

Project Details

ROSES ID: NRA-00-OSS-01

Selection Year: 2001

Program Element: Independent Investigation: LWS

Project Title:

Determining the importance of energy transfer between magnetospheric regions via MHD waves using constellations of spacecraft

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Summary:

Living with a Star (LWS) will consist of many constellations of spacecraft designed to examine in detail parts of the sun-earth system, and, together, to examine the coupling between elements of the system. The data handling, analysis and visualization from so many satellites making coordinated measurements presents a major challenge. We propose to develop techniques to facilitate analysis of these complex data sets, so that the important questions for LWS goals can be answered. We will develop such techniques and visualization software with a focus on MHD waves, because a critical issue for developing a predictive capability for space weather is to determine via what mechanism and how rapidly energy is transferred from the solar wind and the inner magnetosphere and between different magnetospheric regions. Recent observations have provided clear evidence that waves may often be the dominant energy transfer mechanism. We propose to focus on the role of MHD waves, and particularly on the question of identification of wave modes, wave propagation and energy transfer via waves. In so doing, we will develop data assimilation, analysis and visualization techniques and software for missions consisting of constellations of satellites, and thus develop infrastructure for LWS. Our objectives lie in two areas: (1) development of new techniques and software for assimilation, analysis and visualization of data from multiple satellites making in-situ measurements; and (2) determination of the role of MHD waves in energy transport during storms and substorms. We will primarily use data from Cluster, launched near the beginning of the current solar maximum so that many geo-effective solar events can be expected to occur during the three year period of this proposal. We will make use of other spacecraft data sets and MHD simulations which are optimized to study wave propagation in the magnetotail to test our data analysis and visualization software. Our results will have a direct impact on OSS goals. The data assimilation, analysis and visualization techniques will provide vital infrastructure for many upcoming missions. Our research on wave transport of energy will provi

Publication References:

no references