

Project Details

ROSES ID: NNH07ZDA001N

Selection Year: 2008

Program Element: Focused Science Topic

Topic: Focused science topics for Strategic Goal 4 (Ionosphere-Thermosphere): Determine the sources of daily variability in the thermosphere and ionosphere

Project Title:

Ionosphere-Thermosphere Variability: The Interaction of Solar Irradiance Changes with Atmospheric Dynamics

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Project Member(s):

- Marsh, Daniel Robert; Co-I; National Center for Atmospheric Research
- Garcia, Rolando R; Collaborator; NCAR
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- Bowman, Bruce R; Collaborator; null
- Chamberlin, Phillip C; Collaborator; NASA
- Qian, Liying ; Co-I; UCAR

Summary:

Understanding the day-to-day variability of the ionosphere and thermosphere requires unraveling the relative strengths of forcing mechanisms of the I-T system, including solar ultraviolet, extreme-ultraviolet, and X-ray fluxes, magnetospheric processes resulting in geomagnetic activity and auroral effects, and propagation of dynamical variations driven by lower atmosphere weather and middle atmosphere tides. The goal of this investigation is to advance understanding of the observed day-to-day variability of the ionosphere-thermosphere using three-dimensional general circulation models, solar measurements, lower atmosphere analyzed temperatures and winds, and space-based measurements of thermosphere and ionosphere density and composition. As part of a focused science team, we will concentrate on solar forcing, including flare effects, and internal dynamics driven by lower atmosphere processes, in creating observed daily variability. We will complete the extended-altitude version of the Whole Atmosphere Community Climate Model that extends from the ground to the thermosphere/ionosphere, and use solar ultraviolet measurements and a measurement-based flare model as optional inputs. We will impose analyzed meteorological fields on the troposphere/stratosphere region of the model in order to study how atmospheric dynamics propagate into space. We will attempt to understand the seasonal behavior of the thermosphere/ionosphere as well, addressing the hypothesis that the lower atmosphere is responsible for variation on time scales ranging from diurnal to inter-annual.

Publication References:

Summary: no summary

Reference: Qian, Liying; Laštovička, Jan; Roble, Raymond G.; Solomon, Stanley C.; (2011), Progress in observations and simulations of global change in the upper atmosphere, Journal of Geophysical Research, Volume 116, CiteID A00H03, doi: 10.1029/2010JA016317