Project Details

ROSES ID: NRA-NNH04ZSS001N
Selection Year: 2005
Program Element: Focused Science Topic

Topic: To quantify the response of thermospheric density and composition to solar and high latitude forcing.

Project Title:
Quantifying the effects of magnetospheric energy inputs to the thermosphere

PI Name: Arthur Richmond
PI Email: richmond@ucar.edu
Affiliation: NCAR
Project Member(s):
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Summary:
The proposed work has four primary elements. (A) We will develop quantitative empirical models of the high-latitude forcing of the thermosphere, including auroral particle precipitation, electric potential, mean-squared electric-field strength, Poynting flux, and probability distribution of Poynting flux, as functions of magnetic latitude, magnetic local time, season, interplanetary magnetic field, and magnetic activity, by analyzing satellite data and fitting the data to analytic functions of the independent variables. (B) We will evaluate the importance of the nonlinear thermospheric responses to small-scale high-latitude forcing, and develop parameterizations for global thermospheric general-circulation models to account for the effects of these sub-grid-scale nonlinear effects. (C) Through numerical simulations, forced by our empirical models and parameterizations, and through comparisons with observations and empirical thermospheric models, we will evaluate the influence of the high-latitude forcing on the global thermospheric temperature, density, and composition. (D) We will document our empirical models and parameterizations and make them publicly available to the scientific community. This proposal is a Living with a Star Targeted Investigation on Focused Science Topic b (To quantify the response of thermospheric density and composition to solar and high latitude forcing). It addresses NASA OSS RFAs I.SEC.1.b, I.SEC.1.c, and II.SEC.1.c. The investigators will actively participate in the science team that is to be formed for this Focused Science Topic, by providing the needed quantitative information about high-latitude forcing of thermospheric density and composition, by carrying out and analyzing thermospheric general-circulation model simulations that combine the high-latitude and solar forcing, and by comparing the model predictions with observations. As a supplement to this proposal, we are requesting support for a Postdoctoral Research Associate to participate in this research and contribute to the team activities on this Focused Science Topic. The descriptor for this proposal is T3b-C2.

Publication References:

no references