M39a Analysis for a flare trigger with IRIS, SDO, and Hinode

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IRIS successfully scanned over pre-flare brighteinig and a flare trigger region for the X1.6 flare occurred on 2014 October 22 in AR 12192, and SDO and Hinode also observed the region. We aim to examine the occurrence of internal magnetic reconnection, which occurs between large-scale magnetic field of AR and small-scale flare trigger field, because we so far used pre-flare brightening as a marker of a flare trigger region (Bamba t al. 2013, 2014). We analyzed SDO/HMI filter and vector magnetograms, AIA 1600 Å data, IRIS slit jaw images in C II and Mg II k lines and raster scan data in C II, Mg II k, Si IV lines, and Hinode/EIS He II, Fe XII, Fe XV lines. We first distinguished a candidate of flare trigger region using co-alignment images of AIA 1600 Å images and HMI magnetograms. Then we measured the shear angle of transverse magnetic field with respect to the potential magnetic field over the AR, and we determined that the flare was triggered by the Reversed Shear (RS) type magnetic field. We focused also on the last pre-flare brightening over the local polarity inversion line, which satisfies the condition of RS-type configuration, and calculated the Doppler velocities around the region using IRIS and Hinode/EIS data. As a result, strong blue shift ($\sim$40km/s) was observed just beside the pre-flare brightening at almost the same timing in all the IRIS and EIS lines, i.e. from lower chromosphere to corona. We interpreted that the last pre-flare brightening was caused by internal magnetic reconnection, and it supports the theoretical prediction of Kusano model (Kusano et al. 2012).