

Project Details

ROSES ID: NRA-00-OSS-01

Selection Year: 2000

Program Element: Focused Science Topic

Topic: FST #2: Coupling of the Solar Wind Plasma and Energy to the Geospace System

Project Title:

Pressure Pulse Interactions with the Earth's Magnetosphere

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Project Member(s):

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- Omid, Nojan;Co-I;Solana Scientific Inc.

Summary:

Solar wind pressure pulses drive a unique mode of solar wind-magnetosphere interaction. We propose a closely-linked combined observational and hybrid code numerical simulation study of this interaction mode. We begin by determining and distinguishing between the characteristics of pressure pulses intrinsic to the solar wind and those generated by kinetic processes within the Earth's foreshock, with an emphasis on the properties that determine their significance to the overall interaction, namely their extent, amplitude, and occurrence patterns. Observations from L1 monitors and spacecraft immediately upstream from the Earth's bow shock are used for this task. Next we consider how the properties of pressure pulses change as they interact with the bow shock and transit the magnetosheath. Simultaneous observations from spacecraft upstream and downstream from the bow shock are used for this task. Once they reach the magnetopause, pressure pulses drive magnetopause motion and may trigger magnetic reconnection. Observations from spacecraft at and upstream from the magnetopause are used for this task. Finally, both pressure pulses, and the bursty reconnection that they may trigger, launch Alfvén mode waves that propagate down to the ionospheric footprints of magnetic field lines that lead to the magnetopause and fast mode waves that propagate across the magnetic field to locations deeper within the dayside magnetosphere. We survey the corresponding perturbations that occur in high-latitude ground-based magnetograms and in the magnetic field measurements of spacecraft at various locations throughout the dayside magnetosphere to determine the contribution of the pressure pulses to ionospheric convection and diffusion within the radiation belts as a function of solar wind conditions. At each step, we compare hybrid code model predictions with the in situ observations. The significance of the proposed work lies in the fundamental nature of the interaction, its importance to triggering reconnection, and its potential importance to ring current and radiation belt processes. Finally, we propose to lead the focus group team comprising all the proposals selected for this opportunity, establish connections between and beyond the team members selected, and maintain even more regular communication demonstrating progress with NASA HQ staff than the required annual individual and team reports. _x000D_

Publication References:

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Reference: Addison, Kevin M, et al. Lorem Ipsum Dolor. Solar Physics. 2017

- **Investigation Type:** Tools and Analysis Techniques

- **Names of the tools and techniques:** At vero eos et accusamus et iusto odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias excepturi sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedita distinctio. Nam libero tempore, cum soluta nobis est eligendi optio cumque nihil impedit quo minus id quod maxime placeat facere possimus, omnis voluptas assumenda est, omnis dolor repellendus. Temporibus autem

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Summary: asdfasdf

Reference: asdfasdfasdfa

- **Investigation Type:** Tools and Analysis Techniques
- **Names of the tools and techniques:** asdfasdf