

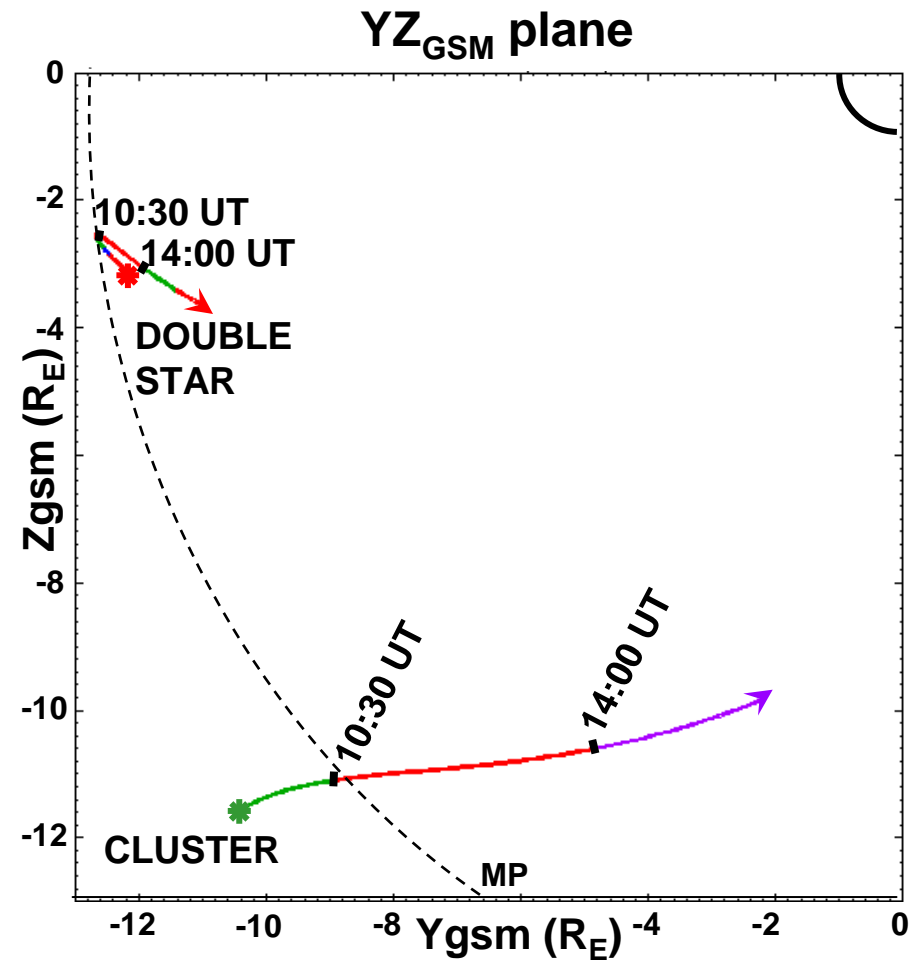
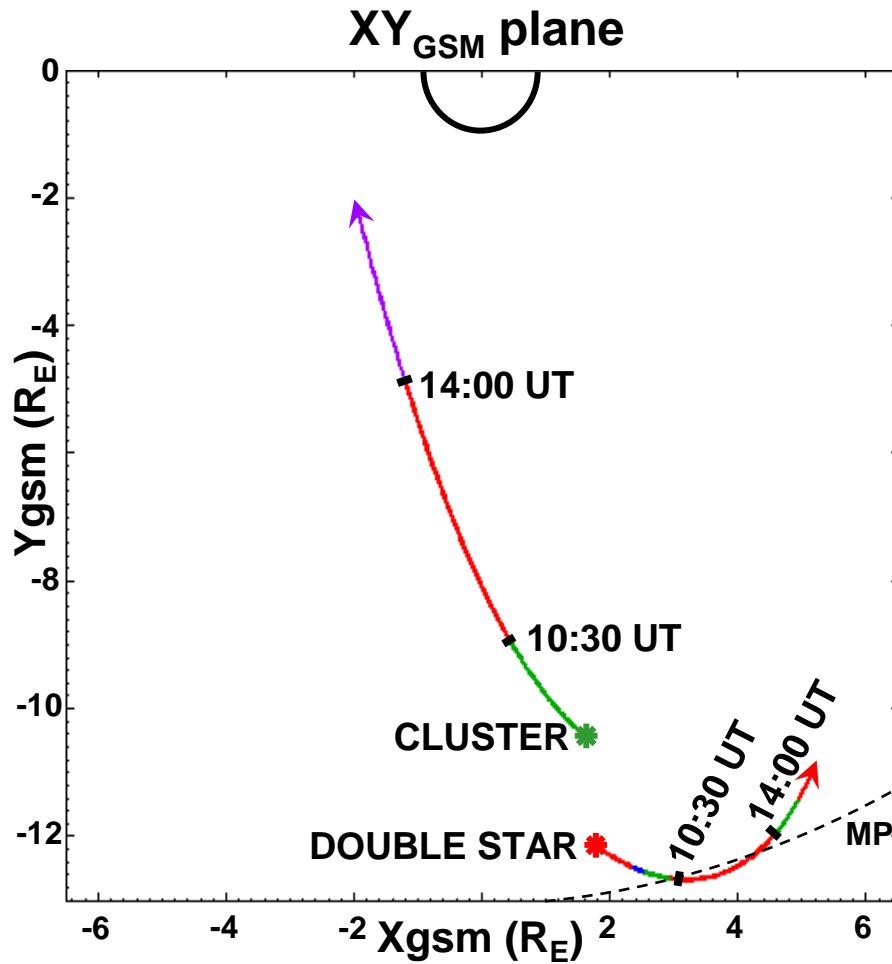
# **Double Star and Cluster observations of FTEs on the dawnside flank of the magnetosphere**

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# Conjunction Geometry

## 08/05/2004 – 08:00-16:00 UT



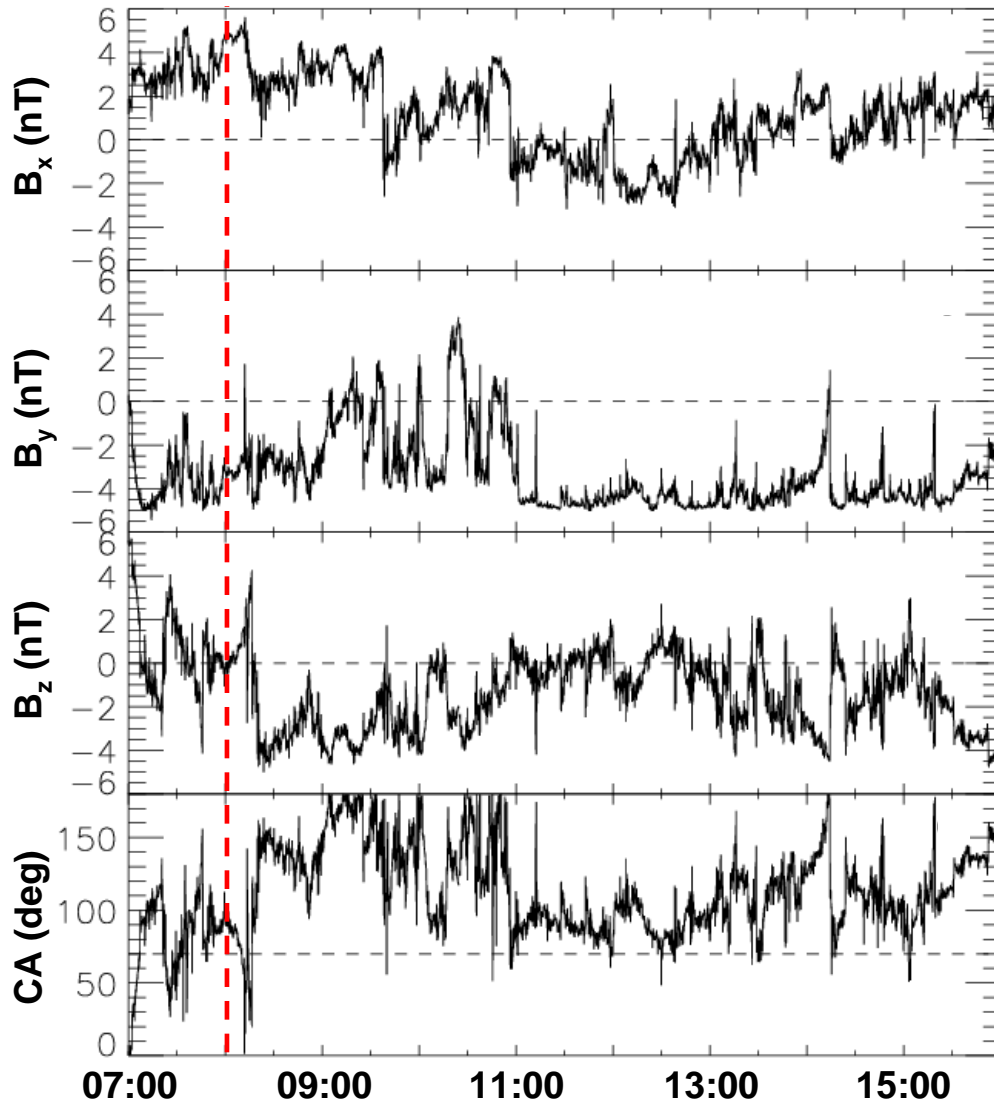
— Magnetospheric FTEs  
 — Magnetosheath FTEs

— Inner Magnetosphere  
 — Boundary Waves (MSP/MSH)

# WIND IMF data



08/05/2004 – 08:00-16:00 UT



- **Delay WIND-Earth:**

23 min

- **IMF data:**

very variable

$|\text{IMF clock-angle}| > 70^\circ$

- **Plasma data:**

Stable:  $V_{sw} \sim 480 \text{ km.s}^{-1}$

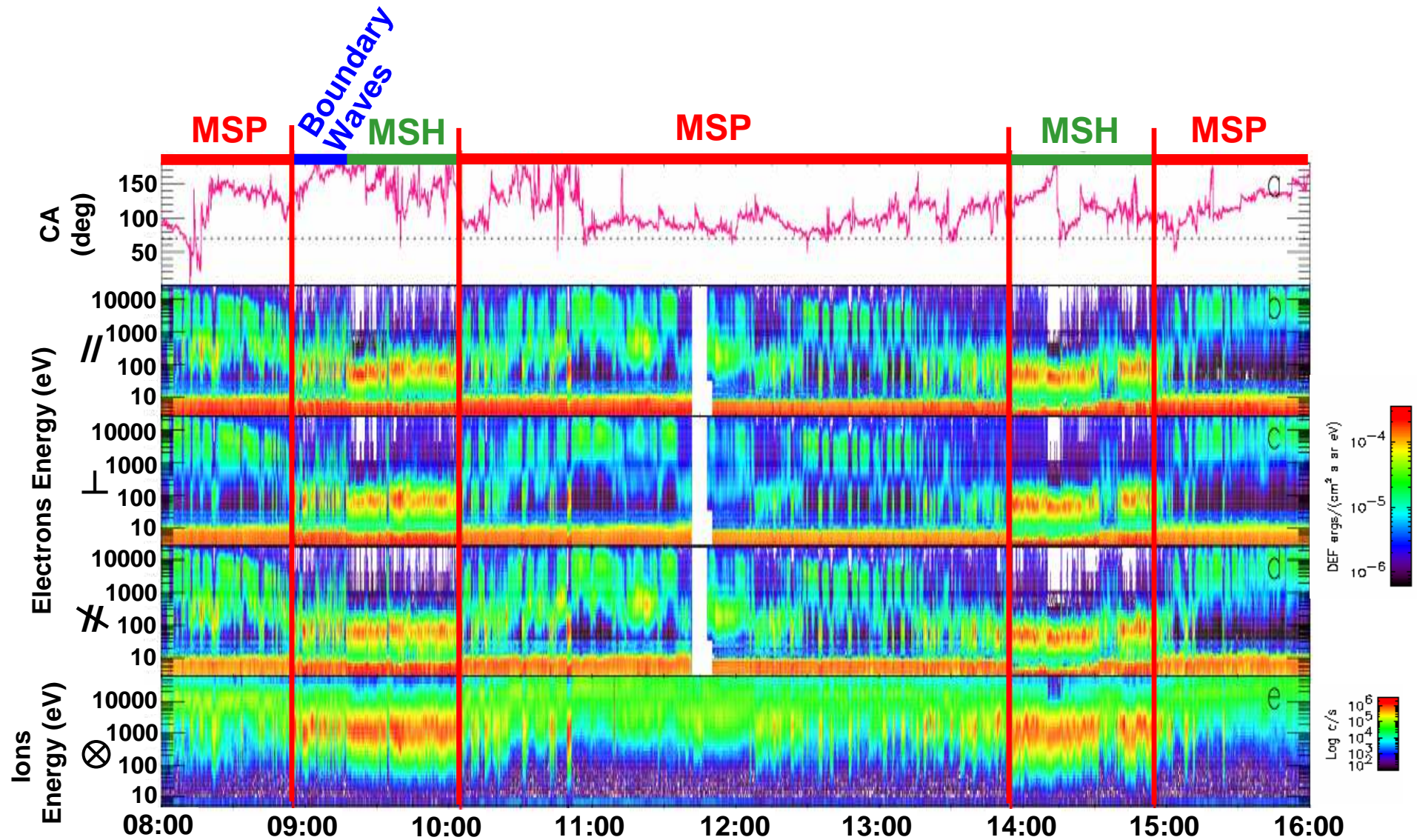
$P_{sw} \sim 1.5 \text{ nPa}$

GSM Coordinates -  $X_{GSM} = 96 R_E$ ,  $Y_{GSM} = -25 R_E$ , and  $Z_{GSM} = -19 R_E$

# Overview Double Star data



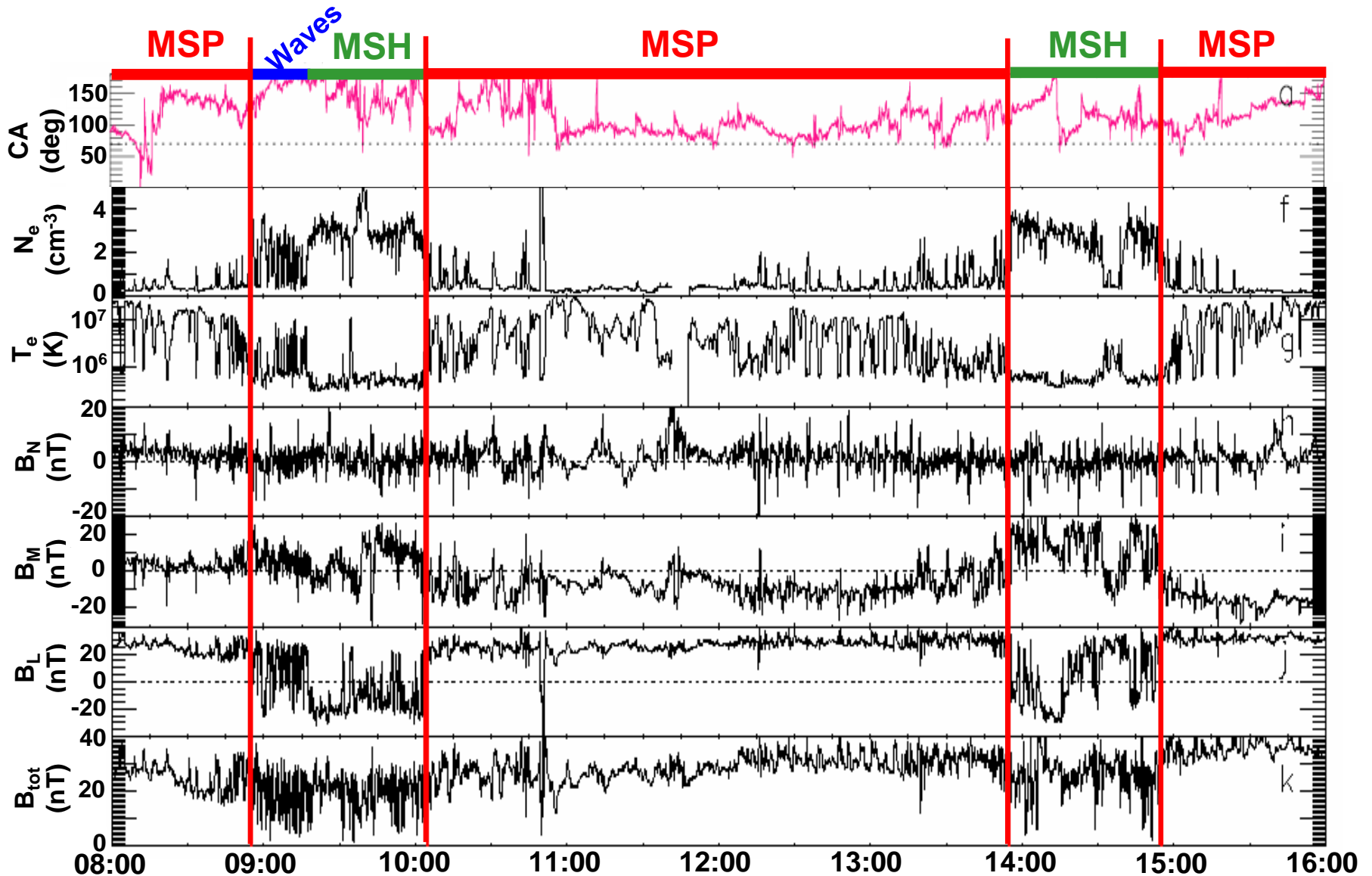
(PEACE-HIA) 08/05/2004 – 08:00-16:00 UT



# Overview Double Star data



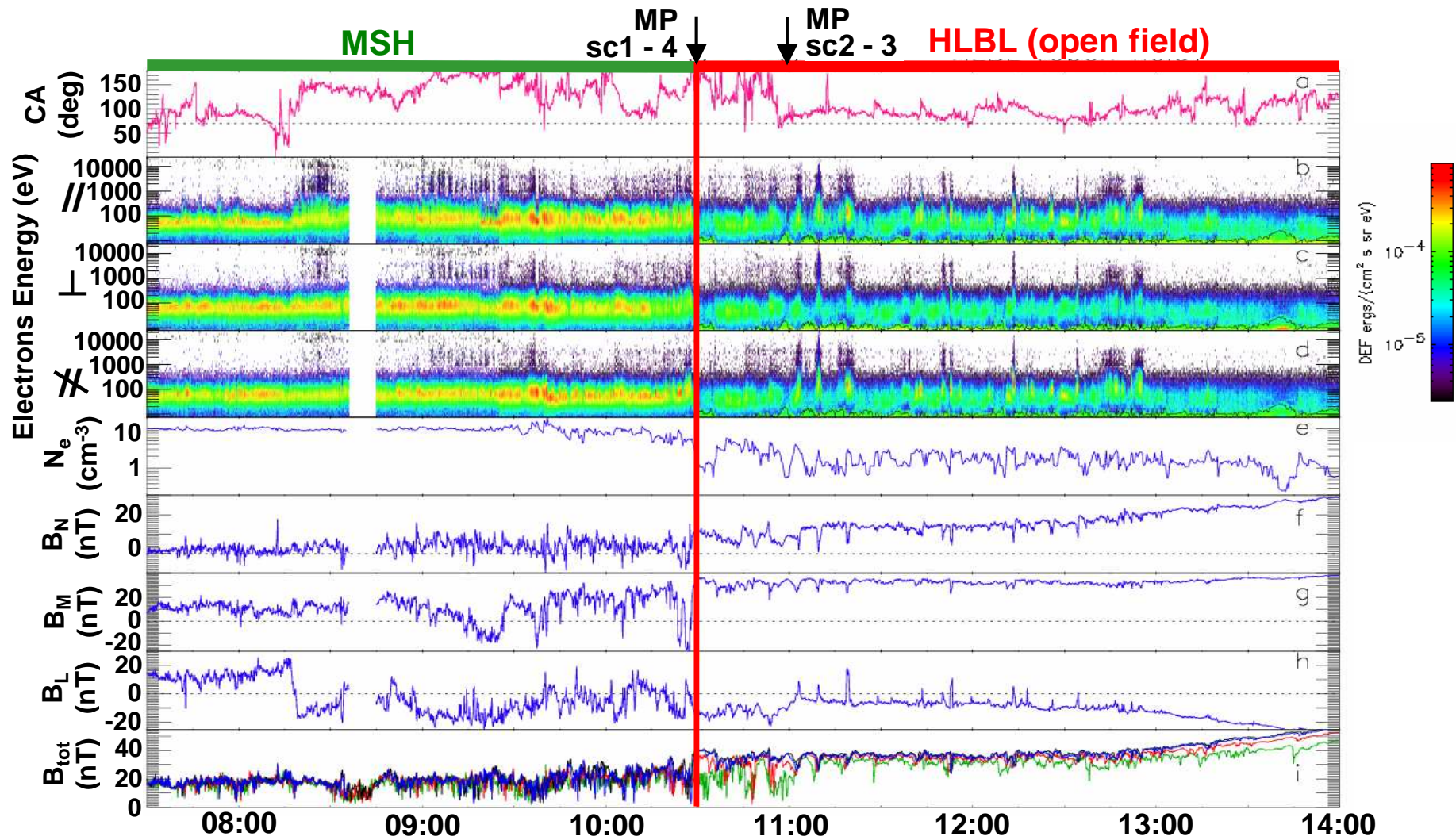
(PEACE-FGM) 08/05/2004 – 08:00-16:00 UT



# Overview Cluster-4 data



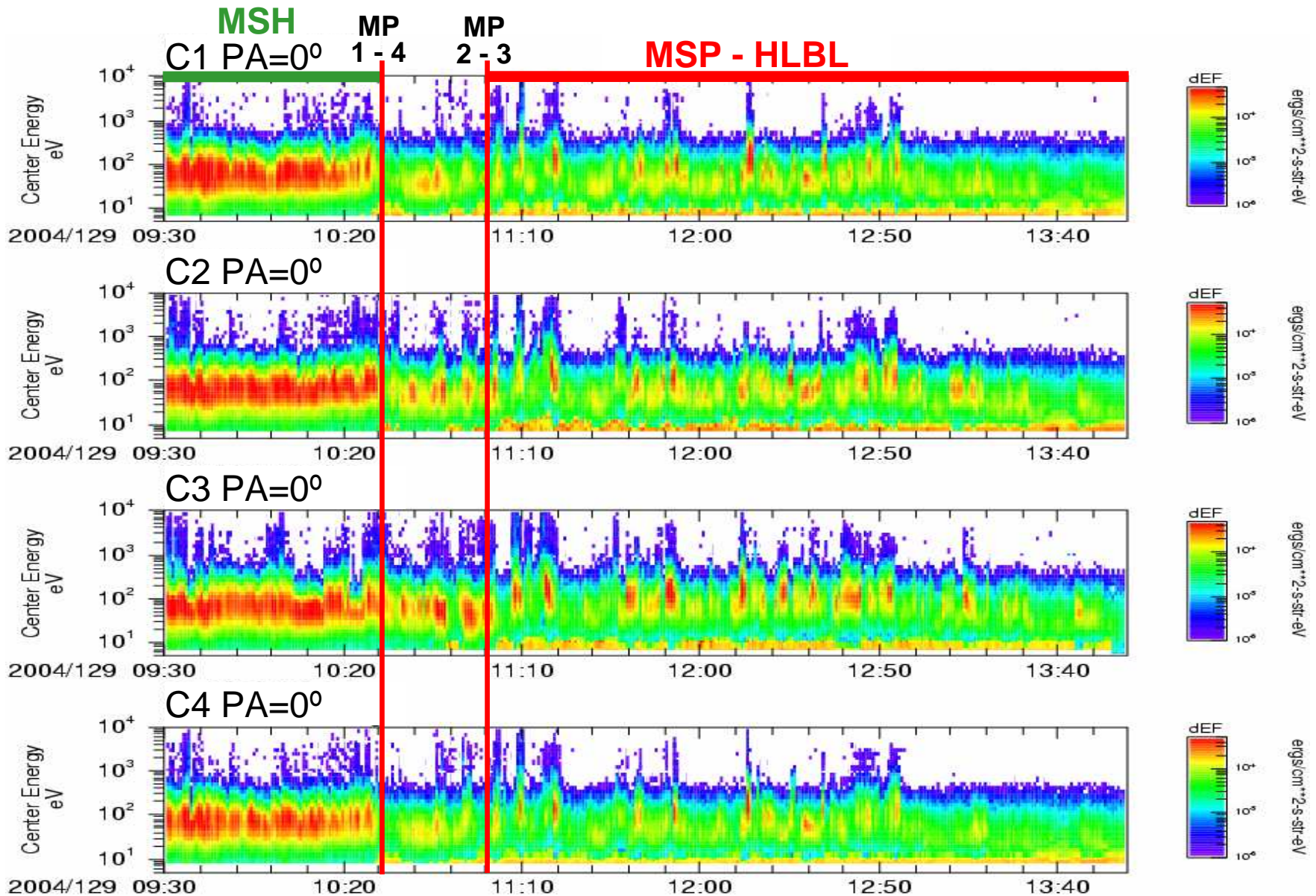
(PEACE-FGM) 08/05/2004 – 08:00-16:00 UT



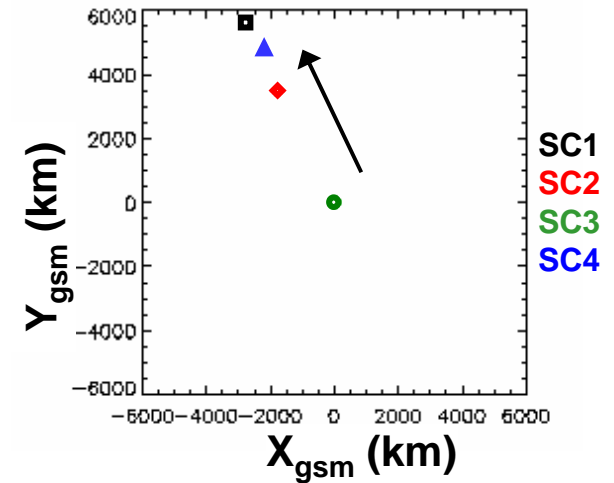
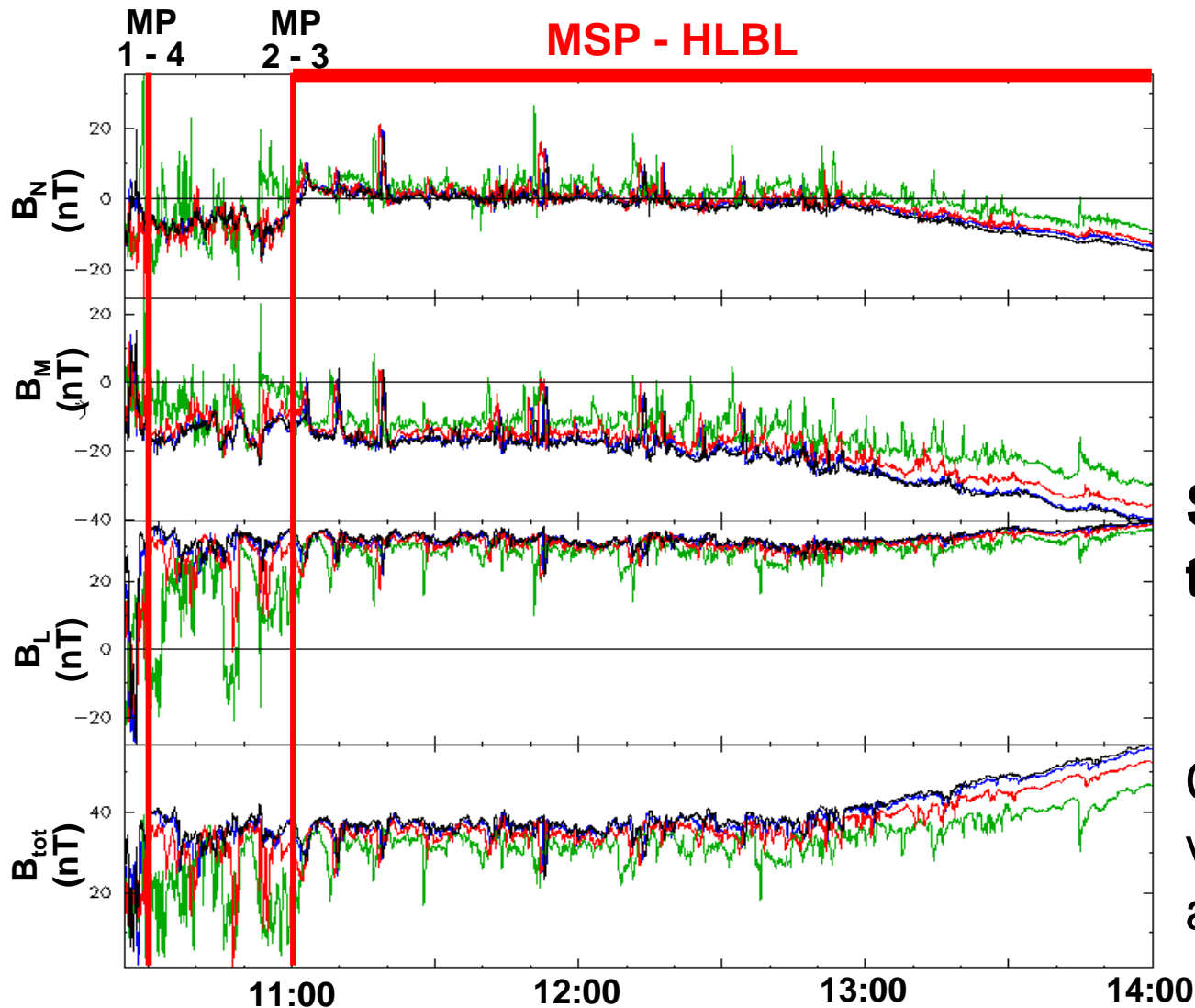
# Overview Cluster PEACE data



## 08/05/2004 – 09:30-14:00 UT



# Drift velocity of the injections from 4-Cluster measurements (FGM data)

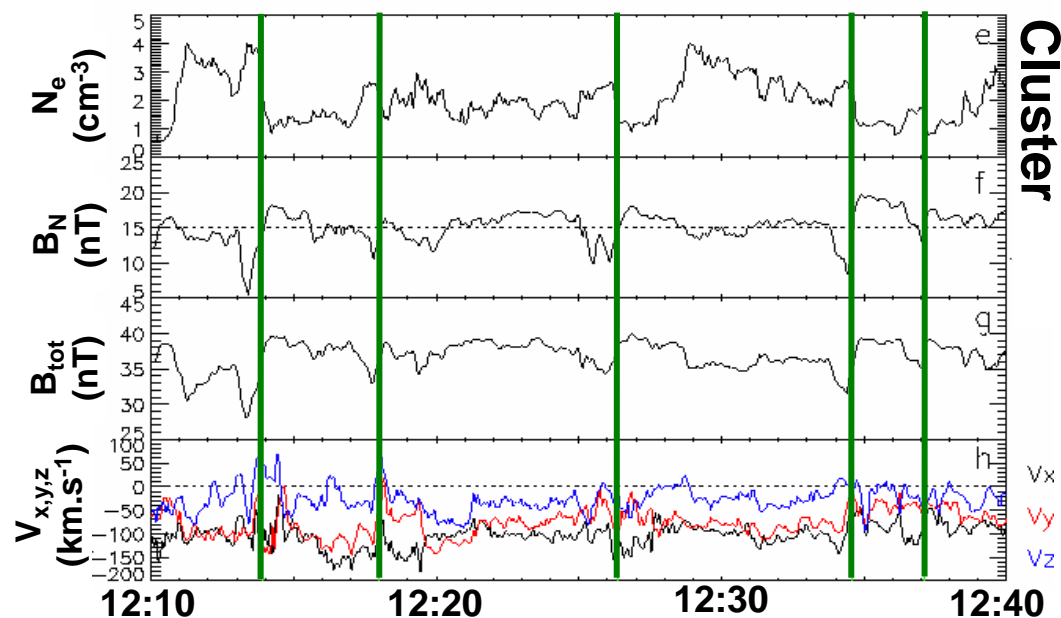
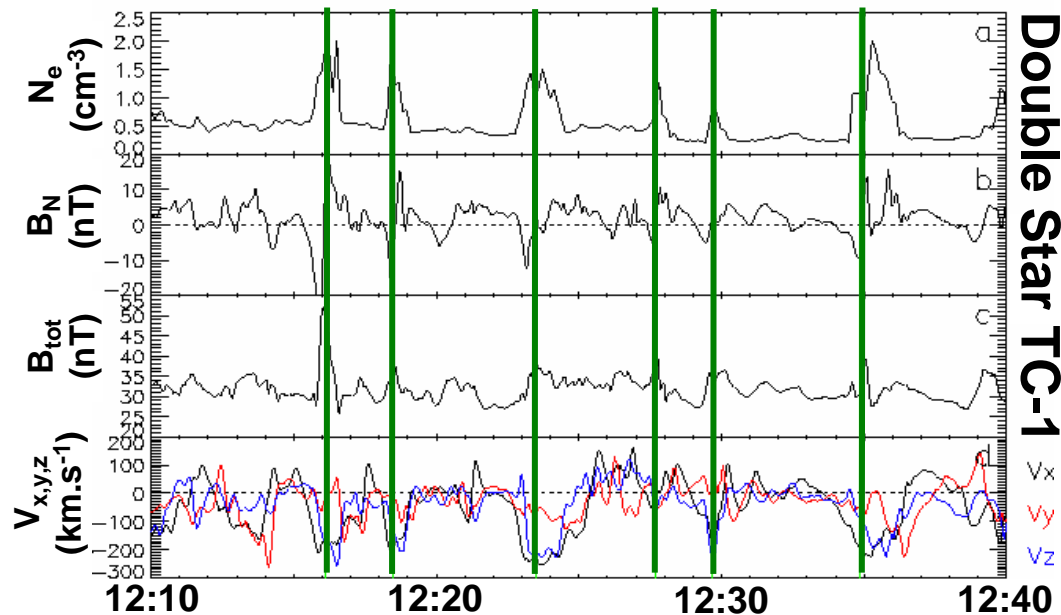


**SC entry order in all the injections :**

**3 2 4 1**

Consistent with a drift velocity mainly tailward and dawnward





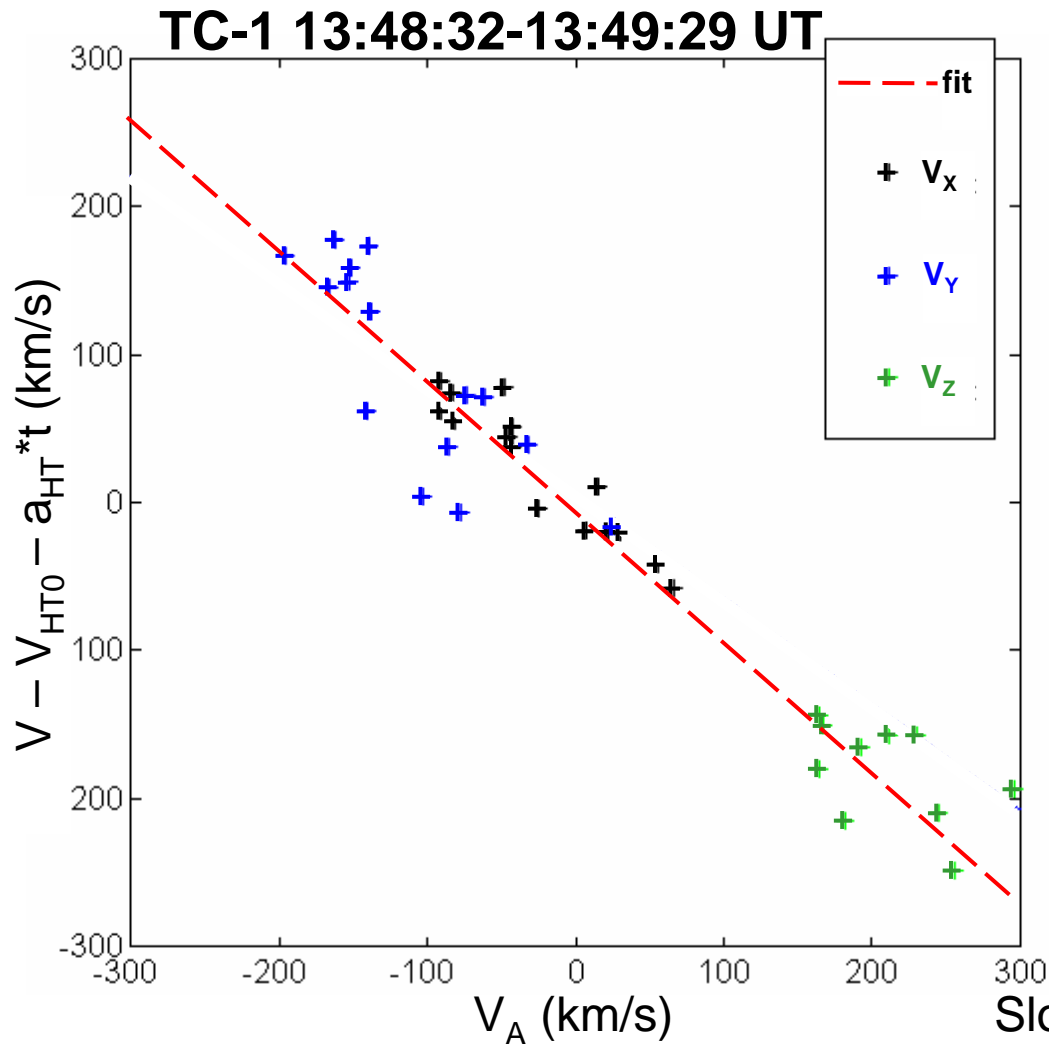
## • Observations:

- Increase of  $N_e$
- Increase of  $B_{\text{tot}}$  for TC-1  
Decrease of  $B_{\text{tot}}$  for Cluster
- Increase of the ion velocity of TC-1 mainly tailward, dawnward and southward
- “Reverse” bipolar signatures in the  $B_N$  component observed by Double Star and Cluster

→ **Cluster and Double Star are located southward of the reconnection site throughout the period**

- No one-to-one correspondence between the reconnection signatures observed by Cluster and TC-1

## proof of magnetopause reconnection seen by TC-1



- Average  $V_{HT}$  (km/s):

(-235.88, -138.10, -104.70)  
(GSM coordinates)

**$V_{HT}$  directed tailward,  
dawnward and southward**

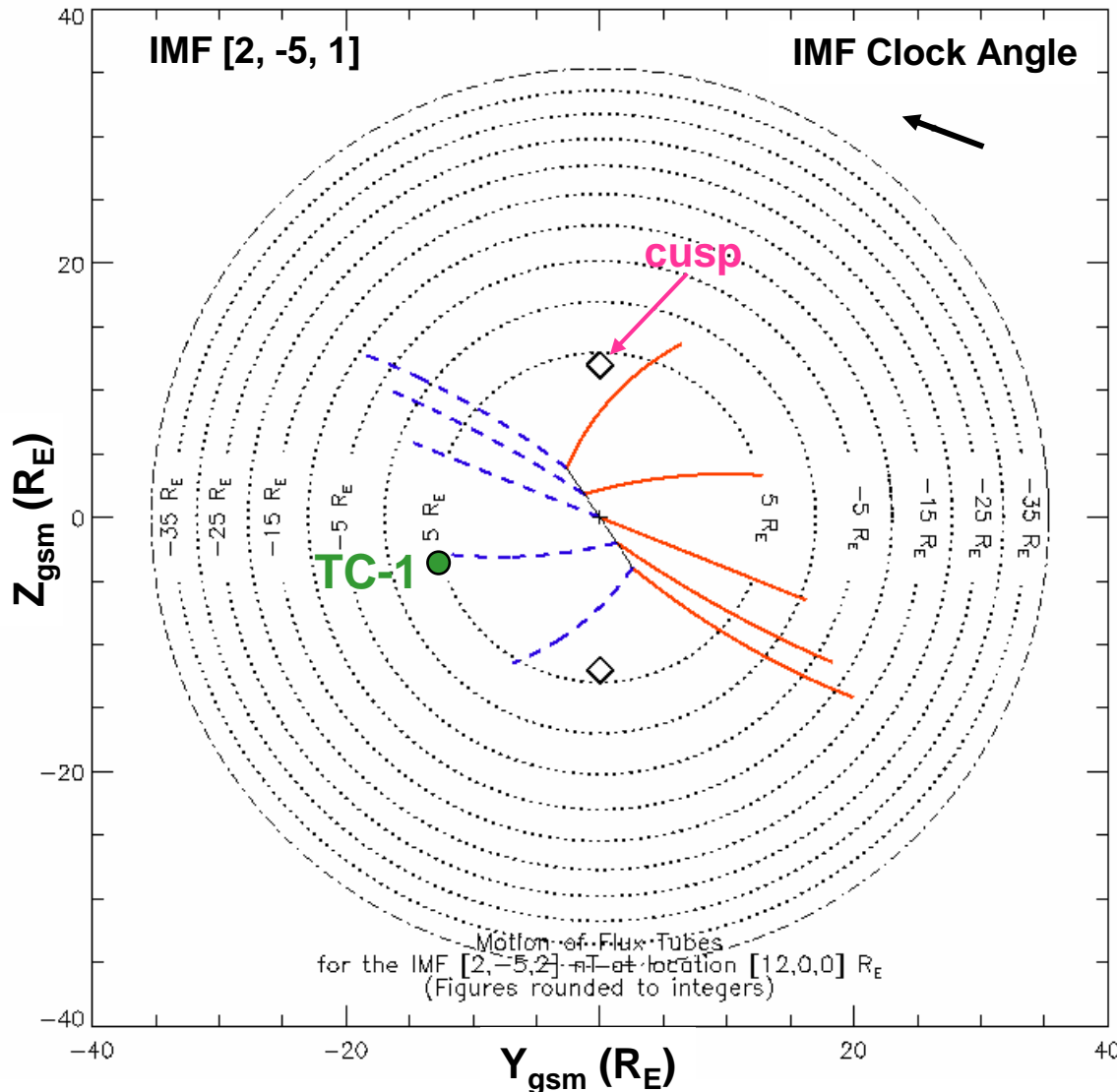
Slope  $\sim -0.9$

Reference interval : 13:49:00-13:49:20 UT

$nH^+ = 94\%$   $nHe^{++} = 6\%$

# Possible Geometry of the magnetopause reconnection (1)

## View from the Sun



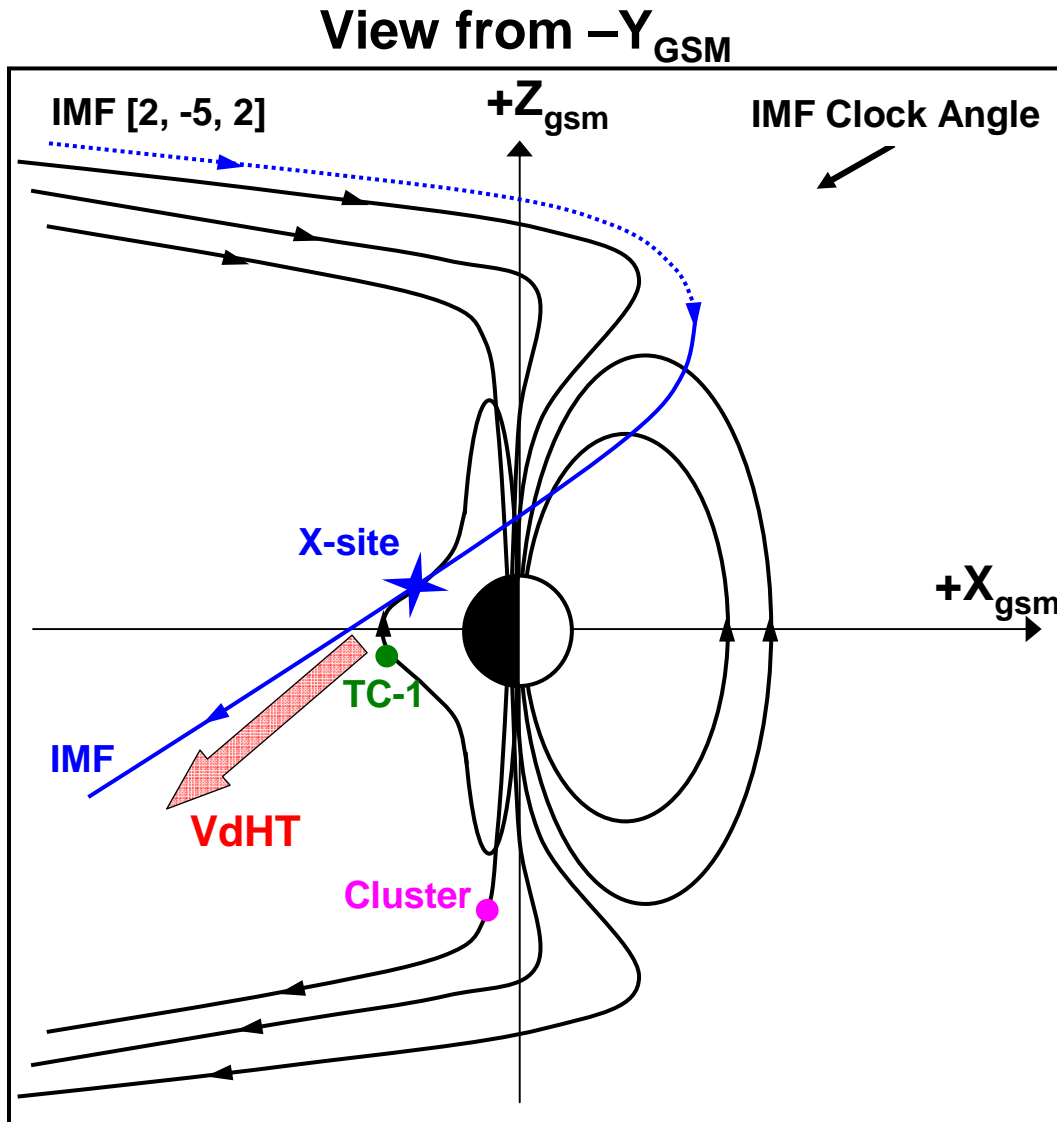
## Subsolar Reconnection

### Model from Cooling et al. (2001)

- Model velocity of the flux tube crossing TC-1 position: mainly tailward, dawnward, but slightly northward
- TC-1 observations show southward velocity of the flux tubes

→ **Geometry unlikely**

# Possible Geometry of the magnetopause reconnection (2)



## Reconnection on the dawnside flank

**Distorted dipolar  
magnetic field on the  
flanks, from Tsyganenko  
Model (2001)**

- In agreement with TC-1 observations of the reconnected flux tubes properties

**→ Reconnection site  
close to the equatorial  
plane and TC-1 position**

- The reconnection site is located northward of both Double Star and Cluster and the reconnection signatures observed by all the spacecraft are similar almost throughout the period

## **The reconnection site remains:**

- quite stable in position (except during some short intervals), despite the varying IMF
- is likely to be located on distorted closed field lines, northward of but close to the equatorial plane on the dawn flank of the magnetosphere, consistent with the reconnection being controlled by the strong IMF- $B_y$
- No one-to-one correspondence between the reconnection signatures observed by Cluster and TC-1 was found
- one extended reconnection line or several reconnection lines  
→ need further investigation