Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08333, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08333
EGU General Assembly 2008

Two-spacecraft reconstruction of a magnetic cloud and comparison to its solar source

C. Möstl (1, 2), C. Miklenic (1), C. J. Farrugia (3), M. Temmer (2, 4), A. Veronig (1), A. Galvin (3), B. Vršnak (4), H. K. Biernat (1, 2)

(1) Institute of Physics, University of Graz, Universitaetsplatz 5, A-8010 Graz, Austria, (2) Space Research Institute, Austrian Academy of Sciences, Schmiedelstr. 6, A-8042, Graz, Austria,(3) Space Science Center and Dept of Physics, University of New Hampshire, College Rd. Durham , NH 03824, USA, (4) Hvar Observatory, Faculty of Geodesy, Kaciceva 26, HR-10000, Zagreb, Croatia, (moestlch@stud.uni-graz.at)

Relating observations of coronal mass ejections (CMEs) and their interplanetary counterpart (ICMEs) is a centerpoint of Sun-Earth connection studies and our ability to forecast space weather. Here we focus on the ICME containing a magnetic cloud which reached Earth on November 20, 2003 and gave rise to the strongest storm of solar cycle 23, with a minimum Dst of -422 nT. Its strong geoeffective impact came about two weeks after the massive eruptions known as “Halloween” events resulted in comparable geo-effects. The aims of this study are threefold. We first apply an advanced methodology to analyze with diverse observations the event on the solar disk, which occurred on Nov 18, 2003, and was associated with an M4 flare and a halo CME. We then employ a Grad-Shafranov reconstruction technique to model the magnetic field geometry at 1 AU. To this end, we use measurements acquired by spacecraft WIND and ACE, $\sim$400 R_E apart. We show how these twin-spacecraft observations allow us to optimize the reconstructed map. Finally, we relate the solar to the interplanetary observations, paying special attention to the orientations and the magnetic fluxes involved at the two locales. By comparing the flare with the original cloud fluxes we infer a possible in-situ flux rope formation during the eruption, though uncertainties are still significant. The error margins in the comparisons are also carefully assessed.