

# NOAA 7270: A Brief Report of Observations

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## Abstract

The NOAA 7270 was one of two main active regions on solar disk in first ten days of September, 1992. The AR 7270 (S10 L035) appeared on east limb on August 29, 1992. It had a simple magnetic structure of the sunspot until September 4. And the region began its rapid development on September 5. The flare activity of the region reached its maximum on September 6, when it produced two X-class X-ray flares. In this paper, it is briefly reported the observational data of NOAA 7270, including the observations with 26cm Solar Telescope at Yunnan Observatory.

## 1. Introduction

The three active regions, NOAA 7260, 7270 and 7321, investigated in this Workshop, all occurred in descending phase of Cycle 22, when the general level of the solar activity was going down. But when the three active regions appeared, the solar activity in August–November, 1992 increased temporarily. In fact, the YOHKOH X-ray Image Video show that the solar X-ray bursts and active phenomena in corona were very frequent and rich during the period mentioned above.

## 2. Outline of NOAA 7270

The AR7270 appeared on east limb of the solar disk on 1992 August 29. During the first seven days, the configuration of the sunspot group and the magnetic field was simple. The sunspot was C or D in McIntosh classification and the magnetic class was B as shown in Figure.1. At the same days, the flare activity of the region was low. Only some small flares occurred. They were subflares in optical and C-class in X-ray.

The AR7270 began develop rapidly on September 5. As shown in Figures 1, 2 and 3, the sunspot group became complex EKI, the magnetic configuration became BDG and the sunspot area increased to about  $500 \times 10^{-6}$  hemi. At same time, the flares in the region occurred frequently. The flare activity of the region reached its maximum on September 6, when it produced 9 M-class X-ray flares and two X-class X-ray flares. They were X1.7/2B flare at 1852UT and X 1.3/1N flare at 2059UT, which were the strongest flares occurred in AR7270. Unfortunately, the two flares occurred in mid-night of Japan and China.

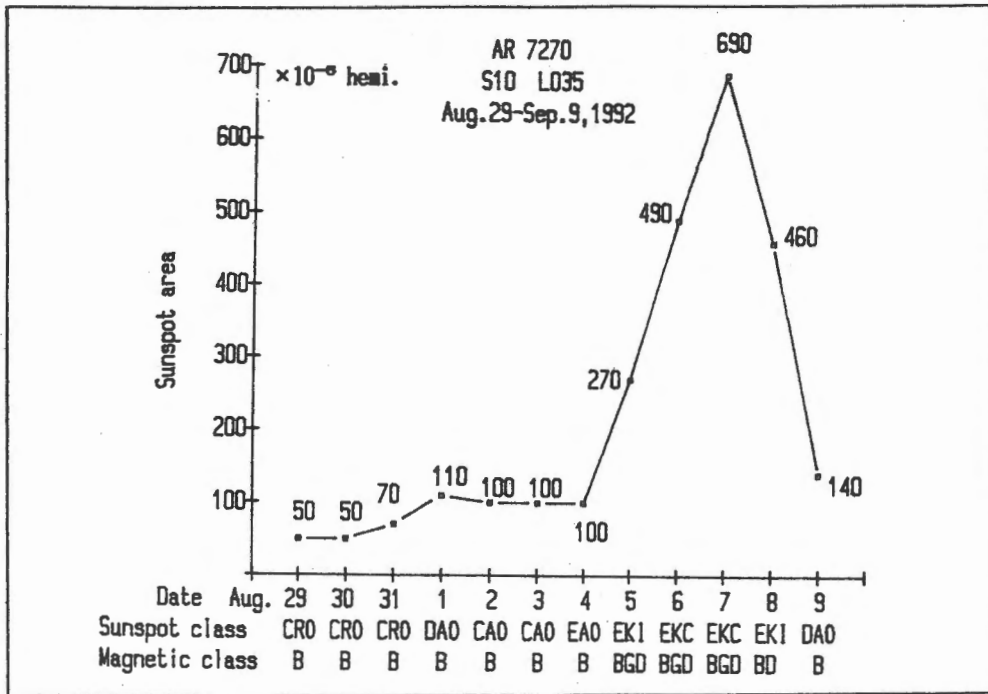


Figure 1. The sunspot and the magnetic class of the NOAA 7270.

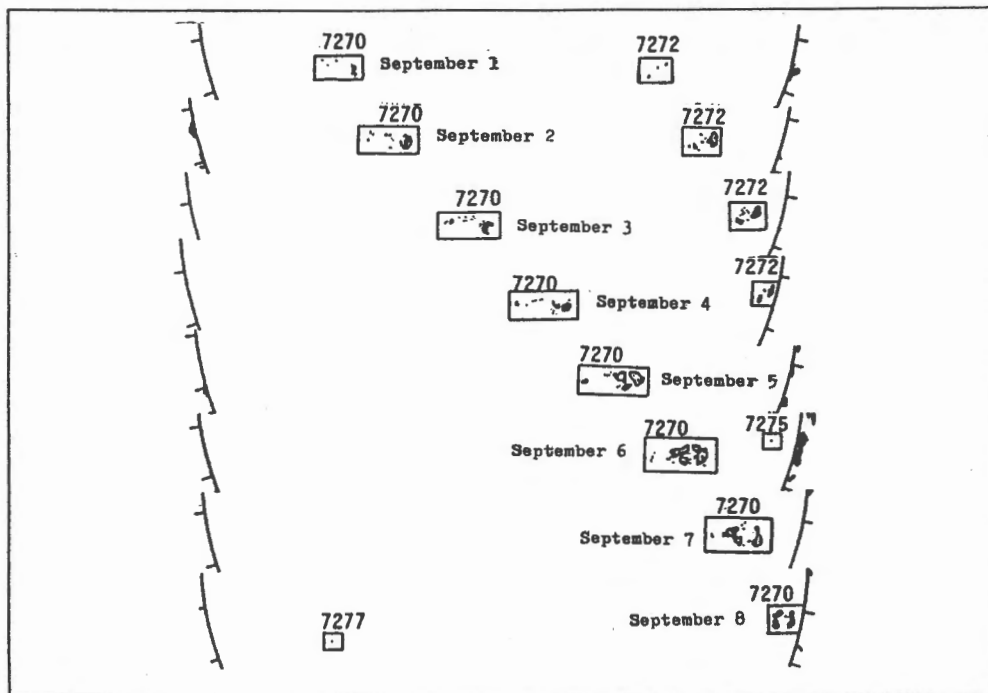


Figure 2. The evolution of the sunspot of the NOAA 7270.

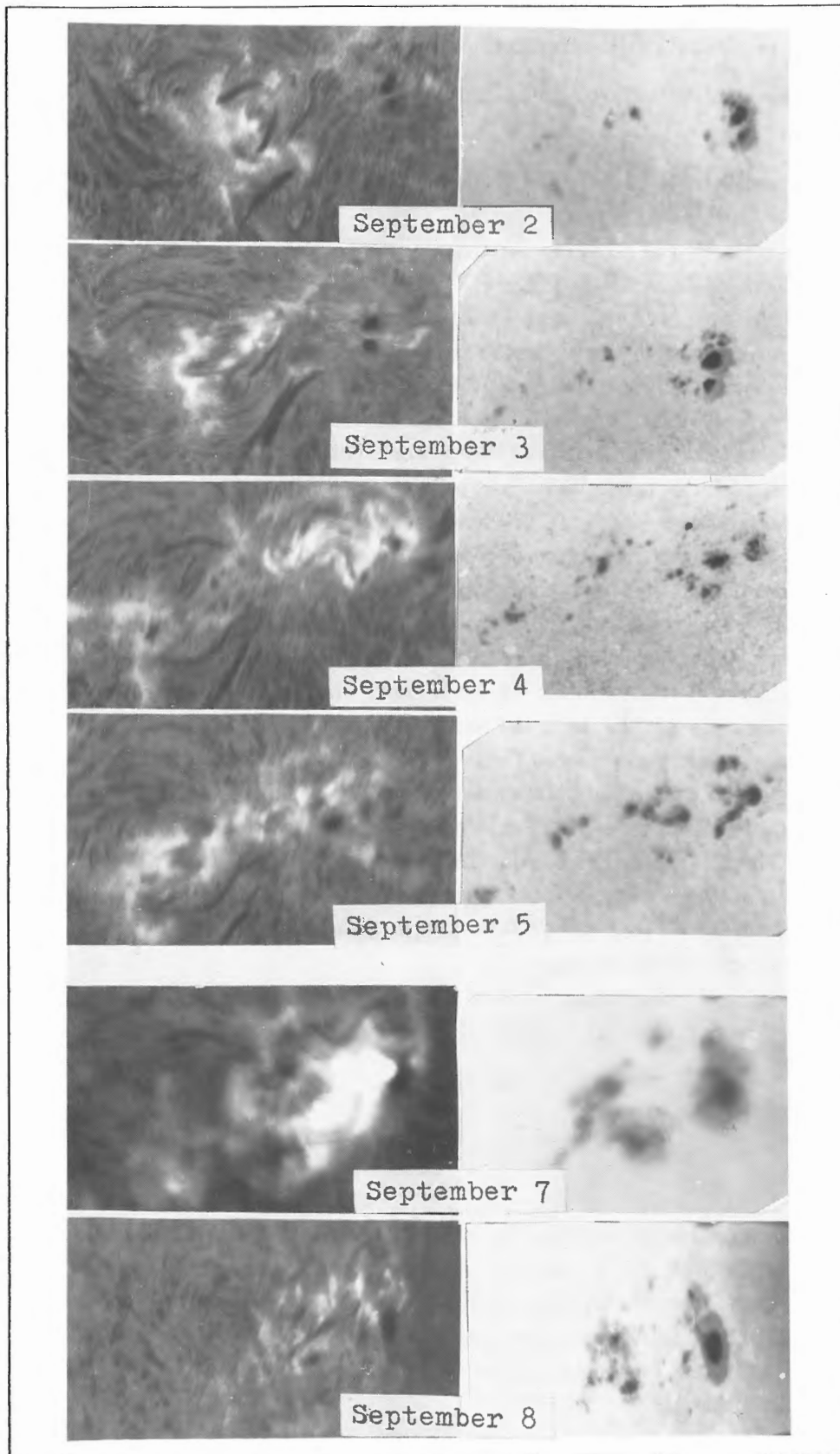


Figure 3. The daily images in H $\alpha$  and in white light of the NOAA 7270 on September 1-9, 1992.  
Scale: 4 arcsec/mm

On September 7 and 8, the region stopped its development and the flare activity decreased gradually. On September 9, the region was near the west limb.

### 3. Observed Results of The NOAA 7270

The lists of the sunspots and the flares of the NOAA 7270 have been published in SGD(1992a, 1992b, 1993) and SESC PRF(1992). A diagrams of GOES X-ray with  $H\alpha$  and X-ray flares have been published in SGD(1993) also. The majority of contribution of the X-ray intensity with flares in the daily diagrams (September 1 to 9) belong to the AR 7270. A Solar Activity Indices at 17GHz with GOES X-ray profiles during the period when the NOAA 7260, 7270 and 7321 passed through the solar disk have been published by Y. Hanaoka of Nobeyama Radio Observatory (1993). The list and the diagrams of YOHKOH Hard X-ray Bursts have been published by T. Kosugi et al. (1993).

The observation of the AR7270 have been carried out by the 26cm Solar Telescope at Yunnan Observatory. But the observed data were not so good, because the weather and the seeing of Kunming were poor during the first ten days of 1992 September. The daily  $H\alpha$  -filtergrams and the white light sunspots are shown in Figure 3. On September 7, two  $H\alpha$  flares were observed by 26cm Solar Telescope. The first one was the C4.5/SN flare at 0158UT. It was a small flare associated with a mass ejection which shape was similar as a fan shown in Figure 4. In the Fig.4, we can see that the dark mass downforward ejected from the flare site near the g-sunspot at 0202UT. And only few dark mass moved upforward (it was shown in simultaneous  $H\alpha$  -blueshift images which not published in this paper for limit of the pages). The second one was the M3. 6/2B flare at 0353UT. The flare occurred in location between two major sunspots of the region shown in Figure 5. An another flare, the M7.1/2B at 0634UT was observed by 18cm Flare Patrol Telescope at Yunnan Observatory. This flare also occurred near the major g-sunspot.

The magnetic observation of NOAA 7270 was obtained in Beijing Observatory and was reported by G.X. Ai et al. (1993) in this Workshop.

### 4. Summary

Generally, the NOAA 7270 is an active region with middle activity in decreasing phase of Cycle 22. Its active life is short, only four days when the new magnetic flux emerged, the sunspots in the region moved, impacted and combined each other. At same time, the flare activity was frequent. Once the region evolved to its maximum which was indicated by the two X-class X-ray flares on September 6. it stopped development and fade-out gradually.

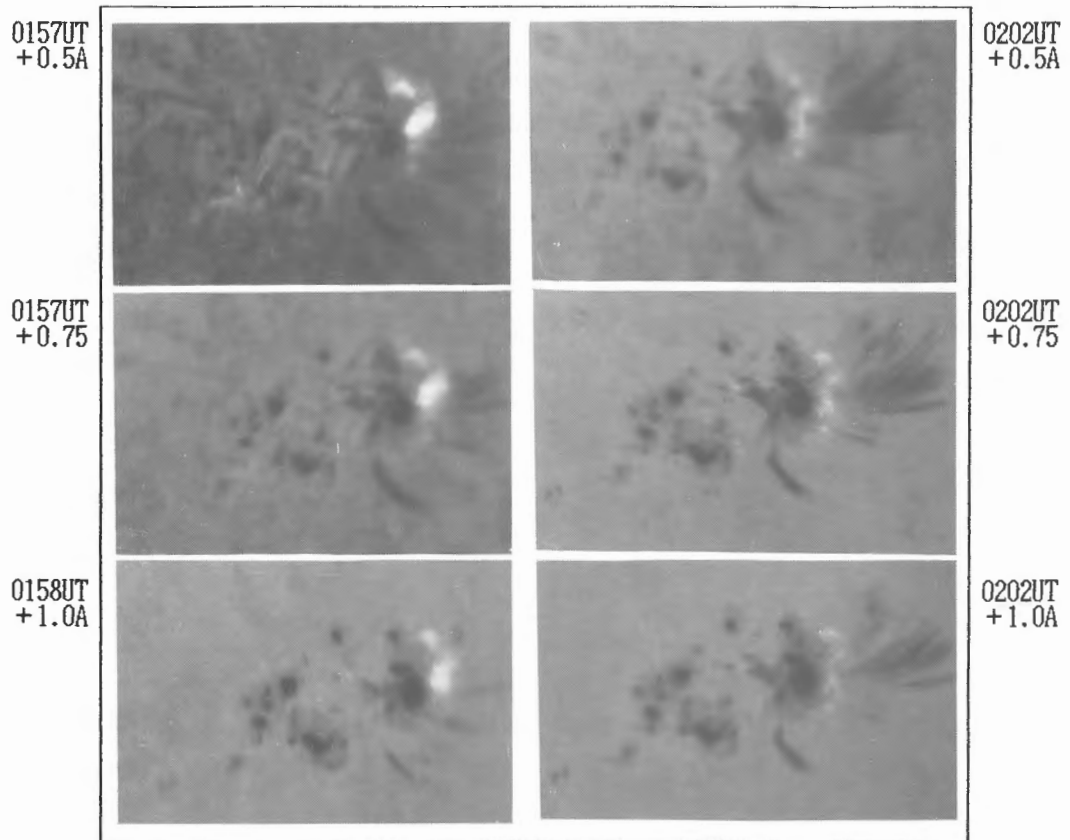


Figure 4. The C4.5/SN flare and associated mass ejection on September 7, 1992.  
Scale: 4 arcsec/mm

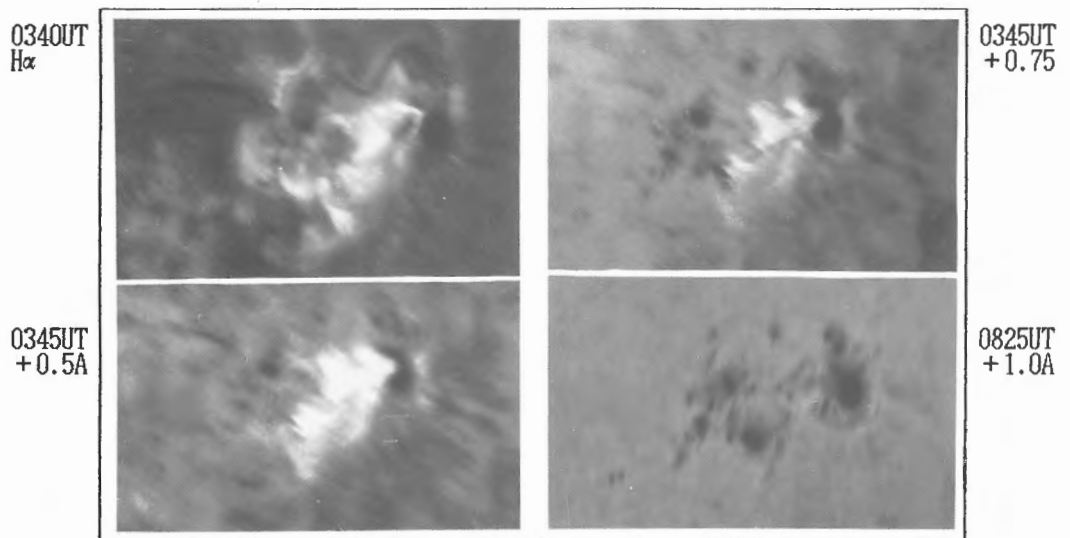


Figure 5. The M7.1/2B flare on September 7, 1992.  
Scale: 4 arcsec/mm

## References

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