

Project Details

ROSES ID: NRA-03-OSS-01

Selection Year: 2004

Program Element: Independent Investigation: LWS

Project Title:

LWS: Effect of EUV and High Latitude Forcing on Thermospheric Densities

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Summary:

Changes in the density and composition of the neutral atmosphere create variable satellite drag, adversely affecting our ability to identify and track objects in space and to predict their re-entry into the atmosphere. We propose to use new density data from the GRACE, CHAMP and TIMED satellites, together with solar EUV drivers from TIMED, and various high latitude data to determine the effects of long and short-term variability of the Sun on the mass density of the atmosphere between 120 and 600 km altitude. Specifically, we will test our understanding and modeling of the effects of solar EUV, Joule and particle heating, and momentum forcing on thermospheric densities in the 120 - 600 km region. The proposed work will lead to improvements in our ability to understand and predict satellite drag variations during geomagnetic storms and during the solar activity cycle. Eventually, this work will lead to 1st principles models (probably with data assimilation) that describe these density (and associated composition) effects with accuracy better than 5%. In turn, the proposed work will lead to better predictions of satellite orbits. We propose to achieve our goals by answering the following three science questions: 1) What is the magnitude of thermospheric density changes in response to variability of the Sun on different temporal scales? 2) How does density in the upper thermosphere respond to Joule heating? 3) What are the key drivers of density perturbations in the upper thermosphere?

Publication References:

Summary: "

Reference: Geoffrey Crowley / Southwest Research Institute-LWS: Effect of EUV and High Latitude Forcing on Thermospheric Densities