Project Details

ROSES ID: NNH10ZDA001N
Selection Year: 2011
Program Element: Solar Dynamics Observatory

Project Title:
Prominence Dynamics and Structure with SDO/AIA

PI Name: Therese Kucera
PI Email: Therese.A.Kucera@nasa.gov
Affiliation: NASA Goddard Space Flight Center
Project Member(s):
- Gilbert, Holly ; Co-I; NASA
- Luna Bennasar, Manuel ; Co-I; UMCP
- Karpen, Judy ; Collaborator; NASA/Goddard Spaceflight Center
- Boerner, Paul ; Collaborator; Lockheed Martin
- Muglach, Karin ; Co-I; Artep, Inc.
- Martin, Sara F; Collaborator; Helio Research

Summary:
The question of prominence formation is essential to our understanding of the energetic processes occurring in the solar atmosphere and solar magnetic field. New data from the Atmospheric Imaging Assembly (AIA) aboard the Solar Dynamics Observatory (SDO) will allow us to make significant progress in this area.

We will use new data from SDO/AIA to answer the fundamental questions: what is the origin of solar prominence mass and how does it evolve? With AIA's unprecedented spatial, temporal, and thermal coverage of the entire disk we will analyze dynamic prominence motions to an extent never before possible. This will enable us to test models of prominence mass formation and energetics, and to make essential advances in understanding the birth and life cycle of these ubiquitous features.

To accomplish this goal we will combine two observational investigations with state-of-the-art prominence modeling. We will perform: 1) a survey of many prominences to determine what proportion of prominences exhibit fast extreme ultraviolet (EUV) motions, at what temperatures they appear, and under what conditions; and 2) an in-depth study of selected prominences in order to determine the life histories of moving prominence features, including measurement of temperature

variation, masses, sizes, and velocities.

The survey will allow us to describe the general characteristics of prominence motions in temperatures from 10^4 to 4x10^6 K so that we can assess the prevalence of signatures of competing models. The results of the in-depth studies of individual prominences will be used for detailed comparisons with and testing of models of prominence mass formation and energetics. In particular, we will compare our results to detailed predictions made with the thermal nonequilibrium model of prominence formation.

This research is directly relevant to 1.2.3 Science Analysis for the Solar Dynamics Observatory (SDO) in the LWS TR&T NRA in that it is centered on analysis of SDO/AIA data with a goal of understanding an important manifestation of solar magnetic activity. Prominences are a key signature of the magnetic variability and organization of the solar atmosphere. A thorough characterization and understanding of the processes resulting in plasma dynamics will enhance our understanding of the magnetic field in prominence channels and perhaps ultimately the eruptions of these fields.

Publication References:

no references