AGU PUBLICATIONS

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Supporting Information for

Flux Transfer Event observation at Saturn's dayside magnetopause by the Cassini spacecraft

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Contents of this file

Introduction

Included in the online supporting material is a presentation of the mSWim solar wind propagation model data (Figure S1), as well as the FTE in LMN coordinates (Figure S2) and electron energy distributions (Figure S3).

Text S1.

Figure S1 shows the solar wind propagation from Earth by the Michigan Solar Wind Model (mSWiM). Here we have shown the dynamic pressure component using the density and velocity from mSWiM. The observations are most accurate within 75 days of apparent opposition of Saturn, Earth and the Sun. It has also been shown that the uncertainty near apparent opposition is ±15 hours (*Zieger and Hansen*, 2008). This event is within 39 days of opposition, and the red lines show the extent of the 15 hour uncertainty.

On the 2nd of February the arrival of a strong and abrupt enhancement of the solar wind dymanic pressure occurs which causes the magnetosphere to be compressed.

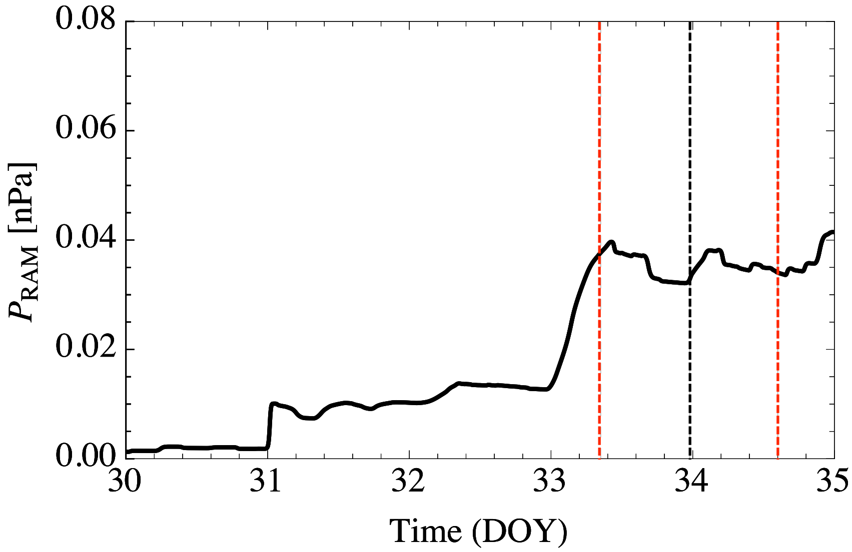

Figure S1. mSWiM forecast for the arrival of a dynamic pressure enhancement at Saturn's magnetosphere, with day of year (DOY) 33 being the 2nd of February 2007 (the event presented in this paper). The black dotted line shows the time of the event, and the red dotted lines mark the models 15 hour time uncertainty calculated by *Zieger and Hansen*, (2008).

Text S2.

Figure S2 shows a presentation of the MAG data in LMN coordinates, using the *Arridge et al.*, (2006) magnetopause model. The normal component (B_N) has a bipolar signature. The bipolar signature is in the `north-south' direction, which is consistent with an FTE travelling in a poleward direction over the spacecraft in the southern magnetosphere (consistent with the results of the paper). There is also a peak observed in the B_M direction, similar to observations by *Russell & Elphic* (1978).

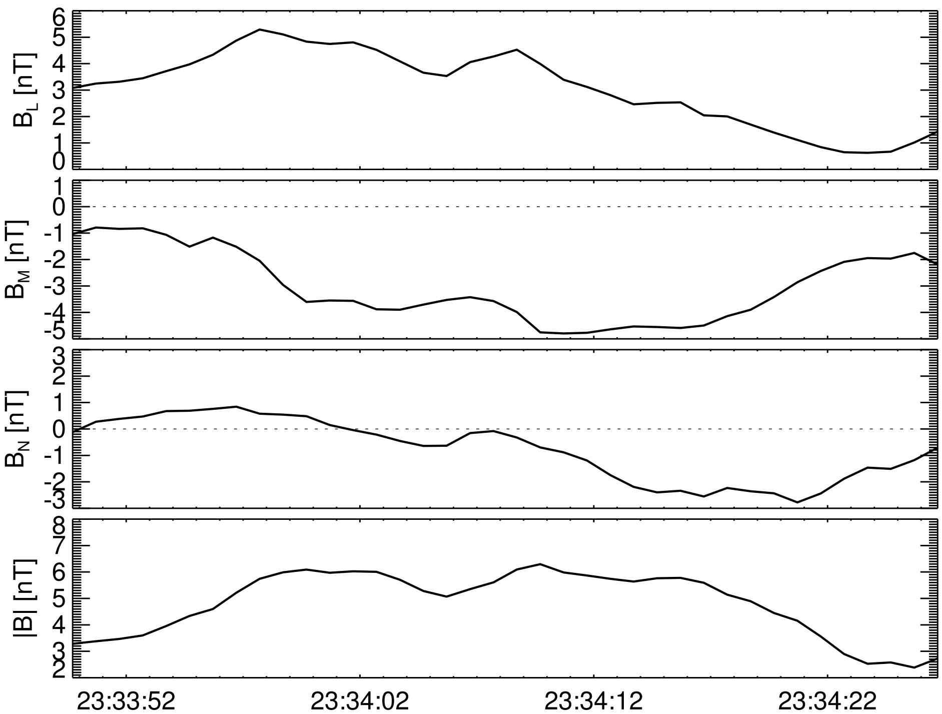

Figure S2. The FTE signature observed by MAG in magnetopause normal coordinates (LMN) using the *Arridge et al.*, (2006) magnetopause model.

Text S3.

The two different plasma populations in the FTE can been seen in the electron energy distributions. Figure S3 shows the energy distributions (from ELS anodes 4 and 5) within the magnetosphere (at 23:27 UT), the FTE, and the magnetosheath at 23:50 UT, as well as the latter two overlaid.

There are two electron energy distribution peaks in the FTE (panel b) highlighted by the arrows, containing an energized magnetosheath population and a magnetospheric population, from reconnection. Only one peak in the magnetosphere and magnetosheath, is seen. This difference is more prominent when the FTE and magnetosheath distributions are overlaid and the magnetospheric (high energy) population can be seen in the FTE. This evidence along with the typical flux rope signatures seen in the magnetic field measurements shows that the observed signature is an FTE.

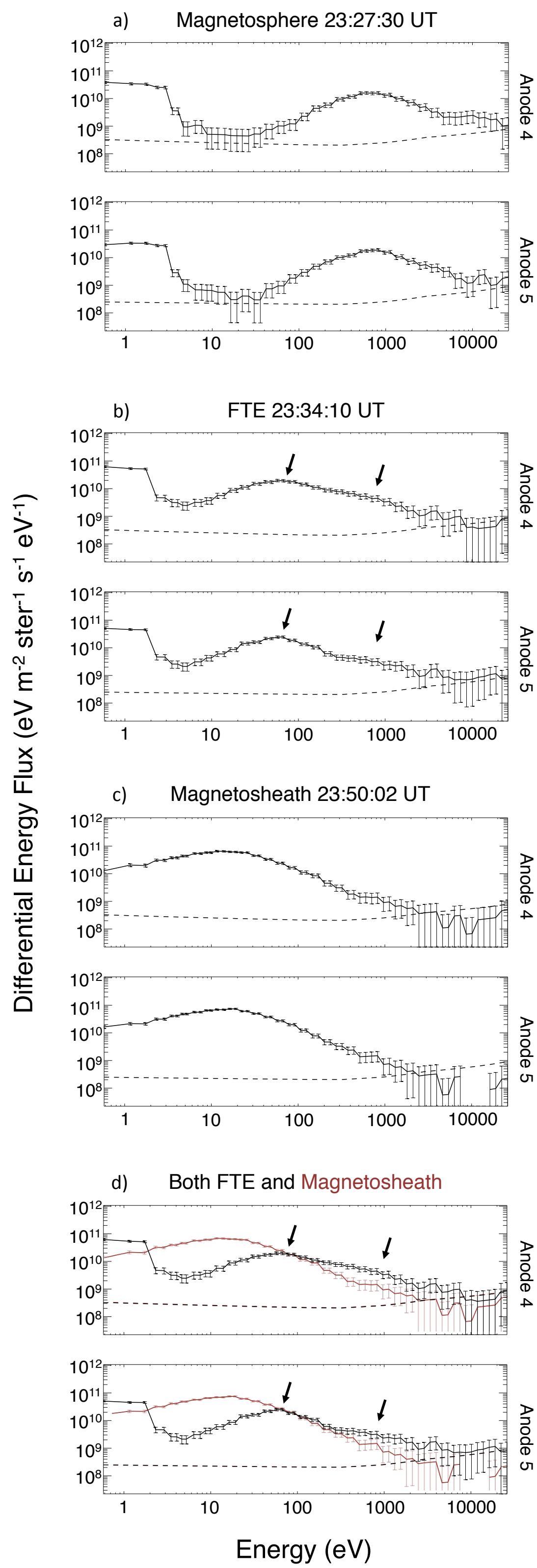

Figure S3. The electron energy distribution measured by anodes 4 and 5 of CAPS-ELS, in the magnetosphere, FTE, and magnetosheath, as well as the latter two overlaid.

References

Arridge, C. S., N. Achilleos, M. K. Dougherty, K. K. Khurana, and C. T. Russell (2006), Modeling the size and shape of Saturn's magnetopause with variable dy- namic pressure, Journal of Geophysical Research (Space Physics), 111, A11227, doi: 10.1029/2005JA011574.

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Zieger, B., and K. C. Hansen (2008), Statistical validation of a solar wind propagation model from 1 to 10 AU, Journal of Geophysical Research (Space Physics), 113, A08107, doi:10.1029/2008JA013046.