2023 Workshop: Space Climate

Long title
Understanding space climate using models and long-term observations
Conveners
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Description

Note: this workshop will be merged with the workshop titled: Long-term changes in the ionosphere-thermosphere-mesosphere system. Conveners: Anastasia Newheart, Liying Qian, Susan Nossal. 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.

The geospace environment is a highly coupled system both within itself and to the space environment above and the stratosphere and troposphere below. While knowledge of the energy inputs from the Sun and solar activity is important for understanding the solar-terrestrial system, of equal importance is the secular change due to increasing levels of CO2 and other greenhouse gases, which cool the upper atmosphere. Solar radiation and energetic particle precipitation are the major drivers for variability in the mesosphere-ionosphere-thermosphere system. On the other hand, continued cooling of the thermosphere reduces satellite drag , thereby increasing orbital debris lifetimes, and lowers the effective ionospheric conductivity, and hence alters the global currents in the magnetosphere-ionosphere system. Decades of ground and space observations and advances in geospace modeling provide an excellent opportunity to advance our understanding of variability and change in the near-Earth space environment, known as space climate. This session welcomes presentations of both ground and space observations and modeling studies on the long-term changes and variability of the mesosphere-ionosphere-thermosphere system that advance our understanding of space climate.

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

Gradual changes in solar activity, solar wind, solar EUV radiation, and Earth’s magnetic field play a significant role in defining the long-term variation in the geospace environment. On the other hand, increasing concentrations of greenhouse gases have also affected the Earth’s radiative balance, leading to pronounced coupling of the middle and upper atmosphere. Today geospace science stands at a crossroads: decades of observations point to an incredibly complex system under the influence of sun and solar activity that is also undergoing long-term change due to increasing greenhouse gases. The problem of space debris and the burgeoning space economy are dependent on the evolution of the geospace. The scientific understanding of the mean-state of the near-Earth geospace change and the longer-term changes of the mean state will ultimately inform future space operations, the developing space economy, and issues in space policy and space law.

Related to CEDAR Science Thrusts:
Explore processes related to geospace evolution
Develop observational and instrumentation strategies for geospace system studies
Keywords
Space Climate, Long-term variability
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