AOGS 2005

Downstream structures of interplanetary fast shocks associated with coronal mass ejections

RYUHO KATAOKA, Shinichi WATARI, NOBUE SHIMADA and HIRONORI SHIMAZU
National Institute of Information and Communications Technology

Downstream structures of interplanetary fast shocks are investigated using 17 shock events during solar cycle 23 identified by ACE spacecraft. The results of our analysis are summarized as follows: 1) Interplanetary magnetic field (IMF) directions follow the shock plane directions during at least 2 hours from the shock arrival. 2) The deflection angles from the shock plane are greater at the shocks with higher upstream β values and/or smaller shock angles. 3) Numbers of IMF discontinuities in the upstream and downstream are comparable. These results support that the downstream structures are generated by the draping and compression of the background solar wind at the interplanetary shocks during the propagation of CMEs. This paper not only gives an important tool to advance the accuracy of space weather forecast, but also puts some limitations on plasma theories of the interplanetary shocks to produce downstream turbulences.

Keywords: Coronal mass ejections, discontinuities, interplanetary shocks, interplanetary magnetic fields, MHD waves and turbulence

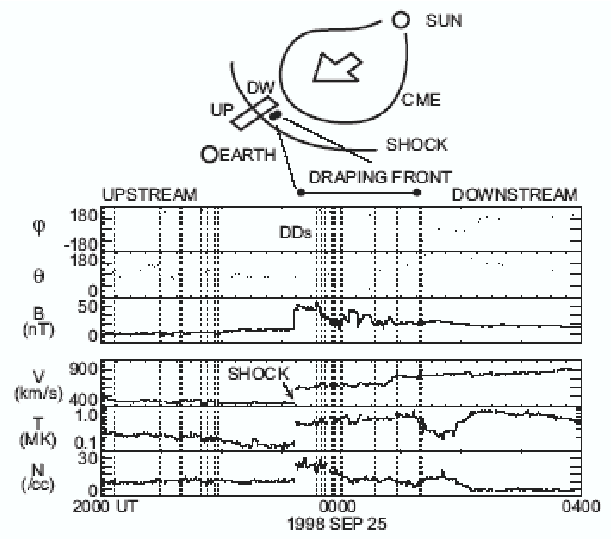

Figure 1. Schematic illustration and a typical example of the draping front structure.