Hinode-3: 3rd Hinode Science Meeting
Hitotsubashi Memorial Hall, Tokyo
1–4 December, 2009

Photospheric magnetic motions and a flare trigger mechanism on AR 10930.

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Abstract. In this study we investigated relationships between photospheric magnetic motions and (pre) flare brightenings on AR 10930, in order to obtain clues for a flare triggering mechanism. Active region 10930 is the last region where X-class flares occurred, and has rich data set observed by Hinode. Hinode satellite could observe high cadence (order of a minute) and high spatial resolution (less than 1 arcsec) data in multi wavelength from the photosphere to the corona. These high cadence data sets would shed light on a flare triggering mechanism.
As photospheric magnetic motions, we estimated transverse velocity fields (V_t) with filter magnetograms obtained from Stokes V/I data of Hinode/SOT. Time cadence of the magnetograms is about 2 minutes, and their pixel width is 0.16 arcsec. Local correlation tracking is used to estimate V_t. We compared V_t with images of Ca II H (SOT), G-band (SOT), 1600Å (*TRACE*), and soft X-ray band (XRT).
In our primary analysis, it is found that there are strong shear velocity field (5 km/s) along a magnetic neutral line around a preflare brightening of an X3.4 flare observed with Hinode/XRT. This preflare brightening exists near start region of the X3.4 flare. We also found a feature whose velocity is $\sim$ 5 km/s in G-band images, while there is no marked feature in CaIIH images. In addition, when the X3.4 flare itself started, we cannot find any anomalous magnetic motions around its start region. It is also found that in some regions there are transverse velocities larger than 5 km/s, while previous papers analyzing MDI magnetograms (96 minutes cadence) reported that most transverse velocities are less than 1 km/s.
We will investigate whether some transient brightenings or jets have statistical relations with these anomalous transverse velocity fields or not from multi wave-lengths data, and whether other X- or M-class flares have anomalous V_t around their (pre) flare regions or not. Finally, we discuss a triggering mechanism guessed from our statistical results.