**Project Title:**
Studies of Ionospheric Plasma Structuring at Low Latitudes from Space and Ground, their Modeling and Relationships to Scintillations

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**Project Information:**
This research is a direct response to the near term emphasis in the announcement of opportunity for LWS TR & T on geophysical conditions favoring the development of low- and mid-latitude scintillations in the Earth s ionosphere. The exciting dataset from the GUVI sensor on the TIMED mission has opened up opportunities for global studies not hitherto possible. We utilize this dataset and couple it with models to isolate the drivers of equatorial electrodynamics. We will validate the results against electric field measurements by the Jicamarca radar (when available), a dense network of ground-based GPS receivers yielding total electron content and conjugate ionospheric imagers, all in the South American longitude sector. We have adopted a two-tiered modeling approach to drive the NRL bubble model with large-scale drivers derived from the SAMI3 model of the background ionosphere, constrained by the GUVI images at 135.6 nm. We will complete the loop by comparing the output of the bubble model against global scintillation measurements obtained from the AFRL scintillation network SCINDA. This will allow us to develop a metric for scintillation occurrence on a global scale at low latitudes. Our comprehensive approach will provide a better understanding of the characteristics of ionospheric plasma structures, and will lead to an improvement of the metric, thereby advancing our capability to predict the occurrence of scintillations. The societal benefit of such improved capability to predict ionospheric space weather will be considerable. This is because of the deleterious effects of large and small-scale plasma structures on satellite communication and GPS-based navigation systems. We will investigate how these effects are controlled by the solar influence on the background ionization density as well as, solar transients that lead to geomagnetic storms and penetration of high latitude electric fields into low latitudes. Such electric fields profoundly modify the ionospheric plasma processes in space and time. Thus the dual goals of this comprehensive research effort, better understanding of ionospheric plasma structuring and estimating impacts on technological systems, are what makes this project uniquely suited to NASA s LWS Program.

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**Duration:**
**Selection Year:** 2004
**Program Element:** Independent Investigation: LWS

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**Citations:**

**Summary:** ''

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