

Statistical Research into Correlation between Solar Filaments and Flare Activities

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Abstract. There is a strong correlation between coronal mass ejection transients and chromospheric H- α activity. Solar physicists hope to ascertain what causes coronal disturbances, and in our current investigation we are trying to address that problem by assessing the likelihood that a coronal disturbance is associated with other manifestations of the same abrupt, perturbing event such as a flare. The correlation, if any, between filament and flare can be derived by a method of image processing. Our next approach is to give the results of statistical research by studying a century of chromospheric H α observations. This poster describes the concept and preliminary experiences of deriving the characteristics of a filament and a flare.

Keywords. CME, filament, flare, chromospheric H α , image processing, long term data set, statistical

1. Outline of the Project

The image shown in Fig. 1 is an original image of chromospheric H α . It was taken from the website <http://aia.cfa.harvard.edu/filament/>.

The NOAA solar monitoring programme records and labels activities as they are observed. The one illustrated in Fig. 1 was NOAA activity number 12093; it occurred around 18:30 on 2014 June 18, and registered both filament and flare activity. The filament in that active area erupted as shown in Fig. 2 at about 18:30 on June 19. The associated flare occurred shortly afterwards, at about 19:00.

Figures 2–4 show the development of the filament and the flare in that activity area. The morphology of the flare that followed the eruption of the filament is shown in Fig. 4. Fig. 5 describes the technique adopted for the data processing flow. Table 1 contains statistics based on the morphology of the filament before its eruption as shown in Fig. 3.

We obtained data for chromospheric H α from 6 observatories around the world. Our strategy for data processing is to deal first with filaments of larger area.

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Table 1. Some statistics of the activities of the filament and the flare

Transient phenomena	Eruption date	time	Location (WCS)	Area (pixels)	Distance (pixels)
The filament before its eruption	2014/06/18	18 : 30 : 40	(-560.84, 4.006)	2830514	187
The flare before the filament eruption	2014/06/18	18 : 30 : 40	(-560.84, 4.006)	10778	187
The flare after the filament eruption	2014/06/19	19 : 00 : 43	(-393.5895, -200.3)	416	no

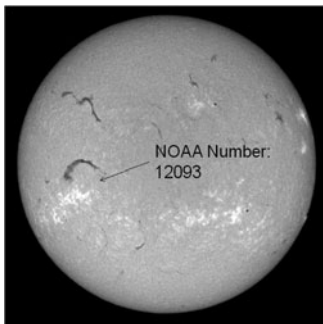


Figure 1. Original image

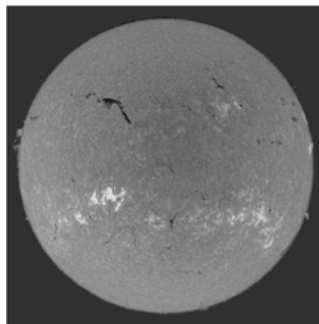


Figure 2. Image after filament eruption



Figure 3. Filament morphology before eruption



Figure 4. Flare morphology after filament eruption

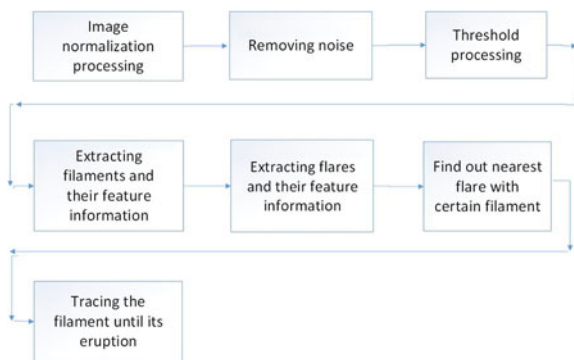


Figure 5. Technique flow