Geophysical Research Abstracts
Vol. 17, EGU2015-1366, 2015
EGU General Assembly 2015

Strong coronal deflection of a CME and its interplanetary evolution to Earth and Mars

Christian Möstl (1,2), Tanja Rollett (1), Rudy A. Frahm (3), Ying D. Liu (4), David M. Long (5), Robin C. Colaninno (6), Martin A. Reiss (2), Manuela Temmer (2), Charles J. Farrugia (7), Arik Posner (8), Mateja Dumbovic (9), Miho Janvier (10), Pascal Demoulin (11), Peter Boakes (2), Andy Devos (12), Emil Kraaikamp (12), Mona L. Mays (13,14), and Bojan Vrsnak (9)

(1) Space Research Institute, Austrian Academy of Sciences, A-8042 Graz, Austria, (2) IGAM-Kanzelhöhe Observatory, Institute of Physics, University of Graz, A-8010 Graz, Austria., (3) Southwest Research Institute, 6220 Culebra Road, San Antonio, TX 78238, USA, (4) State Key Laboratory of Space Weather, National Space Science Center, Chinese Academy of Sciences, Beijing 100190, China, (5) Mullard Space Science Laboratory, University College London, Holmbury St. Mary, Dorking, Surrey, RH5 6NT, UK., (6) Space Science Division, Naval Research Laboratory, Washington, District of Columbia, USA, (7) Space Science Center and Department of Physics, University of New Hampshire, Durham, NH 03824, USA., (8) NASA Headquarters, Washington, DC 20546, USA, (9) Hvar Observatory, Faculty of Geodesy, University of Zagreb, 10 000, Zagreb, Croatia, (10) Department of Mathematics, University of Dundee, Dundee DD1 4HN, Scotland, UK, (11) Observatoire de Paris, LESIA, UMR 8109 (CNRS), F-92195 Meudon Principal Cedex, France, (12) Royal Observatory of Belgium, 1180 Brussels, Belgium, (13) Catholic University of America, Washington DC, USA, (14) Heliophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, Maryland, USA.

We discuss multipoint imaging and in situ observations of the coronal mass ejection (CME) on January 7 2014 which resulted in a major false alarm. While the source region was almost at disk center facing Earth, the eruption was strongly deflected in the corona, and in conjunction with its particular orientation this CME missed Earth almost entirely, leading to no significant geomagnetic effects. We demonstrate this by a synthesis of data from 7 different heliospheric and planetary space missions (STEREO-A/B, SOHO, SDO, Wind, Mars Express, Mars Science Laboratory). The CMEs ecliptic part was deflected by $37 \pm 10^{\circ}$ in heliospheric longitude, a value larger than previously thought. Multipoint in situ observations at Earth and Mars confirm the deflection, and are consistent with an elliptical interplanetary shock shape of aspect ratio 1.4 ± 0.4. We also discuss our new method, the Ellipse Evolution (ElEvo) model, which allows us to optimize the global shape of the CME shock with multipoint in situ observations of the interplanetary CME arrival. ElEvo, which is an extension to the Drag-Based-Model by Vrsnak et al., may also be used for real time space weather forecasting. The presented results enhance our understanding of CME deflection and shape, which are fundamental ingredients for improving space weather forecasts.