

M33a Sunspot Proper Motion and Flare Onset Prediction

Y. Suematsu (NAOJ), C. Y. Yatini (LAPAN)

Proper motion of sunspots in several active regions was studied to detect their indicator on flare onset, using data from the Solar Flare Telescope at Mitaka (four flaring active regions), TRACE (e.g. NOAA 0424, M1.7 flare on 5 Aug. 2003) and Hinode (e.g. NOAA 10930, X3.4 flare on 13 Dec. 2006). The proper motion of individual sunspots was derived using a local correlation tracking method. As a result, we found that the sunspots that are located under or close to chromospheric flaring patches showed a change in their moving direction prior to the flare onset. The change in their movements took place a half to two hours before the flare onset. On the other hand, sunspots in non-flaring areas or non-flaring active regions did not show this kind of change. It is likely, therefore, that if a sunspot shows the particular movement, a chromospheric flare is to occur in its nearby region. In two of the active regions, the flare ribbons were located on a emerging bipolar pair of sunspots. The disturbance in the usual motion of the bipolar sunspots and in other sunspots as well can be interpreted as a sign of magnetic shear development leading to final magnetic energy buildup before its sudden release. We suggest that the change in sunspot motion in a short time scale prior to the flare onset can be regarded as a good indicator in predicting the onset timing and location of chromospheric flare.