Solar and Interplanetary Origins of the CAWSES November 7-8, 2004 Superstorm: Multiple Flaring of AR 696

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During November, 2004, many flares occurred every day from solar active region 696. One of the consequences was a superstorm at Earth with peak Dst = -373 nT on 7-8 November. This superstorm was unique in that it had 3 separate initial phases prior to the main phase. We will show that the causes of these 3 initial phases were three interplanetary fast forward shocks. However only one magnetic cloud was detected by ACE. These interplanetary structures (and many others during this event) are studied in detail using ACE spacecraft plasma and magnetic field data and SOHO/LASCO coronal mass ejection observations. The interplanetary shock speeds and directions were calculated from in situ data and the application of the Rankine Hugoniot relations. CME empirical propagation models were also used to determine the solar sources of the fast-forward shocks.

Publication:
37th COSPAR Scientific Assembly. Held 13-20 July 2008, in Montréal, Canada., p.783

Pub Date:
2008

Bibcode:
2008cosp...37..783E

Comments:
Symposium D, session 24 (poster). Paper number: D24-0044-08