Magnetic field configuration and its evolution of a highly flare-producitve active region NOAA 10930 in Dec. 200606

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Solar activities, such as flares and Coronal Mass Ejections (CMEs), have various effects to the interplanetary medium, the geomagnetic field, and the Earth's ionosphere and upper atmosphere. In order to understand the Space Weather, we need to understand the mechanisms of solar activities.

Active regions on the Sun have different flare productivities with each other. Some regions produce many large flares, while others produce no flares. The key factor of a high flare productivity is the complexity of magnetic field configuration of the region. One of the well-known characteristics of flare-productive regions is the delta-type magnetic
configuration. The delta-type region has umbrae
with both magnetic polarities belong the same penumbra.

The active region NOAA 10930 showed a high flare activity (four X-class and five M-class flares)
at minimum phase of solar activity cycle in
December 2006. We studied the formation process of delta-type magnetic configuration using SOHO/MDI magnetograms. We also studied the evolution of magnetic shear and H-alpha filaments using H-alpha full disk images
obtained with Solar Magnetic Activity Research Telescope (SMART) at Hida Observatory, Kyoto University. In this paper, we summarize the characteristics of magnetic field configuration of this region and discuss its relation to high flare activity.