SOME RESULTS OF VELOCITY MEASUREMENTS IN THE AUGUST 1972 GROUP

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Abstract: Using spectrograms, obtained with the great solar horizontal spectrograph at the Ondřejov Observatory, an attempt to measure relative radial velocities in the large August 1972 sunspot region has been made. Some spectra were photographed just before the proton flare of August 7, 1972 commenced. The main results of the velocity measurements are presented in figures. The highest radial photospheric velocities reached 1 km/sec.

In observing the active sunspot group in August 1972 at the Ondřejov Observatory, we were successful in obtaining comprehensive observational material on August 7. In measuring spectrograms attention was paid to the radial velocities in the observed group. We will not deal with the magnetic field in this contribution, but only with the radial velocities.

During the August 7 series, Zeeman spectrograms, surrounding the line λ 6302.5 A Fe I, were obtained with the aid of the great horizontal spectrograph, having a linear dispersion of about 3.6 mm/A in the fourth order. The solar image at the spectrograph aperture was 32 cm in the diameter.

Sixteen spectra between 14.14 and 15.17 UT were recorded, covering the studied region. A relatively thick line λ 6318 A Fe I (Ti I) has been chosen for the velocity measurements. The Abbe comparator (Zeiss, Jena) has been used for measurements of the Doppler shifts. I have measured a position of an optical "centre of gravity" of the given spectral line step by step along the line. One step was 6 sec of arc. I have used the telluric line λ 6314.2 A to eliminate the influence of the inclination of the line, because spectral lines are, in general, not exactly perpendicular to the direction of the dispersion.

In the studied active region are marked areas where the relative radial velocity goes beyond 500 m/sec (Fig. 1).

The observed group was north-west of the centre of the disk, $\vartheta = 34°$.

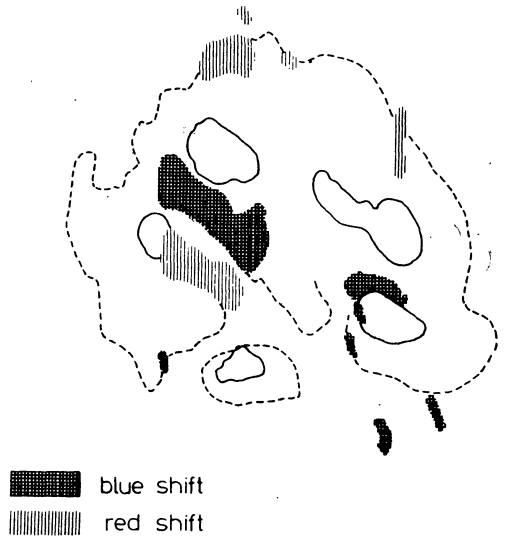

Fig. 1. Areas with relative radial velocities exceeding 500 m/sec in the active region on August 7, 1972.

Now let us look at areas A and B (Fig. 2). In the area A, the penumbrae of the two spots (3) and (4) encounter with relative radial velocity greater than 1 km/sec. In the area B the penumbra of spot (2) is moving toward the umbra of spot (1). The change of velocity is large in both the cases at the drawn dividing lines. Boundary A corresponds to the border of the penumbra of spot (3). Boundary B coincides with the brightening of the periphery of umbra (1).

From morning till afternoon changes in the active group are visible on our photographs (Figs 3,

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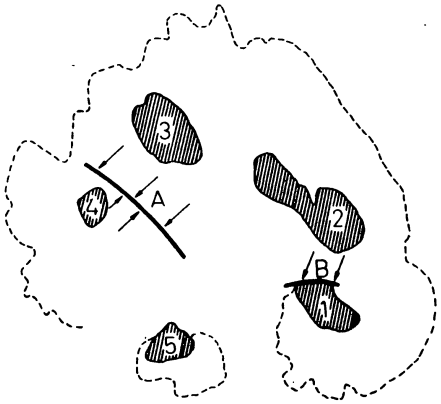

Fig. 2. Diagram of photospheric motions in two areas of the active group.

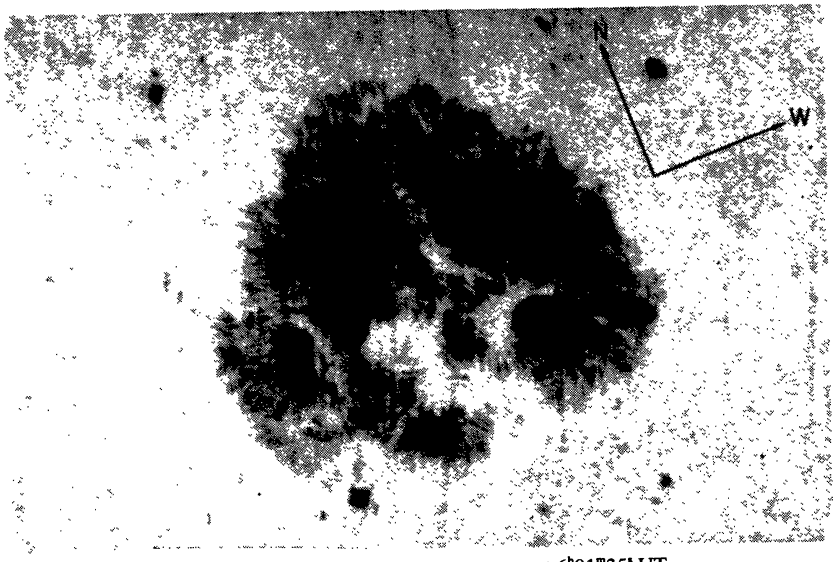

Fig. 3. Photograph of the sunspot group at $6^h01^m35^s$ UT.

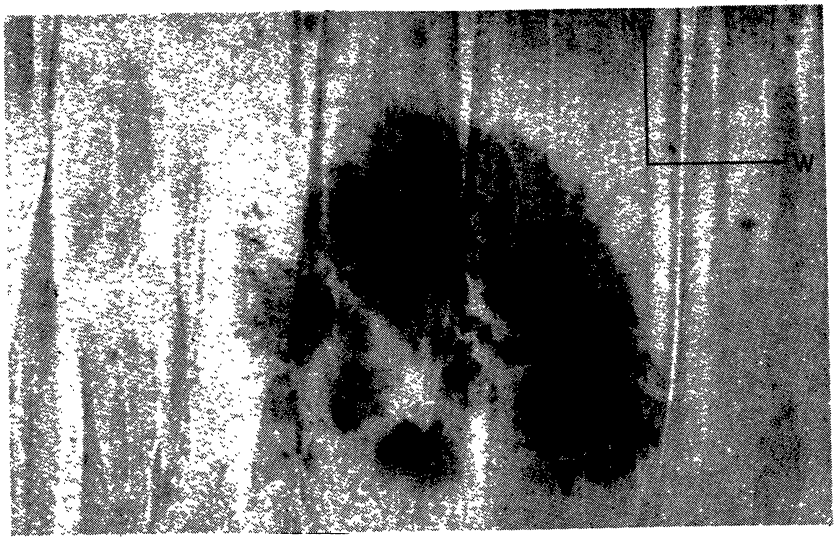

Fig. 4. Photograph of the active group at $15^h09^m36^s$ UT.

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and 4). A striking change occurred in area A where the bright day passes between spots (3) and (4). There are also changes in the neighbourhood of spot (2).

It seems interesting that the high radial velocities around spots (3) and (4) are close to the two knots of the white light flare (Rust, 1972). On the other hand, the essential part of the white light flare occurs in places with no substantial radial velocities.

Roughly speaking, we can summarize that no immediate connection with large radial motions and white light flares after 15.00 UT on August 7 has been found. This conclusion could be held as a preliminary one.

References

RUST, D. M. (1972): Sky and Telescope, *44*, 226.

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