2023 Workshop: Long-term changes in the ITM system

Long title
Long-term changes in the ionosphere-thermosphere-mesosphere system
Conveners
Anastasia Newheart
Liying Qian
Susan Nossal
anewheart@ucar.edu
Description

Note: this workshop will be merged with the workshop titled: Understanding space climate using models and long-term observations. Conveners: Marty Mlynczak, Romina Nikoukar. The merged workshop will be titled: Space climate and long-term changes in the ITM system in the agenda. You can contact either of these two workshops' conveners for your presentations.

Several factors can impact the long-term changes (longer than a solar cycle) in the ionosphere-thermosphere-mesosphere (ITM) system. Increase in greenhouse gas concentration, changes in earth's magnetic field and solar activity variations are major drivers of long-term changes in the ionosphere-thermosphere-mesosphere system. Solar irradiation heats and ionizes the upper atmosphere, making the 11-year solar cycle an important temporal scale for variation in the upper atmosphere. Secular changes in earth's magnetic field vary more slowly, on the order of decades, and impacts in the upper atmosphere due to increases in greenhouse gasses are typically of smaller magnitude over timescales of a solar cycle. Long-running ground-based facilities such as the Jicamarca Radio Observatory and the Millstone Hill ISR enable studies of trends over decades. Developments in modeling also enable studies of long-term changes in the ITM system. In this session we invite observational and modeling studies of decades-long trends in the upper atmosphere.

Agenda

Zoom meeting for virtual participation

Meeting URL:
https://jhuapl.zoomgov.com/j/1607307201?pwd=REN0N0E2SmpyMnJjMis2a0RlZFduUT09&fro

Meeting ID: 160 730 7201 Passcode: 950785

10:00

Romina/Ana

Introduction

10:02

Enrique Rojas Villalba

Long-term trends over Jicamarca from ionosonde and coherent backscatter data

10:14

Dmitry Kotov

Ukrainian IS radar: contribution to the atmospheric trends investigation

10:26

Susan Nossal

Solar activity and greenhouse gas influences on upper atmospheric hydrogen

10:38

Rajan Itani

Long-Term Trend in Fabry-Perot Interferometer Observations of Thermospheric F-region Neutral Temperature

10:50

Chen Wu

Solar cycle variability of atmospheric tides

11:02

Shun-Rong Zhang

Long-term trends in GUVI and millstone

11:14

Anastasia Newheart

Long-term trends in the ionosphere using WACCM-X

11:26

Erin Dawkins

Solar Cycle and Long-term Trends in the Observed Peak of the Meteor Altitude Distributions by Meteor Radars

11:38

Marty Mlynczak

Long-term change and measurement requirements for developing ‘geospace data records’

11:50

Discussion

Justification

Science Questions: How does increased CO2 impact ITM dynamics? How do changes in earth’s magnetic field impact ITM dynamics? How do solar cycle variations impact the ITM system?
How the science questions will be addressed: Modeling and observation studies
Resources that exist, are planned, or needed: long term data sets such as ISRs, modeling capabilities
How to measure progress: improved ability to predict and model ITM conditions

Related to CEDAR Science Thrusts:
Explore processes related to geospace evolution
Fuse the knowledge base across disciplines in the geosciences
Workshop format
Short Presentations
Keywords
long-term trends, greenhouse gasses, magnetic field
View PDF