PRELIMINARY RESULTS

The intention of this project is to observe and analyse the behaviour of sunspots leading up to solar atmospheric events such as flares or coronal mass ejections. This document serves as an overview of the progress.

Data used thus far has been sourced from instruments on board the Solar Dynamics Observatory (SDO), specifically the Helioseismic and Magnetic Imager (HMI) as a means of capturing the evolution of active regions along the solar disk. In light of the literature sudy carried out previously, sunspots which prove to be related to flares or other atmospheric events are selected for further study. Suitably, relevant events were found using those studied in the papers previously reviewed.

Data

The premise for completing the project is entirely based on acquiring, processing, and analysing data. Such a practice requires a streamlined approach, establishing a database of images from SDO/HMI in the first place, then processing and plotting the data using open-sourced code. A quasi-automated approach is vital for generating large unbiased samples of sunspots in order to understand their contribution to solar activity.

With the help of JHelioviewer, coordinates and time of select active regions are determined . Helioviewer is great for quickly accessing and visualising SDO data without too much hassle, which helped make of it less tedious of a task. Eventually, HMI cutouts were used: the cadence can be chosen and images are cropped before downloaded. This improves efficiency drastically, by removing the need to download full disk images every frame.

Some image processing is being carried out in hopes of making analysis more accurate: A full disk orthographic movie of a sunspot is obtained by reprojecting and normalizing each frame to a common image plane.