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Solar Observation with Miyun Radio Telescope

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Abstract. The Miyun Synthesis Radio Telescope (MSRT), Beijing Astronomical Observatory, has been used in observation of the Sun as an one dimension heliograph. Daily observation with MSRT and other two single dishes for total power measurement have been performed since May,1998.(Zhang, X.Z., 1999)

1. The Telescope

The telescope (Wang 1987) consists of 28 antennas, each with 9 m in diameter, on an East-West baseline, providing complete baseline coverage from 18 m to 1164 m with interval of 6 m. The array is divided into two sub-arrays. Those 16 antennas locating in the central part are the elements of Sub-array A with same separations of 72 m, the rest 12 antennas, separated in 12 m, standing with 6 dishes on each side of Sub-array A, contribute to Sub-array B. Only 3 antennas in each side of Sub-array A are used in each observation, resulting in 96 interferometer pairs from the combinations $Ai \times Bj(i = 1, 16, j = 1, 6)$. Two day's observations give a complete UV coverage of 192 baselines. The working frequency of the MSRT is 232 MHz and the band-width is 1.5 MHz. Its spatial resolution is about $3.8'$ and the time-resolution of it are 20 ms and 10 seconds respectively. The sensitivity of MSRT is about 0.003 SFU.

2. Observation Example

An observational example, the strong meter-wave burst on April 15, 1999 is shown in the Fig. 1. This burst started at 3H12M (UT), reached its maximum at 3H32M (UT), and ended at 4H02M (UT) with a maximum intensity of about 70 SFU. The burst was related to a CME, which started at 0217(UT) and ended 0330(UT), near the center of the Sun and no strong burst at microwave and long meter-wave bands was recorded same time.

Fig. 1 shows the solar intensity variation recorded by a long base-line channel of the MSRT. It is found that solar intensity variations at long baselines are rather larger than that at short base-lines. That means the burst may has a compact high temperature core. Fig. 2 gives a solar image at UT 3^h17^m. The source near the center of the Sun, named as source A, is corresponding to the active region AR 8515, while another source located at about E20', named as source B, was associated with AR 8516. As one image can be obtained by the MSRT every 20 ms or 10 second, a serial images were obtained.

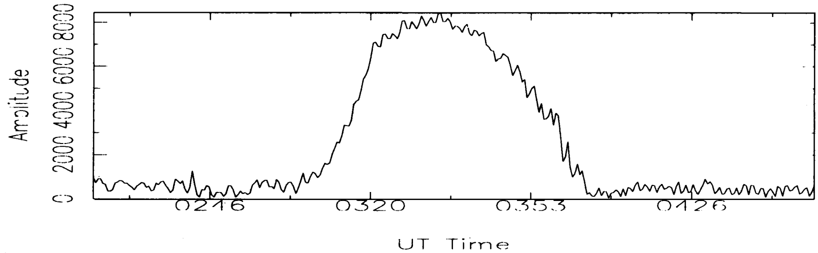

Figure 1. The solar intensity variation recorded by a long baseline of MSRT

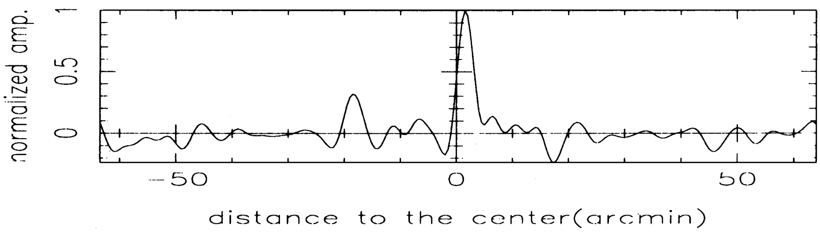

Figure 2. The one dimension image of the Sun at 0317(UT), Apr.15,1999

It is found that the source A is responsible for the solar intensity variation according to the solar image series of our telescope, whereas the source B is stable during the whole observation. Source A is about 3' size in E-W direction measured from the images. A very interesting result was also found by calculating the positions of source A from the images. The result is shown in the Fig. 3. The source A was accelerated from UT 3^h12^m and became stable about 7^m later. This time range is exactly as same as that of intensity rising showed in Fig. 1. this may be explained as that the plasma turbulence in the corona moved as acceleration motion associated with energy released.

References

Wang, S.G. 1987, Publ. of Beijing Astronomical obs., p1

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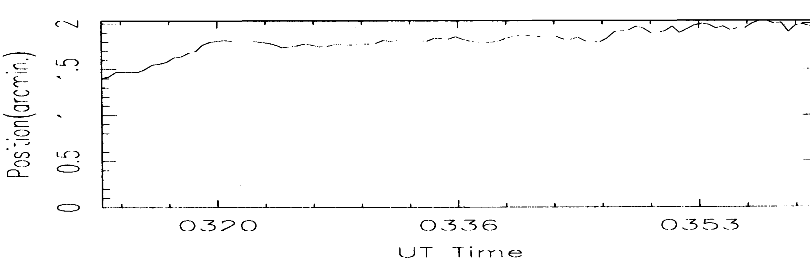

Figure 3. Position variation of the source A (see text)