# Project Details

**ROSES ID:** NNH08ZDA001N
**Selection Year:** 2009
**Program Element:** Data, Tools, & Methods

**Topic:** Determine the possible role of galactic cosmic ray particles as a source for cloud condensation nuclei in the troposphere and lower stratosphere.

**Project Title:**
A quantitative description of ionospheric variability for the International Reference Ionosphere: on average and in real-time

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**Summary:**
We will develop fundamentally important new capabilities for the International Reference Ionosphere (IRI). IRI is a widely used empirical standard for ionospheric environmental parameters. Specifically IRI provides monthly averages of electron density, ion composition, electron temperature, ion temperature and ion drift. Our goal is to add to IRI a description of day-to-day variability both real-time and on average. For many operational applications, IRI users require not only the monthly averages but also the expected range of variation around the monthly mean. The IRI Working Group has given highest priority to the development of such a variability model for IRI. So far, however, most quantitative modeling has been based solely on ionosonde data producing station-specific models for the F-peak density. We will use a large volume of ground and space data including TIMED/GUVI data, ionosonde data, Alouette/ISIS topside sounder data, and insitu data from many older NASA satellites to develop global models for ionospheric variability, not only for F-peak density but for the entire topside and bottomside profile for density as well as temperature and ion composition. Our analysis will help to identify and quantify the contribution of various parameters affecting day-to-day variability including an assessment of solar versus geomagnetic versus 'meteorological' drivers. A real-time description and forecasting of ionospheric variability will be achieved through the use of more appropriate solar proxies than currently applied in IRI and through data assimilation of ionosonde and satellite data.

Our effort will support the LWS TR&T Focused science topic (e) 'Determine and quantify the response of atmospheric/ionospheric composition and temperature to solar XUV spectral variability and energetic particles'. Specifically, it will contribute to the 'development of models that use data assimilation to reproduce past conditions as a test, and then use them to forecast future conditions' that is solicited under this topic.

# Publication References:

**Summary:** no summary

**Reference:** Talaat, E. R.; Yee, J.-H.; Hsieh, S.-Y.; Paxton, L. J.; DeMajistre, R.; Christensen, A. B.; Bilitza, D.; (2013), The quiet nighttime low-latitude ionosphere as observed by TIMED/GUVI, Advances in Space Research, Volume 51, Issue 4, p. 661-676, doi: 10.1016/j.asr.2012.11.012