2023 Workshop: Equatorial Spread F

Long title
Recent advances in understanding Equatorial Spread F using ground and space observations
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Description

Note: this workshop will be "Recent advances in the understanding of Equatorial Ionization Anomaly (EIA) and ionospheric irregularities, part 2" in 2023 CEDAR Workshop agenda due to a merging with another proposed workshop.

Equatorial Spread F (ESF) comprises F region structures, such as plasma bubbles and bottomside layers, that include near 1 km irregularities. This session attempts to create a forum to discuss recent observational, modeling, and theoretical investigations related to all the stages of ESF, from their initiation to decay. ESF generates significant scintillations and outages in communication and navigation systems. Consequently, the ESF phenomenon has significant societal repercussions as we are critically dependent on reliable space-based systems. Recently, dedicated satellites (ICON, COSMIC II), CubeSats (SORTIE, SPORT), space instruments (GOLD), and distributed observatories (NATION, LISN) have been operating and dedicated to addressing low latitude ionospheric dynamics, including ESF.
This workshop welcomes presentations on the causes of ESF, such as atmospheric inputs, including traveling ionospheric disturbances (TID) that can seed plasma bubbles and Sudden Stratospheric Warming (SSW) events that enhance the semidiurnal lunar tide and modify the electrodynamics of the E and F regions and systematic variations of the migrating/non-migrating tides. Intense and moderate magnetospheric storms produce E fields that map to the equator and a disturbance

dynamo field that can also perturb the usual electrodynamics of the low-latitude ionosphere. The observing ability that our community has designed and built in the last five years is of an unprecedented scale. This session will explore what is needed to fully utilize all these resources to conceive, design, and construct a forecasting tool for ESF.

Agenda

1:30-1:45 Endawoke Yizengaw Global Distribution of The Unintended Sources of Radio Frequency Interference

1:45 - 2:00 Chaosong Huang VHF scintillation and ESF irregularities over Kwajalein

2:00 - 2:15 Deepak Karan Unique combinations of differently shaped EPB within a small longitude range

2:15 - 2:30 Ercha Aa Multi-instrument analysis of the day-to-day variability of EPB/ESF

2:30 - 2:45 Jonas Sousasantos Unambiguous detection of severe scintillation over low-to-mid latitudes caused by extreme plasma bubbles: evidence from ground-based monitors and GOLD.

2:45 - 3:00 Enrique Rojas Predicting Spread-F occurrence using neural networks and ionograms.

3:00 - 3:15 Salvador Espinoza Equatorial plasma bubbles observed by ICON & GOLD

3:15 - 3:30 Cesar Valladares On the physics of nearly 1 km irregularities at equatorial latitudes

Justification

This workshop will organize a forum to present and discuss the recent advances in the ground and satellite-based measurements of the low latitude ionosphere and ESF.
This workshop will address several points described in Strategic Thrust #1, “Encourage and Undertake a Systems Perspective of Geospace,” as we aim to predict future conditions and the onset of plasma bubbles and other plasma instabilities at low latitudes.
Strategic Thrust # 6, “to manage, Mine and Manipulate Geoscience/Geospace Data

and Methods.” Specifically, we will discuss joint multi-instrumented campaigns or perform analysis that uses one or more types of instruments (in space and ground). We will also present the results of data mining that include extensive resources provided by distributed observatories and incoherent scatter radar.

Related to CEDAR Science Thrusts:
Encourage and undertake a systems perspective of geospace
Manage, mine, and manipulate geoscience/geospace data and models
Workshop format
Short Presentations
Keywords
Plasma instabilities, Gravity Waves, Traveling Ionospheric Disturbances, scintillations
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