

Evolution of Vector Magnetic Fields in a Flare Productive Active Region NOAA10930 with the Hinode/SOT

Masahito Kubo[1]; Takaaki Yokoyama[2]; Yukio Katsukawa[3]; Saku Tsuneta[3]; Yoshinori Suematsu[4]; Kiyoshi Ichimoto[3]; Toshifumi Shimizu[1]; Shin'ichi Nagata[5]

[1] ISAS/JAXA; [2] School of Science, Univ.Tokyo; [3] NAOJ; [4] National Astronomical Observatory of Japan; [5] Hida Observatory, Kyoto Univ

HINODE satellite is in a sun synchronous polar orbit and can continuously observe the sun without night for eight months each year. HINODE/SOT is the first telescope in space to measure vector magnetic fields in the solar photosphere with a high spatial resolution of 0.2 arcseconds.

We successfully observed evolution of vector magnetic fields in an active region NOAA10930 with HINODE/SOT for one week (2006/12/8-2006/12/15). A lot of flares including four X-class flares occurred in this active region. It was very difficult to perform such continuous observation with constant measurement quality in the case of ground-based telescopes. An evolving sunspot with positive polarity approached with a whirl motion and collided with the opposite polarity old sunspot. Sheared magnetic field structures were formed in the collision site between the two sunspots with opposite polarities, and X3.4 class flare occurred in the collision site on December 13, 2006. Elongated magnetic structures with positive and negative polarities were alternately located along the polarity inversion line in between the two sunspots before the X3.4 class flare. Such elongated magnetic structures were formed due to flux emergence around the following edge of the evolving sunspot, and then the elongated magnetic structures with negative polarity merged into the old sunspot with negative polarity and positive ones merged into the evolving sunspot with positive polarity. These elongated magnetic structures with alternating polarity were not observed a day after the X3.4 class flare.

We will discuss energy stored process in the photosphere and photospheric magnetic activity responsible for large flares by using evolution of high spatial resolution vector magnetic fields observed with HINODE/SOT.