PBI に伴う Pi2 地磁気振動と対応するオーロラの準周期的変動と内部磁気圏の電磁場振動

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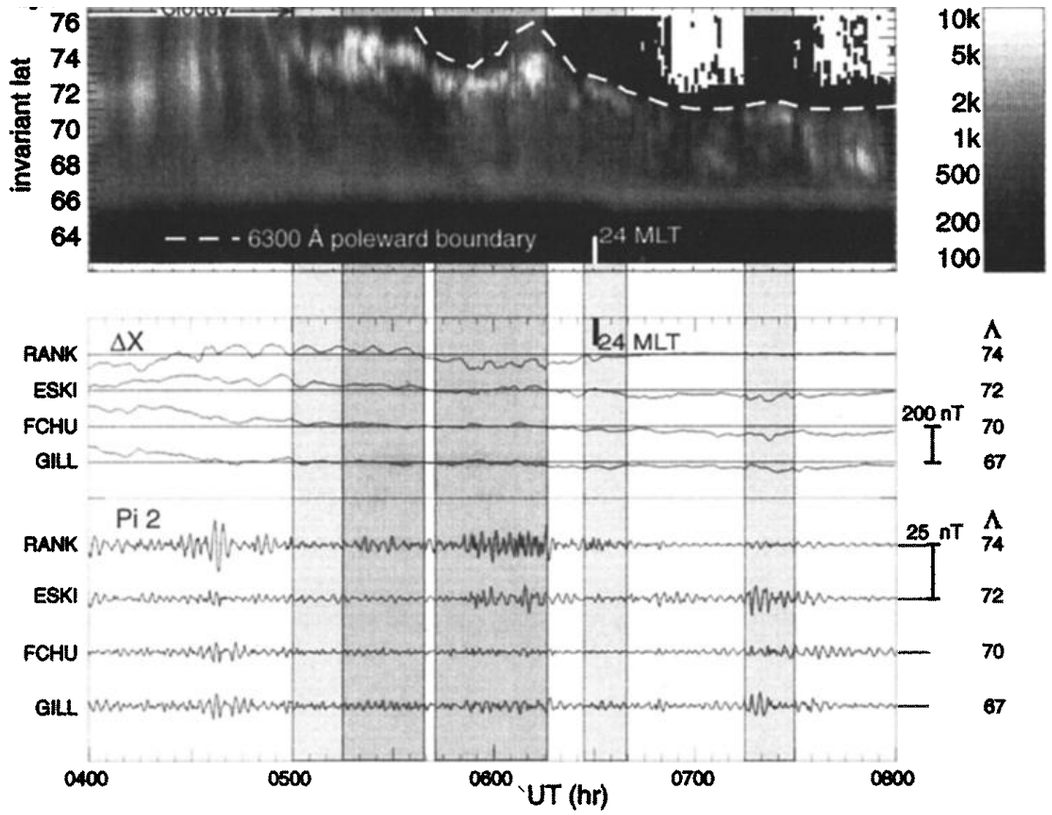
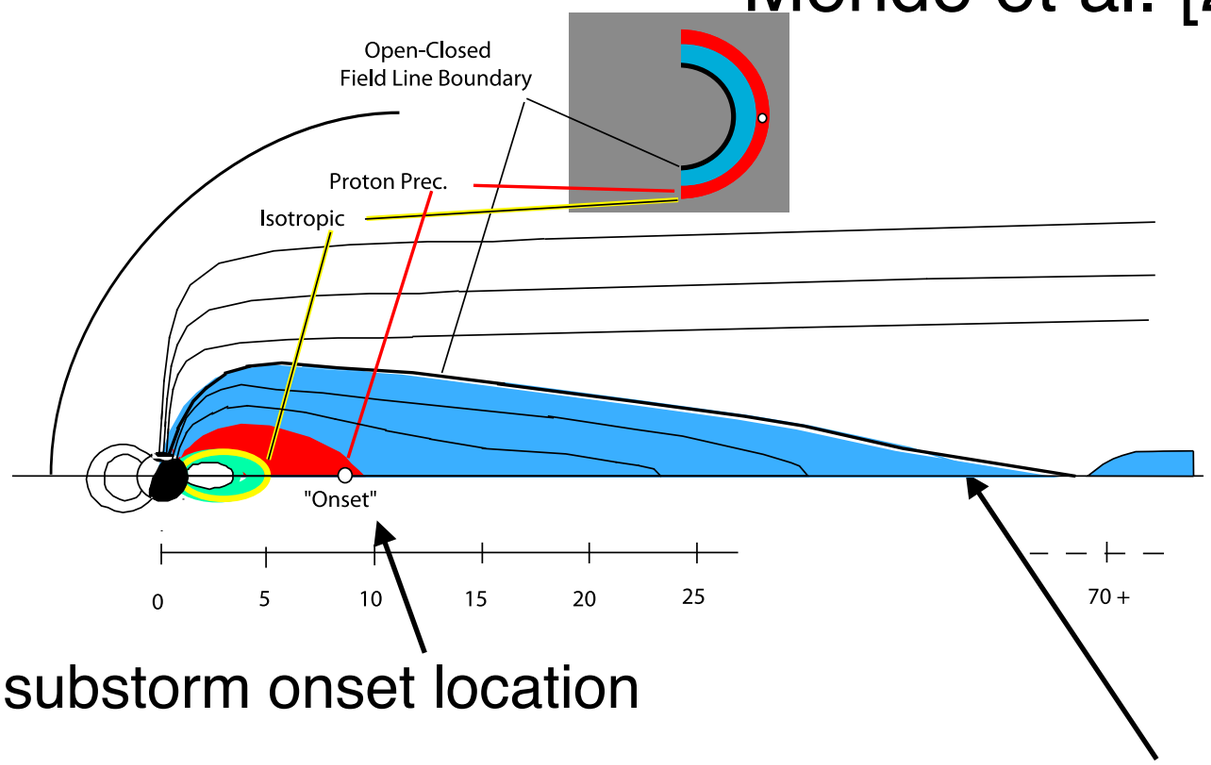
Auroral phenomena and Pi2 pulsations



Lyons et al. [1999]

Mende et al. [2011]



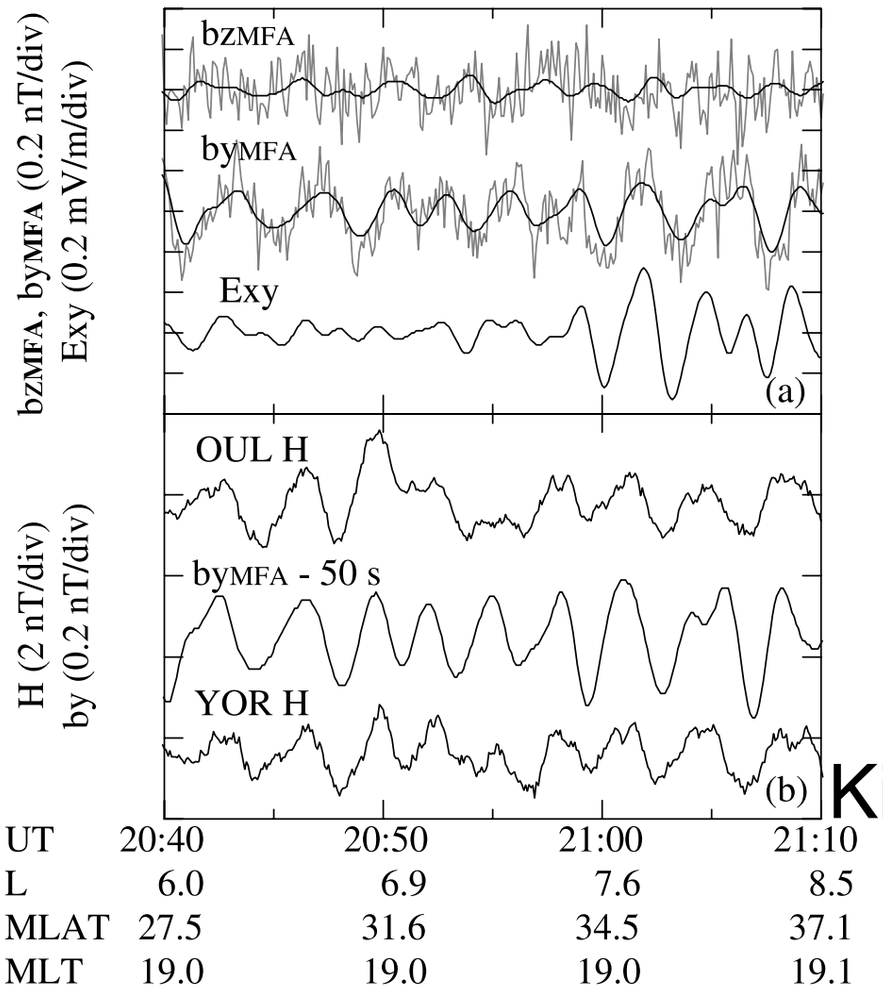
substorm onset location

PBI onset location (possible)

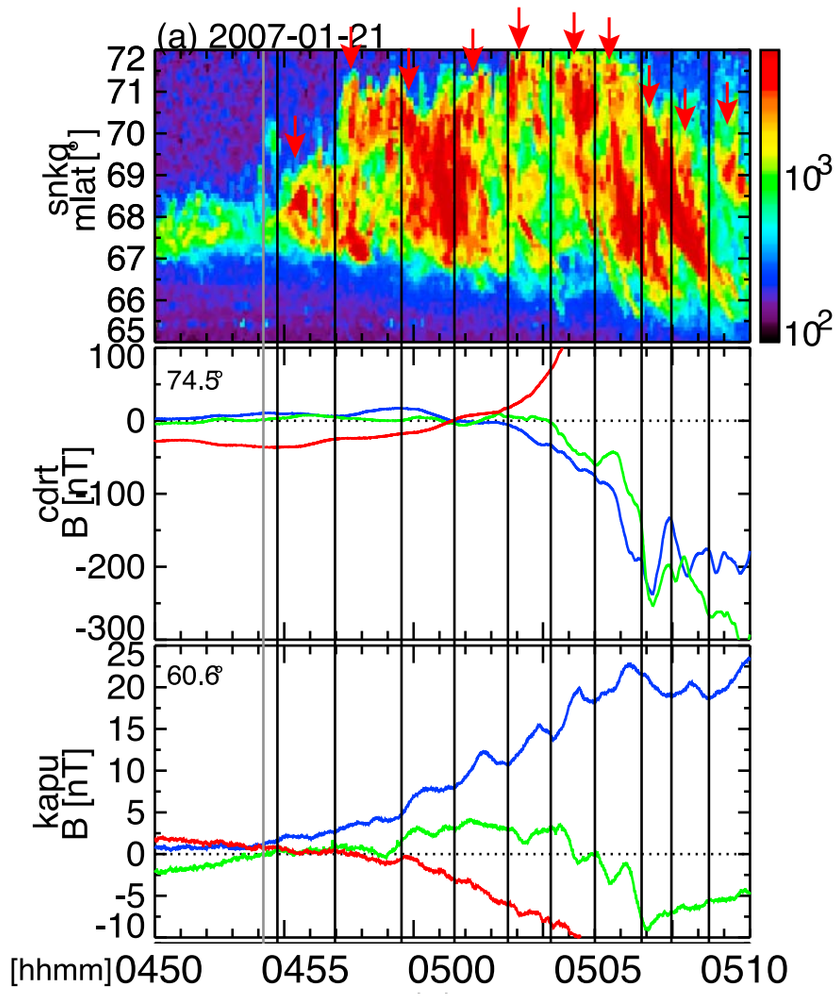
- Pi2 pulsations are irregular geomagnetic oscillations that occur with various auroral phenomena, such as substorms, pseudo breakups, and poleward boundary intensifications (PBI).
- PBIs have the different source location and the physical process from those of substorms.

Why are PBIs and substorms associated with the same pulsation?

PBI-related Pi2 pulsations



Kim et al. [2002]



Nishimura et al., [2012]

Is the signature of the plasmaspheric resonance observed in the inner magnetosphere?

↓

The magnetic and electric field observations by the RBSP satellites

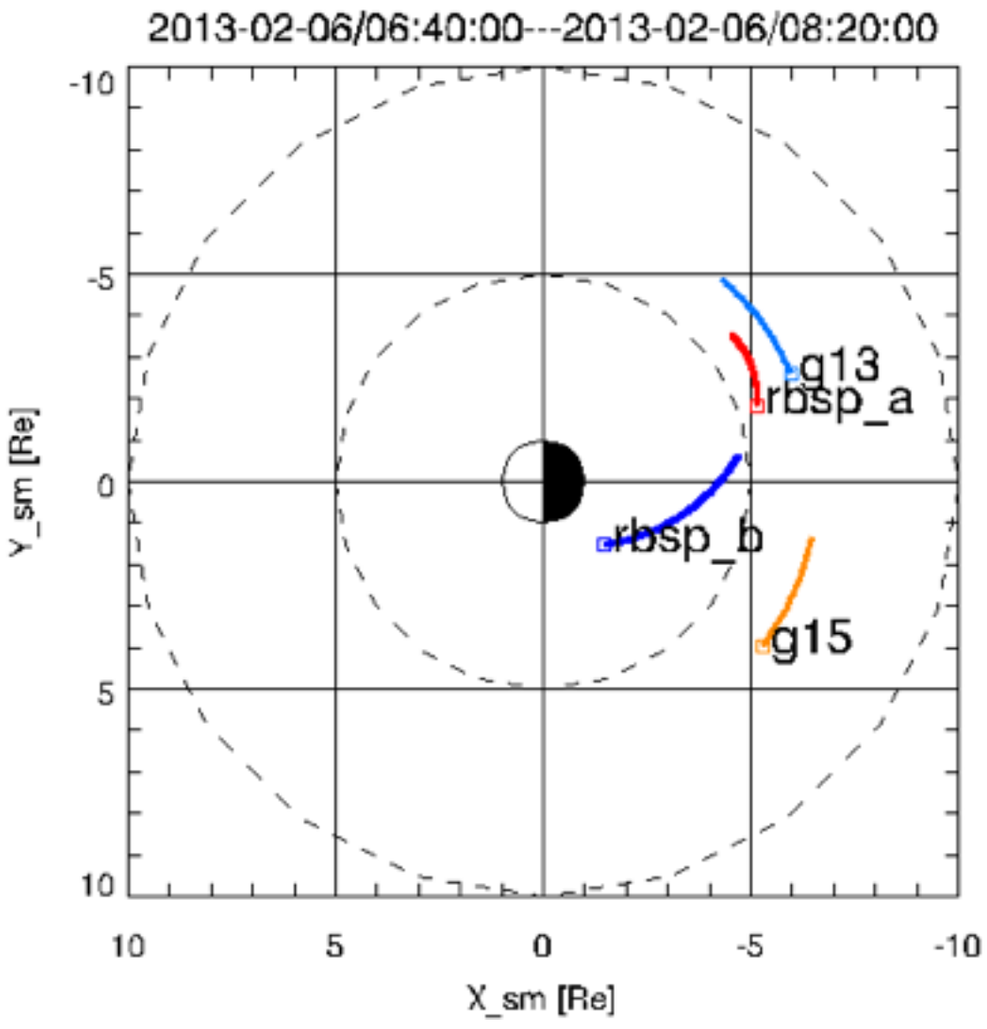
Is the signature of FAC oscillating related-Pi2 pulses observed near the poleward boundary?

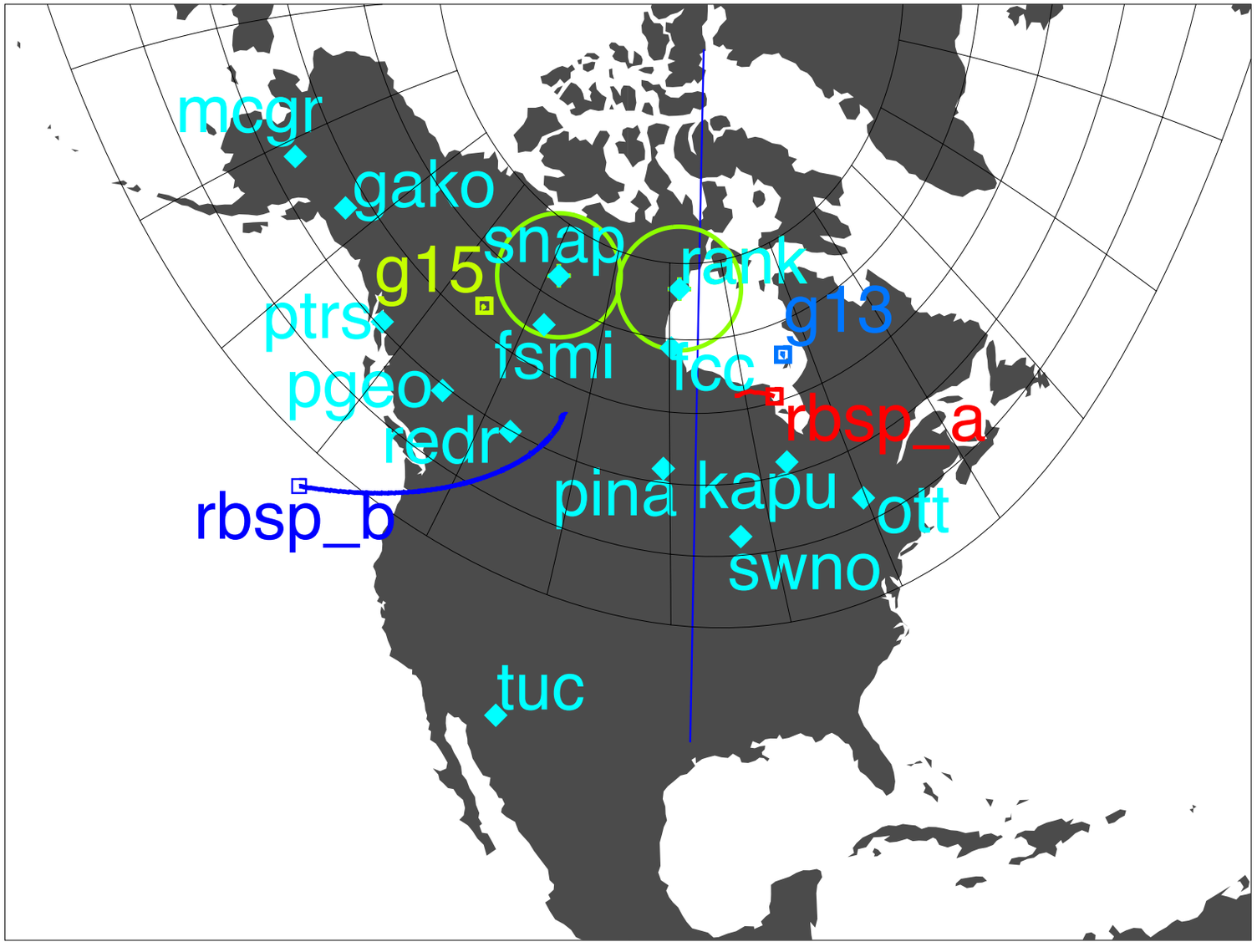
↓

Spatial-temporal comparison between auroral and ground magnetic field

2013-02-06/06:59:47 event (Kp=0)

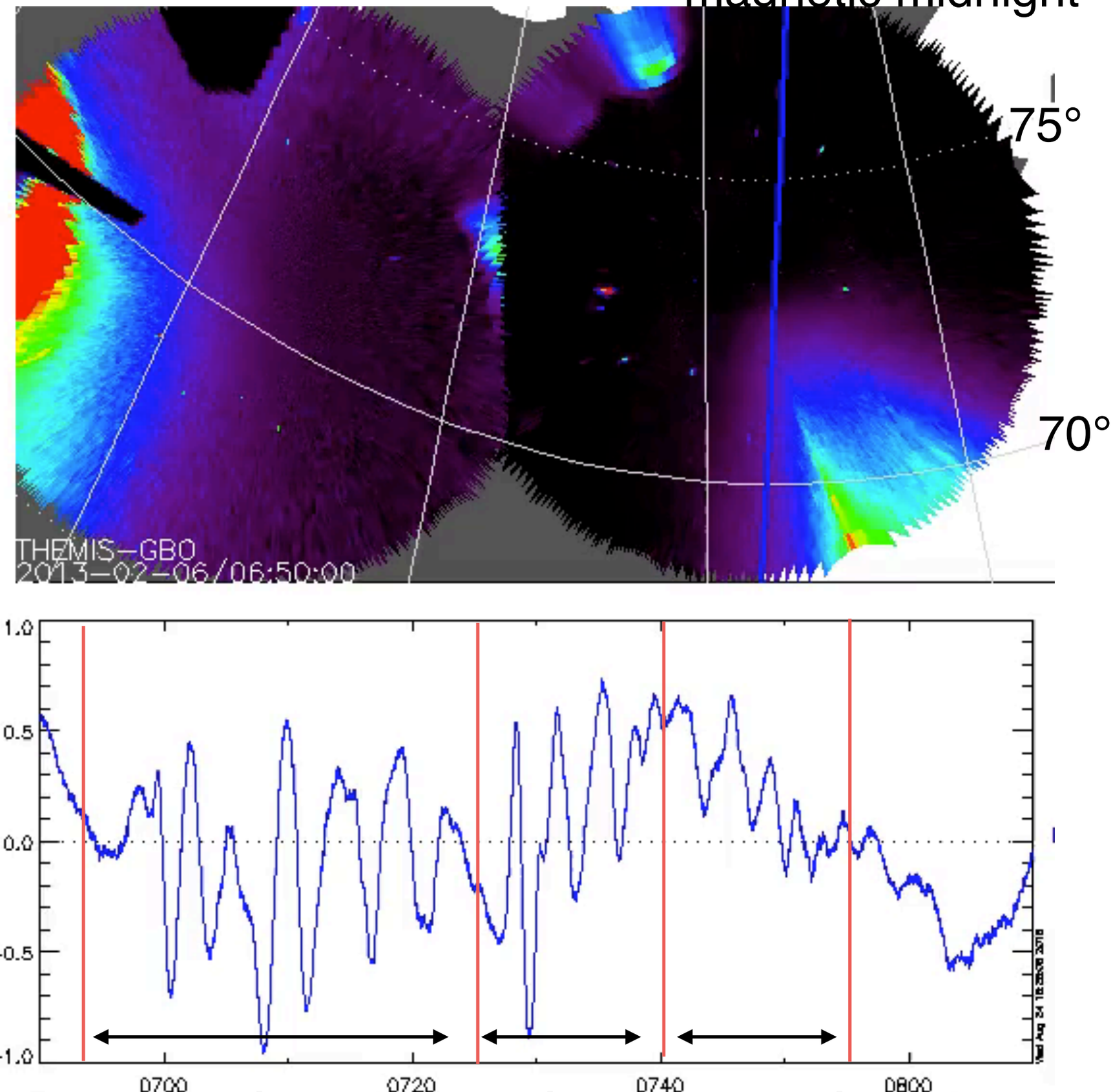
Ground based and satellite location





satellites: RBSP A,B (EMFISIS, EFW), GOES 13, 15 (fluxgate)
all sky imager: THEMIS ASI (RANK, SMAP)
ground-based magnetometer : THEMIS GMAGS, MAGDAS/CPMN

2013-02-06/06:59:47 event (Kp=0)



Keogram and nightside magnetogram (packet 1)

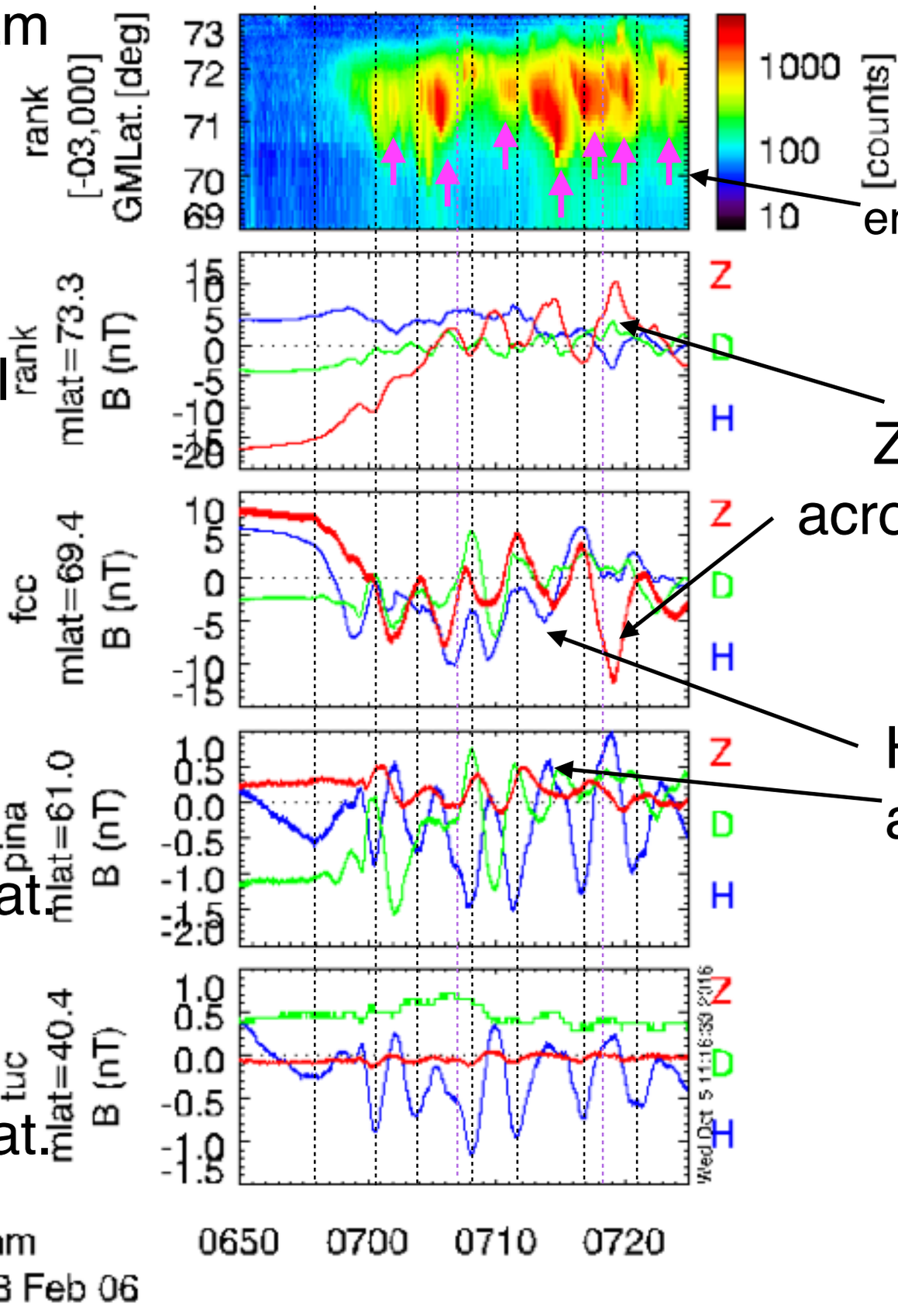
Keogram

high lat.
poleward of PBI

high lat.
equatorward of PBI

mid lat.

low lat.

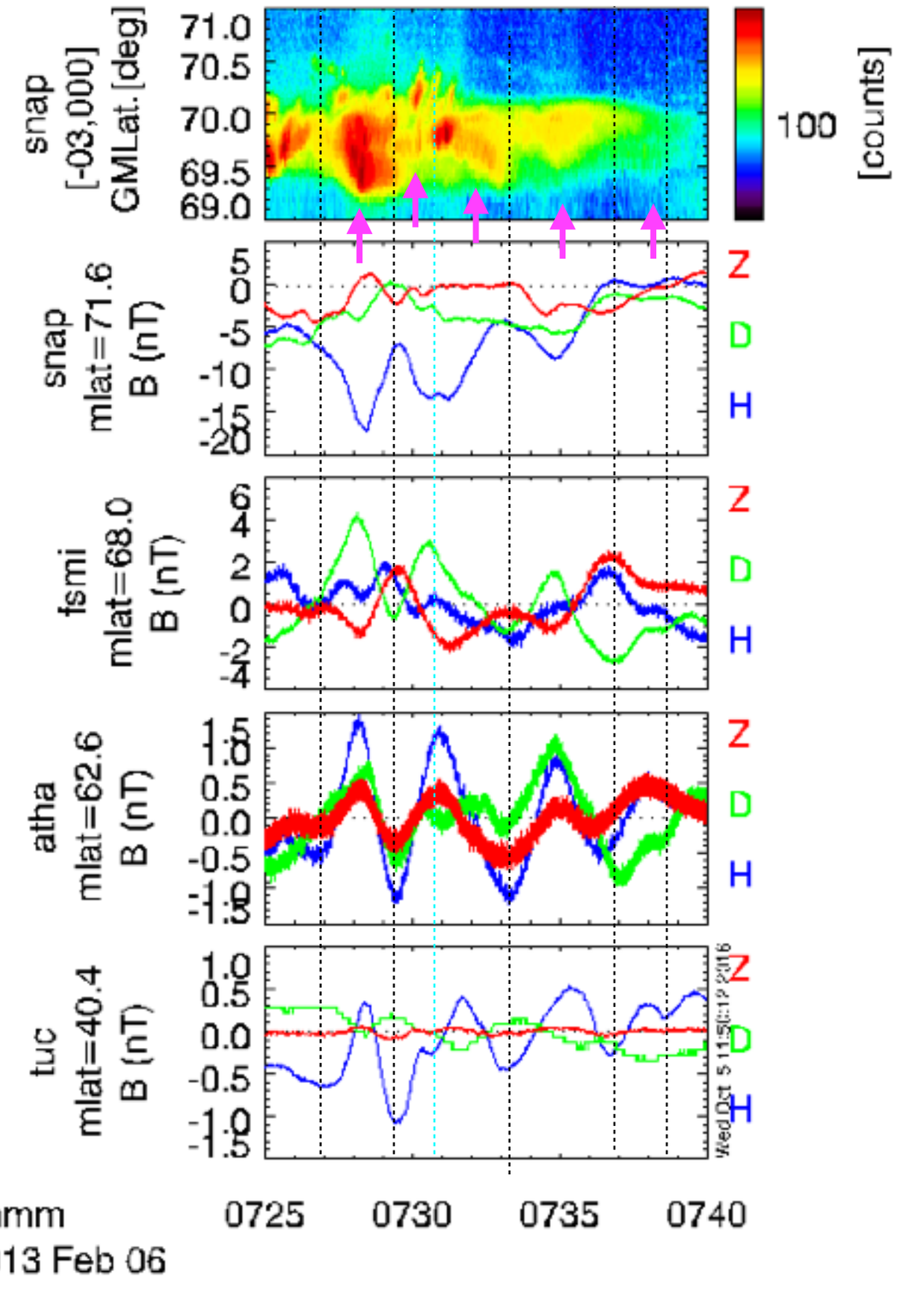


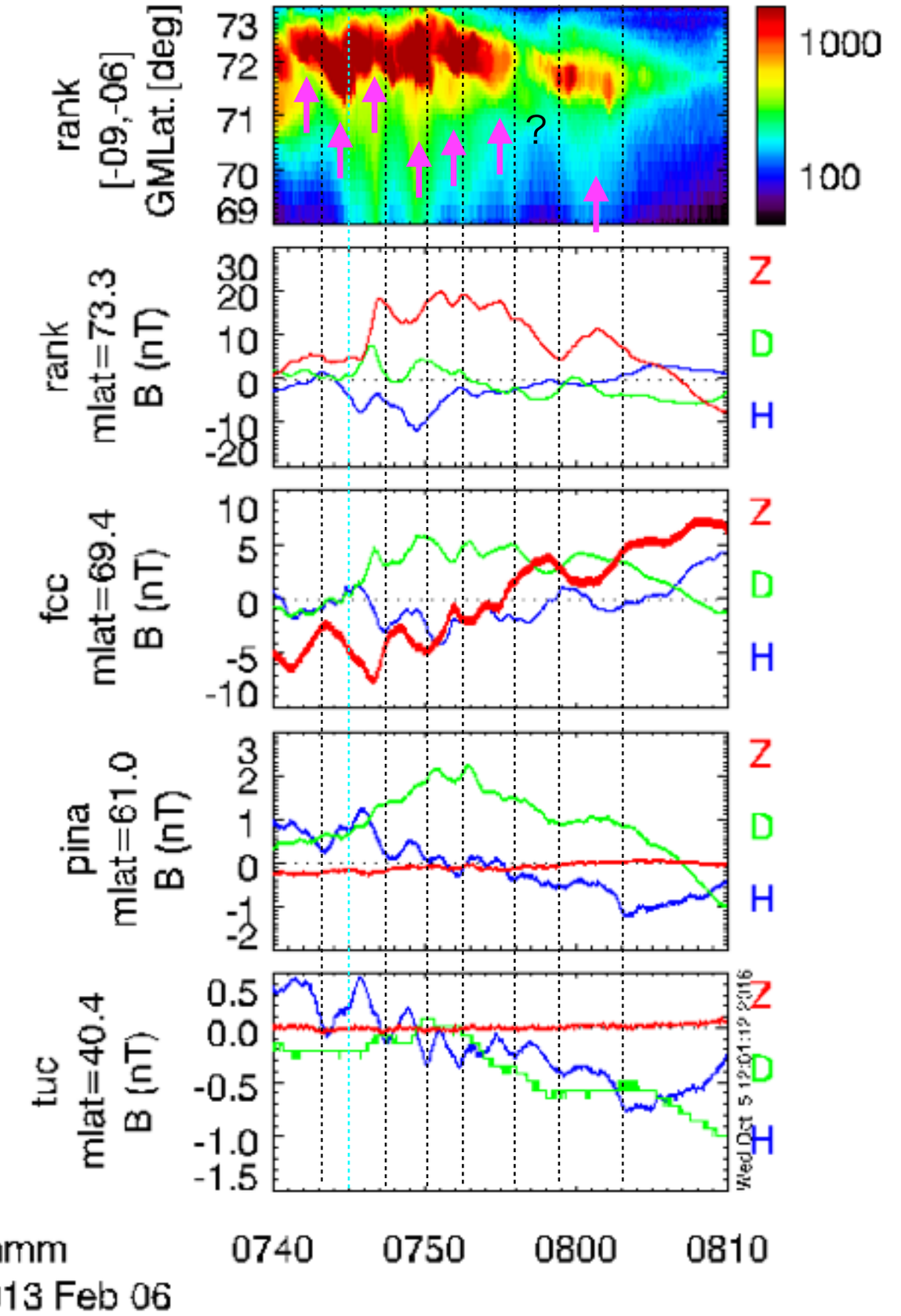
Quasi-periodic auroral emission associated with PBI

Z phase reversal across the PBI latitude

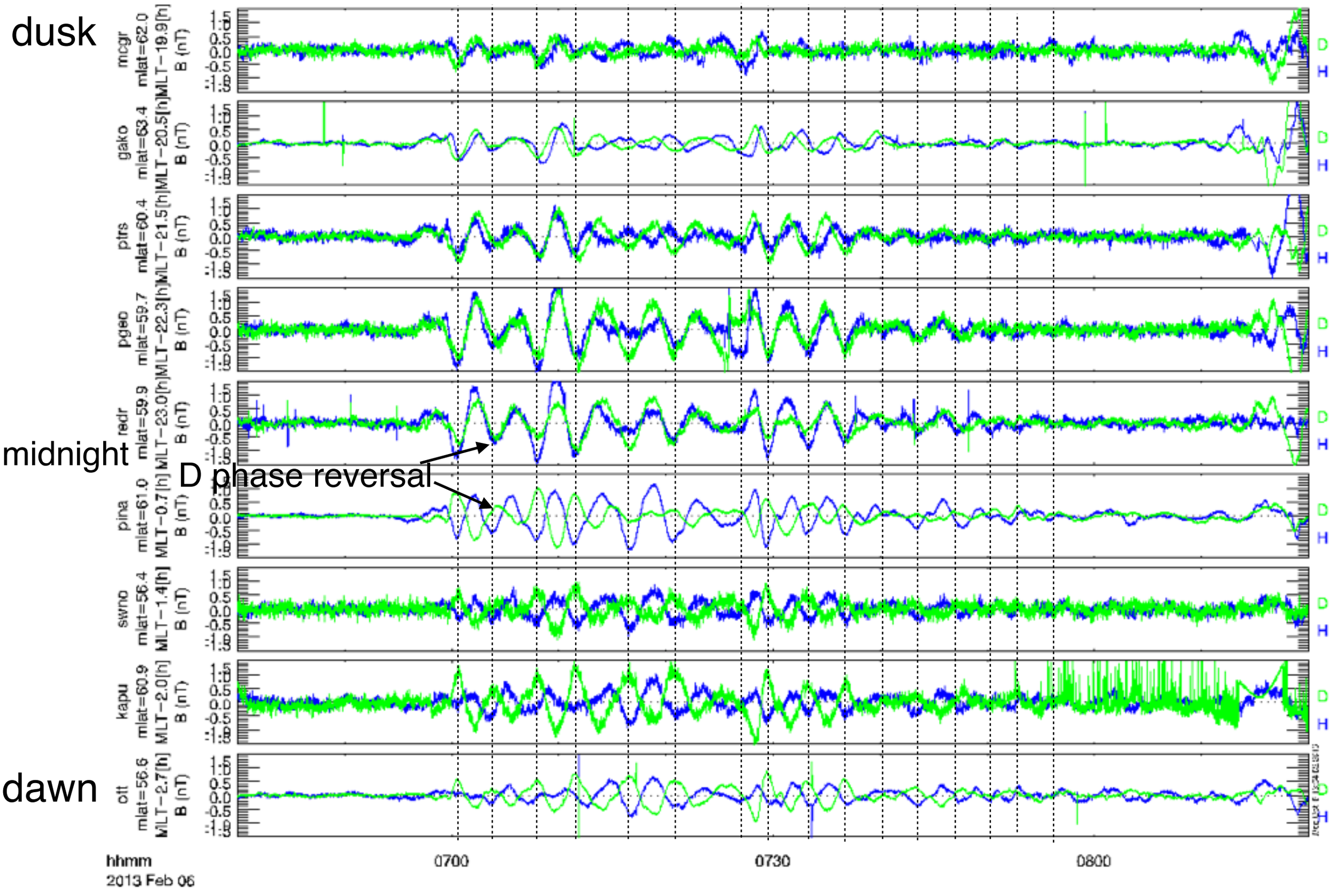
H phase reversal at middle latitude

Keogram and nightside magnetogram (packet 2,3)



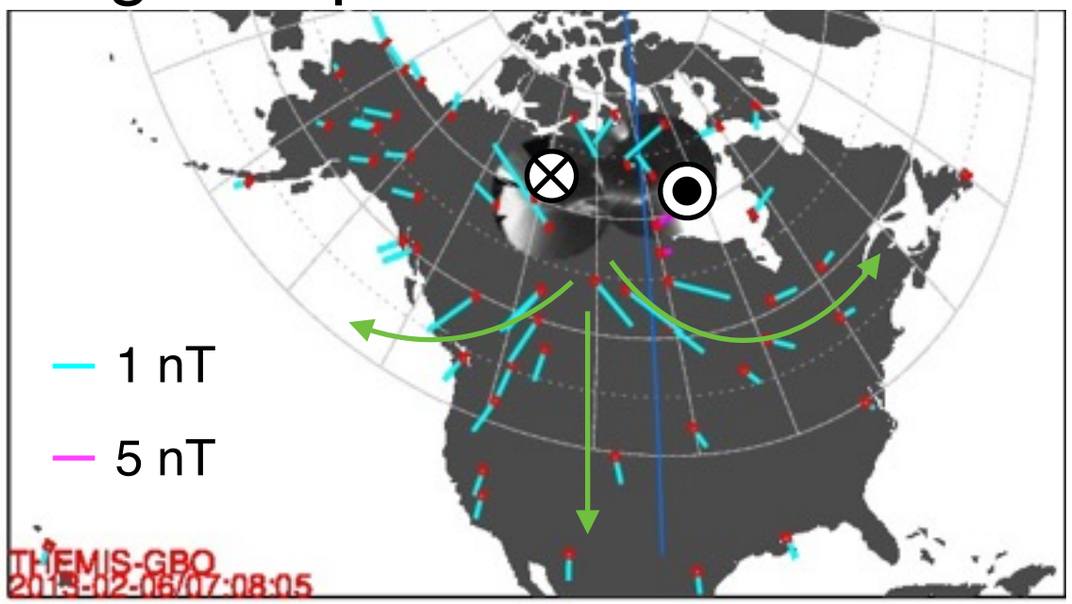


longitudinal profile at midlatitude

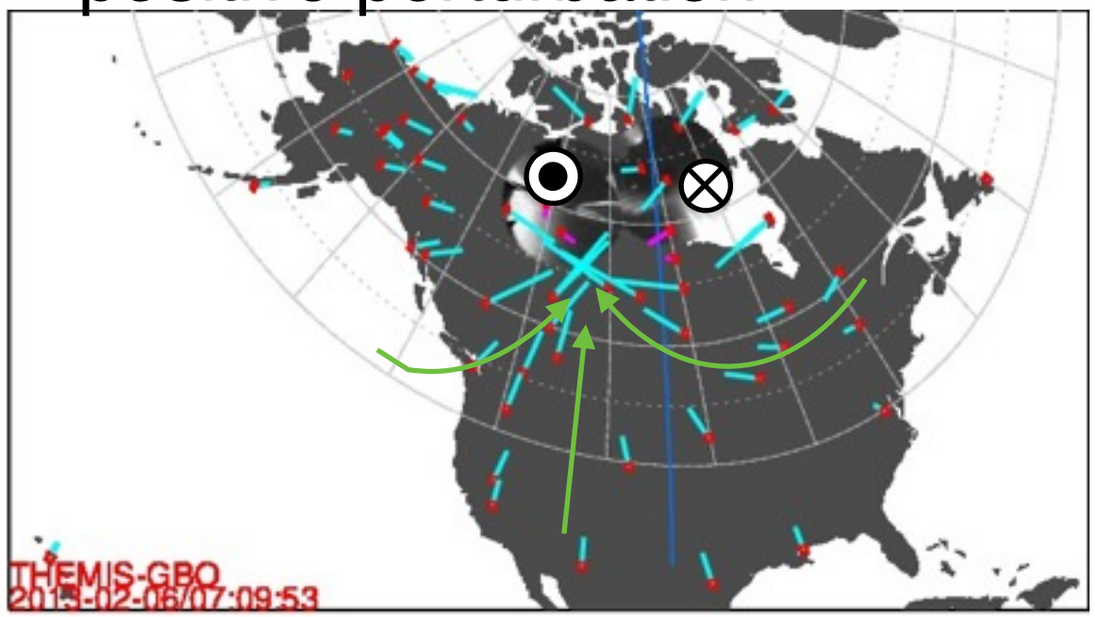


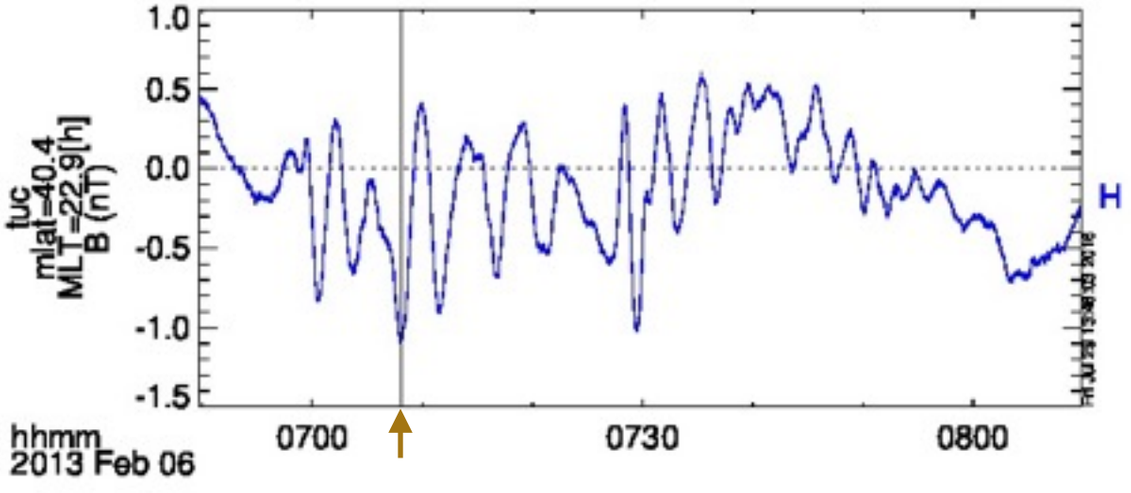
magnetic vector distribution (300 s hp-filtered)

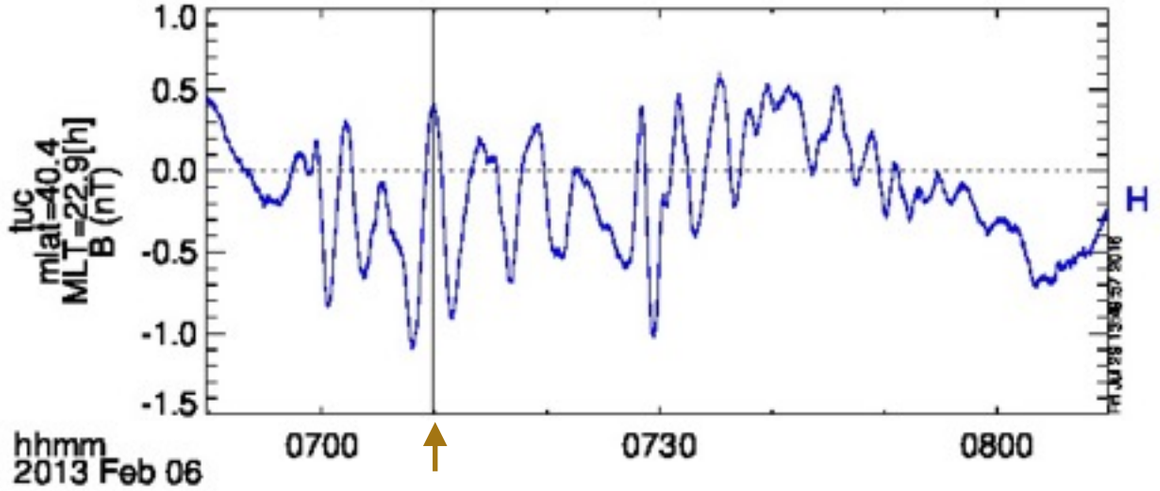
negative perturbation



positive perturbation







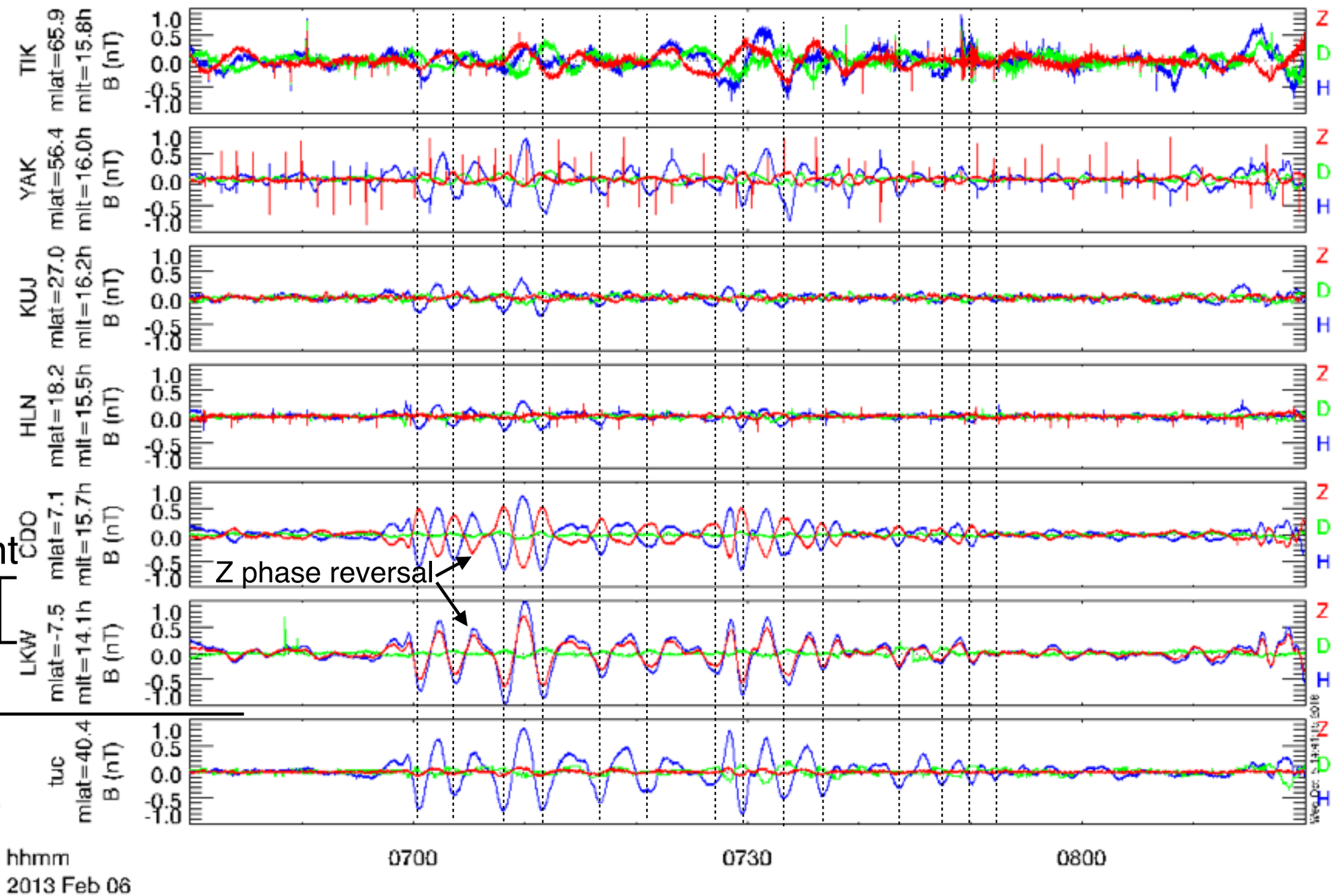
The pattern of magnetic vectors is consistent with oscillation of a pair of FACs [e.g., Lester et al., 1983]

Dayside Pi2

higher latitude

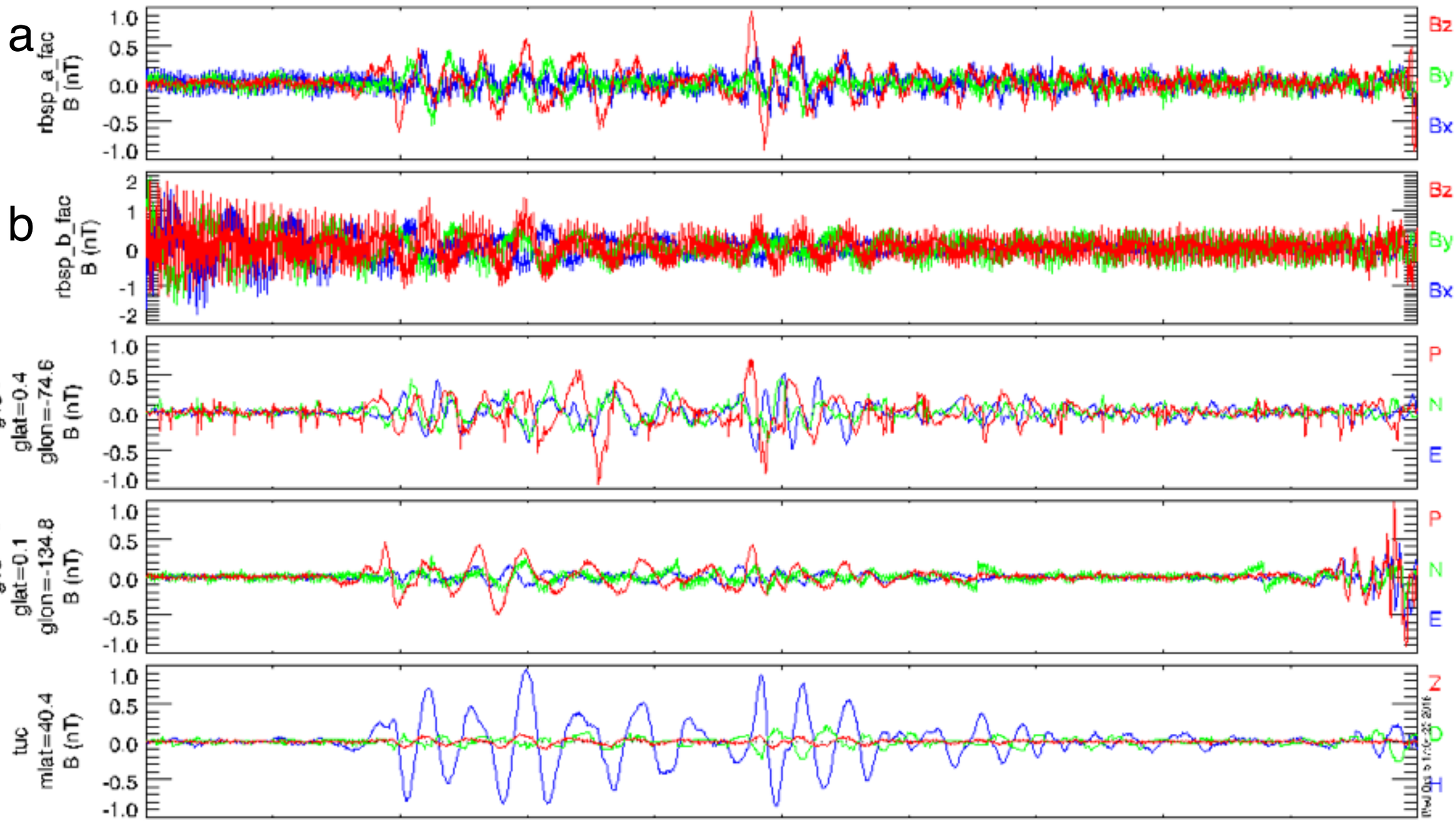
equatorial enhancement

nightside low-latitude



Nightside Pi2 and dayside Pi2 are very similar [e.g., Sutcliffe and Yumoto, 1989].

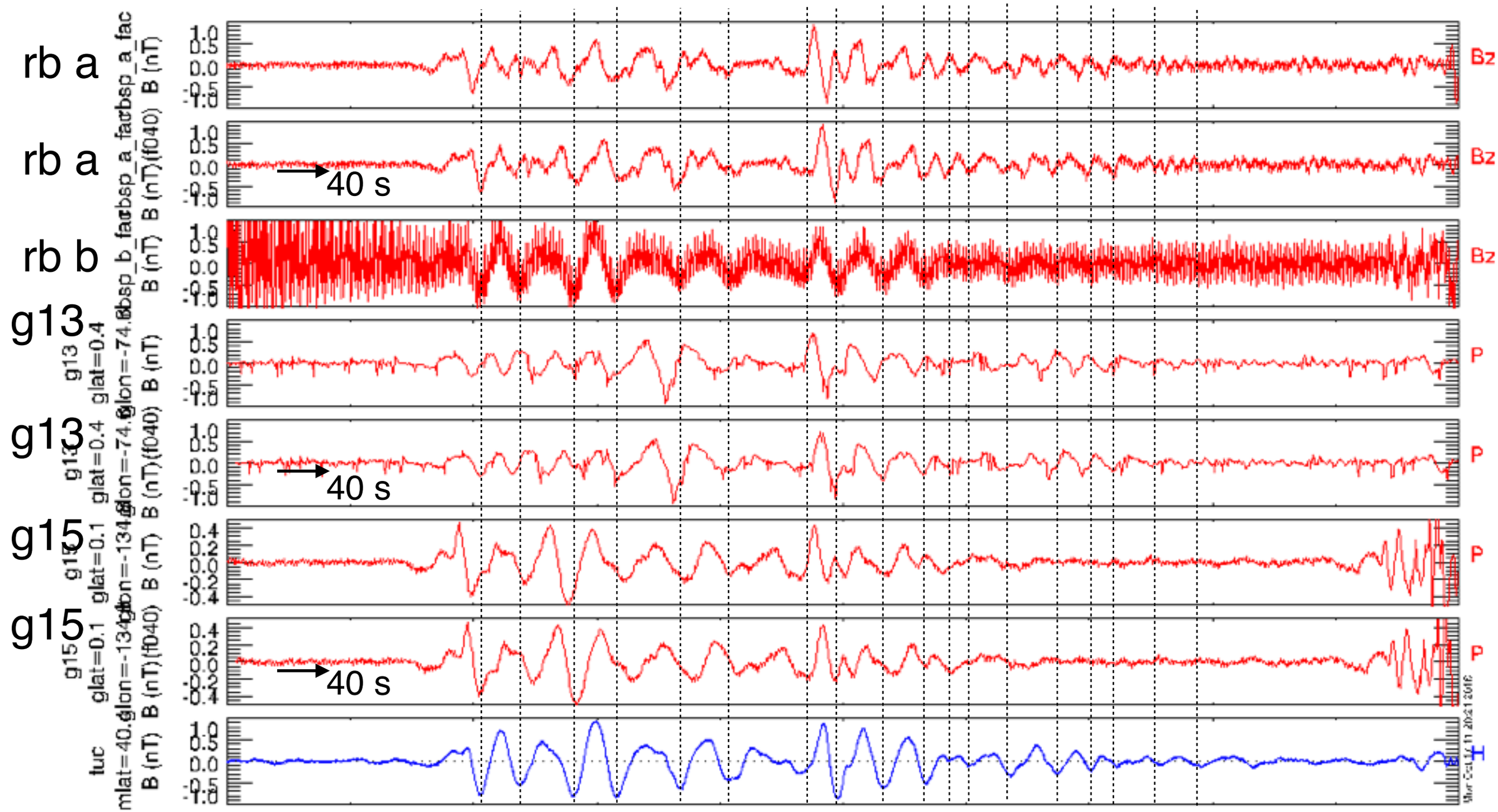
Pi2 in inner magnetosphere: RBSP and GOES observation (300 s hp-filtered)



rbspa MLT [h]	1.6	2.0	2.3
rbspa R[RE]	5.6	5.7	5.8
rbspb MLT [h]	22.2	23.3	0.2
rbspb R[RE]	2.8	3.7	4.4
hhmm	0700	0730	0800

2013 Feb 06

Comparison of compressional component



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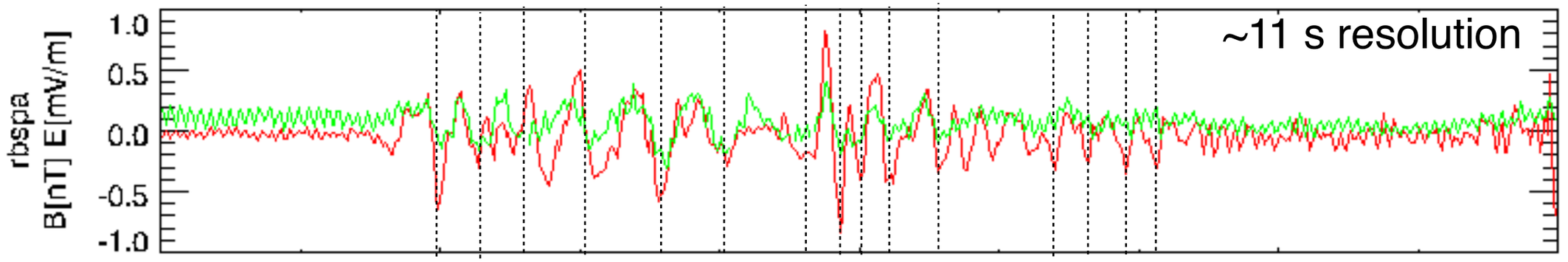
rbspb R[RE]	2.8	3.7	4.4
hhmm	0700	0730	0800

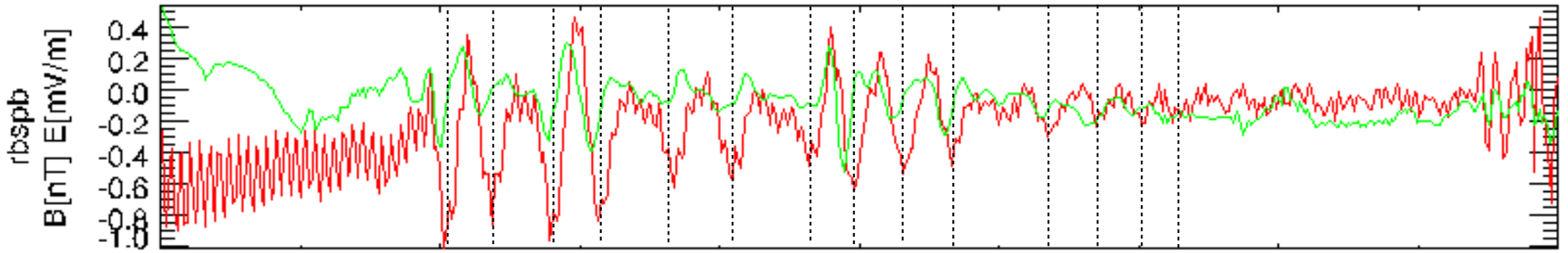
2013 Feb 06

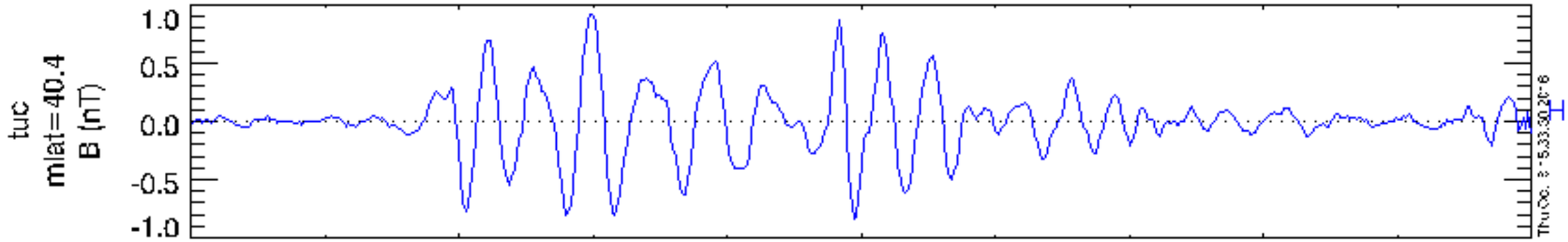
Magnetic and electric fields of compressive mode

rb a



rb b





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rbspb R[RE]	2.8	3.7	4.4
hhmm	0700	0730	0800

2013 Feb 06

Other examples of auroral signatures of PBI-Pi2

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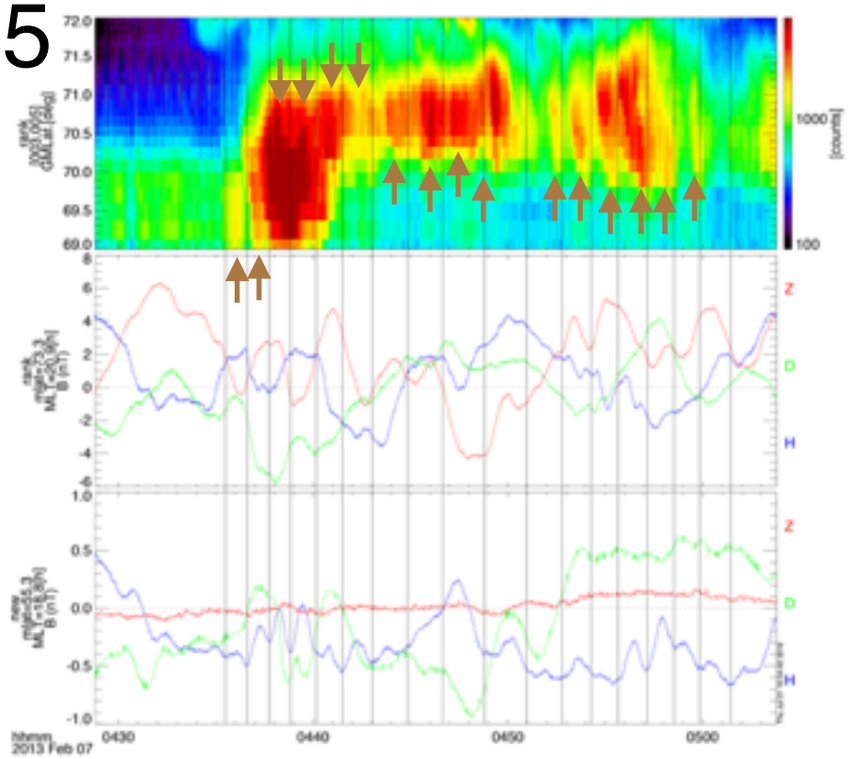

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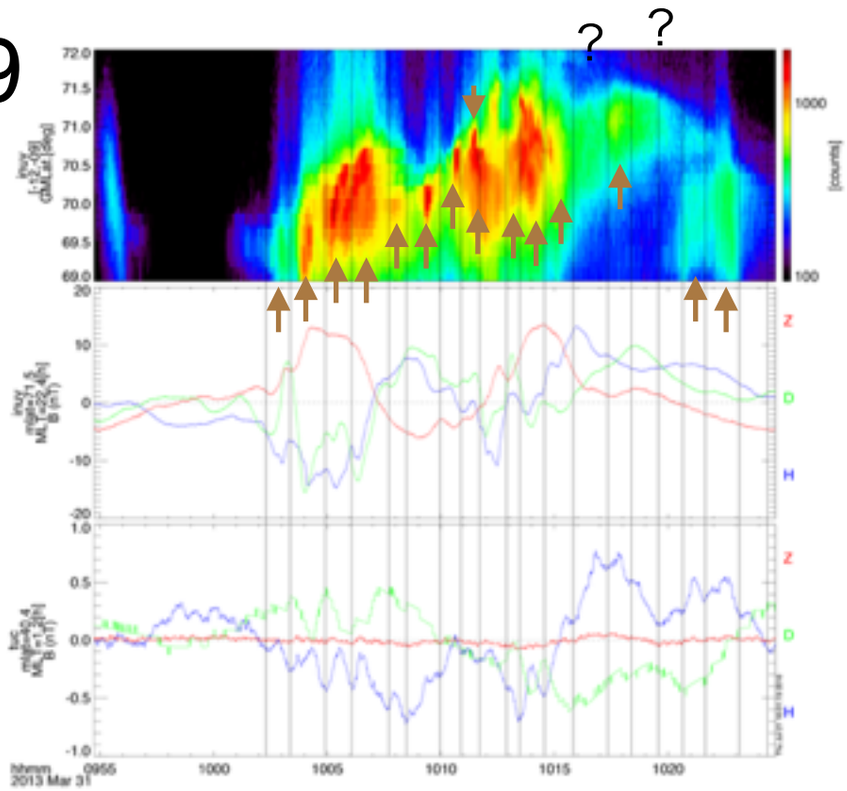

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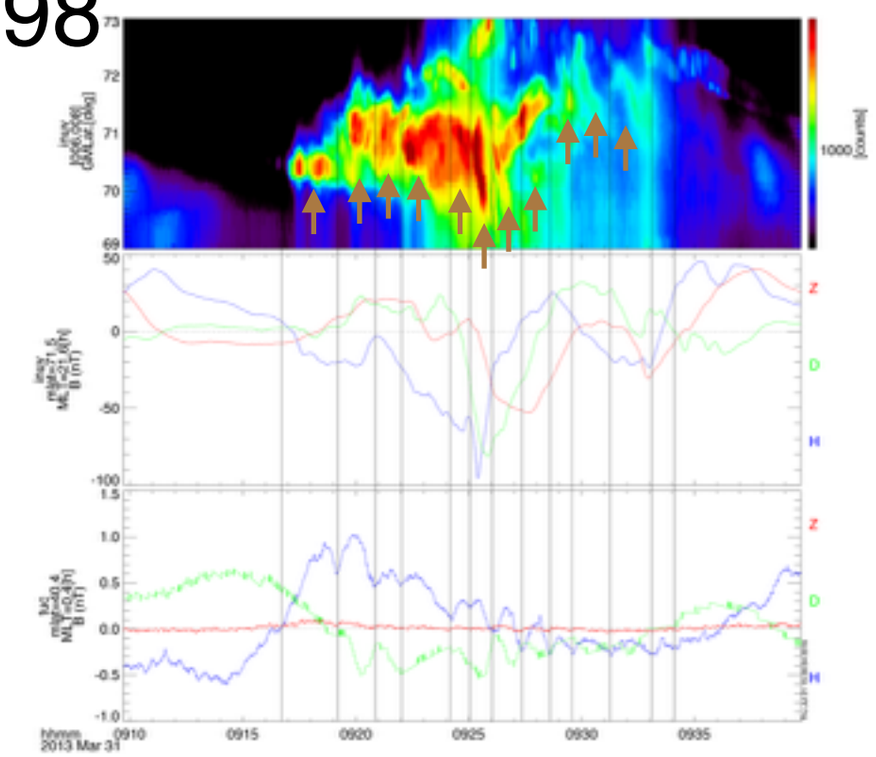
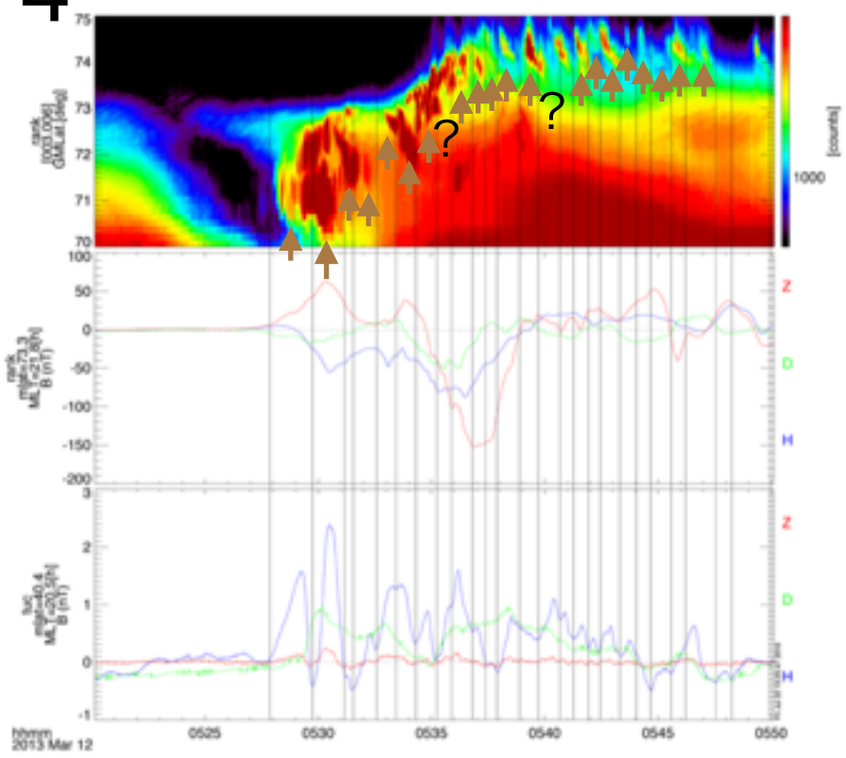


74



END

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