

Investigating the 2011-03-08 eruption

ABSTRACT

Methods of multiscale image analysis were employed and their efficacy on the SWAP data tested for revealing CME structure while suppressing other features. The methods employed are described in detail in Young & Gallagher (2008), whereby successive filtering of an image via a Gaussian and derivative-of-Gaussian produces a number of scales of detail to be inspected. This also produces an image with intensities that represent the relative edge strengths in the original image, which can be used to characterize the structure of interest – specifically for this case the erupting material involved in the CME. In order to overlap the observations from SWAP and MK4, the core material of the CME in its early eruption phase was chosen for its higher signal to noise ratio than the CME front, for example, that was not discernible in the early stages of the observations. In the LASCO field-of-view, the core material was determined to be moving at the same speed as the CME front, at $\sim 500 \text{ km s}^{-1}$. The front portion of the core material in the MK4 images was characterized via point-&-click methodology on the multiscale images of enhanced edges, and an ellipse was fit to the curved front. The same was done for the erupting loop structure observed in SWAP, with the expectation that it might directly correlate to the CME core. However, it was found that the erupting material that starts at the same time and location in both the MK4 and SWAP images, did not proceed to erupt at the same rate. Rather the core material observed in MK4 moves at greater speeds than the loop structures observed in SWAP; rising from an initial speed of $\sim 100 \text{ km s}^{-1}$ (at $\sim 1.5 R_{\odot}$) to a final speed of $\sim 400 \text{ km s}^{-1}$ (at $\sim 2 R_{\odot}$), while the loops continue to steadily rise at $\sim 100 \text{ km s}^{-1}$. The reason for this is unclear, and requires further investigation.

Subject headings: Sun: activity; Sun: corona; Sun: coronal mass ejections (CMEs)

1. Introduction

Eruption of 2011-03-08 $\sim 19:00$ UT observed by AIA, SWAP, MK4, and LASCO. Two-stage eruption, with previously studied two-stage flaring active region (secondary heating?) ().

2. Techniques

2.1. Height-Time Profiles

3. CORIMP Detections

4. Conclusions

REFERENCES

Young, C. A., & Gallagher, P. T. 2008, Sol. Phys., 248, 457