

M14a Study of magnetic non-potentiality in a strong flare-active region NOAA 10720

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The active region NOAA 10720 is a very flare-productive region near the minimum phase of solar cycle No. 23. Five X class flares, seventeen M class flares and many C class flares occurred in this region during its disk passage. It is important, therefore, to examine the evolutional change of magnetic non-potentiality in details to study the flare energy build-up mechanism. In this paper, we focus our analysis on the daily evolution of magnetic non-potentiality of this active region from 14 to 20 January, 2005. The main results are as follows: (1) there were rapidly emergences of magnetic flux near the main neutral line and the initial brightening flare sites just before the occurring of first X class flares on 15 January. (2) Strong magnetic shear was developed rapidly along the neutral line. And the direction of the main neutral line rapidly rotated at the same time. (3) There were continue emergences and rotated motions of magnetic flux after the active region produced the first X1.2 flare on 15 January. (4) Emergences, untwisted rotation and convergence of magnetic fluxes were found near the flare sites which might be responsible for the production of series flares in this region. We propose an emerging twist flux rope model to explain the drastic evolution of this flare-productive region. Magnetic energy is stored in the twisted flux bundle, which is originally formed in the convection zone and released as flares in the course of the emergence of the twisted flux bundle above the photosphere.