Opportunity Title: Characterization of ionospheric dynamics through application of machine learning techniques to GPS measurements
Opportunity Reference Code: 0202-NPP-NOV23-JPL-HelioSci

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0202-NPP-NOV23-JPL-HelioSci

Application Deadline 11/1/2023 6:00:59 PM Eastern Time Zone

Description The Earth's upper atmosphere and ionosphere respond dynamically to geomagnetic storms and driving from the Sun. Ionosphere demonstrates local response to a geomagnetic storm superimposed on daily, seasonal and solar cycle dependent variabilities. These different phenomena make characterization of regional ionospheric dynamics a complex problem. New observational capabilities and sophisticated data analysis tools provide an opportunity to improve our understanding of ionosphere dynamics during storms as compared to quiet times. Specifically, the Total Electron Content (TEC) of the ionosphere is readily available from GPS measurements. Analysis of TEC dynamics over ground-based GPS sites using network analysis is of major interest. Characterizing network topology, connections between TEC measurements at different locations, directionality of the network can lead to better understanding of ionospheric dynamics and advances in space weather forecasting. We seek highly motivated candidates to participate in research on ionospheric dynamics and data analysis. We are particularly interested in candidates who will analyze satellite and ground-based observations to improve our understanding of space weather. Knowledge of basic signal processing techniques and system science approaches are encouraged.

References:

1. Verkhoglyadova, O. P., Komjathy, A., Mannucci, A. J., Mlynczak, M., Hunt, L. & Paxton, L.J. (2017). Revisiting Ionosphere-Thermosphere Responses to Solar Wind Driving in Superstorms of November 2003 and 2004. J. Geophys. Res., 122. https://doi.org/10.1002/2017JA024542.

2. McGranaghan, R. M., A. J. Mannucci, O. Verkhoglyadova, and N. Malik (2017), Finding multiscale connectivity in our geospace observational system: Network analysis of total electron content, J. Geophys. Res., 122, doi:10.1002/2017JA024202.

3. J. Dods, S. C. Chapman, and J. W. Gjerloev, Network Analysis of Geomagnetic Substorms Using the SuperMAG Database of Ground Based Magnetometer Stations, JGR, 120, doi:10.1002/2015JA021456 (2015)

Location:
Jet Propulsion Laboratory
Pasadena, California

Field of Science: Heliophysics Science

Advisors:
Olga Verkhoglyadova

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Eligibility Requirements

- **Citizenship:** LPR or U.S. Citizen
- **Degree:** Doctoral Degree.