

Executive Summary

This report shows the measurement and the prediction of the y -component of the interplanetary magnetic field in a short period by the cosmic-ray Sun shadow observed by the No.1 pool of WCDA in LHAASO. By comparing the simulated results of the displacement of the Sun shadow along the north-south direction with the observed results, the magnitude of the interplanetary magnetic field on the source surface and the shift in Carrington longitude are fitted to obtain the interplanetary magnetic field. This observation result is consistent with the satellite observation result at one astronomical unit, and this result is 3.4 days ahead of the satellite observation result.

Through this report, we summarize the following discussions and results:

- The Sun shadow observed by WCDA-1 can be used to observe the interplanetary magnetic field and its changes.
- The time of the observed interplanetary magnetic field is ahead of that from the satellite, which can be used for space weather prediction.
- There is a coronal hole fast flow in this period of the observed interplanetary magnetic field. The y -component of the magnetic field observed by us is still consistent with that observed by satellite. In the future, we hope to observe the z -component of the magnetic field, which is related to geomagnetic storms, to predict the geomagnetic storms caused by the coronal hole fast flow and even the coronal mass ejections.

There are still some problems and limitations in this report, including: Although our fitting results are consistent with satellite observations, the advance of 3.4 days observation is not consistent with the results of the ARGO-YBJ experiment (1.6 days); In addition, the error of the measurement results in this work is quite complex and has not been fully introduced.