

## PRELIMINARY REDUCTION OF DATA OBTAINED WITH A FULL DISK MAGNETOGRAPH

Y. Liu, G. Song, Jingshan Wang, and Jingxiu Wang

*Beijing Astronomical Observatory, Beijing, 100080, China*

### Abstract

A new full disk magnetograph with high spatial and temporal resolution has been established at Huairou Solar Observing Station of Beijing Astronomical Observatory. Comparing its observing data with the relevant data obtained by the Solar Magnetic Field Telescope (SMFT) (Ai, 1987) at Huairou Station, we find that they are very similar in both respects of magnetic field morphology and intensity. This demonstrates that the observing results obtained by the full disk magnetograph are reliable.

Obvious correlations between radio emission flux and absolute magnetic field flux at the photosphere, and between full disk magnetograms and plages appeared in calcium monochromatic images have been shown.

### 1. Instrument

This system of the Full Disk magnetograph consists of a 10 cm telescope, a 1/8 Å universal filter, a CCD camera of TM-860 and an Imaging Technology SR-151-AT system controlled by an AST-486 computer, which transmits the data to a computer, SUN 4/470, for processing. The field of view of this magnetograph is full-sun, and it uses Fe I  $\lambda 5324\text{\AA}$  ( $g=1.5$ ) for magnetograms. A single frame of solar image can be collected in 1/25 s and spatial resolution is  $4'' \times 4''$ . The sensitivity with 256 frames added is  $\approx 12\text{G}$  for line-of-sight magnetic field and  $\approx 130\text{G}$  for transverse magnetic field. In this way, magnetograms with high temporal and spatial resolution are obtained. Figure 1 is a magnetogram. Active regions are numbered by Huairou Station.

### 2. Preliminary Data Reduction

We degrade the spatial resolution of the relevant data obtained by SMFT in order to make it comparable to the spatial resolution of the full disk magnetogram. Then we compare

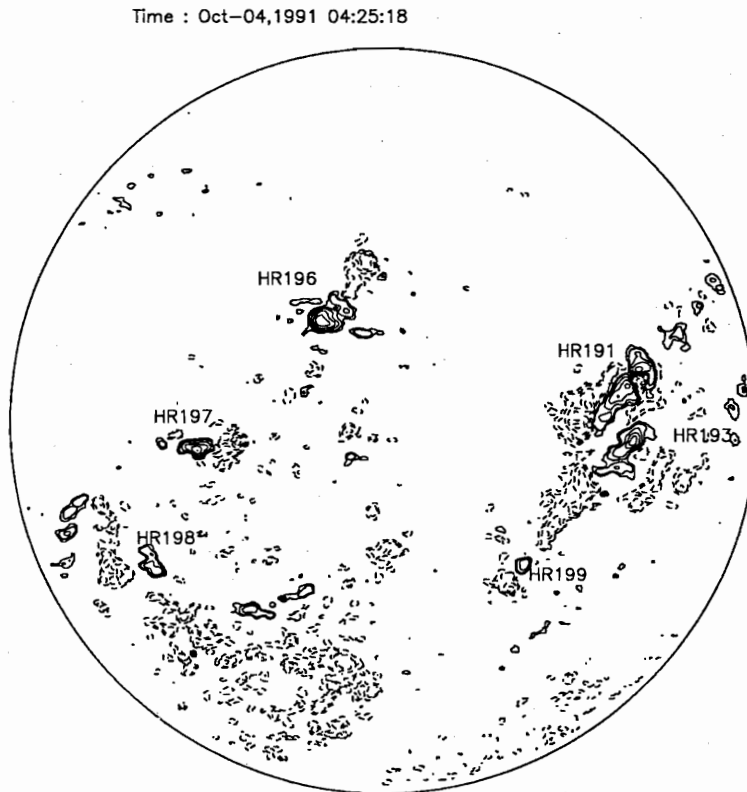


Fig. 1. A Full Disk Photospheric Magnetogram obtained by Huairou Station. Solid and dashed lines are positive and negative respectively.

them (Fig.2). The similarities with respects to magnetic field morphology and intensity are shown, regardless of whether active regions compared are near the limb or at the center.

The absolute magnetic field fluxes at the photosphere are calculated based on the full disk magnetograms. The evolution of the fluxes from May 1 to June 30 shows almost the same tendency with that of the radio emission flux at 2840 MHz (Fig.3).

Calcium K-line monochromatic images are obtained also at Huairou Station. We aligned the image and the full disk magnetogram together by means of cross-correlation method (Fig.4). An obvious correlation between them is displayed in the figure. The magnetic field sketch out roughly the contour of the plages.

### 3. Conclusion

The Full Disk Magnetograph in Huairou Station is considered to be confident.

### References

1. Ai. G.(1987) *Publ. Beijing Astronomical Observatory.* 9,27.

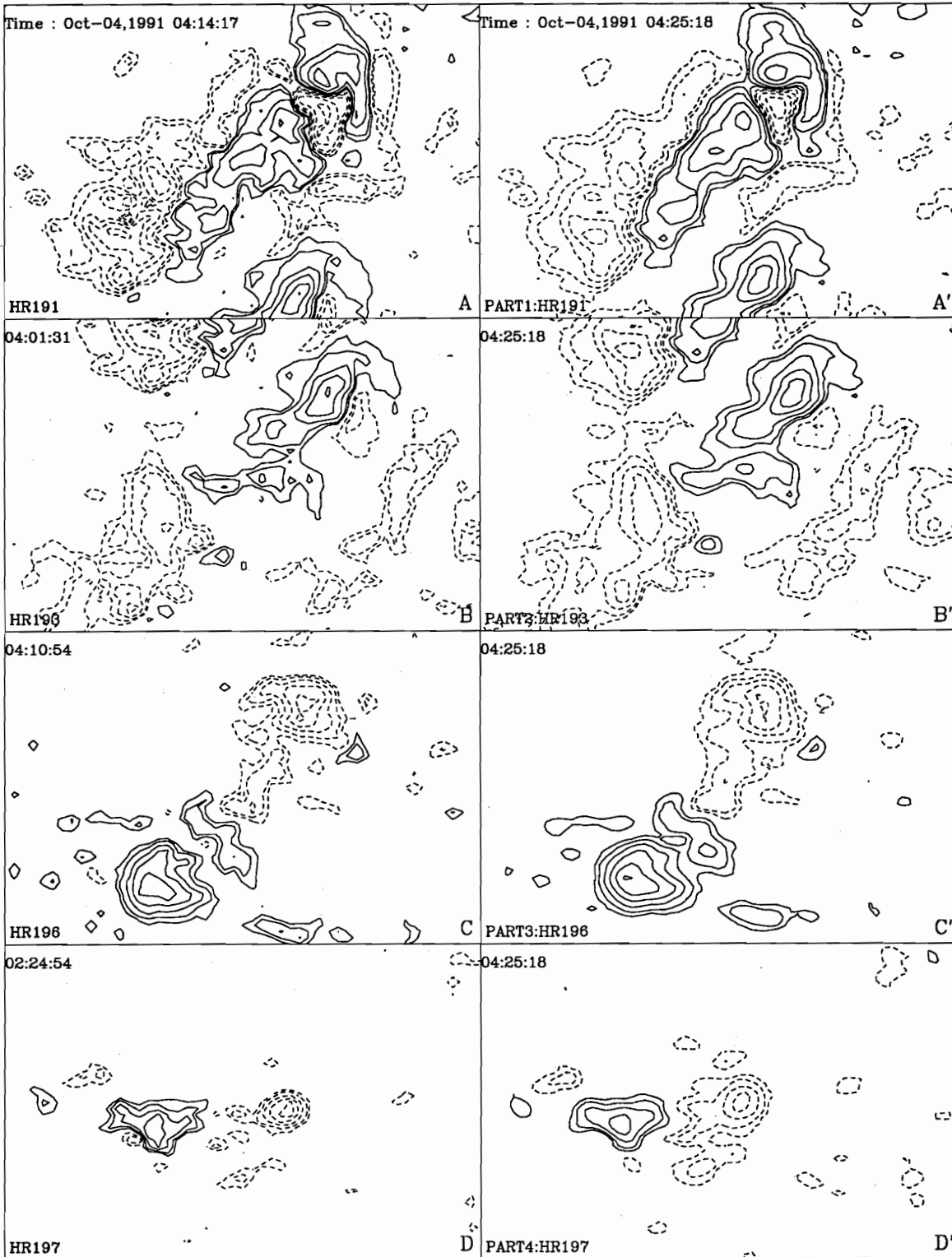


Fig. 2. The Comparison of the Magnetograms Obtained by the 35cm Solar Magnetic Field Telescope (Left) and the 10cm Full Disk Magnetograph (Right).

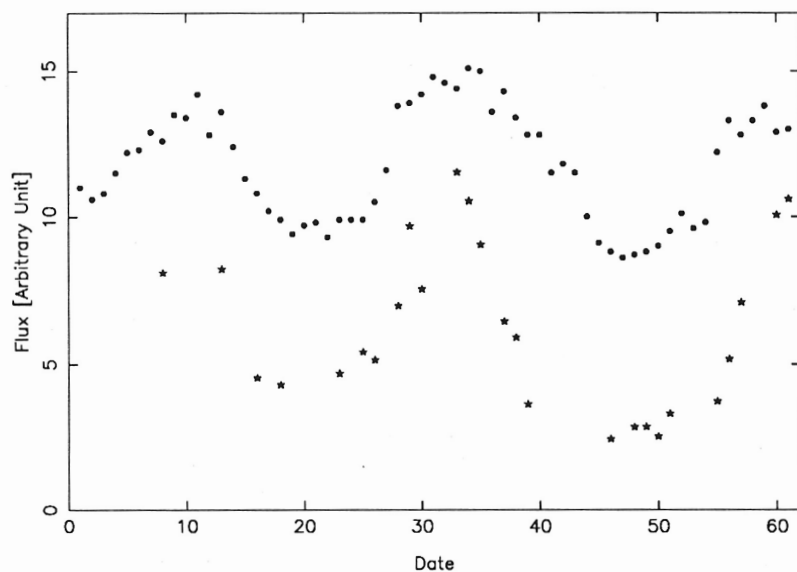


Fig. 3. Comparison of Radio Emission Flux and the Photospheric Absolute Magnetic Flux. Dot and asterisk are Radio Flux and Magnetic Flux, respectively.

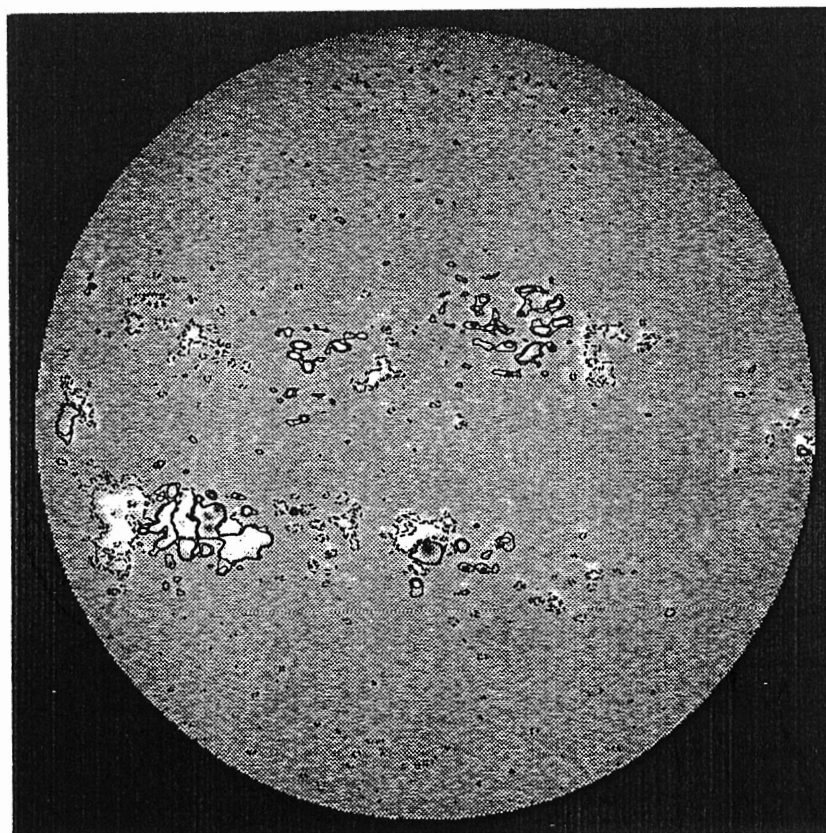


Fig. 4. The correlation between the plages and magnetic field. The gray image is the calcium K-line monochromatic image and the contour is the line-of-sight magnetic field at the photosphere.