2021 Workshop: Thermospheric Dynamics Measurements

Long title
Current Status, Needs, and Capabilities For 21st Century Thermospheric Dynamics Measurements: The 2019-2021 Thermospheric Winds SWOT Analysis
Conveners
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Description

As outlined in the NSF CEDAR: The New Dimension Strategic Vision [2011] roadmap, the most recent NSF and NASA Decadal Surveys, and the White House Office of Science and Technology Policy National Space Weather Strategy and Action Plan (released in October 2015), there are an enormous number of compelling geospace phenomena that impact our current technological developments and have yet to be resolved. Many of these topics, ranging from equatorial spread-F, mid-latitude quasi-periodic echoes, HR radio disruption, neutral thermospheric helium upwelling, LEO spacecraft drag, auroral-zone heating, gravity, planetary, and tidal waves, region 0, 1, and 2 current systems, ULF wave heating, impact of particle precipitation, etc. fundamentally require measurements of the thermospheric wind, over a full diurnal cycle, in order to be resolved.

The purpose of this workshop series, which started at CEDAR 2019, is to bring together various experimental and modeling stakeholders interested in advancing our understanding of thermospheric winds and their variability. To wit, we seek to perform a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis on our current understanding of thermospheric winds. Such an analysis requires 1) a review of our current understanding of thermospheric winds, 2) the identification of needed measurements, 3) identification of unanswered problems, and 4) assessment of closure in the next 10-years. The workshops will be organized to produce a community-accessible traceability matrix associated with this SWOT analysis.

Agenda

Anasuya ARULIAH, University College London, UK
Why could there be a difference between FPI Doppler shifts and satellite drag measurements of thermospheric winds at high-latitudes? (pdf)

John NOTO, Computational Physics, Inc.
Real time neutral winds from CPI FPIs (pdf)

Weijia ZHAN, Clemson University
Altitudinal neutral wind responses in the high latitude E region during disturbed conditions (pdf)

Amal LOUTFI, Cadi Ayyad University, Morocco
Thermospheric neutral winds above the Oukaimeden Observatory: effects of geomagnetic activity (pdf)

Jonathan KRALL, Naval Research Laboratory
Midnight temperature maximum winds and equatorial spread-F (pdf)

Rafael MESQUITA, Johns Hopkins University
In-situ observations of neutral shear instability effects in the mesosphere/lower thermosphere during the Super Soaker experiment (pdf)

Luis NAVARRO, University of Illinois Urbana-Champaign
Non-migrating structures in the midlatitude thermosphere (pdf)

Robert KERR, Computational Physics, Inc.
Comparison of Arecibo vector neutral wind products in the F-region with ICON MIGHTI data in 2020 (pdf)

Manbharat DHADLY, Naval Research Laboratory

Comparison of ICON/MIGHTI and TIMED/TIDI Neutral Wind Measurements in the Lower Thermosphere (pdf)

Brian HARDING, University of California, Berkeley
The neutral wind dynamo as observed by NASA's ICON mission: First results from the conjugate maneuver (pdf)

Justification

The tasks outlined here satisfy a number of strategic thrusts outlined in the most recent CEDAR strategic plan [CEDAR The New Dimension, June 2011], including: Strategic Thrust #2: Explore Exchange Processes at Interfaces and Boundaries Strategic Thrust #4: Develop Observational and Instrumentation Strategies for Geospace System Studies Strategic Thrust #5: Fuse the Knowledge Base across Disciplines Strategic Thrust #6: Manage, Mine, and Manipulate Geoscience Data and Models

Furthermore, the timing of this workshop is well suited for ongoing spacecraft operations, measurements, and new capabilities of the thermospheric system, particularly from the NASA GOLD and ICON missions.

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