Transient Phenomena at Tail Bow shock and Magnetopause

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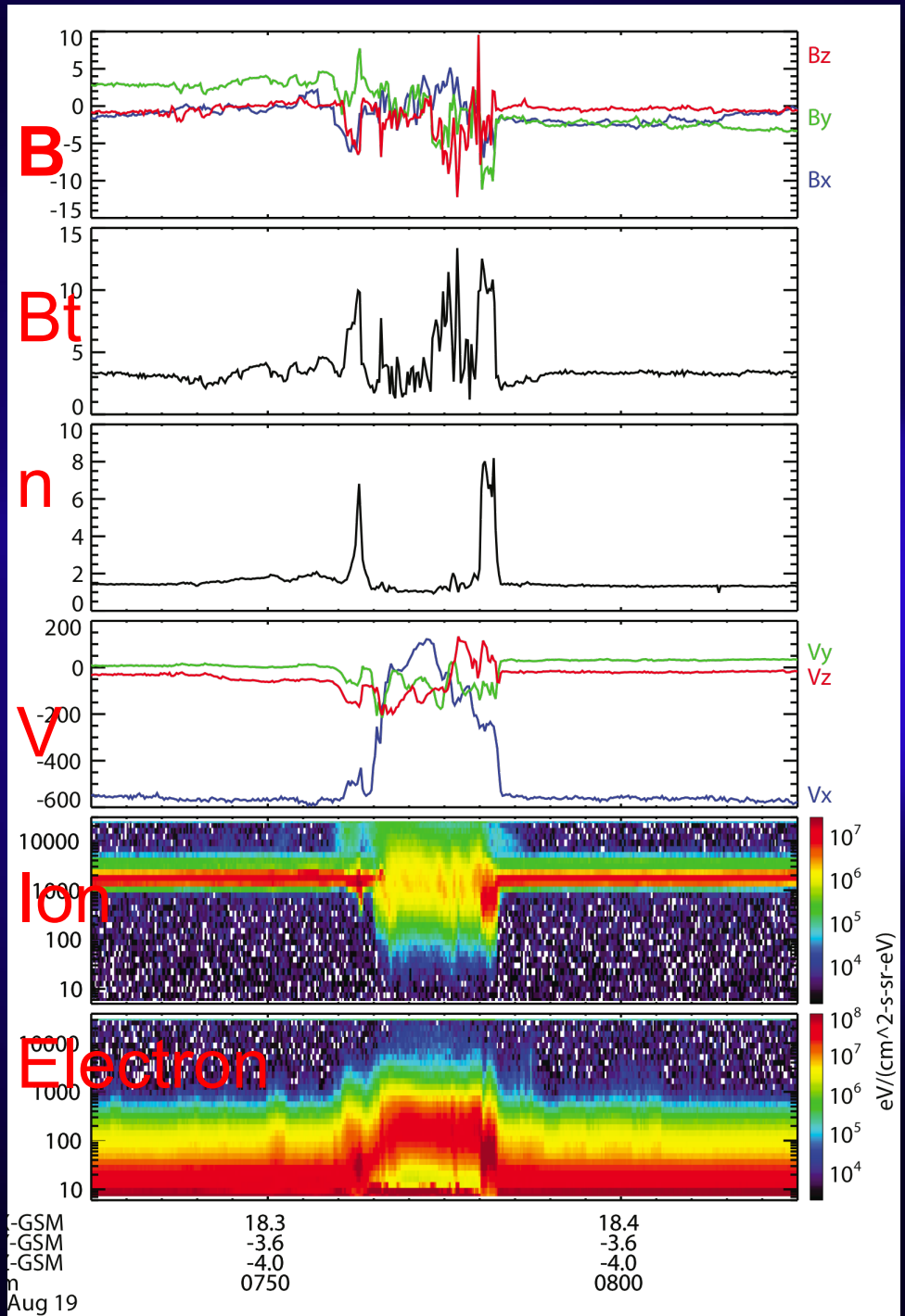
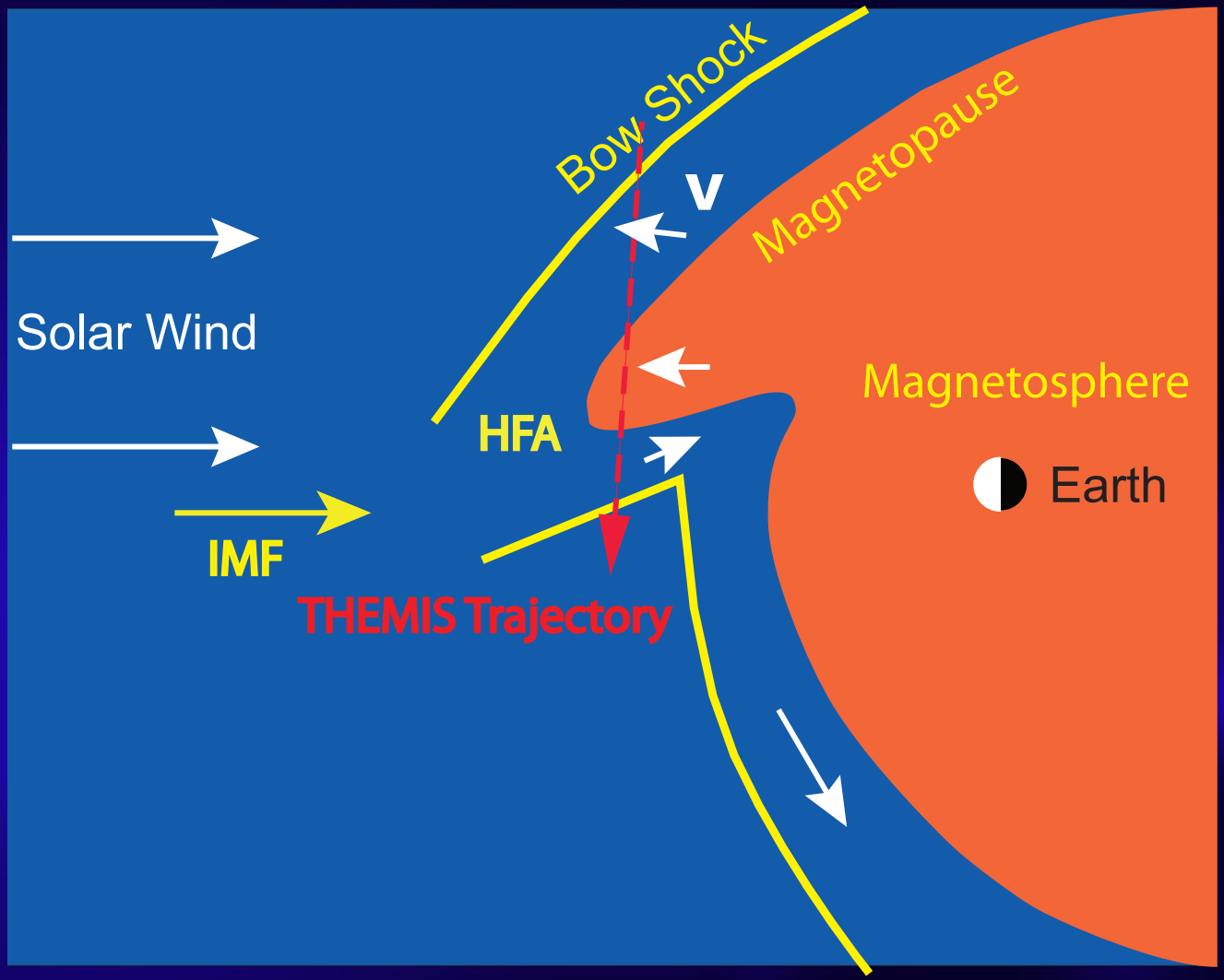


An Example of a Hot Flow Anomaly

Hot flow anomalies (HFAs) are events observed near the bow shock that are marked by greatly heated solar wind plasmas and substantial flow deflection.

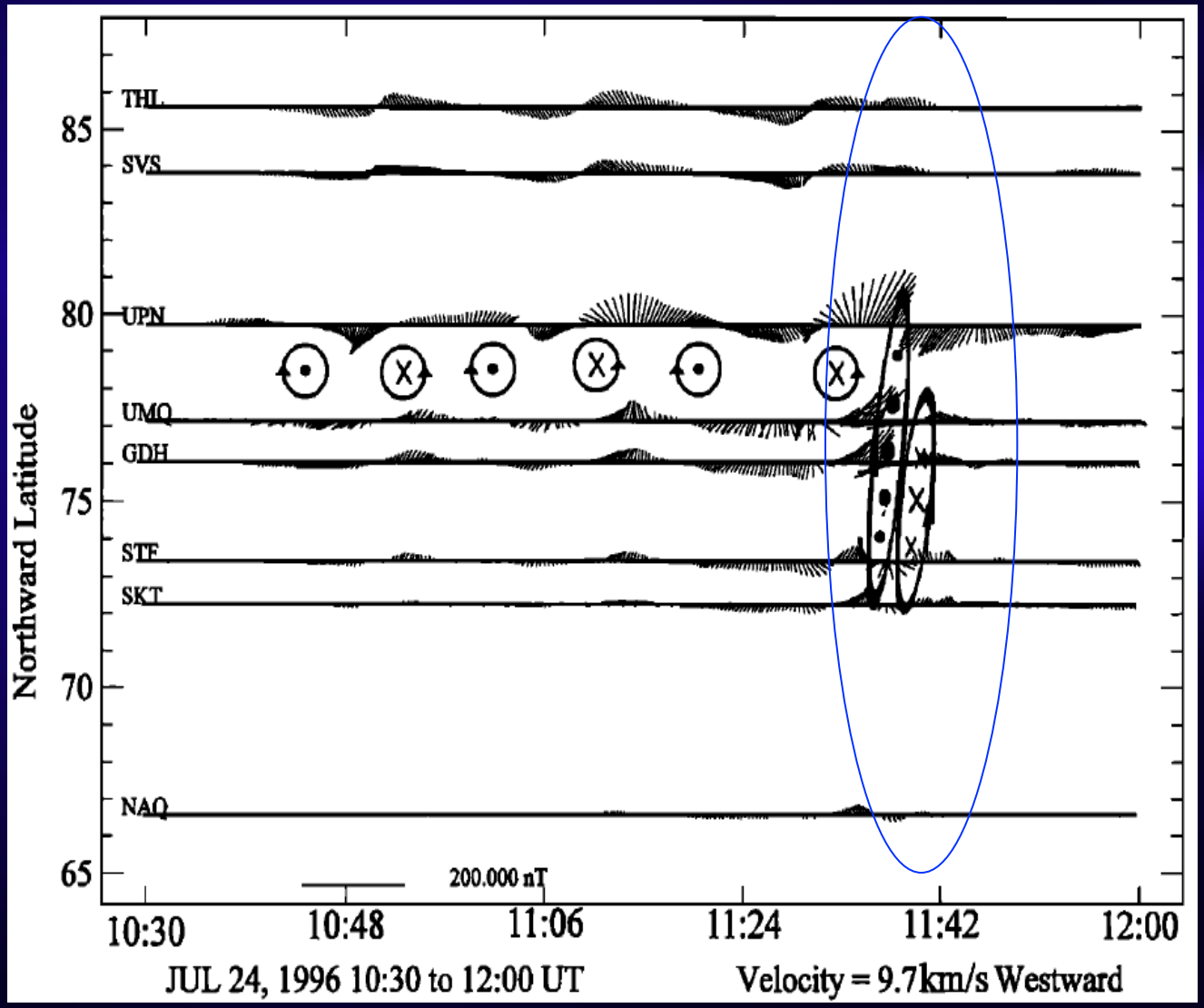
An HFA observed upstream from the Earth's bow shock. [Zhang et al., 2010]



- The magnetopause bulged out by at least 4 $R_{E.}$
- The event lasted 17 minutes => scale size in y direction > 10 R_E
- The bulge is convecting tailward with the magnetosheath flow at ~100 km/s.

Ionospheric TCV Triggered by an HFA

Ground Magnetometer Observations



- Ionospheric convection inferred from ground magnetometers located on the west coast of Greenland.
- Traveling Convection Vortices (TCVs) associated with field-aligned currents.
- The velocity of the TCVs, 9.7 km/s westward
- Lifetime ~ 18min

Sitar et al., JGR, 1998

How far down the tail can HFAs be observed?

Lifetime (~ 18min) x convection speed (100-500 km/s) = 17- 85 Re

Hot flow anomaly remnant in the far geotail?

G. Facskó et al., Journal of Atmospheric and Solar-Terrestrial Physics 124 (2015)

STEREO observations of an remnant at 310 Re

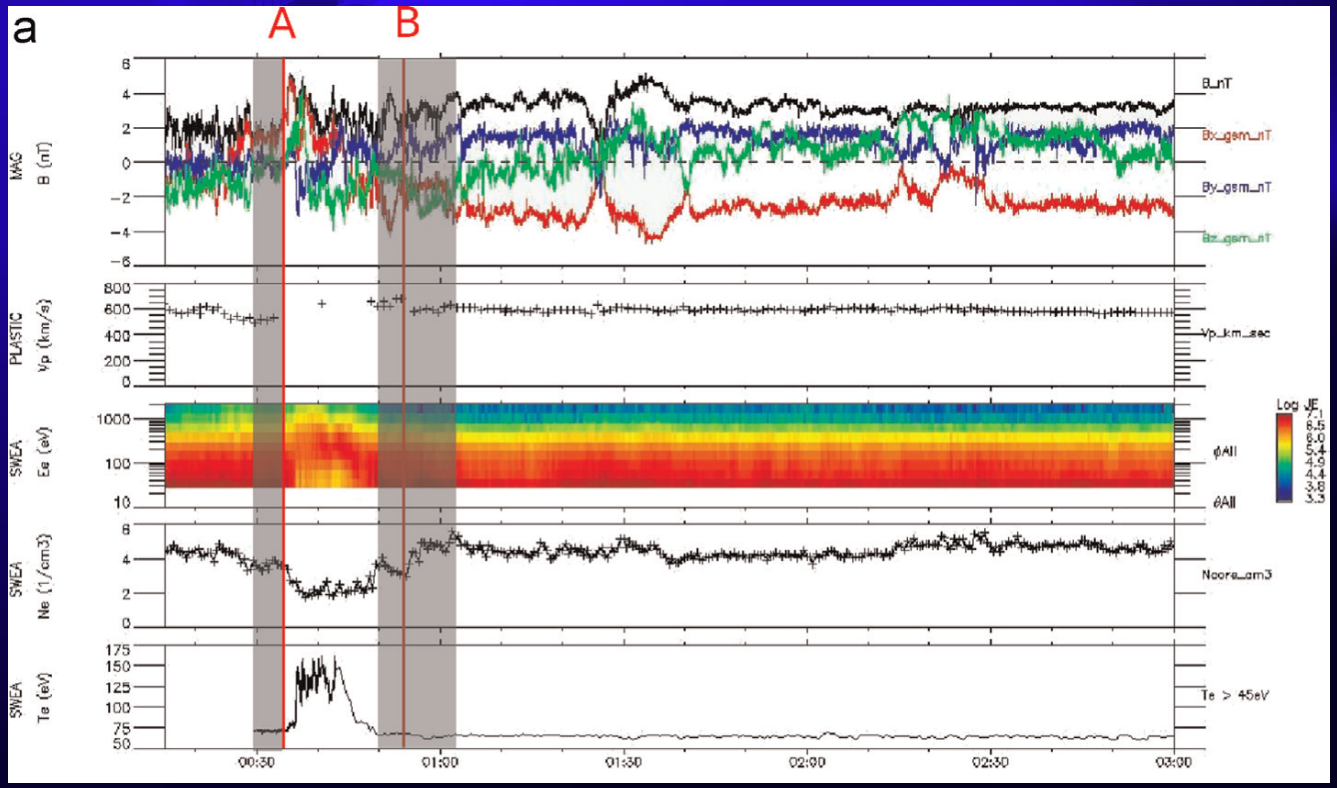
B

Vi

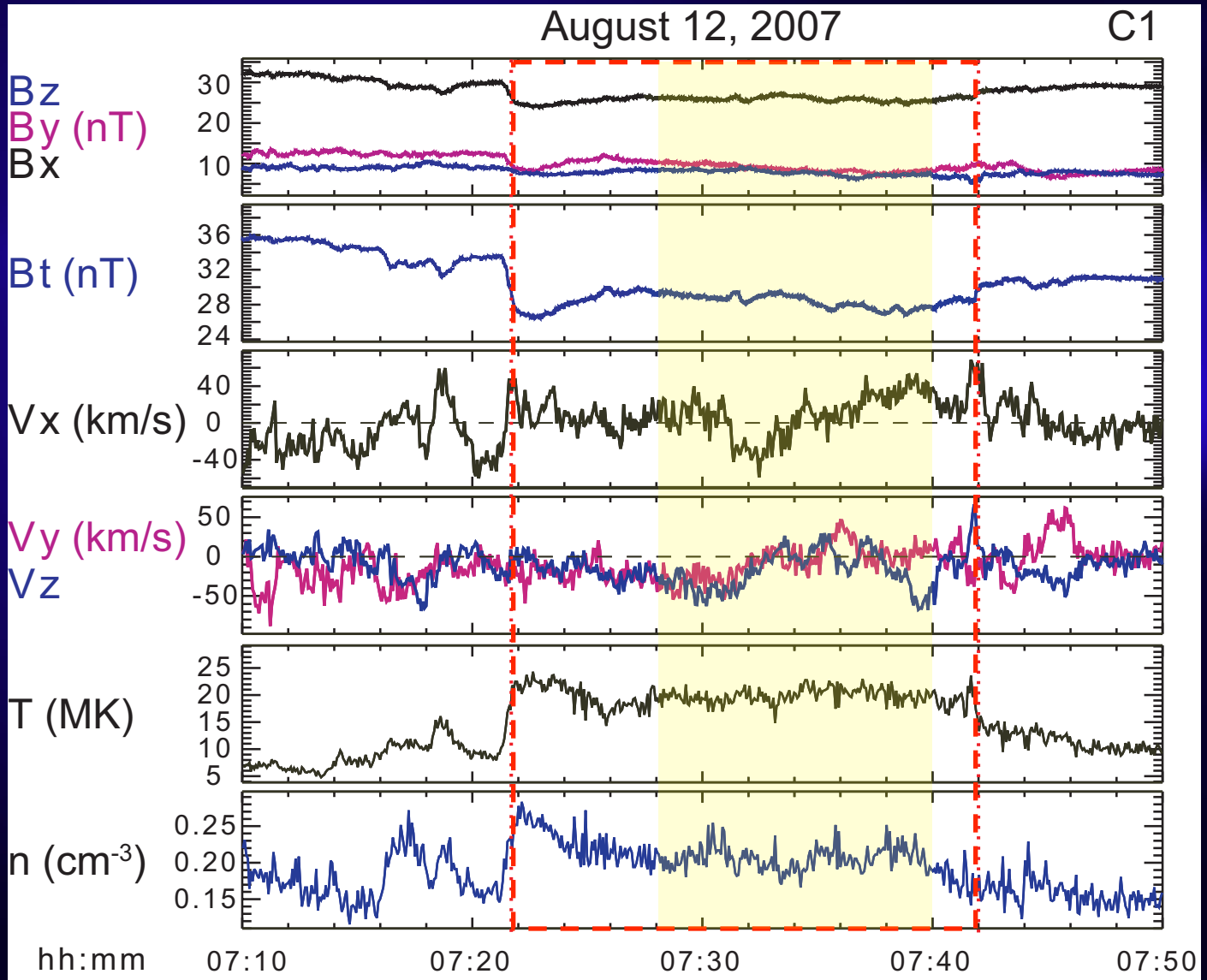
Electron

Ne

Te



Magnetotail Response to an HFA



Cluster Location in GSM

C1:
(-11.0, -8.8, 4.4)

Plasma Sheet Boundary Layer

Summary

It would be interesting to see

- What HFAs look like in the tail.
- Magnetotail response to dayside HFAs.