepancies of thermospheric and ionospheric parameters among model outputs and their differences from the observations. We will also report the current status of theoretical models, understand the strengths and limitations of models, and seek out solutions for the discrepancies among models.

(2) What resources exist, are planned, or are needed: Since the project has been started few years ago, currently there are 20 modelers including 6 ionosphere/plasmasphere model, 6 thermosphere/ionosphere models, and 2 whole atmosphere models participating in Equatorial-PRIMO. Ground-based and satellite measurements are also provided by researchers from different institutions in the community. We would like to use the historical dataset to calibrate model results and coordinate closely with each modeler to improve their models under quiet conditions. Model results under specific conditions will be compared with observations from the organized observational campaign at low-latitude region.

(3) How progress should be measured: Through the workshop, we would like to understand these ionosphere models, to improve models to have better agreement among themselves under quiet conditions, and to evaluate their strength and limitations in simulating thermosphere and ionosphere under disturbed conditions.

To better understand the underlying ionospheric physics and work with modelers to improve models, we would like to undertake a multi-year CEDAR project that

coordinates model-data and model-model comparisons. A working-group meets annually at the CEDAR Workshop and communicates frequently through teleconferences between workshops will be an efficient way to coordinate simulations and observations to address issues come up during annual workshop and to achieve our primary objectives. Organizing campaign, analyzing observations, conducting and improving model simulations all require significant amount of planning and discussion.

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