Coronal and Stellar Mass Ejections
Proceedings IAU Symposium No. 226, 2005
K. P. Dere, J. Wang & Y. Yan, eds.

doi:10.1017/S1743921305000359

SoHO/EIT Observation of a Coronal Inflow

D. Tripathi[1], V. Bothmer[1], S. K. Solanki[1], R. Schwenn[1], M. Mierla[1] and G. Stenborg[2]

[1]Max-Planck-Institut für Sonnensystemforschung, 37191 Katlenburg-Lindau, Germany
email: tripathi; bothmer; solanki; schwenn; mierla@mps.mpg.de

[2]NASA Goddard Space Flight Center, Washington DC, USA
email: stenborg@kreutz.nascom.nasa.gov

Abstract. A distinct coronal inflow has been discovered after ∼90 min of prominence eruption associated coronal mass ejection (CME) on 05-Mar-2000 by EIT (Extreme ultraviolet Imaging Telescope) aboard SoHO (Solar and Heliospheric Observatory). Evolution of the prominence seen by EIT was tracked into the LASCO/C2 and C3 field-of-view (FOV; 4-10$R_\odot$) where it developed as the core of a typical three-part CME. The speed of the inflow, which was only seen in EIT FOV, was 70-80 km/s at a height between 1.5-1.2 $R_\odot$ coinciding with the deceleration phase of the core of the CME in LASCO/C2. In contrast to dark inflow structures observed earlier and interpreted as plasma void moving down, the inflow reported here was bright. The inflow showed a constant deceleration and followed a curved path suggesting the apex of a contracting magnetic loop sliding down along other field lines

Keywords. Sun: corona, Sun: coronal mass ejections (CMEs)

1. Introduction

Detection of dark downflows after CME eruptions has been reported by several authors based on soft X-ray, LASCO and TRACE (Transition Region and Coronal Explorer) observations (McKenzie 2000; Wang *et al.* 1999; Innes *et al.* 2003). These downflows were interpreted as plasma voids. Based on the TRACE and RHESSI observations, non-thermal radiations were detected at the time of downflows which was interpreted as evidence for magnetic reconnection underneath the CME (Asai *et al.* 2004). In this paper we report an observation of a bright inflow identified by EIT at 195 Å in the course of a prominence associated coronal mass ejection.

2. Observations and Conclusions

(*a*) The prominence (P1, Fig. 1 left panel) was first accelerated with a constant acceleration of about 65-70 m/s^2 in EIT FOV (1.5 $R_\odot$), then decelerated with constant acceleration of 25 m/s^2 in the LASCO/C2 FOV (2-5 $R_\odot$) and finally achieved a constant speed of about 200 km/s higher up in the corona (Fig. 2, left panel).

(*b*) The inflow was first seen at 17:36 UT at a height of about 1.5 $R_\odot$, at the edge of the EIT FOV (Fig. 1, right panel). The vertical speed of inflow was initially about 70-80 km/s (Fig. 2, right panel). The speed of the inflow was comparable to the speed observed for downflows in white-light (Wang *et al.* 1999) and soft X-ray (McKenzie 2000) observations.

(*c*) The inflow started during the deceleration phase of the core of the CME (Fig. 2, left panel). The speed of the inflow decreased linearly with decreasing height, i.e., the downflow appeared to be decelerated (Fig. 2, right panel).

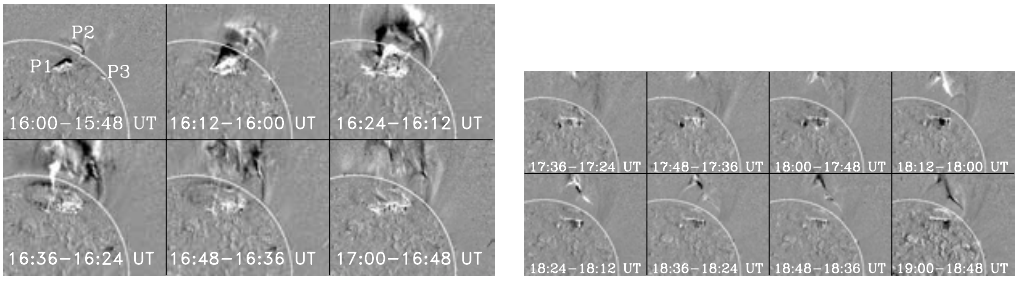

Figure 1. Left Panel: Running difference images taken by EIT at 195 Å showing simultaneous eruptions of the prominences marked by P1, P2 and P3. The eruption started on 05/03/00 at around 16:00 UT. In all images North is upward and West is to the right. Right Panel: Series of EIT 195 Å running difference images displaying the sunward moving plasma after the eruption. The inflow, visible as the bright feature in the NW part of the limb, started at around 17:36 UT in the EIT FOV.

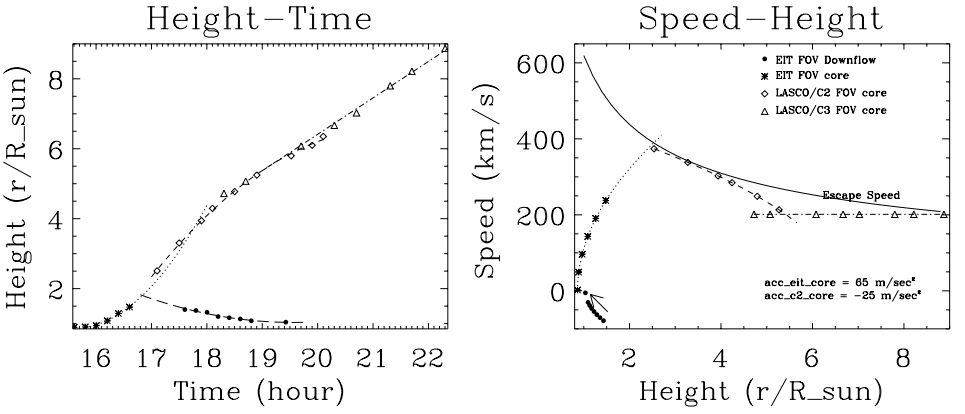

Figure 2. Left Panel: Height-time profile for the prominence (asterisks) in EIT, the core in LASCO/C2 (diamonds) & C3 (triangles) and the inflow (solid dots) in EIT. Right Panel: Speed height profile for all the features. Symbols have the same meaning as in the left panel. The solid line represents escape speed profile. Arrow marks the direction of motion.

(*d*) The inflow did not propagate vertically, but appeared to follow paths outlining the magnetic loops. Two branches emanating from the same apex were seen. The right branch showed a clear kink (Fig. 1, right panel).

Acknowledgements

This study is part of the scientific investigations of the project Stereo/Corona supported by the German "Bundesministerium für Bildung und Forschung" through the "Deutsche Zentrum für Luft- und Raumfahrt e.V." (DLR, German Space Agency) under project number 50 OC 0005. We also thank the SOHO/LASCO/EIT consortium for providing the data.

References

Asai, A., Yokoyama, T., Shimojo, M., & Shibata, K. 2004, *ApJ* (Letters) 605, L77
Innes, D. E., McKenzie, D. E., & Wang, T. 2003, *Sol. Phys.* 217, 247
McKenzie, D. E. 2000, *Sol. Phys.* 195, 381
Wang, Y.-M., Sheeley, N. R., Howard, R. A., St. Cyr, O. C., & Simnett, G. M. 1999, *Geophys. Res. Lett.* 26, 1203