# 2020 Workshop: Joint Session on TAD/TID/MSTID

Long title
Joint Session on TAD/TID/MSTIDs: Earth’s atmosphere vertical coupling relation with MSTIDs; Identification and Source Differentiation; Disturbances of high latitude origin and their low latitude impacts.
Conveners
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Description

This workshop will combine papers in the following subjects:

(1) State-of-the-art investigations of the atmospheric processes that enable or indicate coupling and energy transfer within the atmosphere layers, including the MSTIDs phenomena. We welcome submissions on methodologies, including theory, modeling, observation, and experiment. Particularly attention is given to mid-latitude, but studies from other latitudes are also welcome.

(2) Traveling Ionospheric Disturbances are a frequent feature of the ionosphere at all latitudes. It is believed that there are a number of processes responsible for their generation including the Perkins instability, high latitude forcing, lower atmospheric forcing resulting from severe tropospheric weather events (e.g., hurricanes, tornadoes, tropical cyclones, thunderstorms), earthquakes, tsunamis, volcanic eruptions, meteor impacts, as well as explosions, spacecraft launches, etc. We want to better understand the origin of TIDs and how to distinguish different types of TIDs from each other. We are interested in modeling and data studies of TIDs, as well as how to use multi-instrument approaches to better understand the phenomena.

(3) Understanding the formation, progression, and global impacts of Traveling Atmospheric/Ionospheric Disturbances (TADs/TIDs) is one of the long-standing challenges of space weather research. Given our ever-increasing reliance on space-based technology, we have reached a critical point where distinguishing their role in low latitude variability and the energy budget of the ionosphere-thermosphere

system is crucial for advancing global ionosphere-thermosphere (I-T) space weather research and forecasting. The formation of high-latitude, equatorially propagating TIDs/TADs are phenomena made possible by the strongly coupled nature of the I-T system. Their origins have been tied to magnetospheric processes such as Joule heating and auroral precipitation. Another way the high latitude disturbances can affect lower latitudes is through the penetrating electric field, particularly during geomagnetically active times. Penetrating electric fields can change the low latitude dynamo, ion drift, and thermospheric winds leading to other consequences. Recent improvements in I-T modeling and observational coverage allow new insights into the ways in which TIDs/TADs connect the high- and low-latitude I-T system. Inspired by these updated tools, this workshop aims to address the challenge of the role of TADs and TIDs in connecting the high and low latitude I-T systems by fostering collaborative efforts among present and future research activities. To this end, data and modeling results investigating the origins of high-latitude TIDs/TADs and their impacts on low latitude aeronomy are welcome.

Agenda

1 - Pedrina Terra - Arecibo Observatory - Geomagnetic and Solar dependency of MSTIDs occurrence rate: A climatology based on airglow observations from the Arecibo Observatory Remote Optical Facility (ROF)

2 - Fabio Vargas - University of Illinois - MSTID Vertical wavelengths seen from ground-based imagery of the thermospheric redline and TEC

3 - Virendra Yadav - Indian Institute of Technology Roorkee - A unique case of a complex interaction between MSTIDs and mid-latitude plasma depletions over geomagnetic low-mid latitude transition region (view video)

4 - Sukanta Sau - Indian Institute of Geomagnetism - Study of quasi-periodic waves observed in thermospheric nightglow emission obtained from the Indian dip equatorial region

5 - Shunrong Zhang - MIT Haystack Observatory - SAPS impact on LSTIDs and MSTIDs

6 - Mark Conde - University of Alaska Fairbanks - Gravity wave signatures in thermospheric winds observed using Scanning Doppler Imagers

7 - Kevin Pham - National Center for Atmospheric Research - Coupled Magnetosphere-Ionosphere-Thermosphere Simulation of TADs/TIDs

8 - Pavel Inchin - Embry-Riddle Aeronautical University - Constraining finite-fault kinematics of a large earthquake from the ionospheric responses to infrasonic acoustic waves

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