

# Active region evolution and flare activity on the Sun in Nov. 2004 (H-alpha and magnetic field observations)

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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 to the same penumbra.

From Nov. 6 through Nov. 11 in 2004, two X-class (the largest class) flares were reported. The two flares have occurred in the delta-type active region NOAA 10696.

This region has produced 62 flares, including 2 X-class and 13 M-class flares. We observed an M9 flare on Nov. 6 and an X2 flare on Nov. 10 with our H-alpha telescopes at Kwasan and Hida Observatories, Kyoto University. In this paper, we present the evolution of the active region NOAA 10696 using our own H-alpha data and downloaded magnetograms obtained with the Solar and Heliospheric Observatory (SOHO) / Michelson Doppler Imager (MDI). We also summarize the H-alpha and magnetic field observations which we can easily access via Internet.