2014 Workshop: Equatorial Spread F

Long title
Grand Challenge: Observations, Modeling, and Forecast of Equatorial Spread F Irregularities and Scintillation
Grand Challenge
Conveners
Chaosong Huang
Cesar Valladares
Vince Eccles
Description

Large-scale plasma bubbles and associated equatorial spread F (ESF) structures are the most significant disturbances in the low-latitude ionosphere and cause severe radio scintillation. This session focuses on how the equatorial ionosphere responds to magnetic storms, penetration electric fields, magnetospheric energy input at high latitudes, and atmospheric disturbances; what controls the generation and evolution of equatorial plasma bubbles and ESF irregularities; how significantly seeding perturbations affect the generation of plasma bubbles; how the occurrence of equatorial spread F depends on longitude, season, and solar activity; and how ionospheric scintillation is correlated with spread F irregularities. We welcome observational and simulation studies that address these topics and that aim to improve the current capability of forecasting plasma bubbles, spread F irregularities, and scintillation activities.

Justification

Equatorial spread F (ESF) irregularities and scintillation have long been an active research area and remain as a major challenge for the CEDAR community. Large-scale plasma bubbles and associated ESF irregularities are the most significant disturbances at low latitudes. Radio scintillation produced by plasma irregularities causes degradation or disruption of communication, navigation, and surveillance systems. Advancing understanding and prediction capability of ESF and scintillation is related to CEDAR strategic thrusts #1, #2, and #3. This workshop is also related to the study of the ionosphere-thermosphere-mesosphere system in an integrated fashion and the effective space weather and climatology capabilities emphasized in

the 2013-2022 Decadal Survey for Solar and Space Physics.

Equatorial spread F (ESF) irregularities and scintillation have long been an active research area and remain as a major challenge for the CEDAR community. Large-scale plasma bubbles and associated ESF irregularities are the most significant disturbances at low latitudes. Radio scintillation produced by plasma irregularities causes degradation or disruption of communication, navigation, and surveillance systems. A number of outstanding scientific problems (including the ionospheric condition for the generation of ESF and plasma bubbles, the evolution and decay process of plasma bubbles, the type of seeds needed for bubble initiation, the spatial and temporal distribution of ESF and scintillation, etc.) have not been well understood. The prediction capability of ESF occurrence and scintillation has not been established.

View PDF