2011 Workshop: Low Latitude Studies

Long title
Theoretical and experimental studies of the low-latitude thermosphere-ionosphere system
Conveners
Fabiano Rodrigues
Odile de La Beajuardiere
Jonathan Makela
Gang Lu
Description

In the past few years, new hypotheses and theories describing equatorial spread F initiation and development have been proposed. New and exciting ground-based and in-situ observations of the Ionosphere-Thermosphere (IT) at low-latitudes have also been made. Additionally, numerical modeling capabilities of the low-latitude IT have significantly improved. This workshop will provide an opportunity for the CEDAR community to present and discuss results of theoretical and experimental studies related to the low-latitude IT system; emphasizing equatorial spread F (ESF).

The workshop welcomes contributions on experimental investigations, theoretical analyses and numerical simulation studies, including assimilative models of the low-latitude ionosphere, and non-linear models of ESF. The presentation of results related to observations of the low-latitude IT or phenomena related to ESF, especially those made by new ground stations, by C/NOFS and results from the spreadFEx2 campaign in Brazil are expected. Additionally, we anticipate contributions related to studies of the effects of magnetosphere-ionosphere coupling processes on the low-latitude thermosphere/ionosphere and ESF as well as on the effects caused by the coupling with the lower and neutral atmosphere.

Agenda

Schedule of Talks (pdf)

Justification

The workshop is justified/motivated by recent new experimental and theoretical advances related to studies of the quiescent and turbulent low-latitude thermosphere-ionosphere system.

Summary

We had a successful session with a total of 14 speakers presenting results of their experimental and theoretical studies of the low-latitude thermosphere-ionosphere system. An audience of over 80 people was present at all times. Each speaker had about 12-15 minutes to present. Questions and discussions were encouraged at the end of each presentation.

The morning session started with Jeff Klenzing who presented results of an analysis of the observations of low-latitude ionospheric plasma enhancements made by instruments onboard the C/NOFS satellite. Jonh Meriwhether presented and discussed new measurements of thermospheric winds made in the Peruvian and Brazilian longitude sectors. His talk was followed by a presentation given by Nick Pedatella. Nick presented longitudinal variations in the F-region and topside TEC measured using the radio occultation technique and observations made by GPS receivers onboard COSMIC satellites. The longitudinal variations observed by COSMIC were associated with the effects of non-migrating tides. Cheryl Huang also presented and discussed signatures of non-migrating tides observed by C/NOFS. Esayas Shume presented radar and magnetometer observations suggesting the control (growth and suppression) of electroject plasma waves by electric fields of magnetospheric origin capable of penetrating to the equatorial ionosphere. Chaosong Huang presented observations and discussed the origin of broad plasma depletions measured by C/NOFS. Rob Pfaff concluded the morning session with an update on electric and magnetic fields measured by the vector electric field instrument (VEFI) instrument onboard C/NOFS. Interesting new observations of quasi-sinusoidal perturbations in the bottomside F-region were presented.

The afternoon session started with a presentation by David Hysell. He presented results of his new three-dimensional numerical model of ionospheric irregularities with focus on the morphology of equatorial spread F structures. Russell Stoneback presented results of an analysis of the seasonal variability of ionospheric irregularities and meridional drifts as observed by the Ion Velocity Meter (IVM) onboard C/NOFS. Jonathan Krall presented results of the SAMI3 model. Jonathan presented and discussed SAMI3 simulations of “plasma bobs”, and ESF development

associated with MSTIDs. Edgardo Pacheco presented results of the seasonal variability of ESF observed by the JULIA radar in Peru for the low solar flux period between 2007 and 2009. The JULIA observations allowed the authors to determine not only the occurrence of ESF as a function of local time but also as a function of altitude. John Retterer presented results of his plasma bubble model driven by winds and electric fields from IDEA (Whole Atmosphere Model - WAM and Global Ionosphere-Plasmasphere Model - GIPM). Joseph Comberiate presented and discussed the analysis of SSUVI UV imager observations of plasma bubbles and its application to predict the occurrence of ionospheric scintillation. Yann Tambouret finished the session presenting the results of kinetic simulations of small-scale (< 80 m) ESF irregularities. Yann discussed the implications of the simulations for observations of meter-scale ESF irregularities that have been made by rockets and radars.

View PDF