2016 Workshop: Distributed observatories

Long title
Distributed Networks of small instruments: Recent scientific results at low and mid latitudes
Conveners
Cesar E Valladares
Carlos Martinis
Terry Bullett
Fabiano Rodrigues
Description

During the last 10 years, several distributed observatories, networks of small instruments and conjugate arrays have been installed in the American sector to study the climate and weather (dynamics and coupling) of the low- and mid-latitude ionospheres. The networks of small instruments include arrays of GPS receivers, chains of magnetometers, Fabry-Perot interferometers, ionosondes, coherent radars, all-sky imagers, and multiple RF receivers. Some of these networks have also a global extension and are used to point out and study the causes of the longitudinal differences that exist. Conjugate observations using multiple satellites, such as C/NOFS, DMSP and/or SWARM satellites and ground-based instruments are also welcome to participate and present their scientific results in this workshop. A central part of this workshop will consist of recent results on the assimilation and modeling employing observables acquired by distributed observatories. Important features of the distributed observatories are their inherent regional coverage, their real-time capability and in most cases their 24/7 operation that provide continuous observations of the ionosphere/thermosphere system. Projects to be discussed, but not limited to, include: (1) longitudinal variability of E×B drifts, TEC, and plasma depletions/scintillations across the American continent, (2) spatial/temporal variability of wind systems in the American sector, (3) conjugacy of MSTIDs, (4) statistics of regional maps of TEC, (5) investigations of the origin of TIDs in the American sector, (6) modeling work using measurements acquired with distributed observatories and (7) seeding conditions for equatorial bubbles and MSTIDs at mid latitudes. This workshop aims to answer two fundamental questions: Is the present instrumentation in South and Central America (and other parts of the Globe) able to assess the temporal and spatial variability that exists at all local times, and during

all ionospheric conditions? And, can a first-principle physics-based assimilation model of the low latitude ionosphere reproduce the ionospheric variability that is observed with distributed networks?

Agenda

- 1:30 – 1:40 Terry Bullett, Sample Oblique Ionograms
- 1:40 – 1:50 Ethan Miller, Multi-Instrument Observations of and Insights into MSTIDs over Puerto Rico
- 1:50 – 2:00 Cesar Valladares, Measurements of TIDs and plasma structures conducted with the LISN distributed observatory
- 2:00 – 2:05 Carlos Martinis, Conjugate studies using C/NOFS and All-sky imagers
- 2:05 – 2:15 Dustin Hickey: Multiple Instrument Observations of the MTM
- 2:15 – 2:25 Rafael Mesquite, New results on the mid-latitude Midnight Temperature Maximum
- 2:25 – 2:35 Fasil Tessema, New results on equatorial thermospheric winds and temperatures from Ethiopia, Africa
- 2:35 – 2:45 Keith Groves, Longitudinal Variability of Scintillation Variability
- 2:45 – 2:55 Fabiano Rodrigues, Equatorial spread F radar observations with MELISSA: A status report
- 2:55 – 3:05 Julio Urbina, An update on Penn State Radar (CIRI) in Huancayo
- 3:05 – 3:15 Vince Eccles, High Latitude and Middle Latitude Data Assimilation during Storm Periods.
- 3:15 – 3:30 General Discussion

Justification

This workshop will address several points described in the Strategic Thrust #4 to develop Observational and Instrumentation Strategies for Geospace System Studies and # 6 to manage, Mine and Manipulate Geoscience Data and Methods. Specifically, we will conduct coordinated multi-instrumented campaigns and perform statistical analysis that use more than one type of instruments. We will also mine the large resources provided by distributed observatories and conduct: • Continued evolution of data assimilation schemes to integrate data with physics-based models for improved predictive capability. • Develop advanced analysis techniques needed for effective fusion of observations into sophisticated inference models. This workshop is also related to the study of the ionosphere-thermosphere system in an integrated fashion and the effective space weather and climatology capabilities

emphasized in the 2013-2022 Decadal.

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