

Statistical Analyses of White-Light Flares Observed by Hinode/SOT

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Using the Hinode Flare Catalog (http://st4a.stelab.nagoya-u.ac.jp/hinode_flare/; Watanabe et al., 2012), we are performing a statistical analysis of white-light flare events.

In association with a solar flare, we sometimes observe enhancement of visible continuum radiation, which is called a "white-light flare". Since close correlations of white light and hard X-ray emissions occur in many events, there is some consensus that the origin of white-light emission is accelerated particles, especially non-thermal electrons.

Hinode/SOT has the capability to observe white-light flares. SOT observes the G-band (4305A) and continuum (Blue: 4505A, Green: 5550A, Red: 6684A) by broadband filter, and we can use these wavelengths for white-light flare observations. We picked up the white-light events using G-band and continuum data, and found 14 events in the 2006 ? 2011 time period.

We analyze one of the white-light flares that occurred on December 14, 2006 in detail. We use G-band data from SOT for white light emission and hard X-ray data observed by the RHESSI satellite. We compared the white-light power and the electron power assuming a blackbody for the white light and the thick-target model for the non-thermal electrons, obtaining a good correlation (Watanabe et al., 2010).

Recent white-light flare observations are being performed using continuum bands. We can determine the temperature of the white-light emission in detail, because we made observations in 3 continuum bands. We estimate the temperature distribution of the white-light emissions that occurred on February 15, 2011 by fitting the 3 points using the Planck formula, and all temperatures are calculated to be between 5000 and 6000K. The temperature of the white-light emissions were estimated as ~10000K in previous studies (Kretzschmar 2011, etc.), however, a much lower temperature was obtained in this study.

In this paper, we present a statistical analysis of the SOT white-light events and discuss the flare parameters. We also review models to explain the observations in terms of particle acceleration.

Keywords: solar flare, white-light