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白色光増光現象を引き起こす太陽フレアの特徴
Characteristics that enhance white-light emission in solar flares

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In association with large (such as X-class) solar flares, we sometimes observe enhancements of visible continuum radiation, which is known as a ”white-light flare”. Because many white-light events show a close correlation between the time profiles and locations of white-light emission, and the hard X-rays and/or radio emission, it is believed that the origin of white-light emission is non-thermal electrons. However, not all large solar flares have white-light enhancements, and non-thermal electrons exist even in micro-flares. There should be some necessary condition to generate white-light enhancements.

To understand what conditions generate a white-light flare, we analyzed 42 M- and X-class flares observed with Hinode/SOT during the period from January 2011 to August 2013. Comparing the white-light (19 events) and no white-light (23 events) events, we concluded that the key factor needed to generate white-light enhancement is the precipitation of large amounts of nonthermal electrons into a compact region within a short time duration (Kitagawa et al., submitted to ApJ).

In this paper, we present the statistical results until December 2014. Not only the Hinode/SOT white-light (G-band (4305A) and continuum (Blue: 4505A, Green: 5550A, Red: 6684A)) data, but we also check SDO/HMI continuum data. The total number of events is now about twice that of Kitagawa’s study. We compared the white-light emission data with GOES, hard X-ray emission data and/or the strength of the photospheric magnetic fields and looked for any relationship between them.

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