

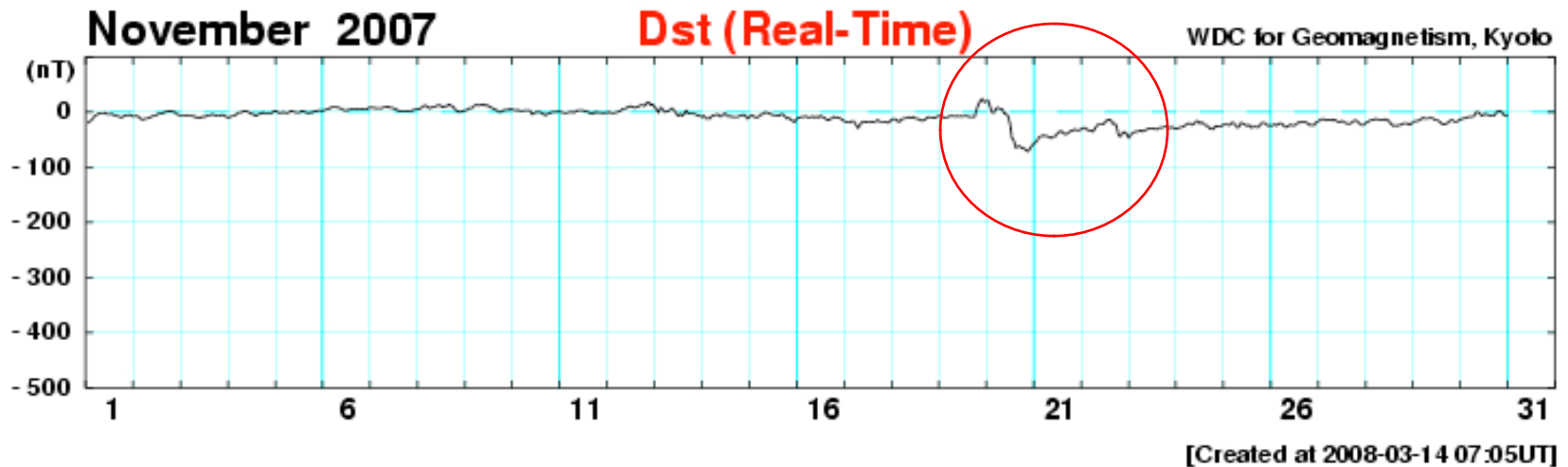
# **Multi-spacecraft Comparison of ICME Flux Rope Signatures**

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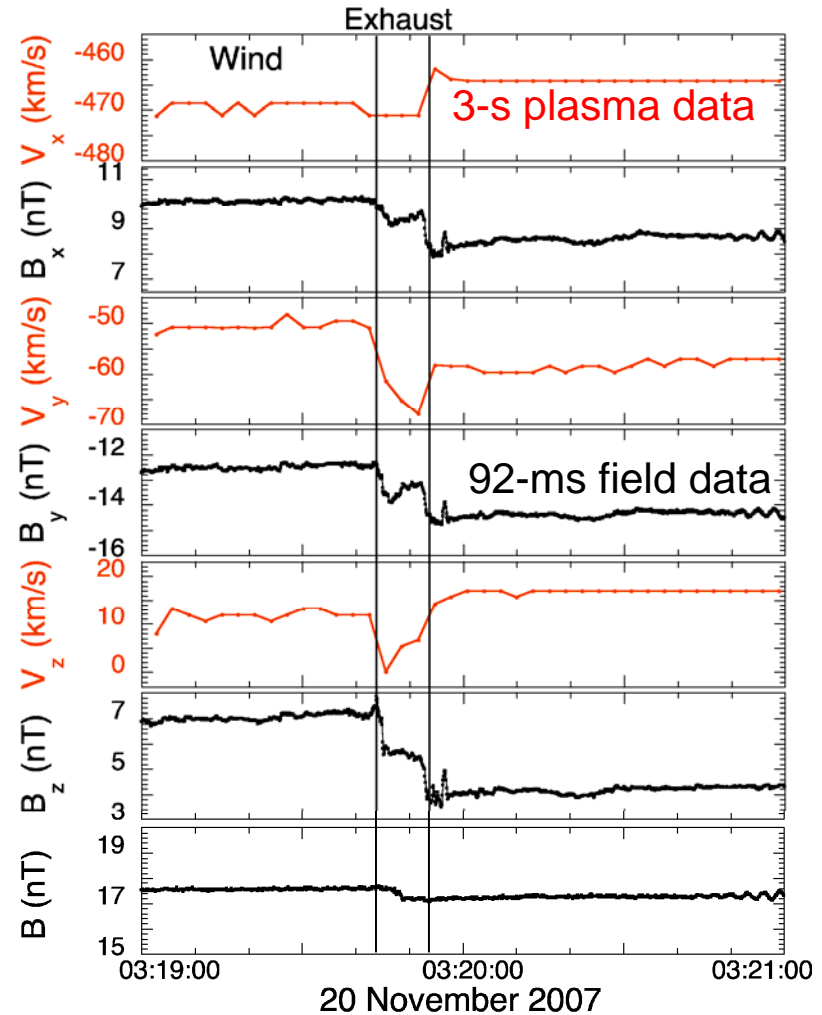
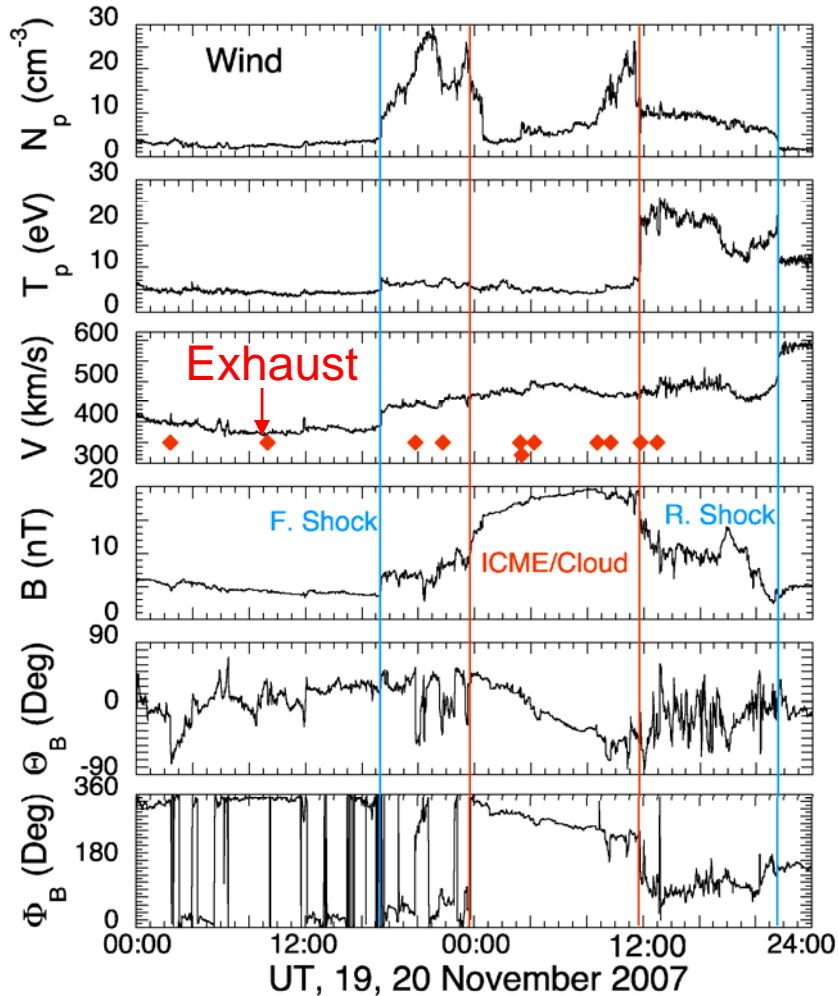
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# A Very Small Geomagnetic Storm Associated With an ICME/Cloud



# Reconnection Exhausts Associated with an ICME/Cloud-Driven Disturbance

Field Shear Angle =  $15^\circ$

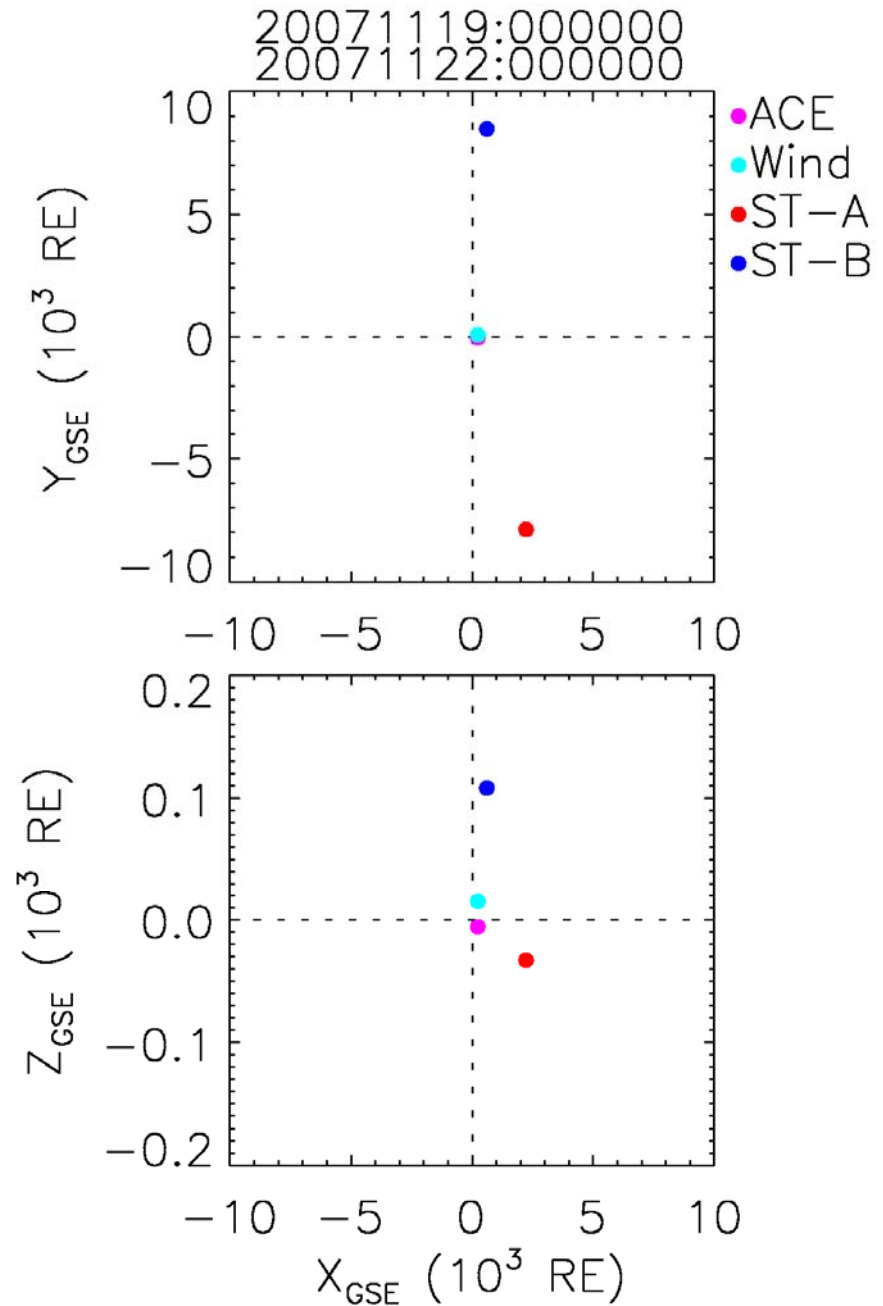


*11 exhausts in a 1.5-day interval.*

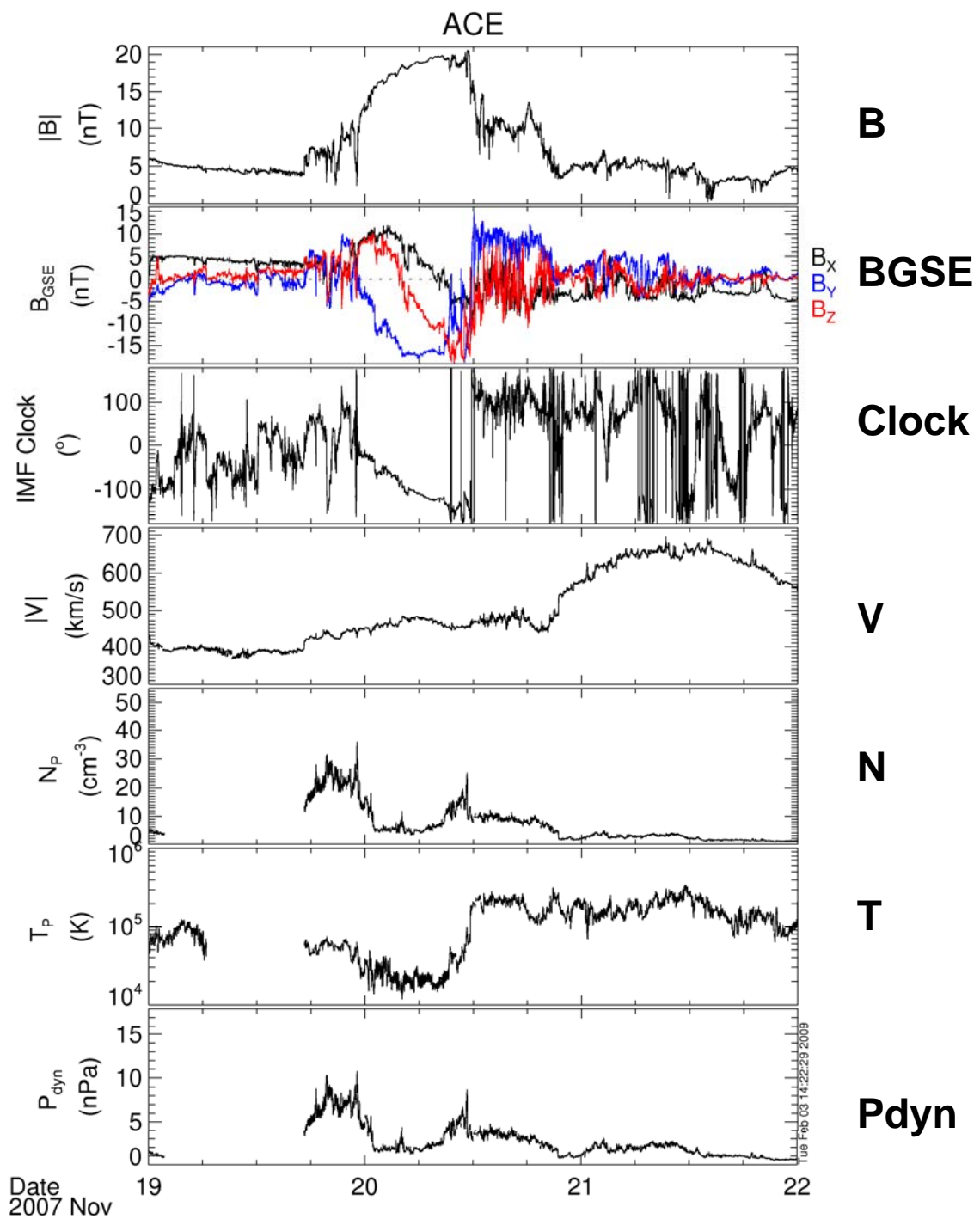
*5 exhausts within the cloud and 1 at trailing edge.*

*3 of cloud exhausts occurred at local field shear angles  $< 18^\circ$ !*

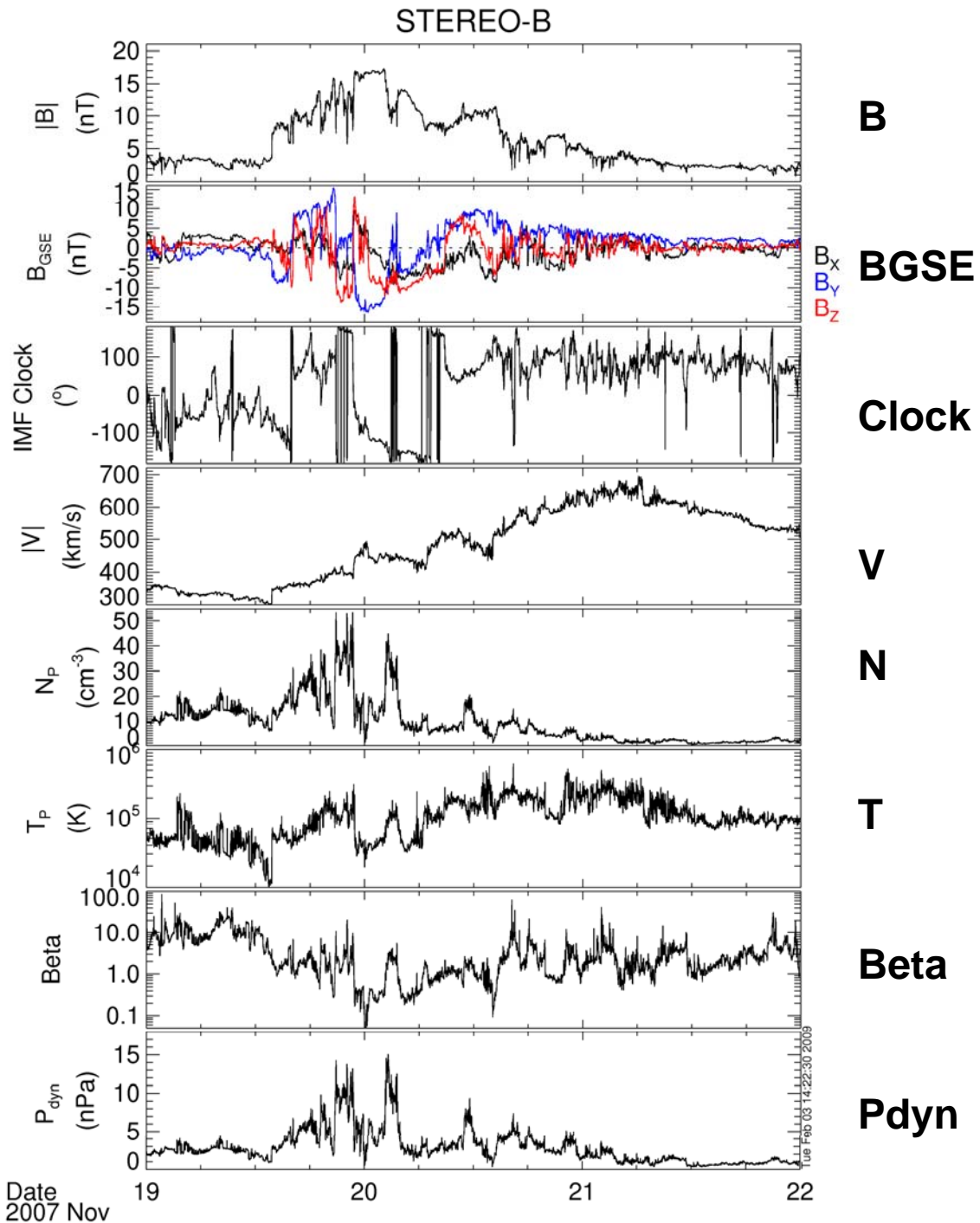
# 19 Nov 2007 GSE Positions



# 19-22 Nov 2007 ACE

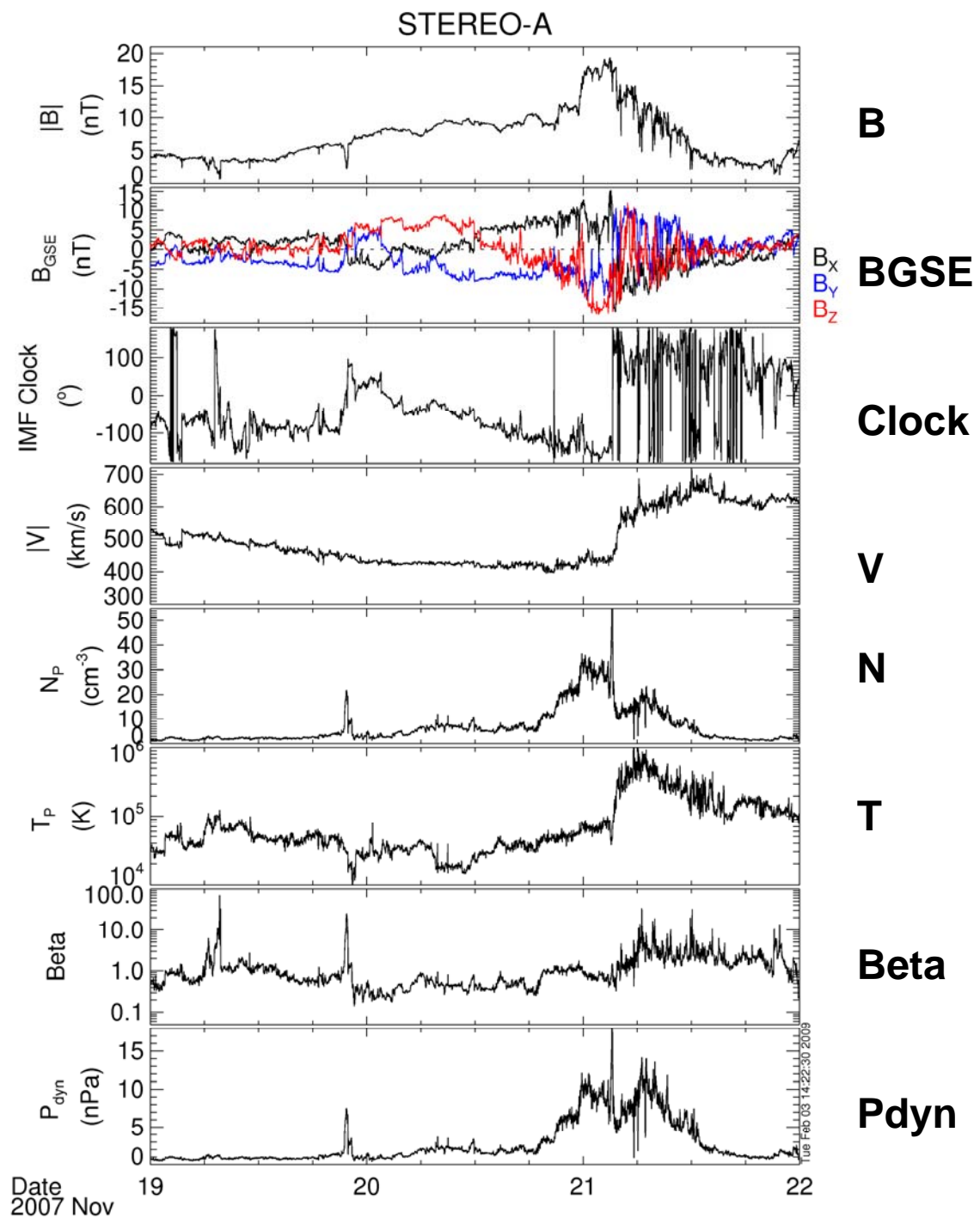


# 19-22 Nov 2007 STEREO-B



**IMF clock angle definition:**  
 $\theta = \arctan(B_Y/B_Z)$   
 $\theta = 0$  (northward BZ)  
 $\theta = 90$  (positive BY)

# 19-22 Nov 2007 STEREO-A



Note: Last day analyzed is January 2, 2008. List is updated on June 9, 2008.

## ICMEs Observed by STEREO A/B

| Comparison pair # | # | STEREO | Start time [Year Doy Month/Day HH:MM] | Magnetic obstacle (~ flux rope) start time | End time             | Ptmax [pPa] | Bmax [nT]   | Vmax [km/s] | $\Delta V^1$ [km/s] | Group <sup>2</sup> | Comment   |
|-------------------|---|--------|---------------------------------------|--|----------------------|-------------|-------------|-------------|---------------------|--------------------|---|
|                   | 1 | A & B  | 2006 348 12/14 14:12                  | 2006 348 12/14 23:04                       | 2006 349 12/15 14:08 |             | 18 (20)*    |             |                     |                    | plasma data data gap, like Group 3 event                                |
| 1                 | 2 | B      | 2007 142 5/22 04:20                   | 2007 142 5/22 04:20                        | 2007 142 5/22 22:00  | 135         | 17.5        | 480         | -60                 | 1                  | STEREO B: higher Ptmax, shorter. At both A & B, followed by fast stream |
|                   | 3 | A      | 2007 142 5/22 14:00                   | 2007 142 5/22 14:00                        | 2007 143 5/23 13:30  | 63          | 11.5        | 540         | -80                 | 2                  |   |
|                   | 4 | B      | 2007 296 10/23 10:35                  | 2007 296 10/23 16:50                       | 2007 297 10/24 00:07 | 50 (125)    | 10.3 (10.6) | 395 (420)   | -35                 | 2                  | not nice B rotations, slow, low $\beta$ , followed by a SIR             |
|                   | 5 | B      | 2007 364 12/30 02:00                  | 2007 364 12/30 07:00                       | 2008 1 1/1 05:50     | 120         | 12          | 365 (378)   | -85                 | 1                  | fuzzy plasma data, slow, nice <b>B</b> rotations, left-handed flux rope |

(\*)\*: values are from the region including the sheath region

$\Delta V^1$ : temporal variation of solar wind speed over one event

Group<sup>2</sup>: We sort ICMEs into 3 groups depending on their temporal profiles of Pt. Corresponding to the Group 1, 2, and 3 ICMEs, the Pt profile, excluding any shock and/or sheath region (if present), respectively, has a central pressure maximum, a steady plateau, or a gradual decay. In the hypothesis that all ICMEs have a central flux rope, these three groups of Pt profiles are due to different approach distances to the central flux rope. Group 1 ICMEs are assumed to be the ones penetrated by spacecraft near the flux rope axis, and they usually present signatures of magnetic clouds. See Jian et al. [2006a] for more detail.

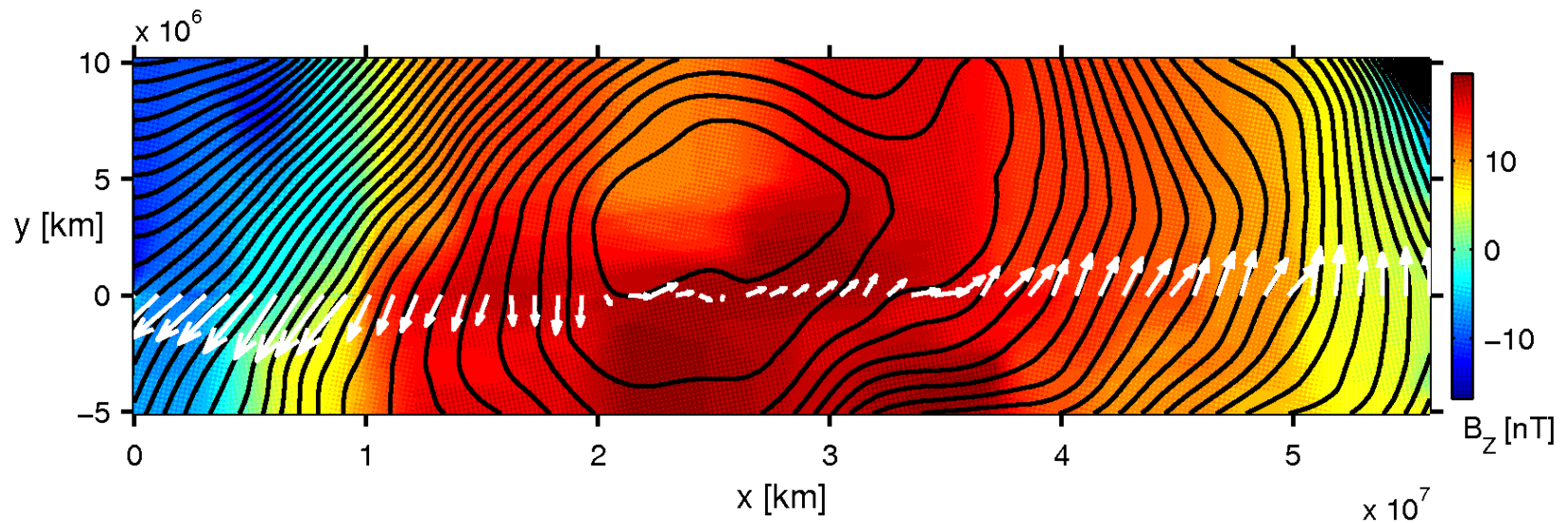
[http://www-ssc.igpp.ucla.edu/~jlan/STEREO/Level3/STEREO\\_Level3\\_ICME.pdf](http://www-ssc.igpp.ucla.edu/~jlan/STEREO/Level3/STEREO_Level3_ICME.pdf)



# G-S Reconstruction of a Magnetic Cloud Observed by Helios

MC Orientation=[ 0.28734 -0.87541 0.38872 ]

B-Field Map: 04-Jan-1978 08:00:00 – 05-Jan-1978 12:00:00



x axis= 0.95653 0.24112 -0.16407

y axis= 0.04990 0.41896 0.90663

# Proposed Analysis

- Perform GS-like and MHD reconstructions of three flux rope events in 2007 for different STEREO intra-spacecraft separations.
- Compare magnetic field and plasma structure at different positions relative to flux rope. Emphasis on IMF clock angle.

# 19-22 Nov 2007 Multi-spacecraft comparison relative to ACE

ST-A - 16 hrs

ST-B + 3.5 hrs

