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:
Collaborative Research: Midlatitude Spread F - Exploring Correlations with Geophysical Forcing and Gravity Wave Propagation Conditions

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Project Member(s):
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Summary:
This proposal is one part of a collaborative research effort entitled "Collaborative Research: Midlatitude Spread F - Exploring Correlations with Geophysical Forcing and Gravity Wave Propagation Conditions " led by PI Dr. Greg Earle, University of Texas.

A complete solar cycle (1996-2006) of digital ionograms from Wallops Island, Virginia have been archived and statistically analyzed at the University of Texas at Dallas. The ionograms were taken around the clock every day of the year with a 15 minute cadence; hence the statistical significance and temporal resolution of the dataset are very high. An autotmated software algorithm has been developed to analyze these digital ionograms using adaptive noise filtering and pattern recognition techniques. Using these tools we have characterized both the seasonal and solar cycle variability of midlatitude spread F at Wallops Island. As a result of this study we have been able to formulate anecdotal conclusions about the causes of midlatitude spread F (MSF). In this proposal we describe a two-phase plan to test these conclusions while significantly extending our understanding of the underlying sources of MSF. One aspect of this plan involves testing the hypotheses developed from the Wallops Island records against data taken at a separate site that has a very different declination angle. The second aspect involves comparison of the statistical results against the GW characteristics predicted by a state-of-the-art GW propagation model. This will be done using a combination of specific case studies and average behavioral characteristics. The results of this study should provide new insights into midlatitude spread F that will likely guide future theoretical understanding of the phenomenon.

Publication References:

Summary: no summary

Reference:
Earle, G. D.; Bhaneja, P.; Roddy, P. A.; Swenson, C. M.; Barjatya, A.; Bishop, R. L.; Bullett, T. W.; Crowley, G.; Redmon, R.; Gr oves, K.; Cosgrove, R.; Vadas, Sharon L.; (2010), A comprehensive rocket and radar study of midlatitude spread F, Journal of Geophysical Research: Space Physics, Volume 115, Issue A12, CiteID A12339, doi: 10.1029/2010JA015503