Name(s)
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Project Number
S1812

Project Title
Systematic Analysis of Solar Activity and Developing Predictive Indicators Pertaining to Solar Storms Using MATLAB Code

Abstract

Objectives/Goals
The main objective of our project is to create a tool using MATLAB that will automatically analyze pictures of the Sun right before a solar storm occurred.

Methods/Materials
We used data captured by satellites from the Solar Dynamics Observatory, which is a NASA mission that was launched in 2010, and the Joint Science Operations Center database from Stanford. Our methodology was creating an image-processing code using MATLAB to analyze images of the sun 30 days prior at 12 hour intervals before a solar flare or coronal mass ejection occurred. We calculated the total area of sunspots which we correlated with solar activity.

Results
Our results indicate that the solar activity, which represents irregularities in the magnetic field on the surface of the sun, increased before solar storms happened.

Conclusions/Discussion
We learned that before a solar storm occurs, solar activity in the form of sunspot area increased. Therefore, we can use this as a predictive indicator that allows us to predict future solar storms.

Summary Statement
We created a MATLAB code that calculates the total area of sunspots on pictures of the sun and learned that the area of sunspots increased before a solar storm occurred.

Help Received
We got the idea to use the JSOC database and SDO satellite images from our project advisor.