Geophysical Research Abstracts
Vol. 20, EGU2018-3119-1, 2018
EGU General Assembly 2018

Forecasting Southward Bz Periods Following Shocks

Tarik M. Salman, Noé Lugaz, Reka Winslow, Charles J. Farrugia, Charles W. Smith, Antoinette B. Galvin, and Nathan Schwadron

University of New Hampshire, Space Science Center, Durham, United States

Long-duration periods of strong southward magnetic fields are known to be the primary cause of geomagnetic storms. The majority of such events are caused by the passage over Earth of a magnetic ejecta, although sheath fields, corotating interaction regions and compressed ejecta are also common drivers of geomagnetic storms. Independently of the interplanetary cause, fast forward shocks often precede such strong southward Bz periods.
Here, we first look at all long-duration periods of strong southward magnetic fields measured by the Wind spacecraft as well as fast-forward shocks measured by the Wind spacecraft. We find that about 20% of shocks are followed within 48 hours by a strong Bz south period, but 75-80% of strong Bz period are preceded within 48 hours by a shock. Then, we devise a probabilistic forecasting method based on the shock properties and the pre-schock solar wind plasma and interplanetary magnetic field characteristics. Preliminary results show that a combination of the magnetic field strength (B), the southward magnetic field (Bz) and the solar wind proton density (N) can forecast with improved accuracy the occurrence of a long-duration southward period after a shock.