

Project Details

ROSES ID: NNH11ZDA001N

Selection Year: 2012

Program Element: Focused Science Topic

Topic: Atmosphere-Ionosphere Coupling During Stratospheric Sudden Warmings

Project Title:

What can the data and model tell us about the stratospheric warming effect on the ionosphere?

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Project Member(s):

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Summary:

The key objective of the project is to understand how the stratospheric warming events can affect the ionosphere. Since the stratospheric warming events alter the tides and planetary waves, they are the focus of the study. The goal is to understand why these waves change with the stratospheric warming and how they propagate upward and affect the ionosphere.

We plan to do the study by using a NASA satellite mesospheric data-driven thermosphere ionosphere community model from NCAR. Because the data contains the changes related to the stratospheric warming changes, it can provide a true description of the mesosphere for ionosphere simulation. We will use ground-based data to study fast variations in the mesosphere and ionosphere to validate the simulation results.

The space weather phenomena in the upper atmosphere and ionosphere can cause anomalous satellite drag, GPS position error, radio blackouts, and radar clutter. In order to mitigate space weather's impact on life and society, NASA Living With a Star program supports research to deliver understanding and predictive models of upper atmospheric and ionospheric responses to changes in solar electromagnetic radiation and to coupling above and below. This proposal addresses the impact on the ionosphere by the stratosphere from below, which is not well understood now. A better understanding of this impact will eventually lead to ionosphere predictive capability in the future. The proposed effort will improve a widely used community model TIEGCM by adding a new data driven capability. Considering that NASA CCMC (Community Coordinated Modeling Center) provides TIEGCM model runs, more improvements to the model will certainly benefit a large number of community users.

Publication References:

Summary: no summary

Reference: Yue, Xinan; Schreiner, William S.; Kuo, Ying-Hwa; Wu, Qian; Deng, Yue; Wang, Wenbin; (2013), GNSS radio occultation (RO) derived electron density quality in high latitude and polar region: NCAR-TIEGCM simulation and real data evaluation, Journal of Atmospheric and Solar-Terrestrial Physics, Volume 98, p. 39-49, doi: 10.1016/j.jastp.2013.03.009