Project Details

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

Project Title:
Near-Surface Flows, Magnetic Evolution, and the Formation of Coronal Bright Points

PI Name: Derek Lamb
PI Email: atn@g.ucla.edu
Affiliation: Southwest Research Institute
Project Member(s):
- DeForest, Craig E.; Co-I; Southwest Research Institute
- Attie, Raphael ; Collaborator; Max Planck Institute for Solar System Research
- Saar, Steven H.; Co-I; Smithsonian Astrophysical Observatory

Summary:
We propose to study the role that near-surface flows and the evolution of the photospheric magnetic field play in the formation and evolution of coronal bright points on the Sun. We will determine why some magnetic bipoles have bright points and others do not, identify relationships between the properties of bright points and magnetic and flow fields, and determine the difference in the magnetic configuration of bright points in different areas of the Sun. We will use the automated feature recognition algorithms in the SDO pipeline to identify bright points in AIA data, the magnetic features associated with those bright points, and surface and sub-surface flow maps from HMI. Using these high-level data products will allow us to focus our efforts on ensemble imaging and advanced statistical methods, conducting the first large-scale magnetic field and bright point evolution study from a publicly-available bright point database. To date, most studies of bright points have focused either on a small number of bright points and detailed analysis of their properties, or the cursory ensemble analysis of many bright points. We will greatly expand on these past studies by analyzing many bright points in many EUV passbands, developing statistical relationships between the bright points and the associated magnetic and flow fields. Because bright points are thought to be formed by magnetic reconnection, understanding bright point formation will aid in the understanding of reconnection in other heliophysical settings. As part of the proposed work, we will measure the properties and evolution of the solar magnetic field, linking the near-surface flows with magnetic fields in the solar atmosphere. Our effort is directly relevant to the SDO mission goals of determining how the Sun's magnetic field is structured and how stored magnetic energy is released. Our team includes experts in bright point tracking, magnetic feature tracking, and surface flow field measurements and interpretation, making our team ideal for addressing these science questions and their relationship to the LWS program goals.

Publication References:

Summary: no summary

Reference: Huang, Zhenghua; Madjarska, Maria; Doyle, Gerry; Lamb, Derek; (2013), Evolution of magnetic field corresponding to X-ray brightening events in coronal holes and quiet Sun, Solar and Astrophysical Dynamos and Magnetic Activity, Proceedings of the International Astronomical Union, IAU Symposium, Volume 294, pp. 155-156, doi: 10.1017/S174392131300241X