Project Details

ROSES ID: NNH07ZDA001N
Selection Year: 2008
Program Element: Focused Science Topic

Topic: Focused science topic for Strategic Goal 1 (Solar storms): Exploring the magnetic connection between the photosphere and low corona

Project Title:
Coronal Morphology - The Interplay of Structure and Energetics

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Summary:
Alfv n waves have been invoked as the driving force behind solar coronal heating and solar wind acceleration since their theoretical inception even though they had not been directly observed in the inner heliosphere (closer than the ~0.3AU of HELIOS), solar corona or below. That was the case until recently when they were directly observed in the corona by NCAR's CoMP instrument and then in the Chromosphere by Hinode/SOT.

The discovery of ubiquitous Alfv n waves that carry an energy flux large enough to power the quiet Sun corona and the solar wind has significant implications for the solar atmosphere and inner heliosphere. Our goal is to use the unique spectropolarimetric-imaging observations of CoMP as a foundation to understand coronal magnetic morpholgy and its impact on the energy flow through the solar atmosphere and inner heliosphere in a reasonable, self-consistent fashion. Such a goal is possible through a tightly constrained fusion of data analysis (timeseries analysis from CoMP, line-of-sight density estimation from white light coronagraphs, EUV imaging data of the corona) and forward-modeling (based on magnetic field extrapolations).

The proposed project is relevant to the LWS Targeted Research & Technology portion of the ROSES 2007 solicitation and, in particular, focused science topic one (for Strategic Goal 1) "Exploring the magnetic connection between the photosphere and low corona". This work has direct relevance to NASA's Strategic Sub-goal 3B: "Understand the Sun and its effects on Earth and the solar system" and, in particular, Research Objective 3B.1 "Understand the fundamental physical processes of the space environment from the Sun to Earth, to other planets, and beyond to the interstellar medium". Understanding and monitoring the energy input mechanism to the corona and solar wind will eventually lead to a better understanding of the solar atmosphere, nascent solar wind and their structure.

Publication References:

Summary: no summary

Reference: Tomczyk, Steven; McIntosh, Scott W.; (2009), Time-Distance Seismology of the Solar Corona with CoMP, The Astrophysical Journal, Volume 697, Issue 2, pp. 1384-1391, doi: 10.1088/0004-637X/697/2/1384

Summary: no summary