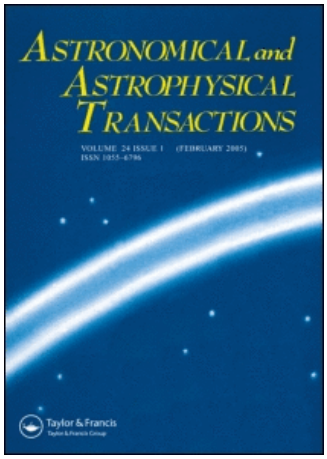

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THE HE I 10830Å OBSERVATION OF THE FLARE OF JULY 9, 1996

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The He I 10830Å data of observations of the flare that occurred on July 9, 1996 are presented. Images of the active region were obtained at the Crimean Astrophysical Observatory at the BST-2 telescope. The presence in the flare of long-lived emission kernels and extended loop structures is evidence of the large power of this flare, which is not typical for the minimum of the cycle. Judging by its duration this flare could be an LDE-flare.

KEY WORDS Chromosphere, flare, He I 10830Å

The dynamic events in the upper solar chromosphere based on observations of the He I 10830Å line are poorly understood at present, therefore obtaining and interpreting additional observational data seems to be a sufficiently important task. The work of Harvey (1992) is devoted to analysis of two-ribbon flares and bright X-ray points in the He I line. The comparison of dynamical peculiarities in the development of the flare process in the chromosphere in the He I line and in the photosphere in the Hα line were examined by Baranowsky *et al.* (1990) and Belkina *et al.* (1996).

The investigation of the active region (AR) during the flare in the He I line allows us to study the peculiarities of flare activity on the Sun in the upper chromosphere, the nature of the interaction and the change of magnetic structures on different scales, and the physical states of the plasma. The interpretation of similar data could improve our understanding of the mechanism of the accumulation and release of flare energy.

The observations of the Sun in the He I 10830Å chromosphere line are continuously carried out of the Crimean Astrophysical Observatory at the BST-2 telescope equipped with a multi-purpose spectrophotometer (Didkovsky *et al.*, 1989). Though these observations are aimed mainly at the identification and investigation of coronal holes, different dynamical events could be studied with high spatial resolution. This paper presents a series of spectroheliograms of the active region obtained during the flare.

A map of the magnetic field of sunspots obtained at Crimean Observatory is presented in Figure 1. We detected the AR on July 7 and found it to have existed

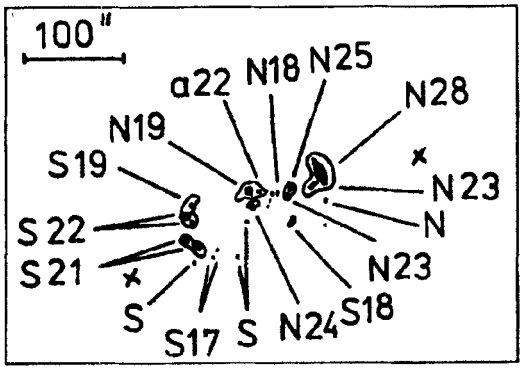

Figure 1 Map of the magnetic field of sunspots on 09.07.1996.

at least during two solar rotations. From July 7 to July 13 AO had a bipolar configuration with a long-lived sunspot with transversal magnetic field. The magnetic field strength increased during the first two davs and then began to decrease.

Four spectroheliograms of this active region using the He I line were obtained on July 9 from 7:50 to 14:56 UT. The first one was obtained before the flare; the second and third during the flare; and the fourth after the flare.

All images were corrected for limb darkening, equally scaled and combined at spots and plages. Image reduction was made in the IDL language using a special method elaborated by the author Malanushenko (1995). The reduced spectroheliograms are presented in Figure 2(*a–d*). The distances in angular seconds are given on the axes. The darkst parts of the image correspond to the darker parts of the solar atmosphere. In Figure 2(*e–g*) the differences of the images during the flare and before it (*b–a*, *c–a*, *d–a*) are performed. The location of the parallel of declination is marked by a cross in Figures 1 and 2(*a*).

From the analysis of these figures the evolution of the flare be described as follows. The flare starts with the appearance of two emission centres A and B (Figure 2(*e*)), reminiscent of the contours of two crossed loops. Kernel A appeared to the east of the tail sunspots in the plage and kernel B in the northern part of the group close to the line of polar division. In structure C the long thin loop starts to the west of kernel A, goes across one of the S-polar spots and finishes at the spot with inverted pole. Forty minutes after the observations of this picture the brightness of kernel B was increased. New emission kernels D (at the sunspot with transversal field) and E appeared (Figure 2(*c*)). The intensity of the flare kernel D was equal to 1.07 (the intensity for the undisturbed Sun corresponds to 1.0). Kernels D and E were connected by emission loop with a distance between its bases of approximely 100″. The observations 5 hours later showed that kernel D disappeared and the sunspot restored its previous shape. In the emission loop region the new sunspot F was created (Figure 2(*g*)). At the initial emission centres (kernels A and B) small residual changes in the brightness and structure of plages became visible.

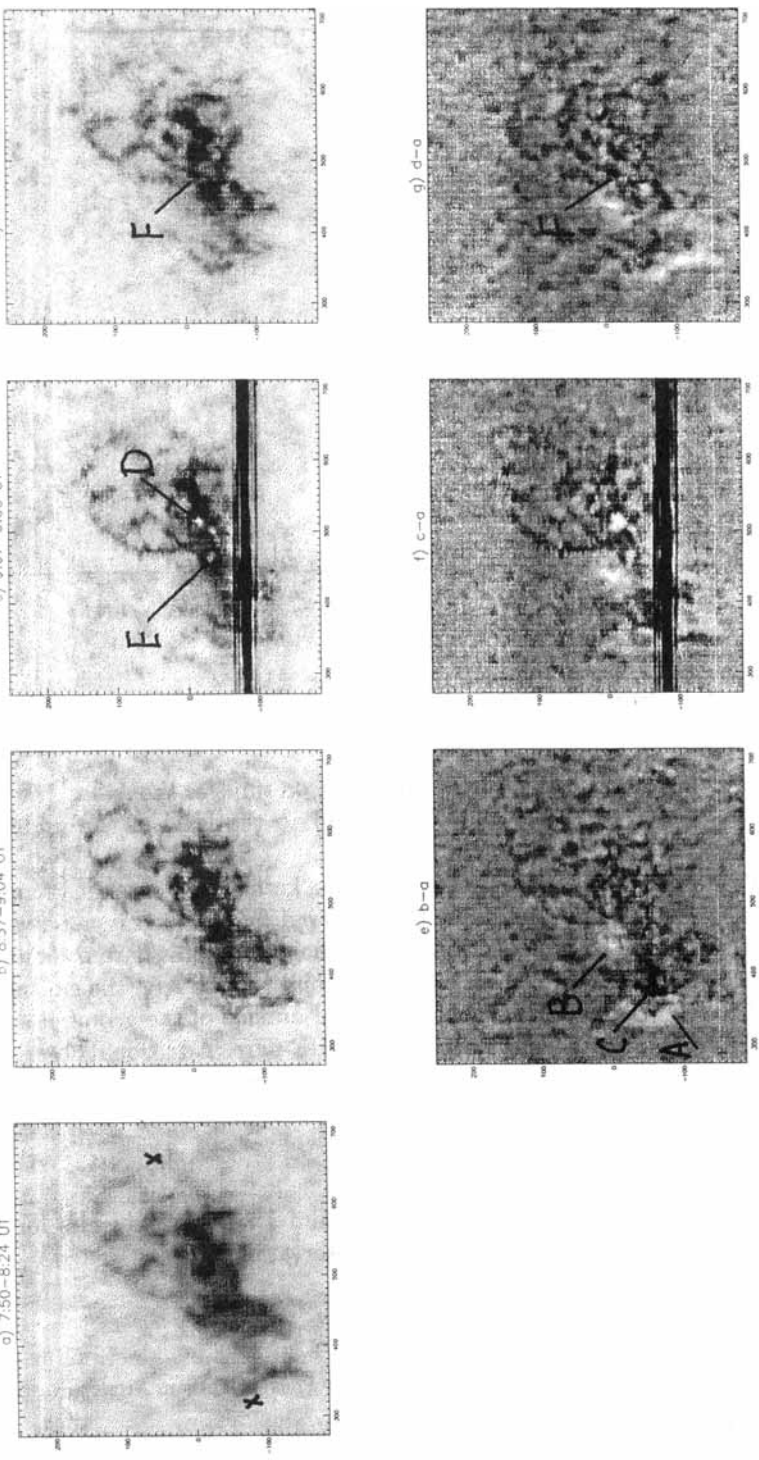

Figure 2 The spectroheliograms of the active region of 9.07.96, obtained during the flare (the UT is given above each image) and the differences of images during the flare and the first image.

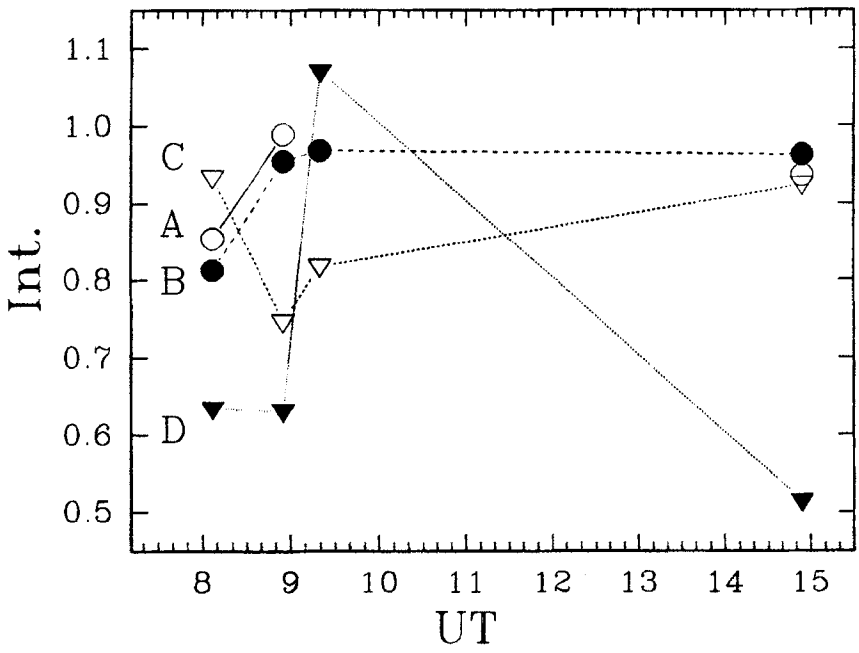

Figure 3 The dependence of intensity on time for the four kernels of the flare A, B, C and D.

In Figure 3 we give the dependence of intensity on time for the A, B, C, D kernels the flare described above. The unit correspond to the level of the undisturbed chromosphere.

The existence in the flare of long-lived emission kernels and extended loop structure is evidence for the great power of the observed flare, which is not typical for the minimum of the cycle. The extraordinary behaviour of this flare is defined also by the fact that it started far from the "special point" of the AR (the sunspot with transversal field) but in the field of plage situated outside of the group of spots.

Judging by its duration the flare could be an LDE-flare. Additional observational data in the Hα and X-ray regimes could resolve this problem.

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