

Project Details

ROSES ID: NNH19ZDA001N

Selection Year: 2019

Program Element: Focused Science Topic

Topic: Magnetospheric and Ionospheric Processes Responsible for Rapid Geomagnetic Changes

Project Title:

Mesoscale Ionospheric Electrodynamics as a Driver of Rapid Geomagnetic Variability

PI Name: Kareem Sorathia

PI Email: atn@g.ucla.edu

Affiliation: Johns Hopkins University

Project Member(s):

- Kuvshinov, Alexey;Co-I;EIDGENOSSISCHE TECHNISCHE HOCHSCHULE ETH
- Vines, Sarah K;Co-I;Johns Hopkins University
- Michael, Adam T;Co-I;Johns Hopkins University
- Blake, Sean;Co-I;Catholic University of America
- Merkin, Viacheslav G.;Co-I;Johns Hopkins University
- Pulkkinen, Antti A;Co-I;NASA Goddard Space Flight Center
- Ohtani, Shin-ichi;Co-I;Johns Hopkins University

Summary:

Science Goals and Objectives.

Ongoing work has identified the critical role of complex and localized geomagnetic disturbances (GMDs), and their interaction with the Earth's 3D conductivity distribution, in driving geoelectric fields (GEFs). These localized and rapid GMDs are not only a key space weather target but also a manifestation of fundamental magnetospheric processes and their auroral ionospheric counterparts at mesoscales. The overarching goal of the proposed project is to "Understand the physical processes responsible for the generation of localized and rapid GIC variability by characterizing magnetospheric drivers and ground effects of mesoscale ionospheric electrodynamics."

Predicting GICs is a grand challenge of geospace modeling, ground effects are the end result of a causal chain of processes ultimately driven by the interaction of solar disturbances with the magnetosphere. To accomplish our goal we will utilize a combination of cutting-edge first-principles models and a collection of heterogeneous data sets spanning geospace: in the magnetosphere, ionosphere, and on the ground. We will address the following science questions:

SQ#1: What is the role of magnetotail bursty bulk flows in driving localized (