

Analysis of recent substorm events and relation to electromagnetic wave activity

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(6) SSL, UCB, USA

(7) TUBS, Germany

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(9) University of Alberta, Canada

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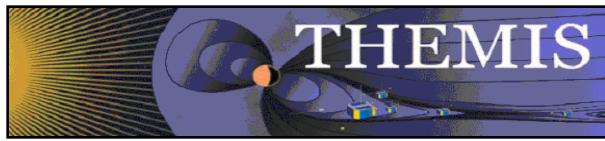
1) AMDA (Automated Multi-Dataset Analysis,
<http://cdpp-amda.cesr.fr/>) developed by CDPP
(<http://cdpp.cesr.fr/>)

Simple criteria:

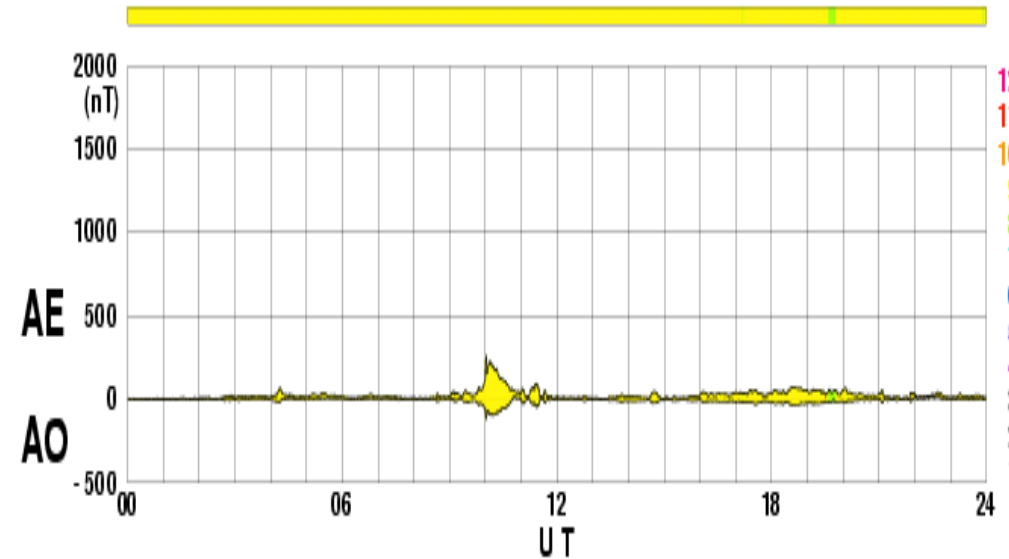
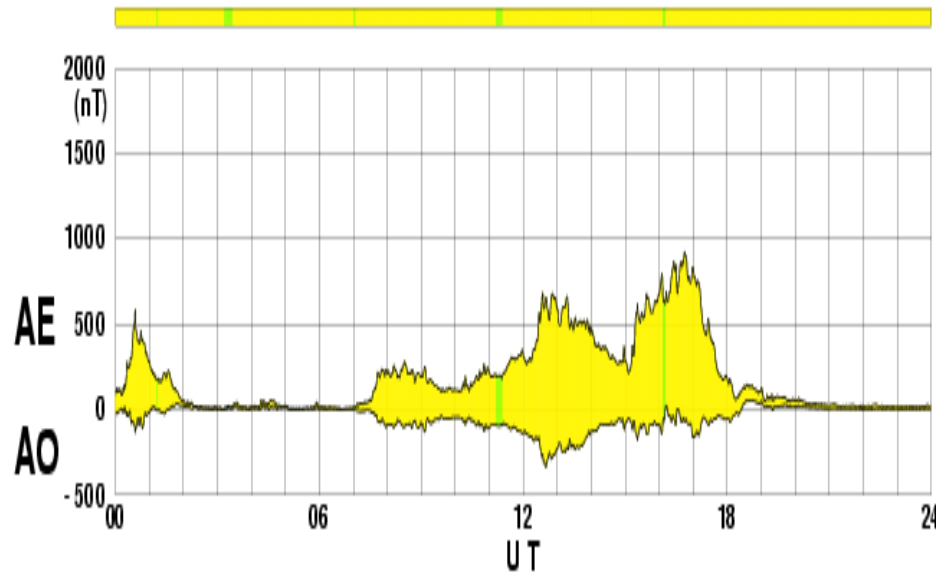
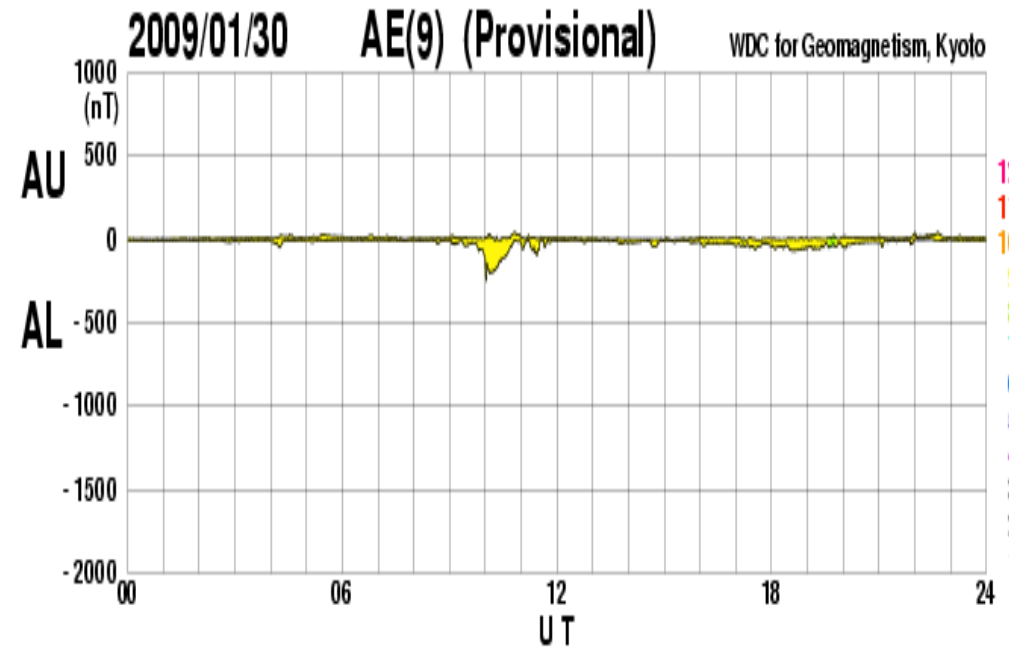
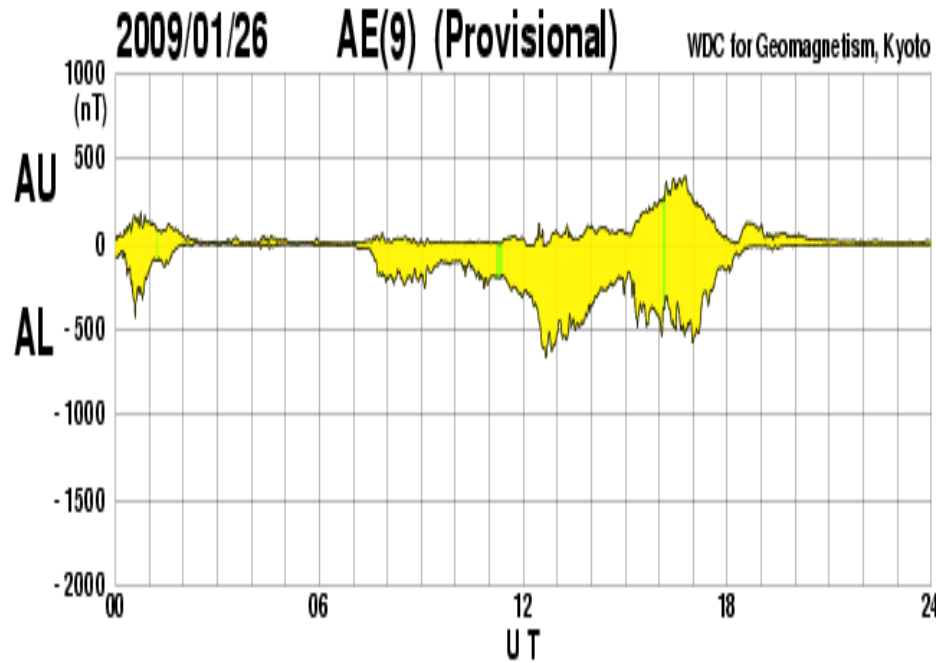
$X < -5RE$ **AND** $\text{SQRT}(V_x^2 + V_y^2) > 50 \text{ km/s}$ for THD
AND

$X < -5RE$ **AND** $\text{SQRT}(V_x^2 + V_y^2) > 80 \text{ km/s}$ for THB, THC
Time period: from Jan. 15 to Feb. 6

2) Onset database established by the team
of THEMIS ground base observatory and double checked
with ASI movies,
⇒ 11 events selected

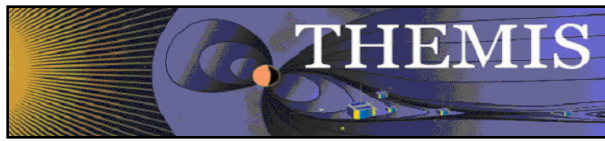


2 days: Jan. 26&30, 2009



[Created at 2009-03-09 09:52UT]

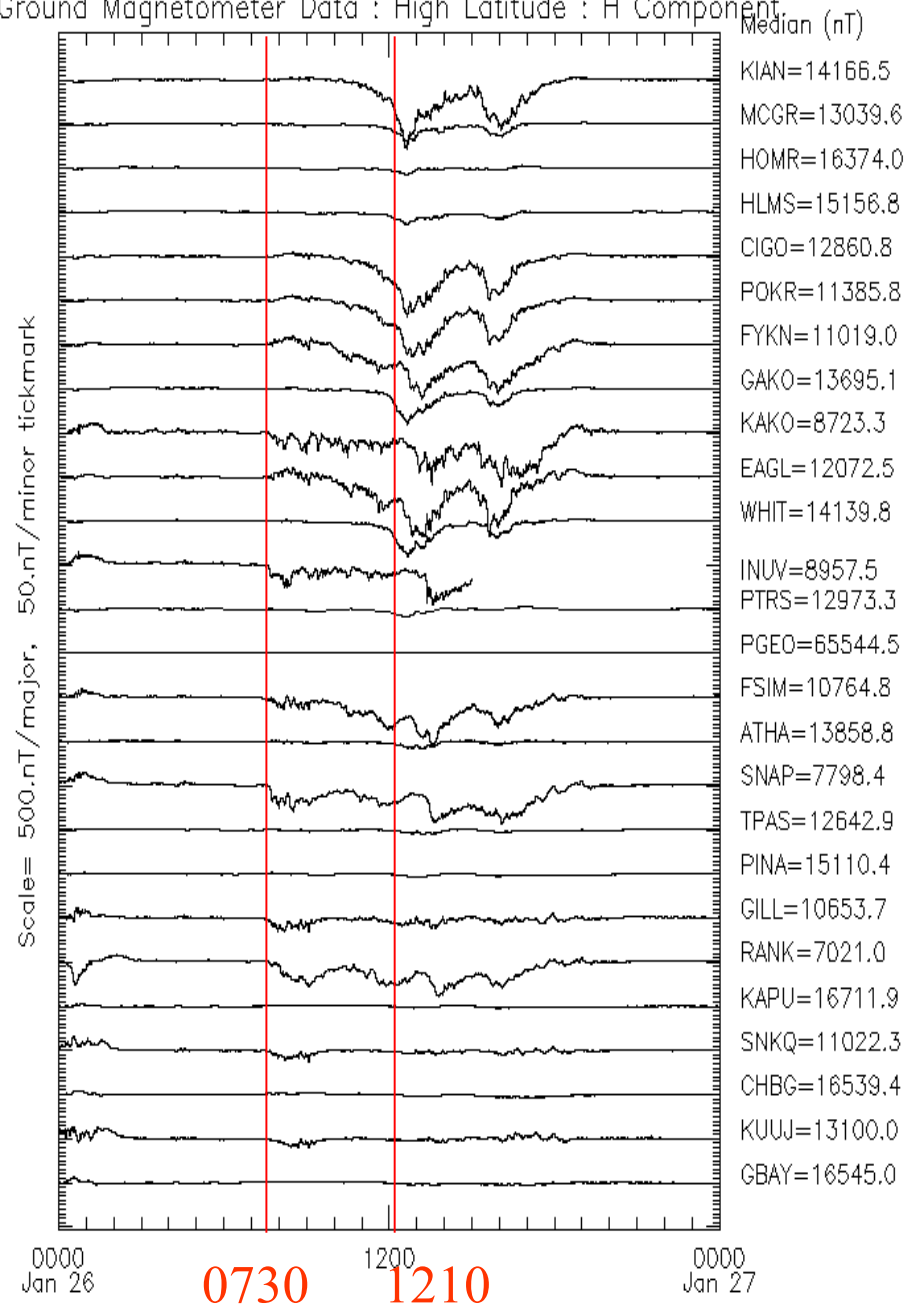
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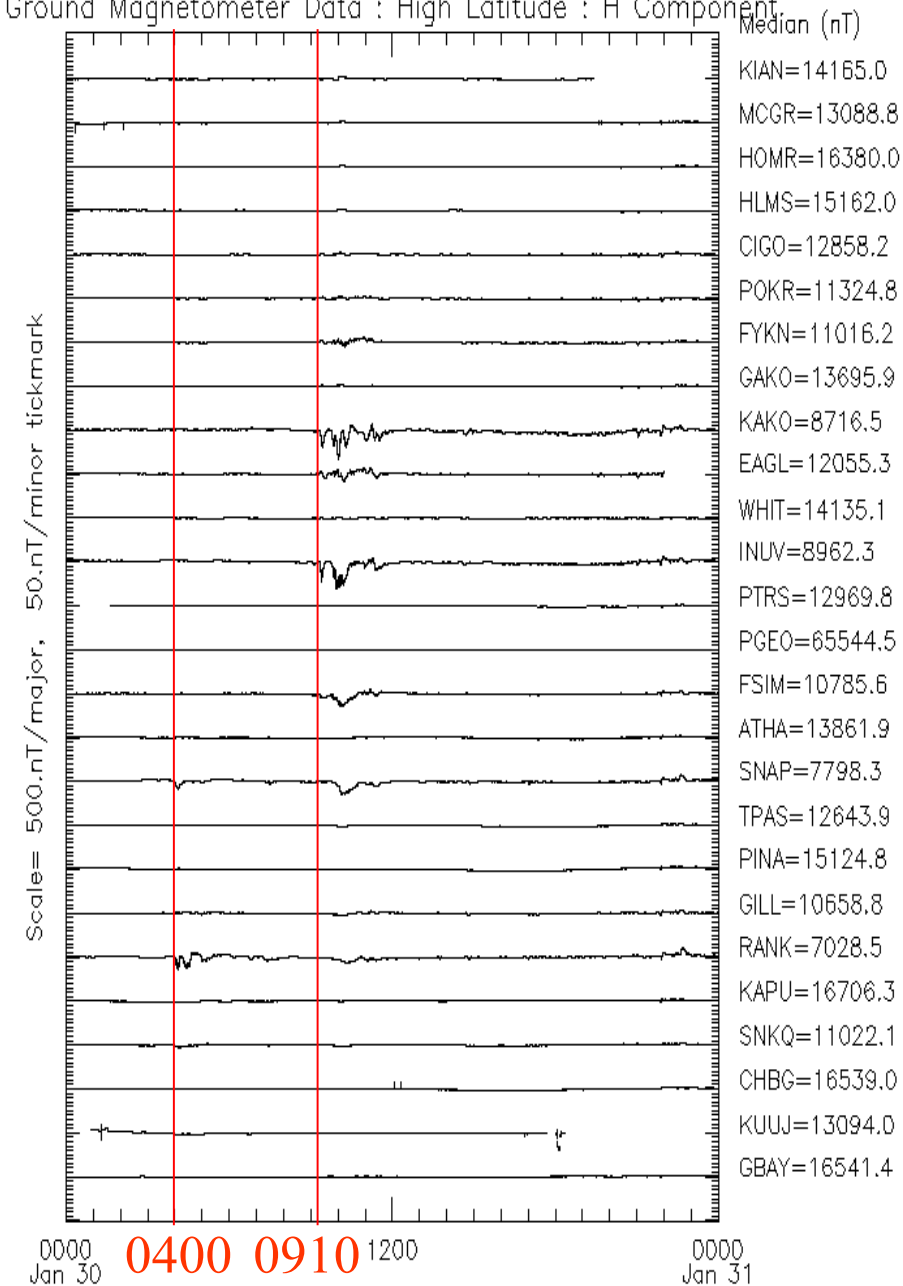
2 days: Jan. 26&30, 2009

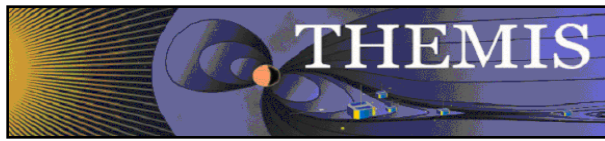


Ground Magnetometer Data : High Latitude : H Component



Ground Magnetometer Data : High Latitude : H Component

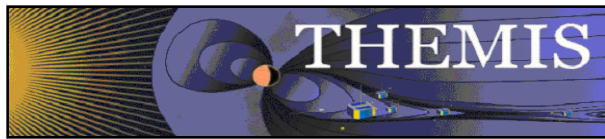




Auroral and in-situ timings



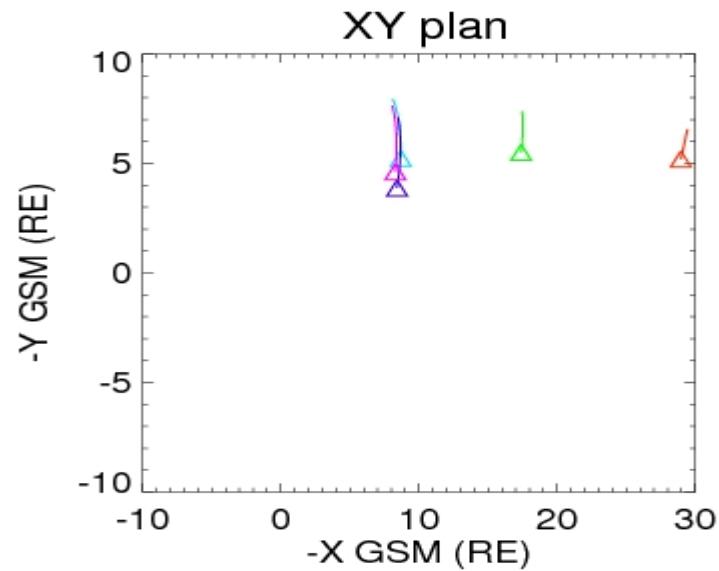
Event	FSIM	FSMI	GAKO	GILL	INUV	KIAN	NRS Q	RANK	SNAP	SNKQ	THD	THC	THB	THD&TH C&THB
20090126 0											0736	X	X	X
1 Small subst	0722	0726		0732 0735	0738				0740		0736	0739	0734	0739
2	0805	0810			0808			0800 0809	0810	0810	0800	0800	0757	0800
3	0834		0840	0833				0833 0835	0841		0830	0820 ?	0829 ?	0830
4	1030	1030			1035						1040	1025	1023	1032
5 subst.						1205		1200			1224	1206	1204	1251
20090130 6										0239	0243	0239	0240	0247
7								0515	0508	KUUJ 0456	0453	0452	0441	0452
8					0902						X	0930	0915	X
9 Small subst					0942						0949	X	0944	X
10					1054						X	X	1053	X



THEMIS Locations



THEMIS positions on 2009-01-26/00:00:00.0 from 06:00:00 to 09:30:00



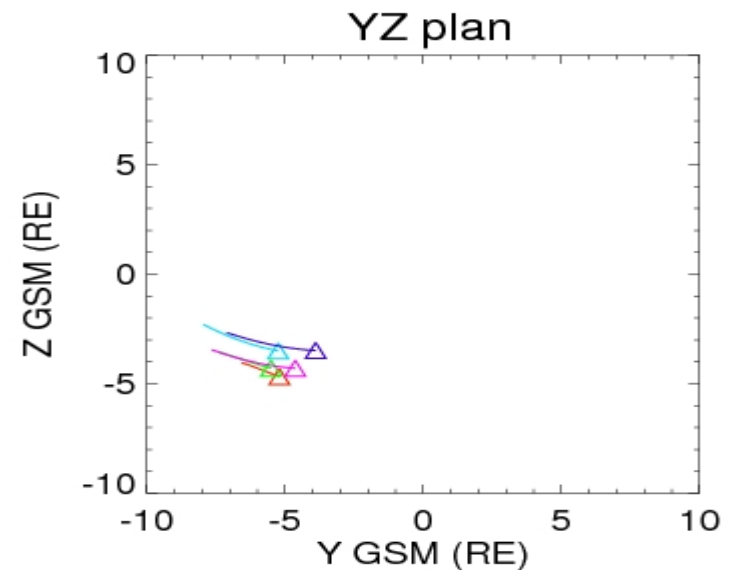
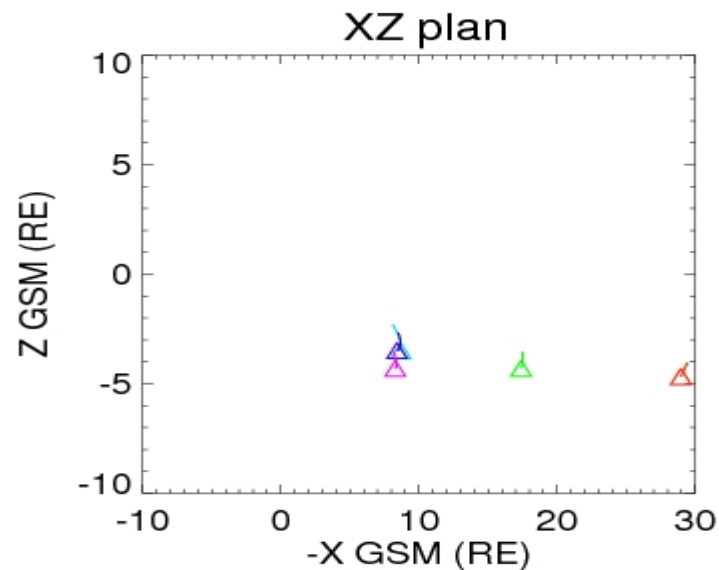
THEMIS-P1 (THB)

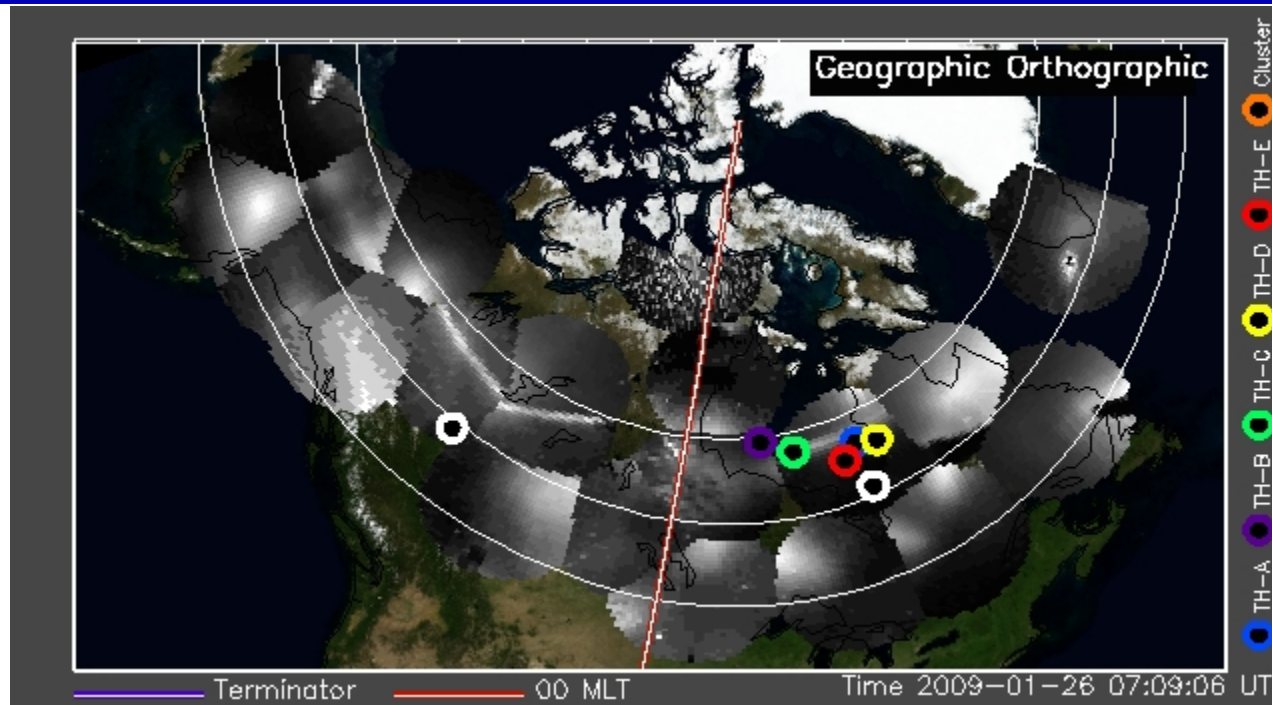
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THEMIS-P3 (THD)

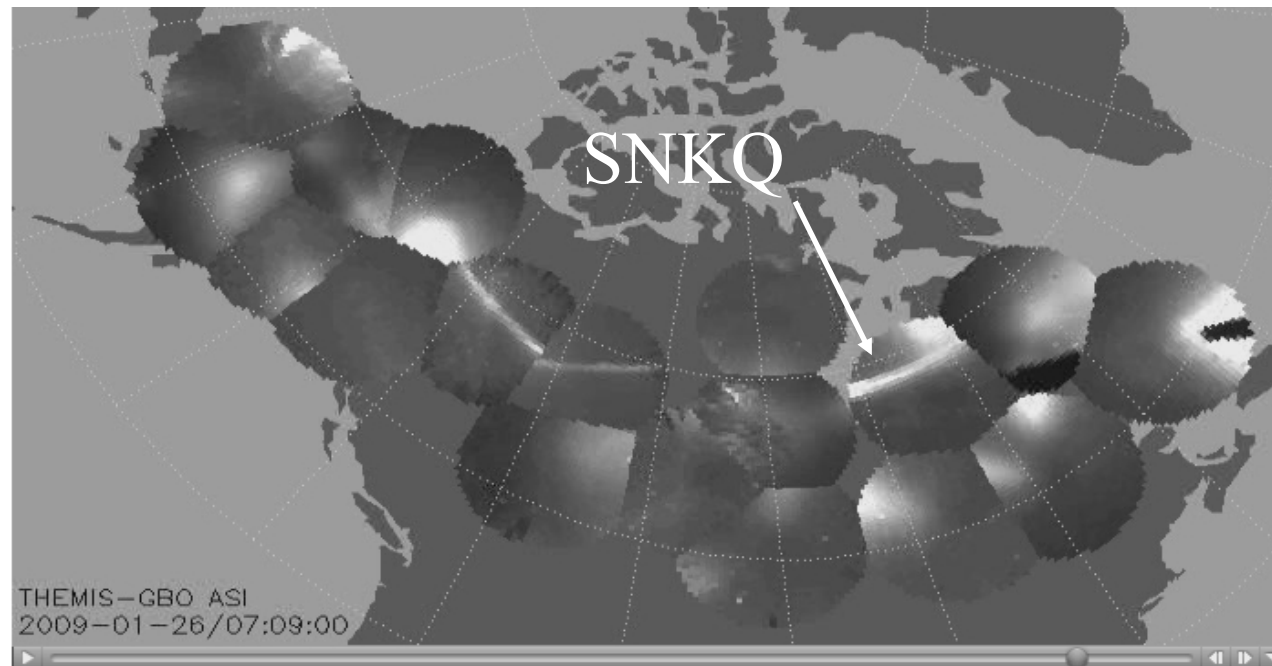
THEMIS-P4 (THE)

THEMIS-P5 (THA)

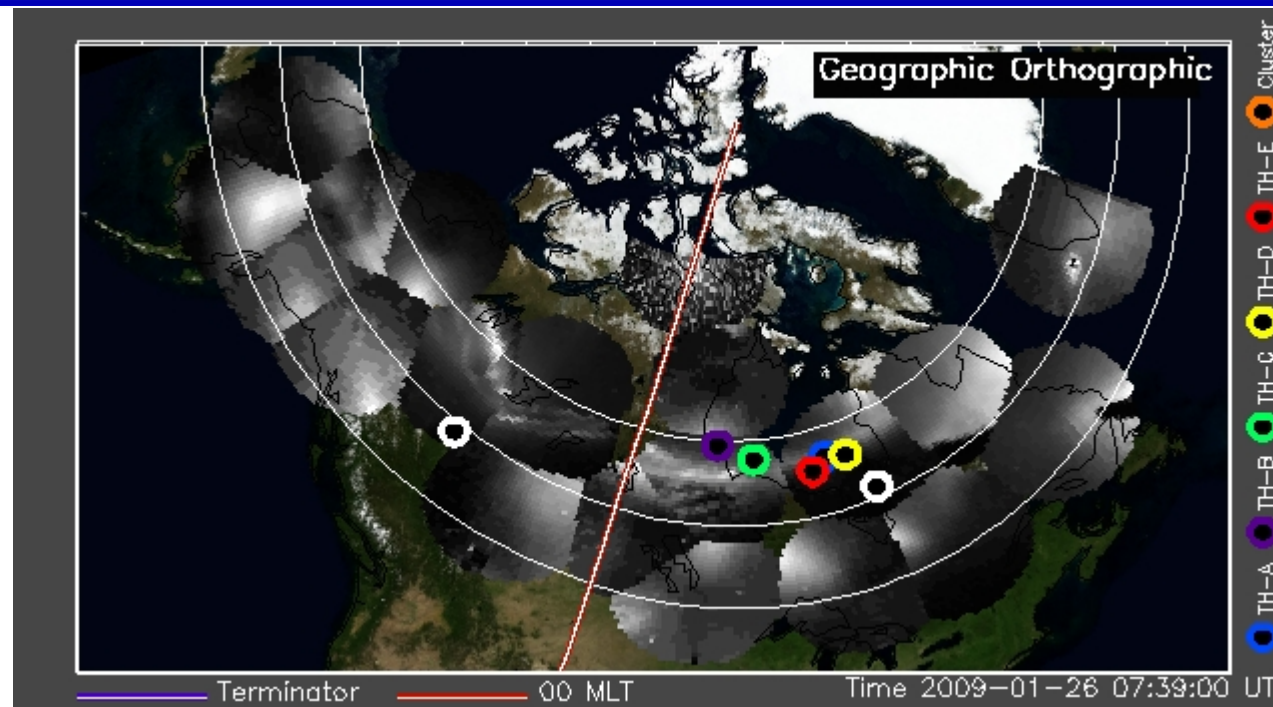




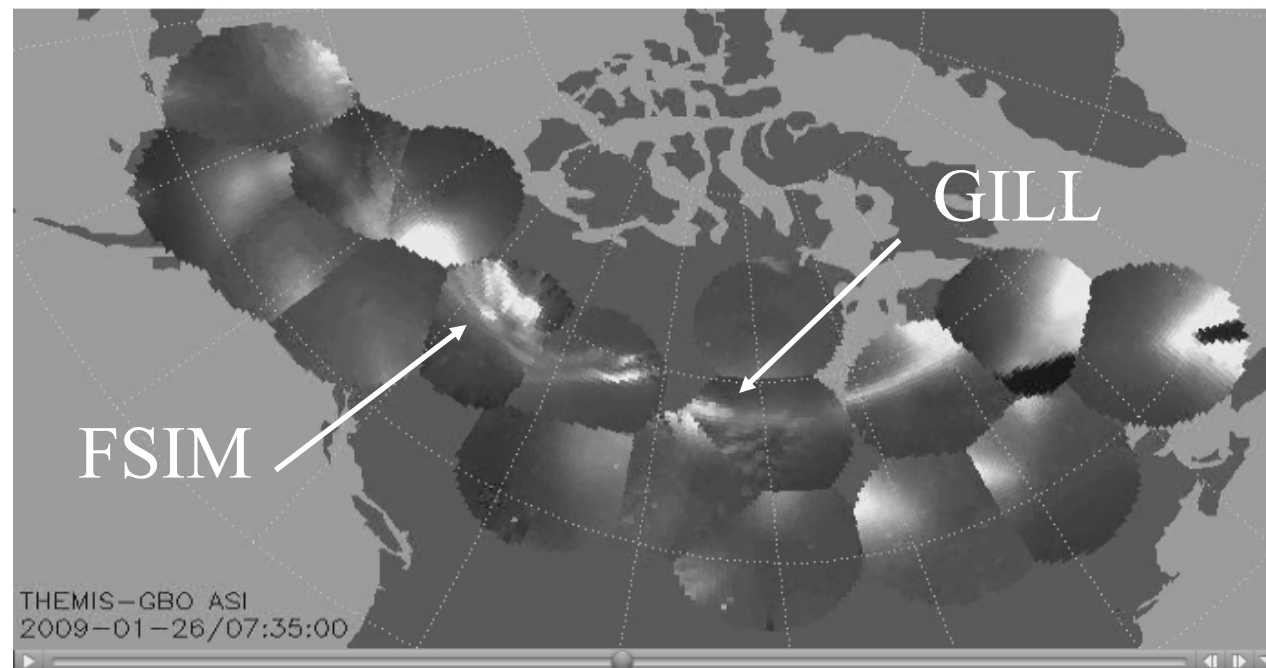
0709 UT



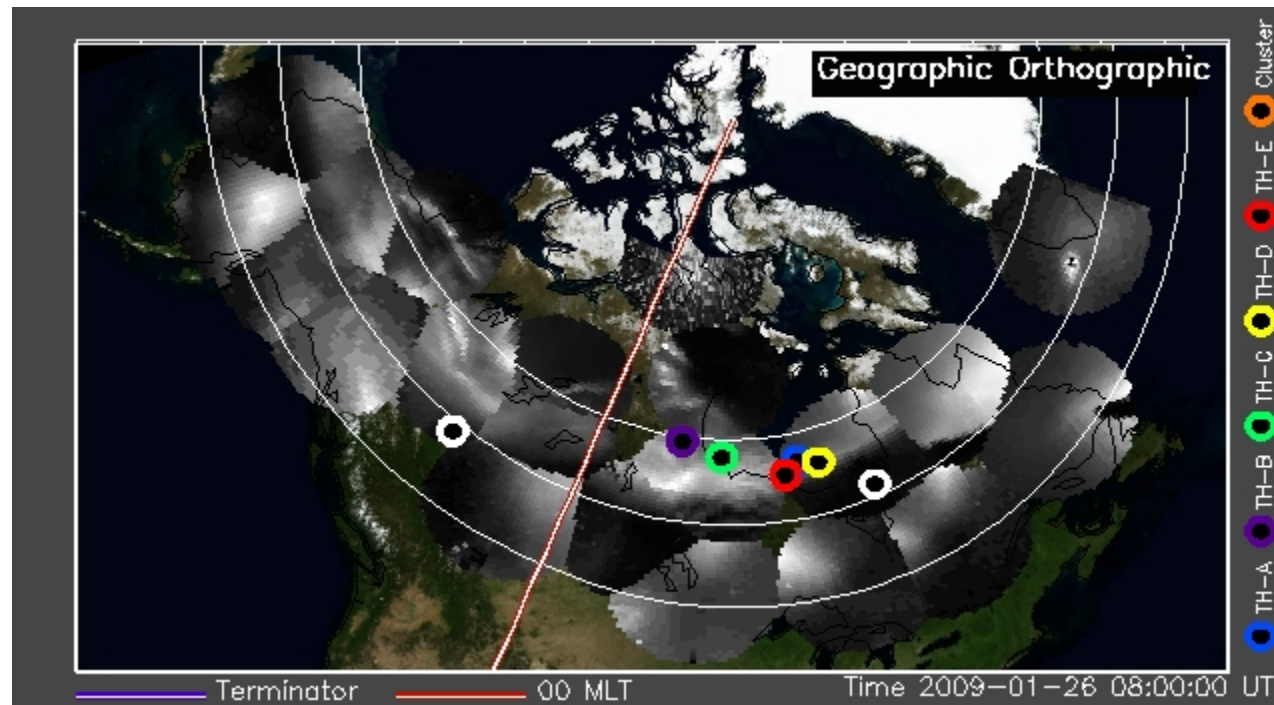
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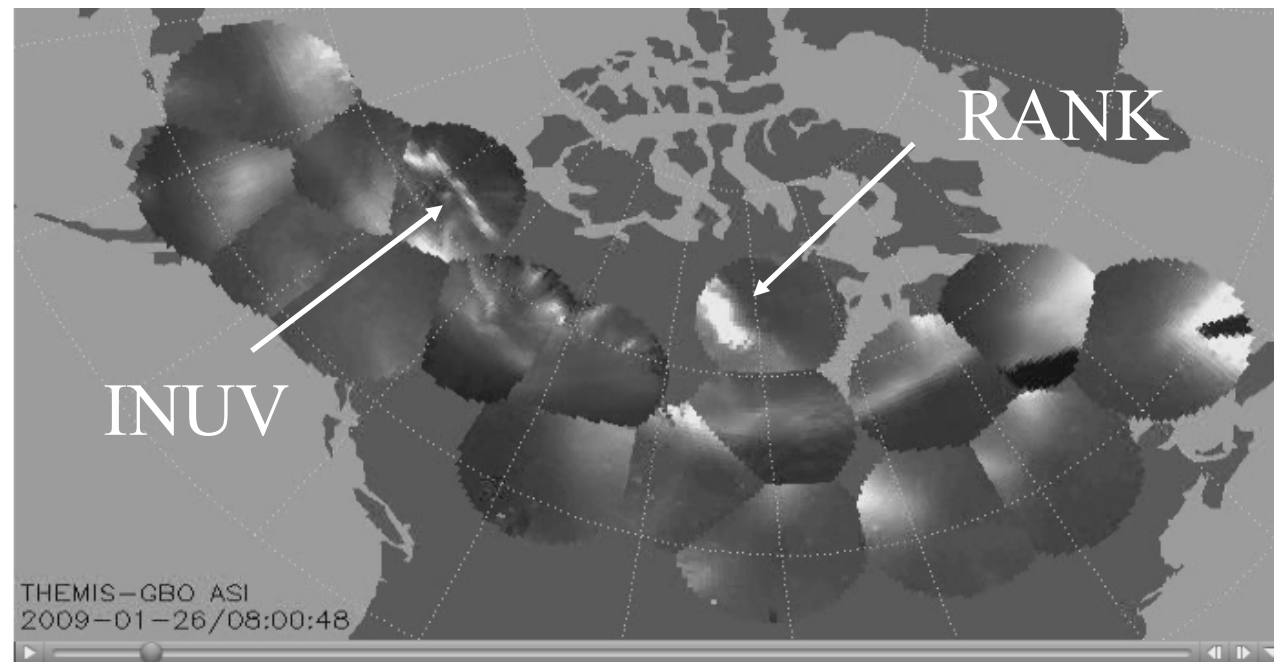
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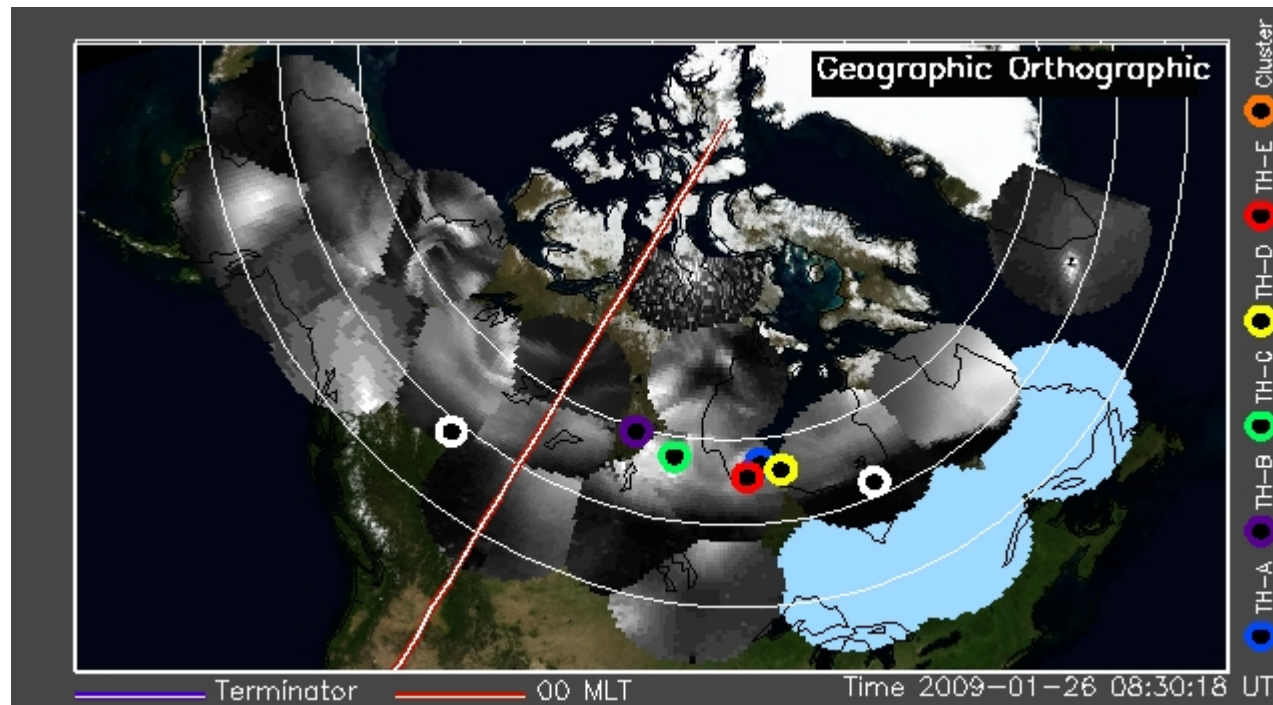
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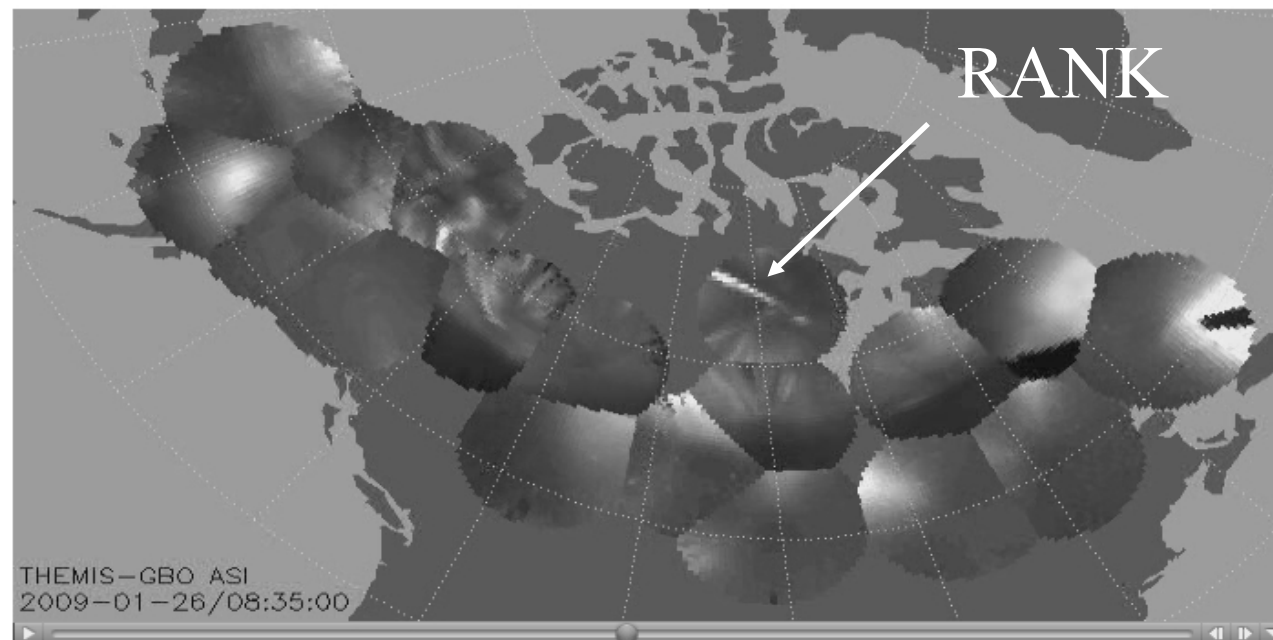
0800 UT



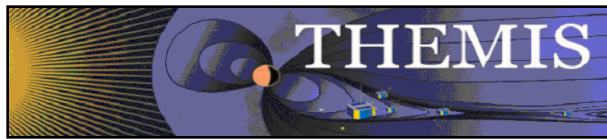
080848 UT



083018 UT



0835 UT



20090126 IN-SITU 0600-0930 UT



B_x

B_y

B_z

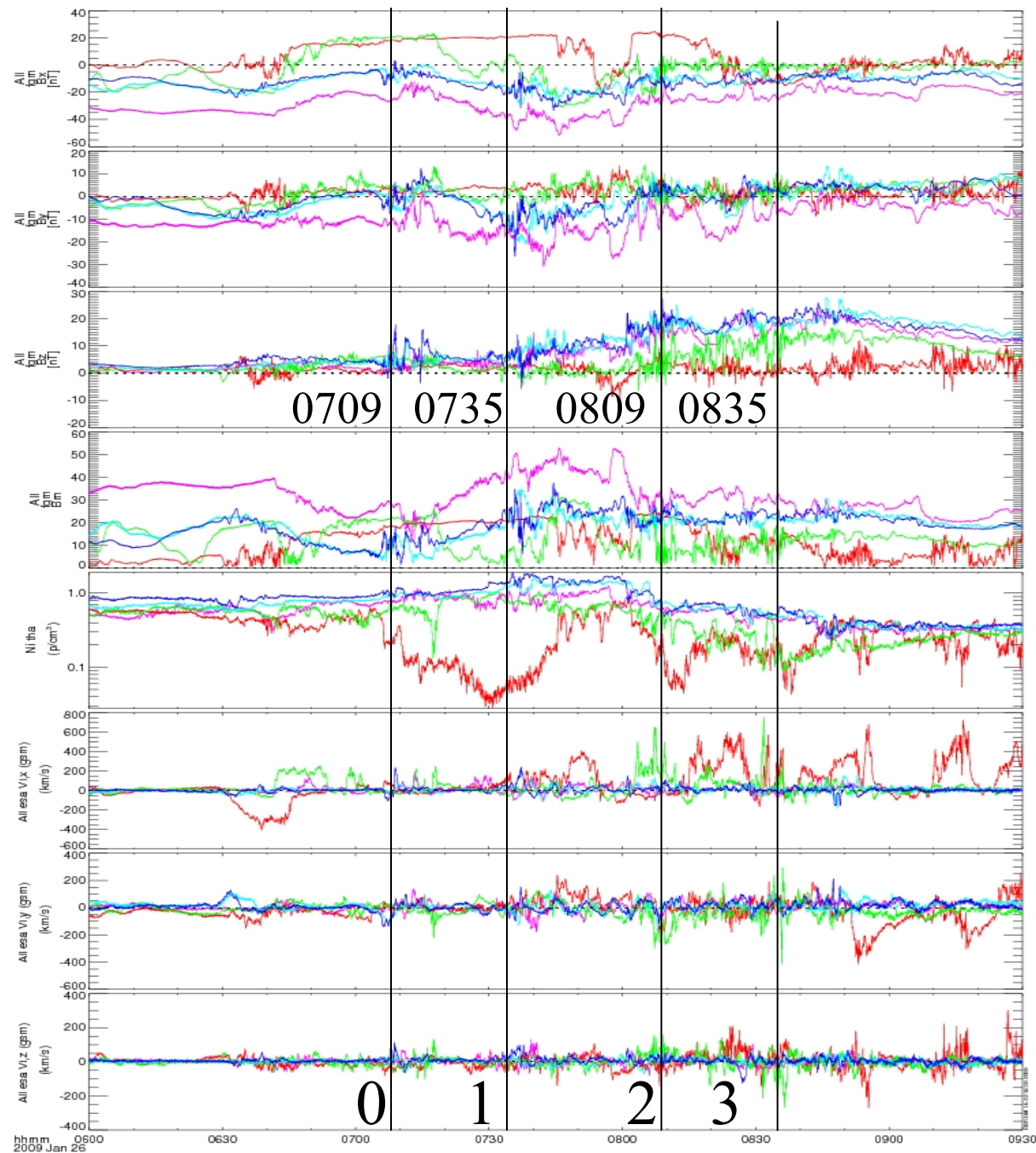
B

N_i

$V_{x,i}$

$V_{y,i}$

$V_{z,i}$

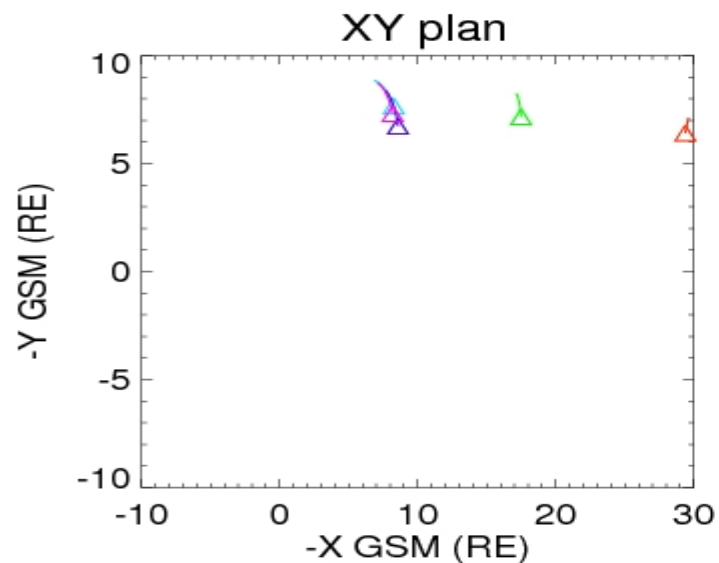




THEMIS Locations



THEMIS positions on 2009-01-26/00:00:00.0 from 09:00:00 to 12:00:00



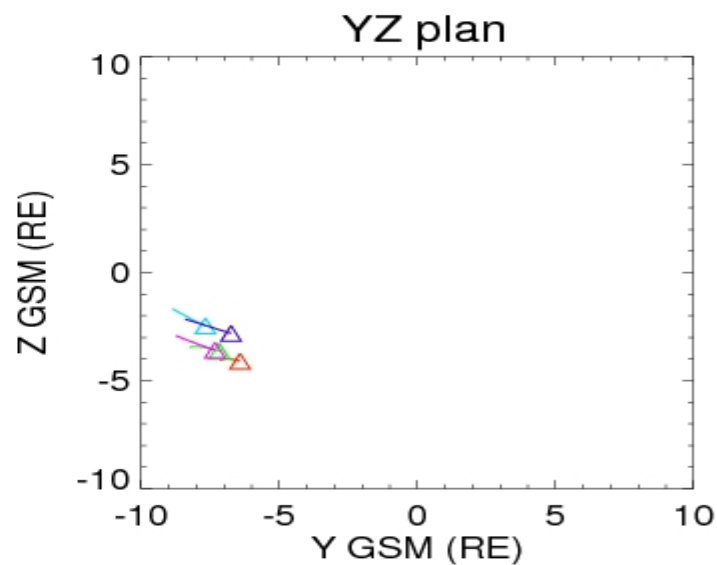
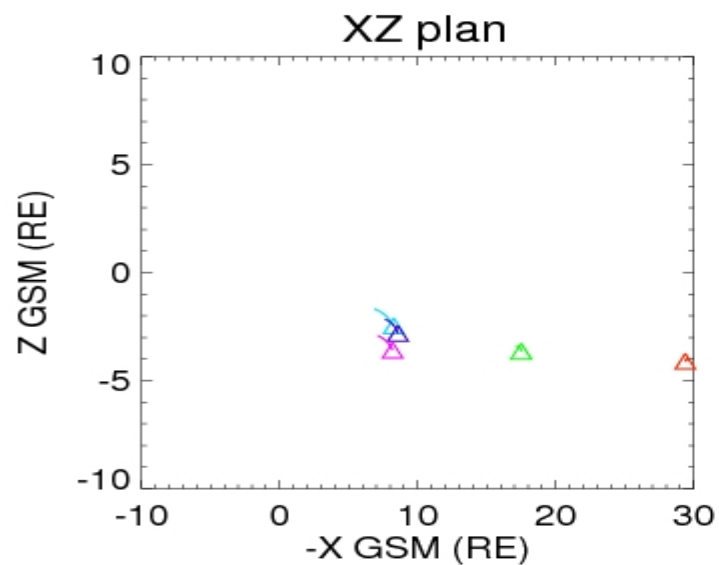
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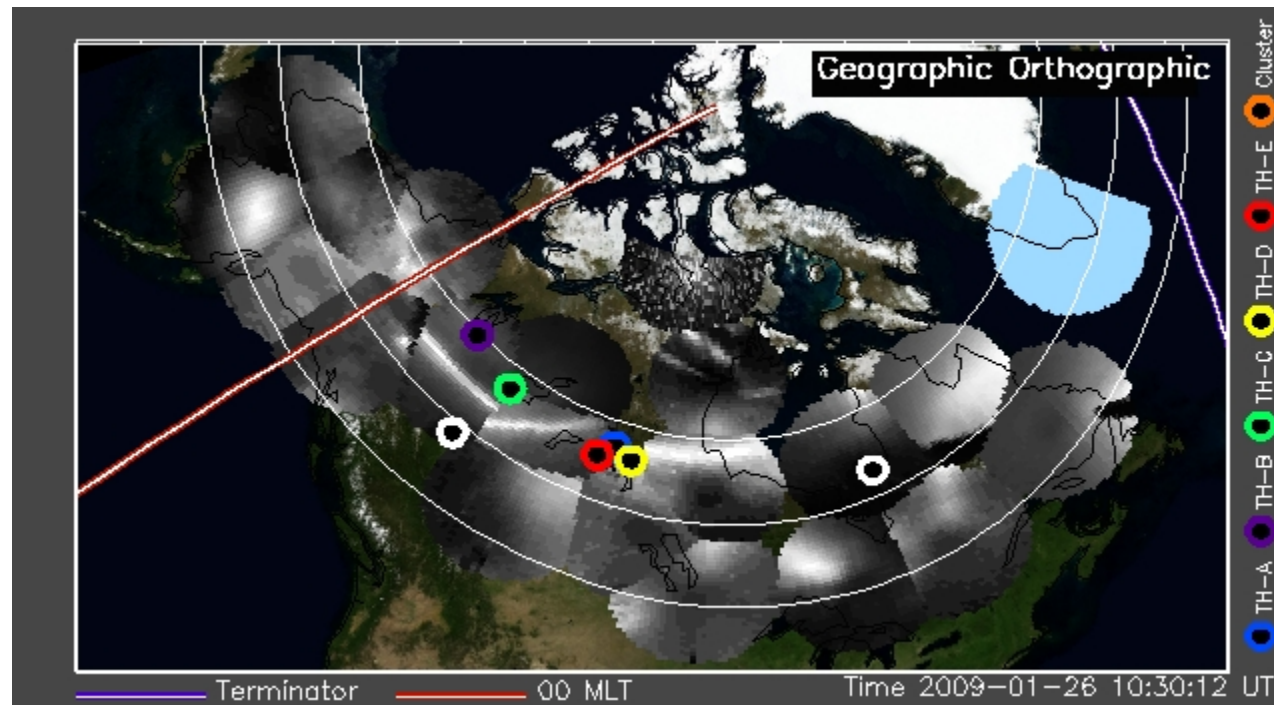
THEMIS-P2 (THC)

THEMIS-P3 (THD)

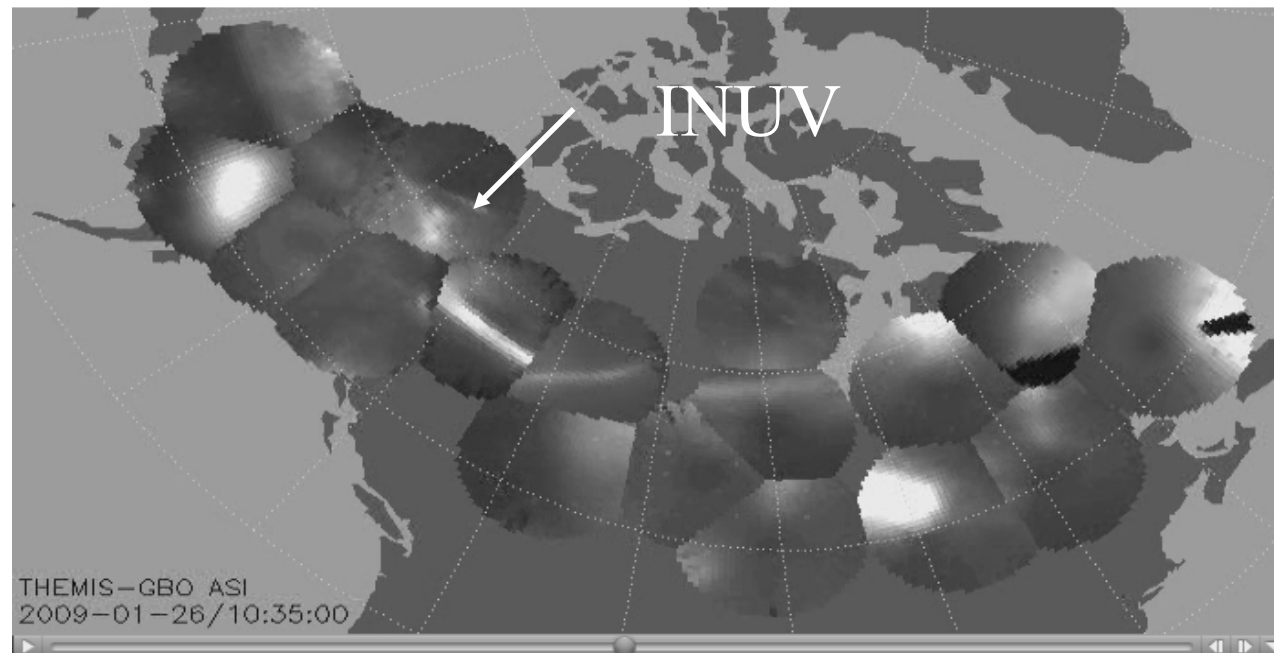
THEMIS-P4 (THE)

THEMIS-P5 (THA)

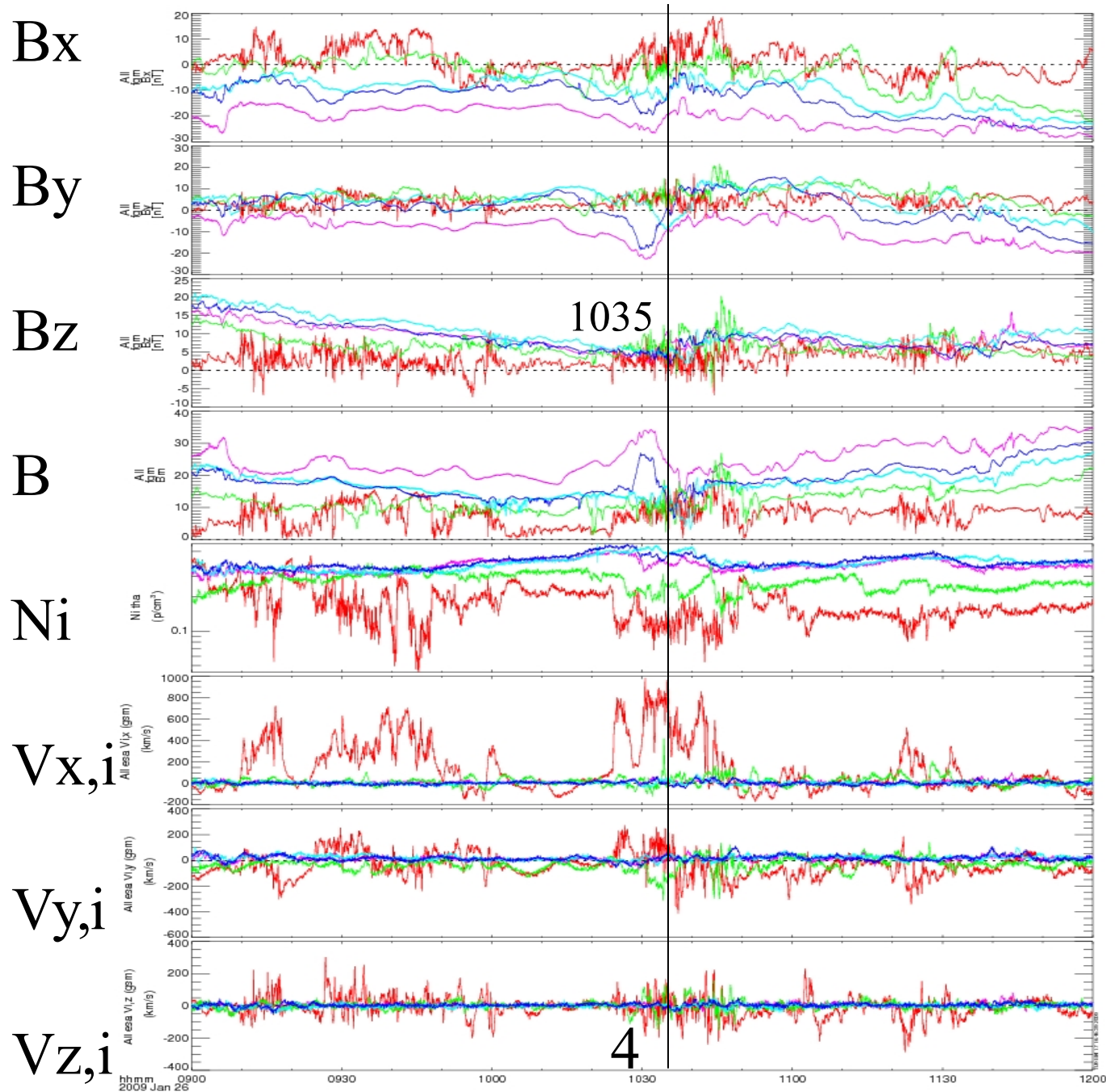


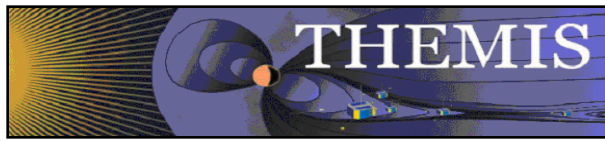


103012 UT



1035 UT

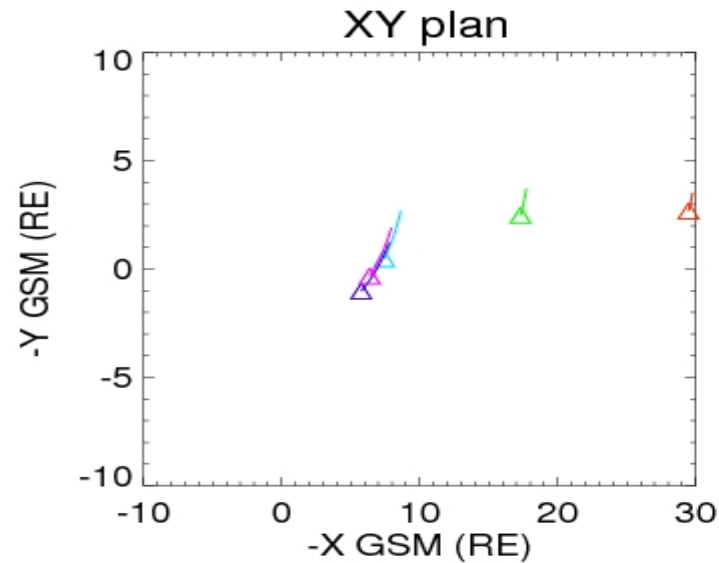




THEMIS Locations



THEMIS positions on 2009-01-30/00:00:00.0 from 02:00:00 to 04:00:00



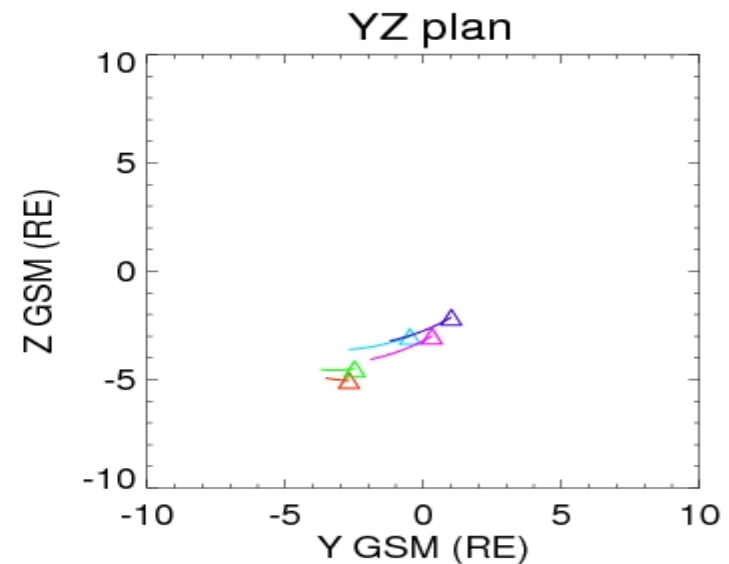
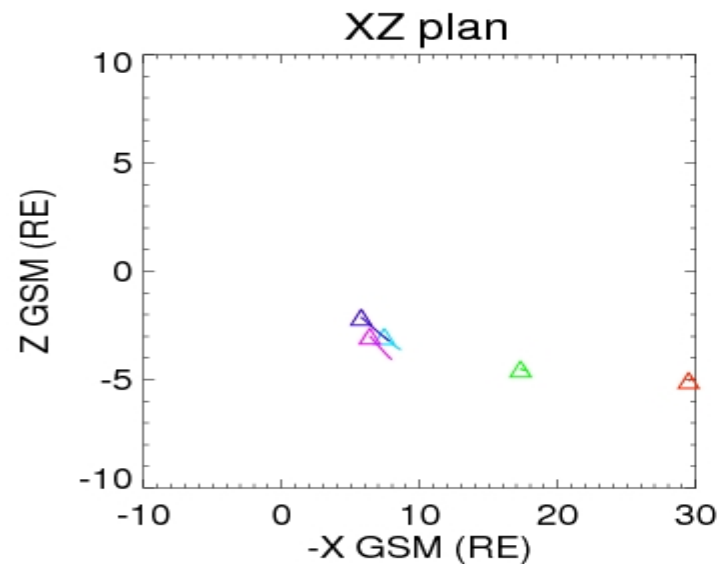
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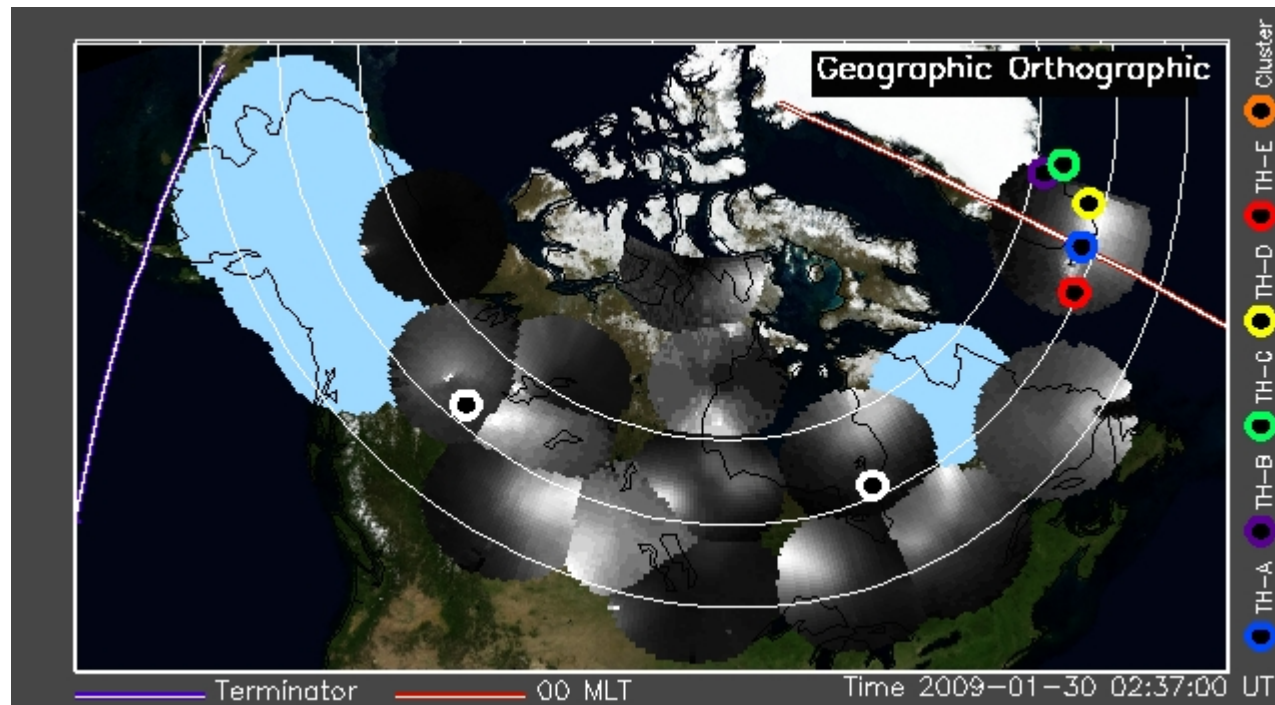
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THEMIS-P3 (THD)

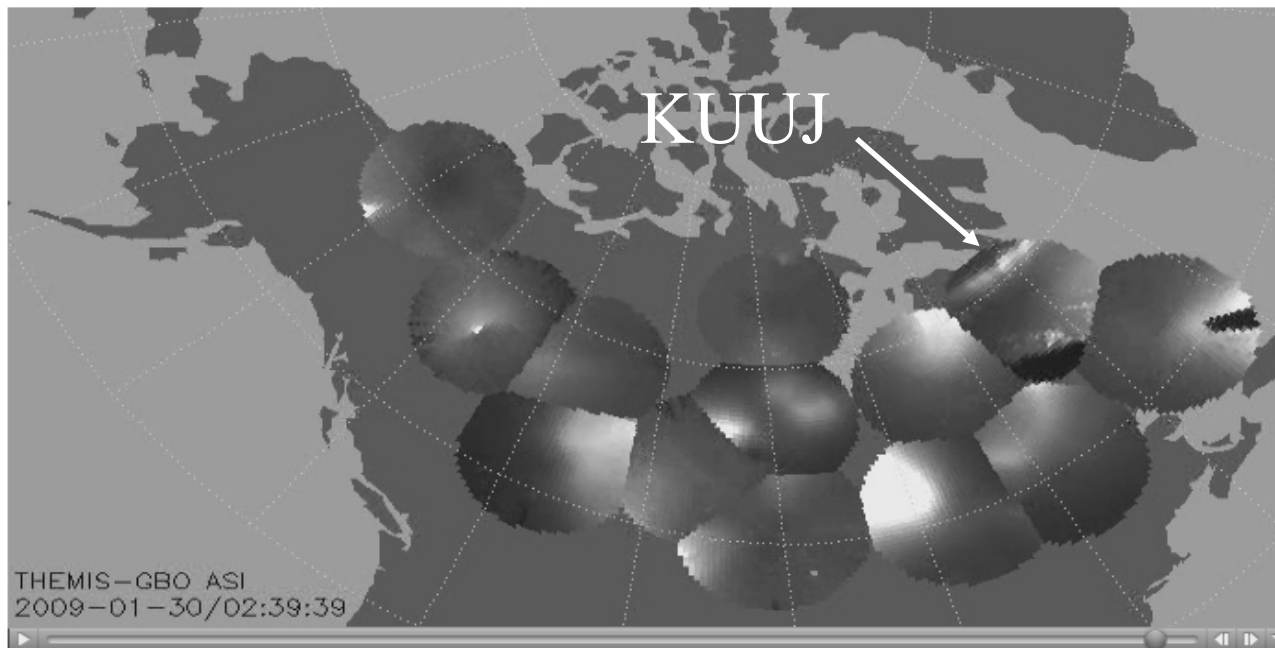
THEMIS-P4 (THE)

THEMIS-P5 (THA)

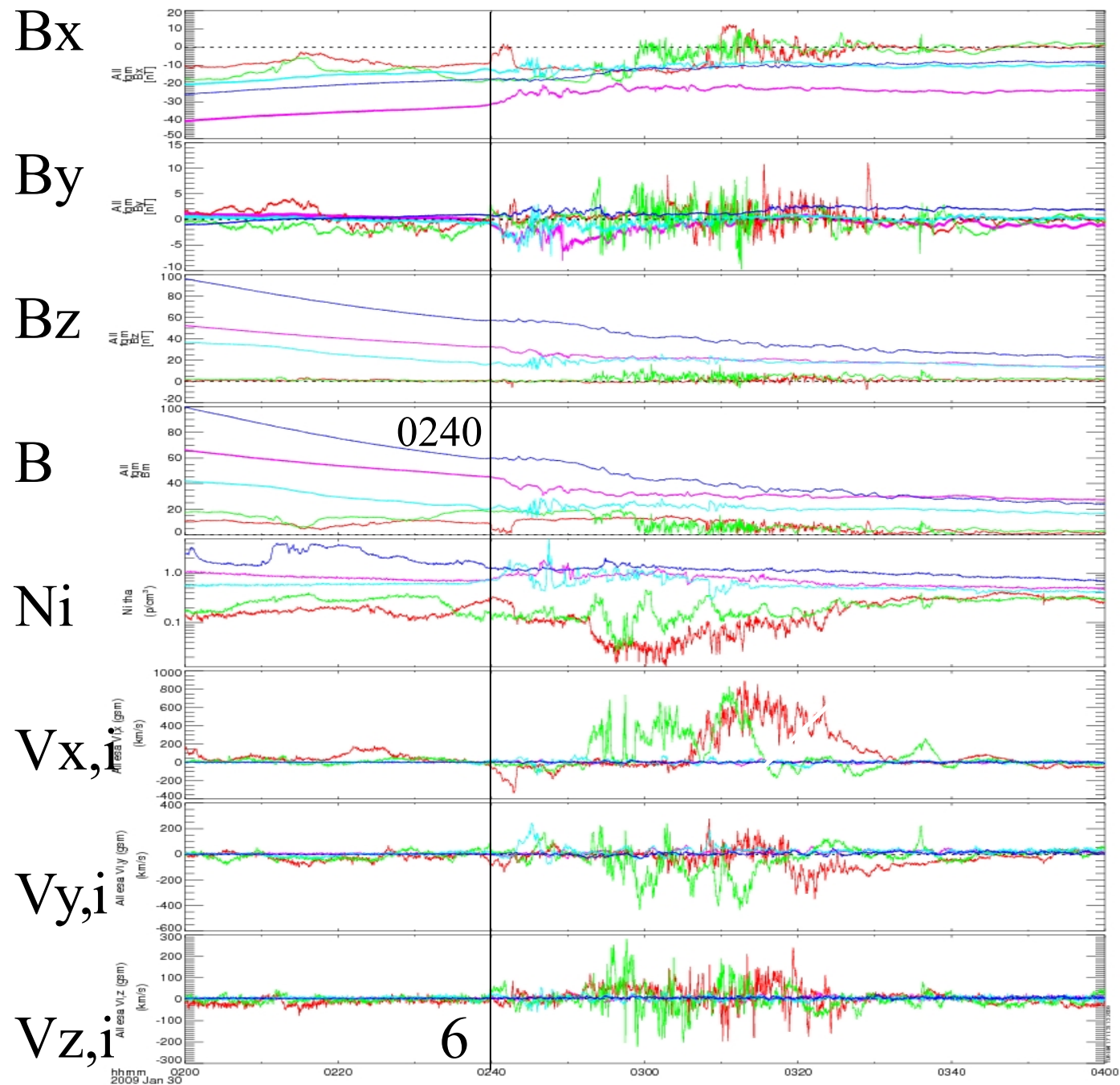




0237 UT



023939 UT

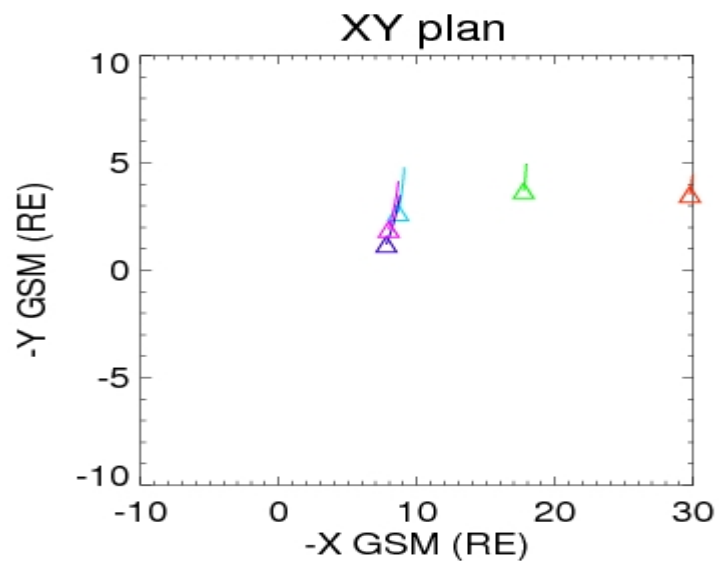




THEMIS Locations



THEMIS positions on 2009-01-30/00:00:00.0 from 04:00:00 to 06:00:00



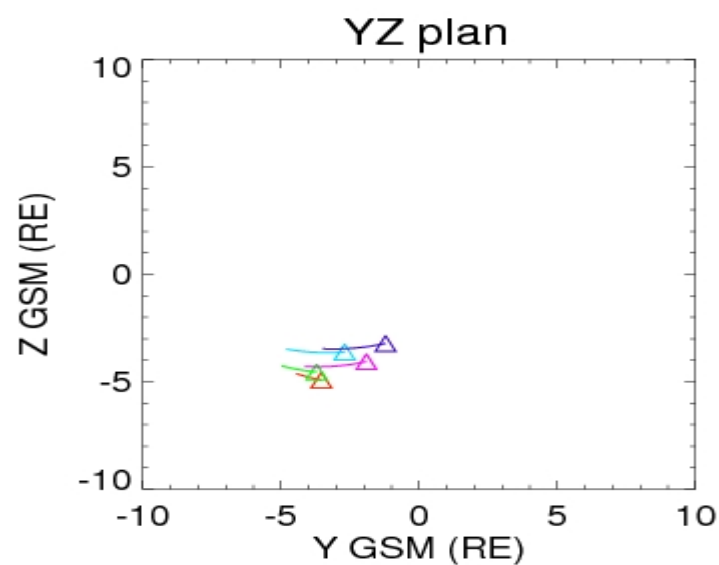
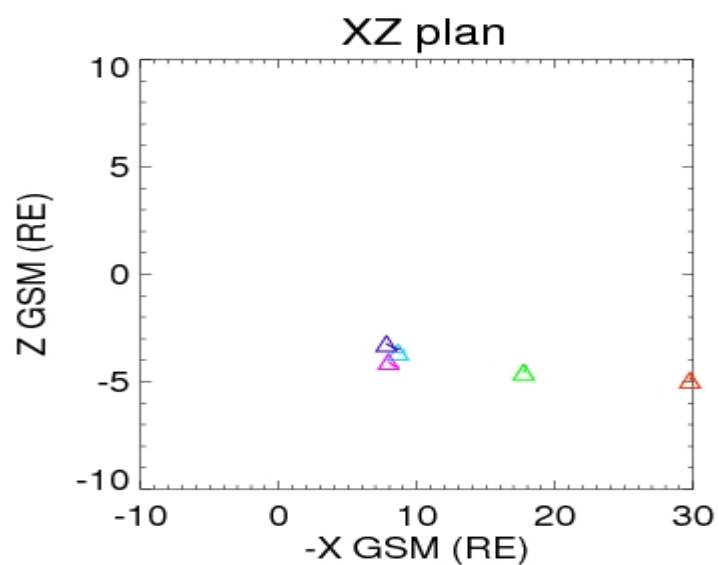
THEMIS-P1 (THB)

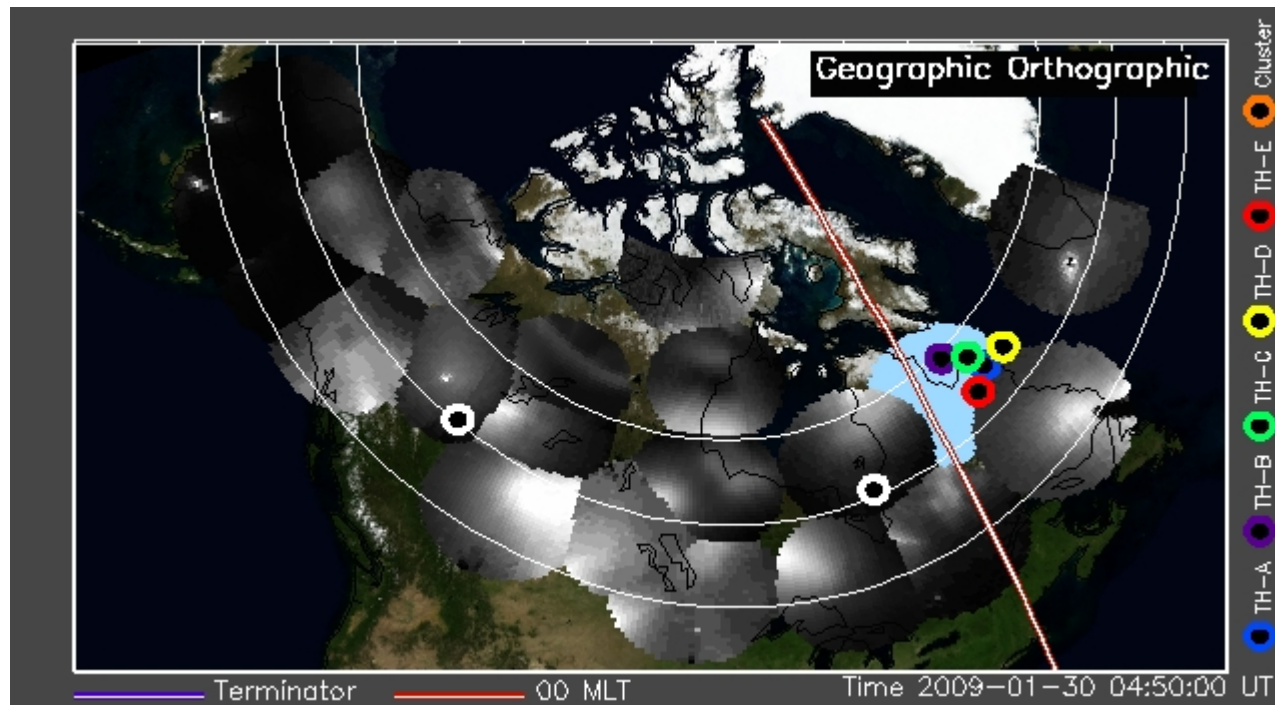
THEMIS-P2 (THC)

THEMIS-P3 (THD)

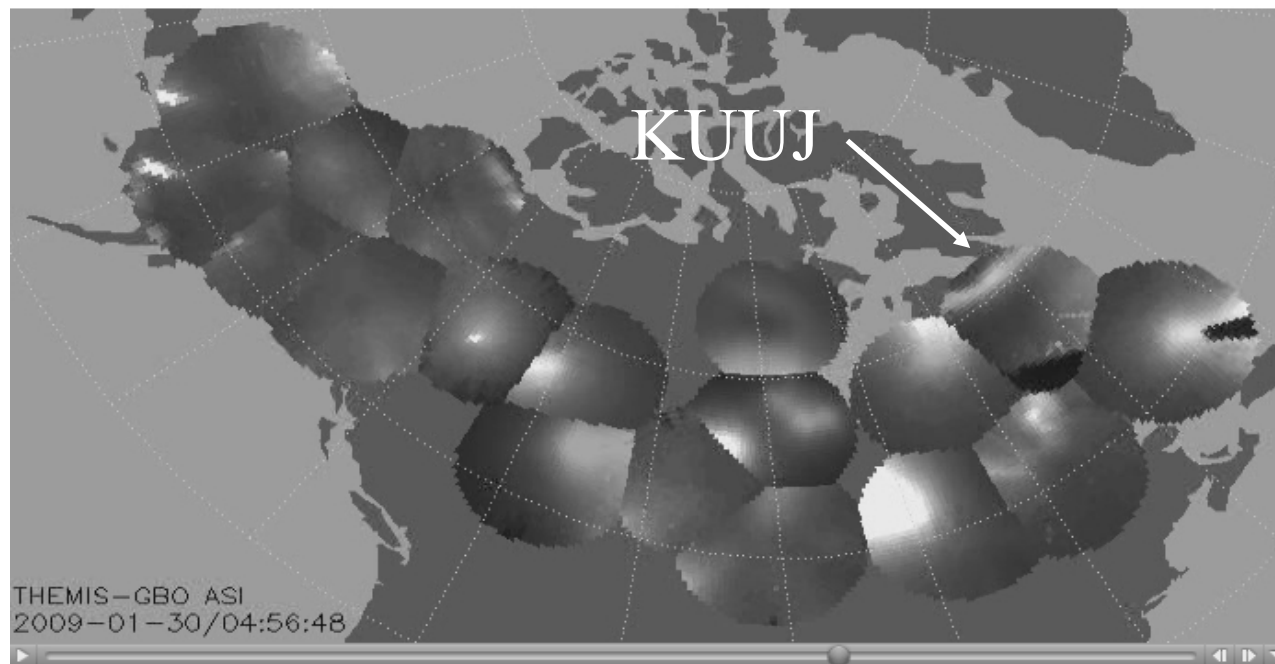
THEMIS-P4 (THE)

THEMIS-P5 (THA)

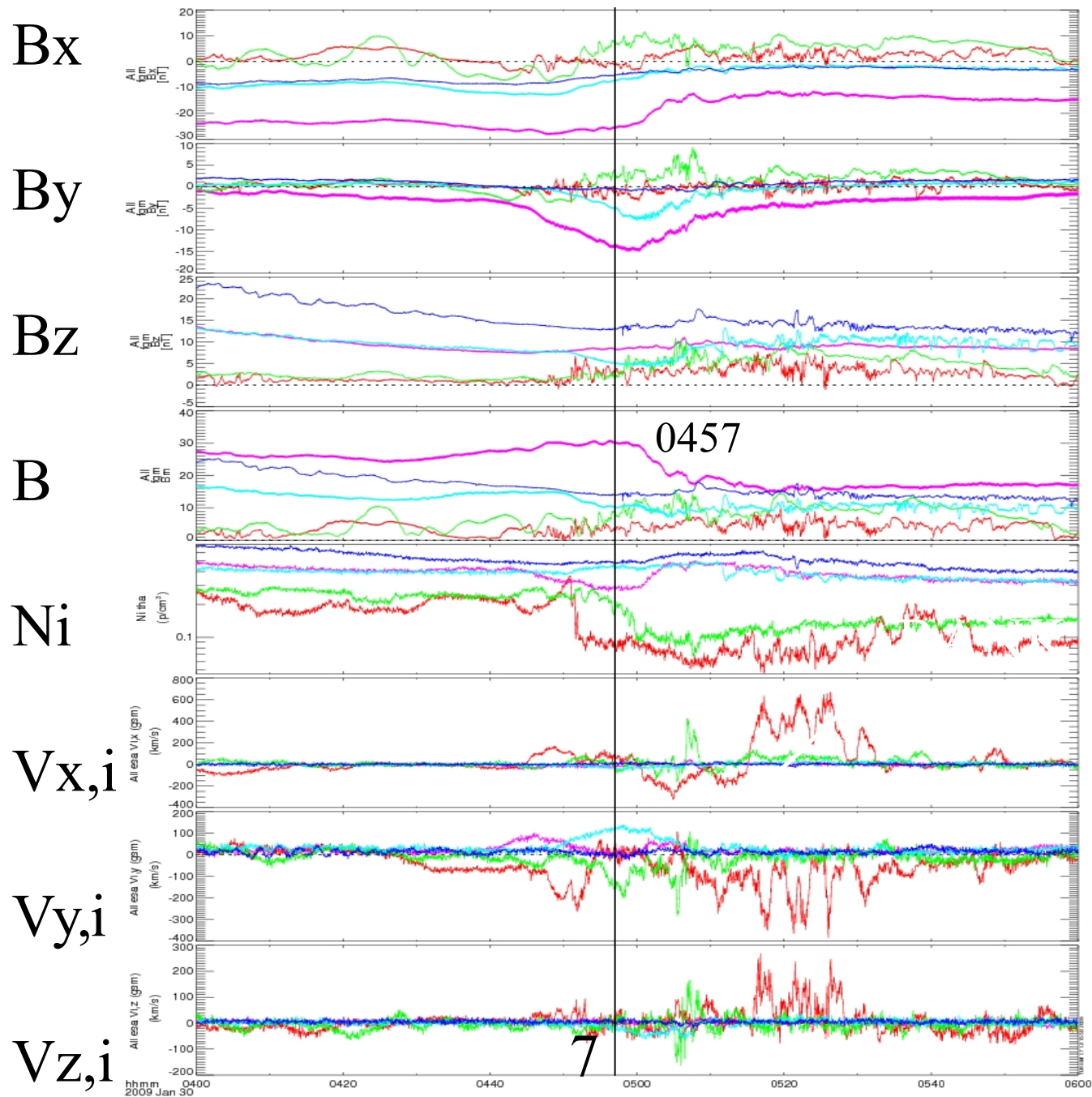


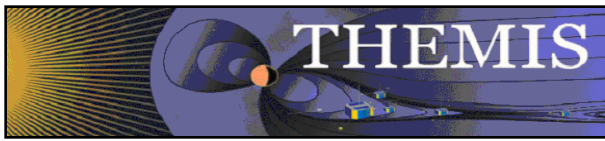


0450 UT



045648 UT

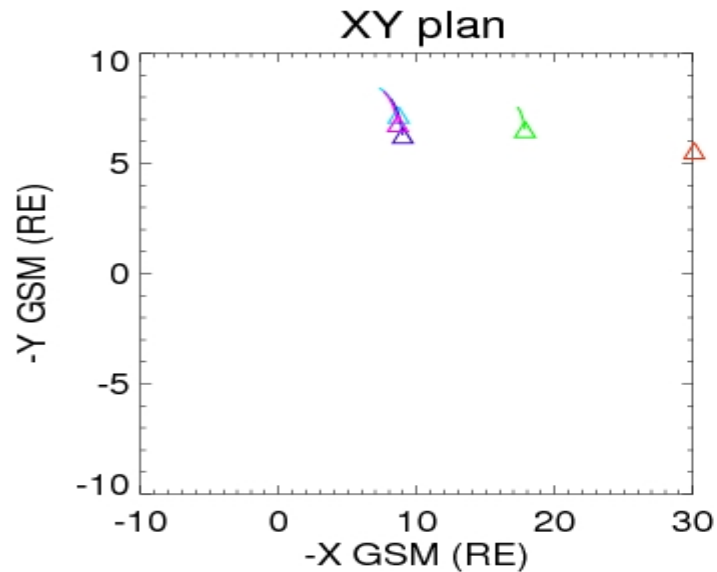




THEMIS Locations



THEMIS positions on 2009-01-30/00:00:00.0 from 09:00:00 to 12:00:00



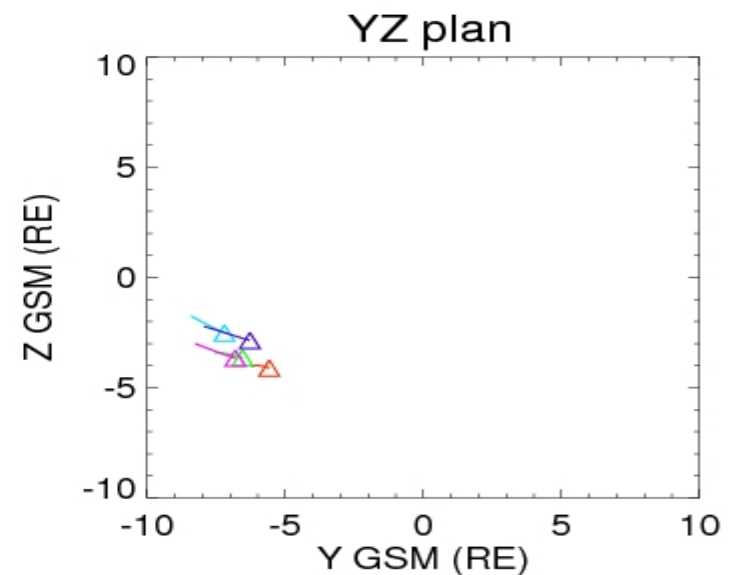
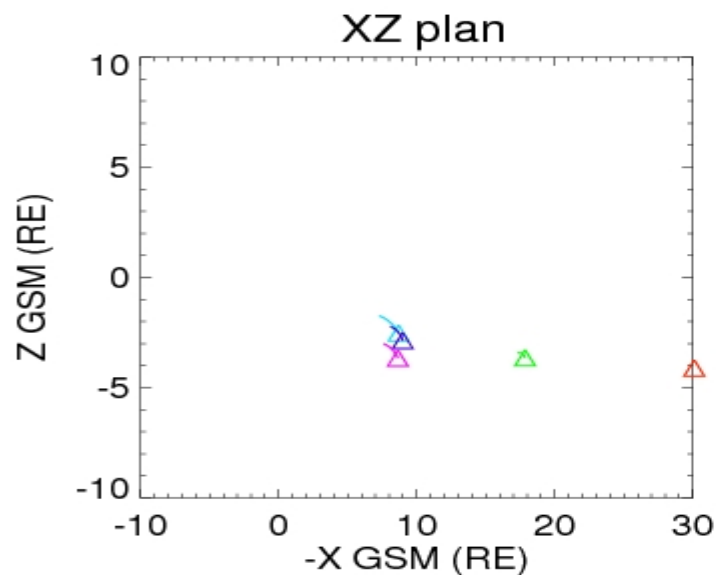
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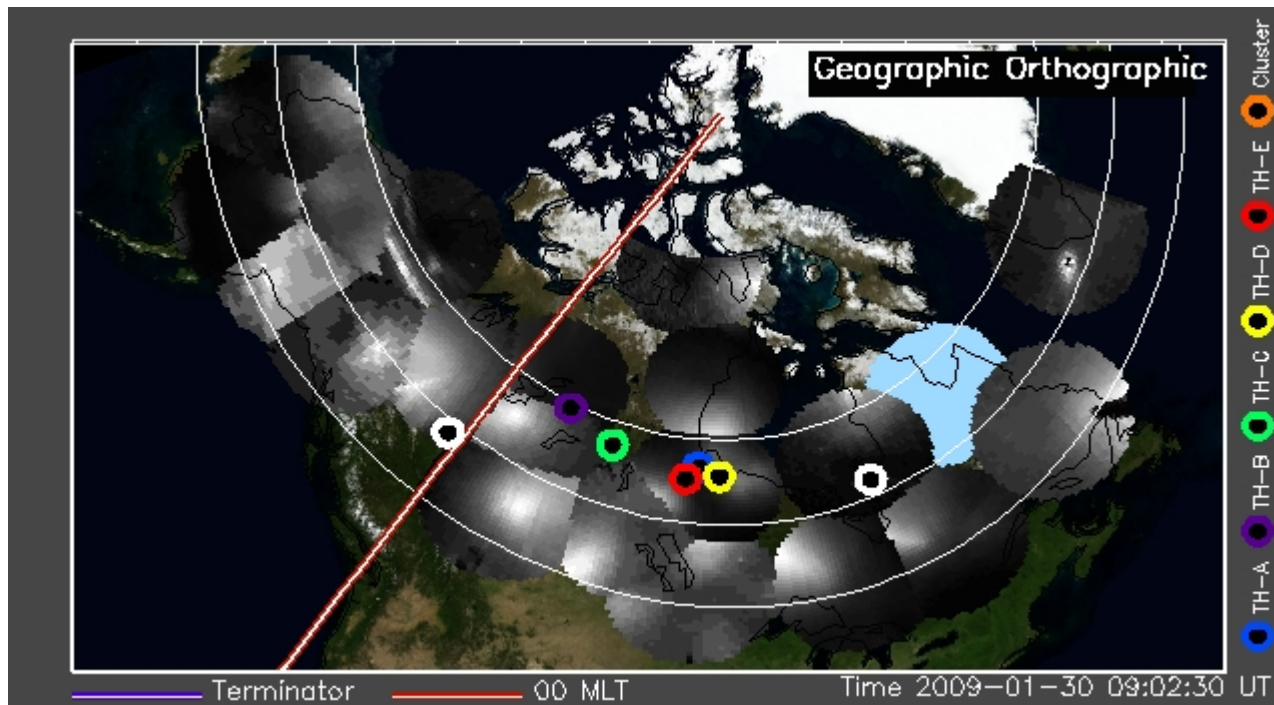
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THEMIS-P3 (THD)

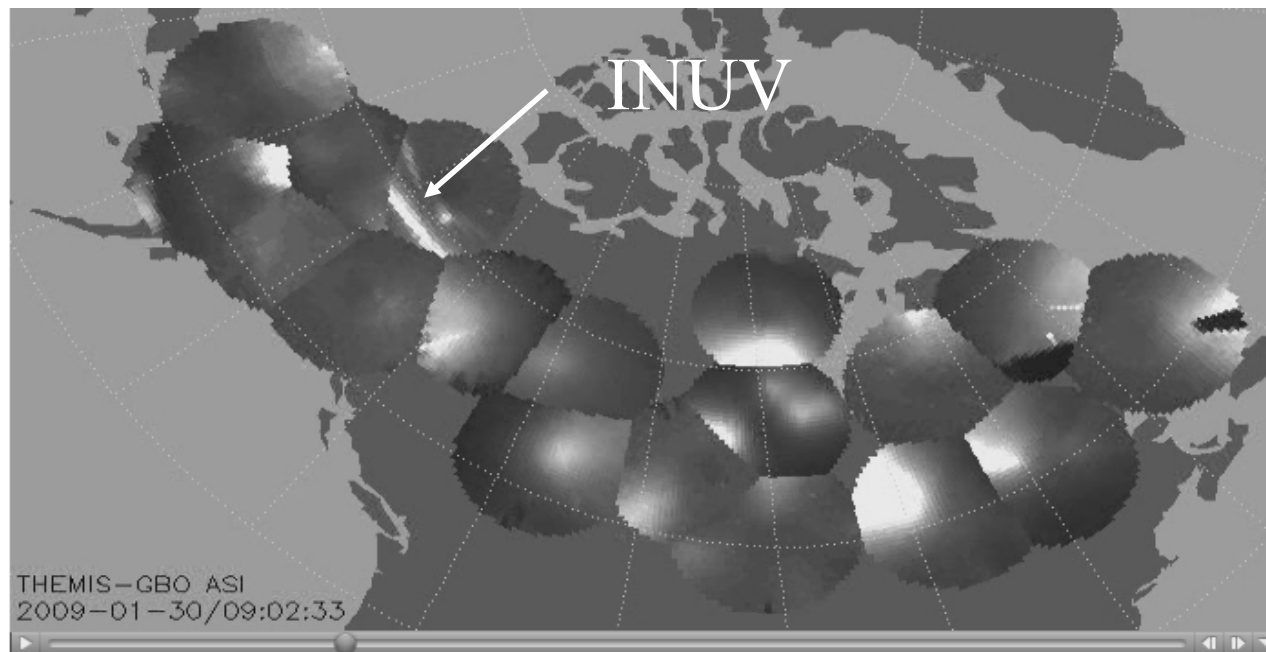
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THEMIS-P5 (THA)

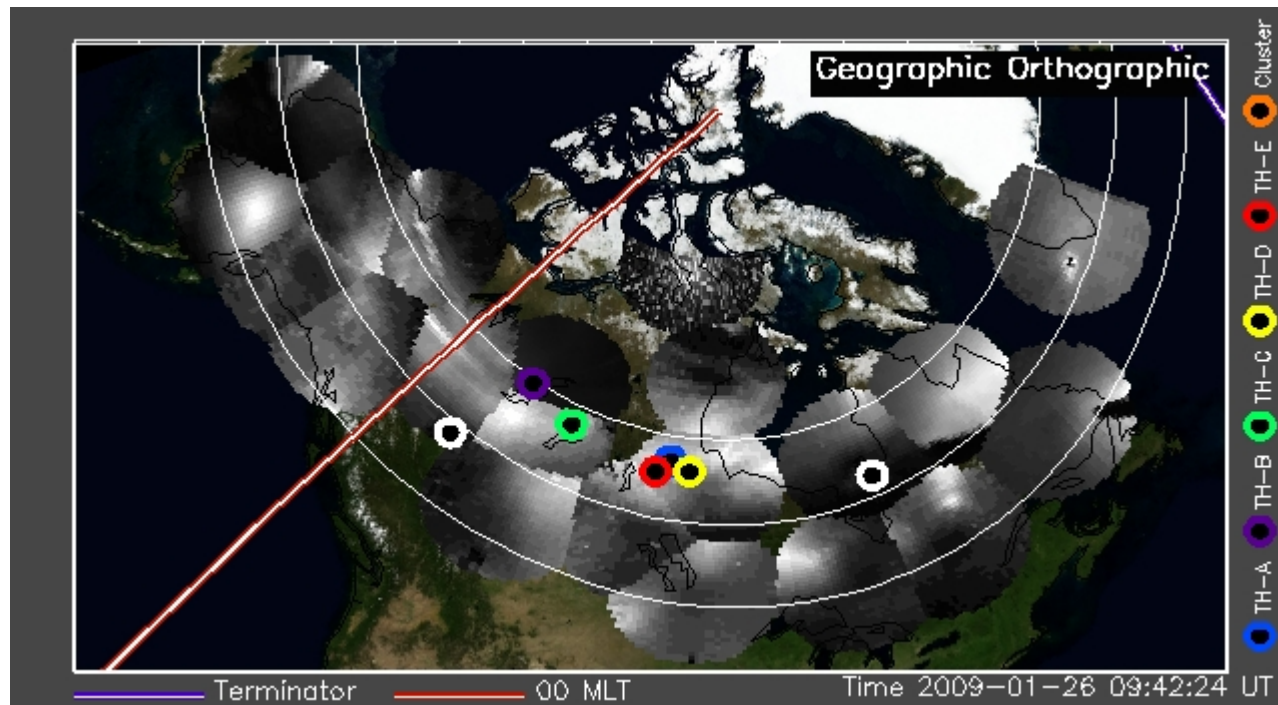




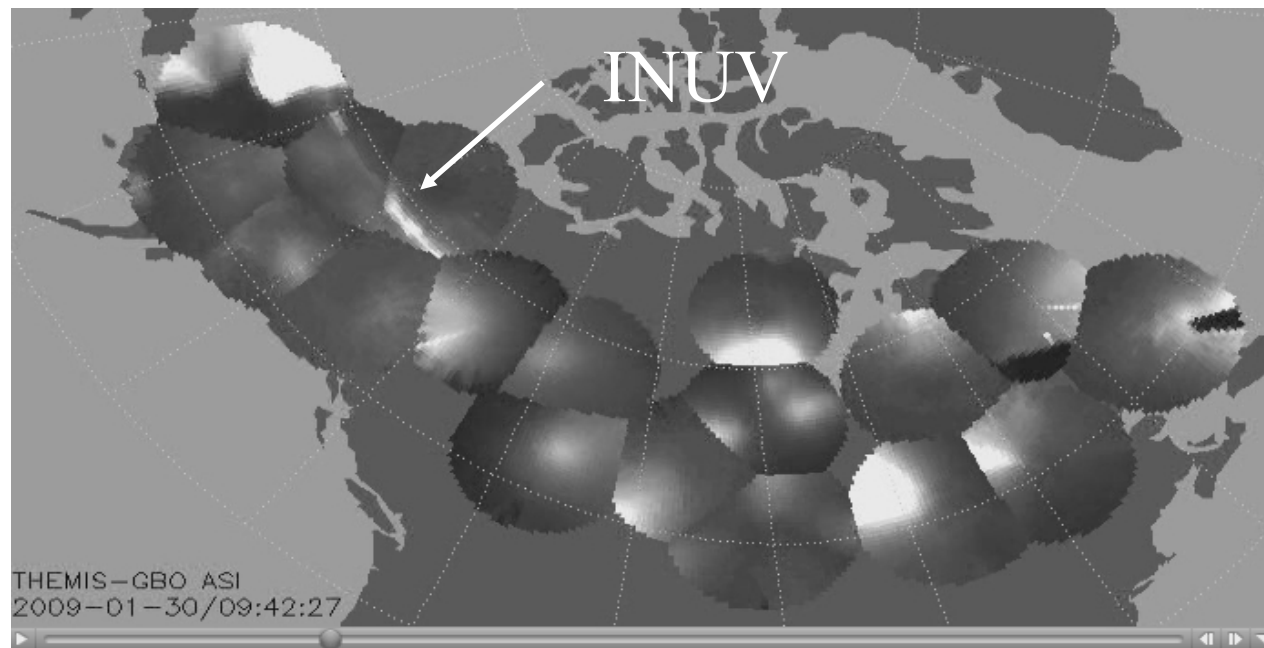
090230 UT



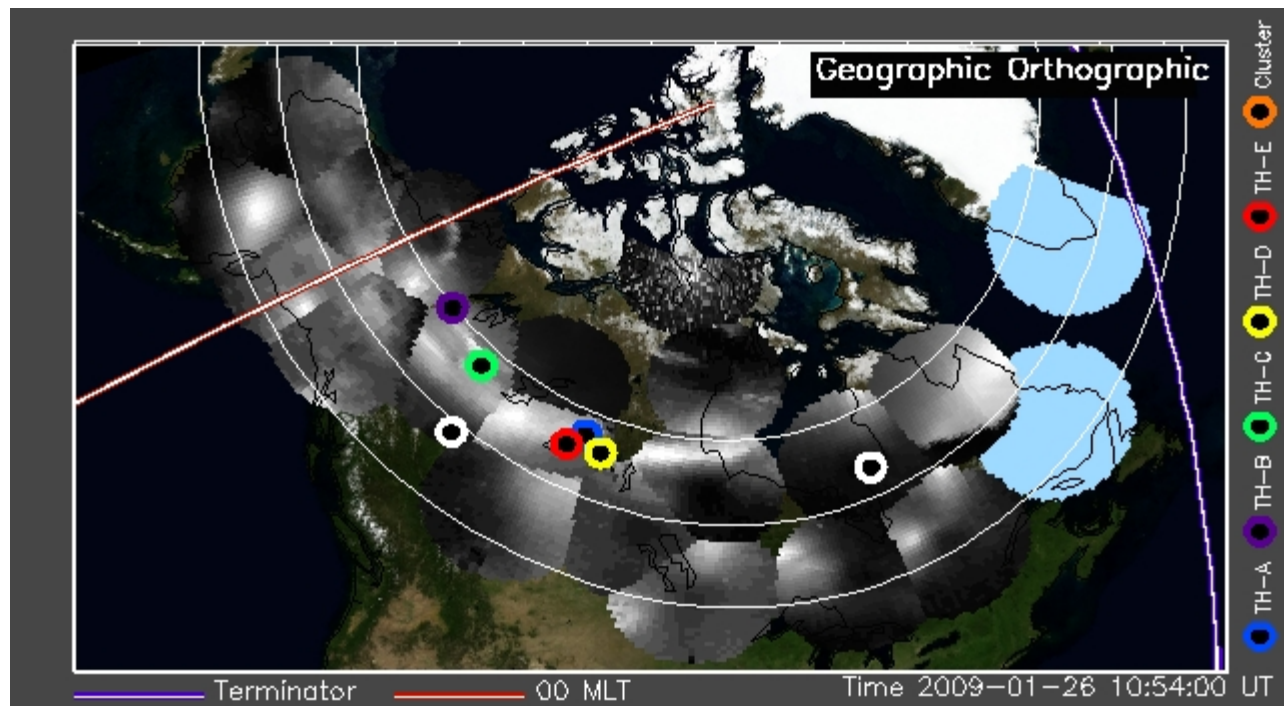
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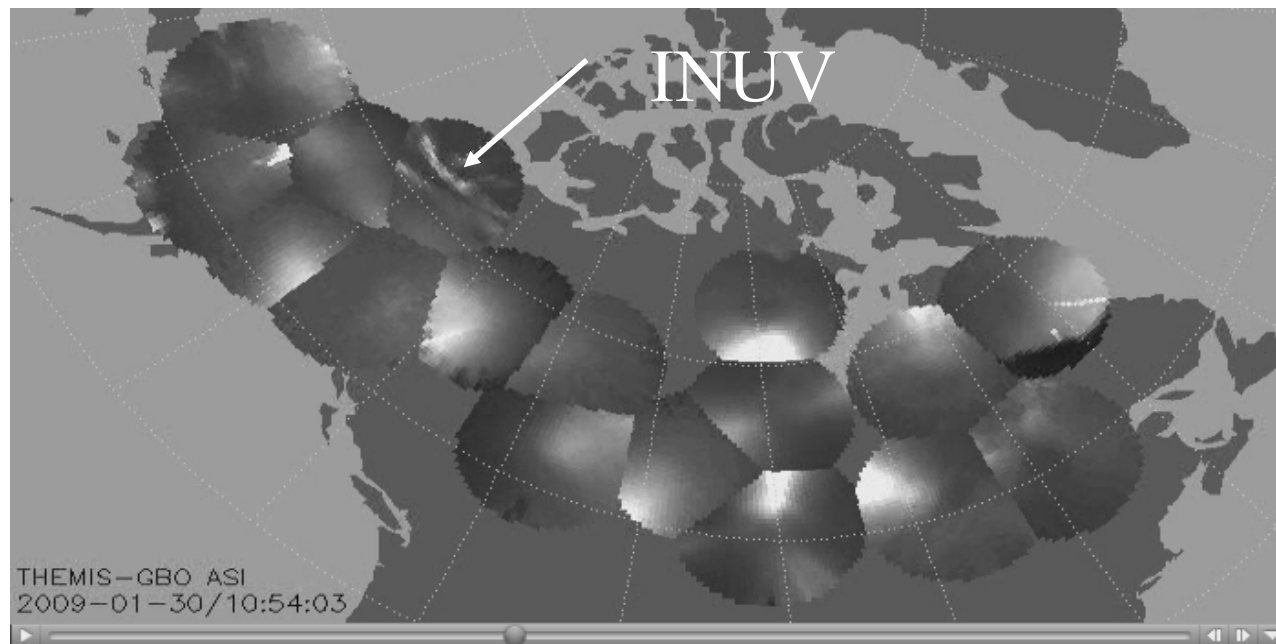
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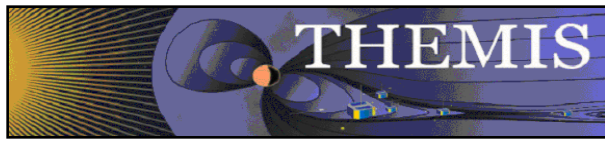
094227 UT



1054 UT



105403 UT



20090130 in-situ 0900-1200 UT



B_x

B_y

B_z

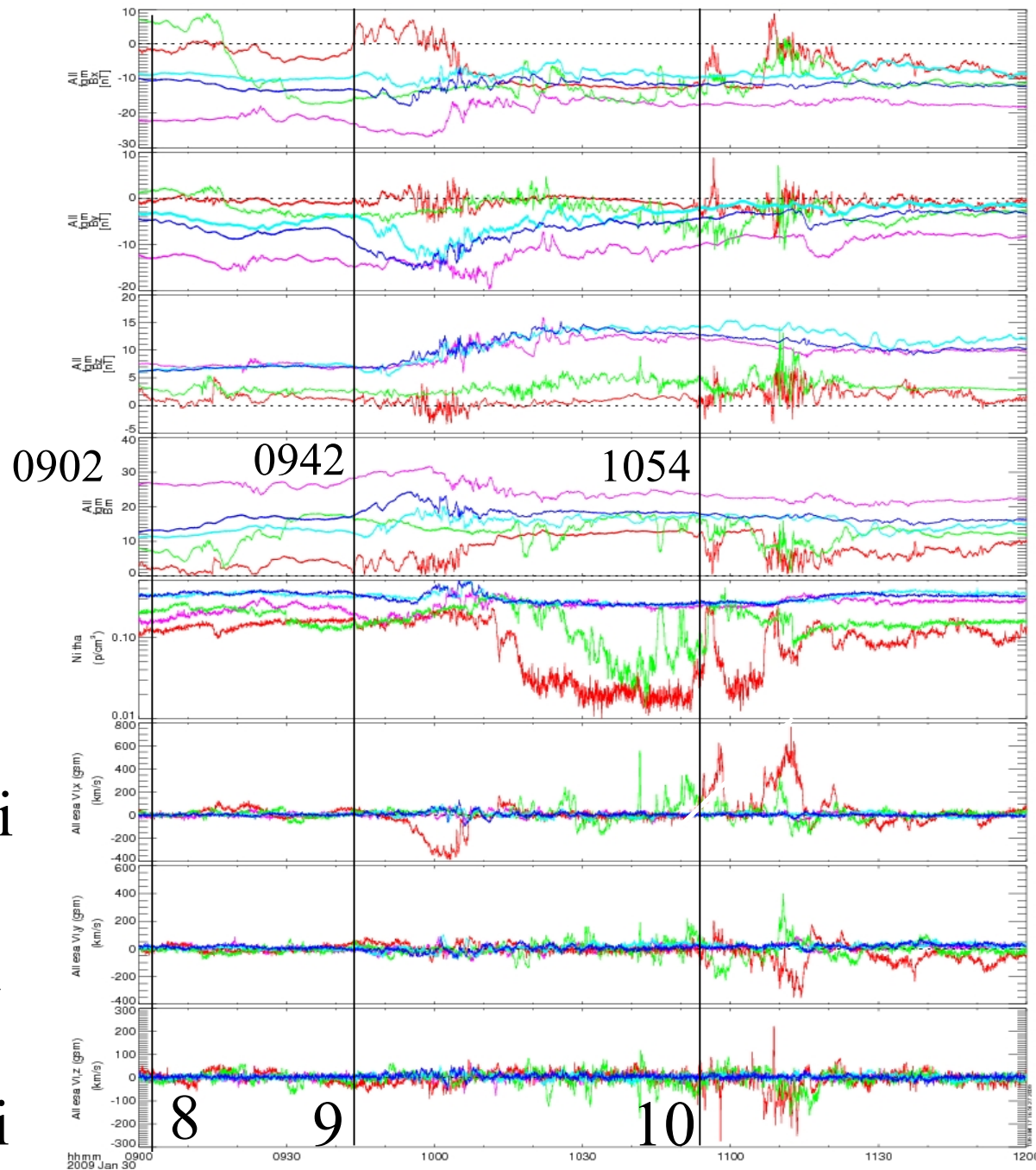
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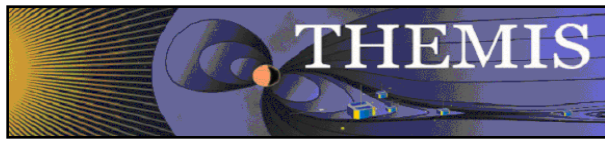
N_i

$V_{x,i}$

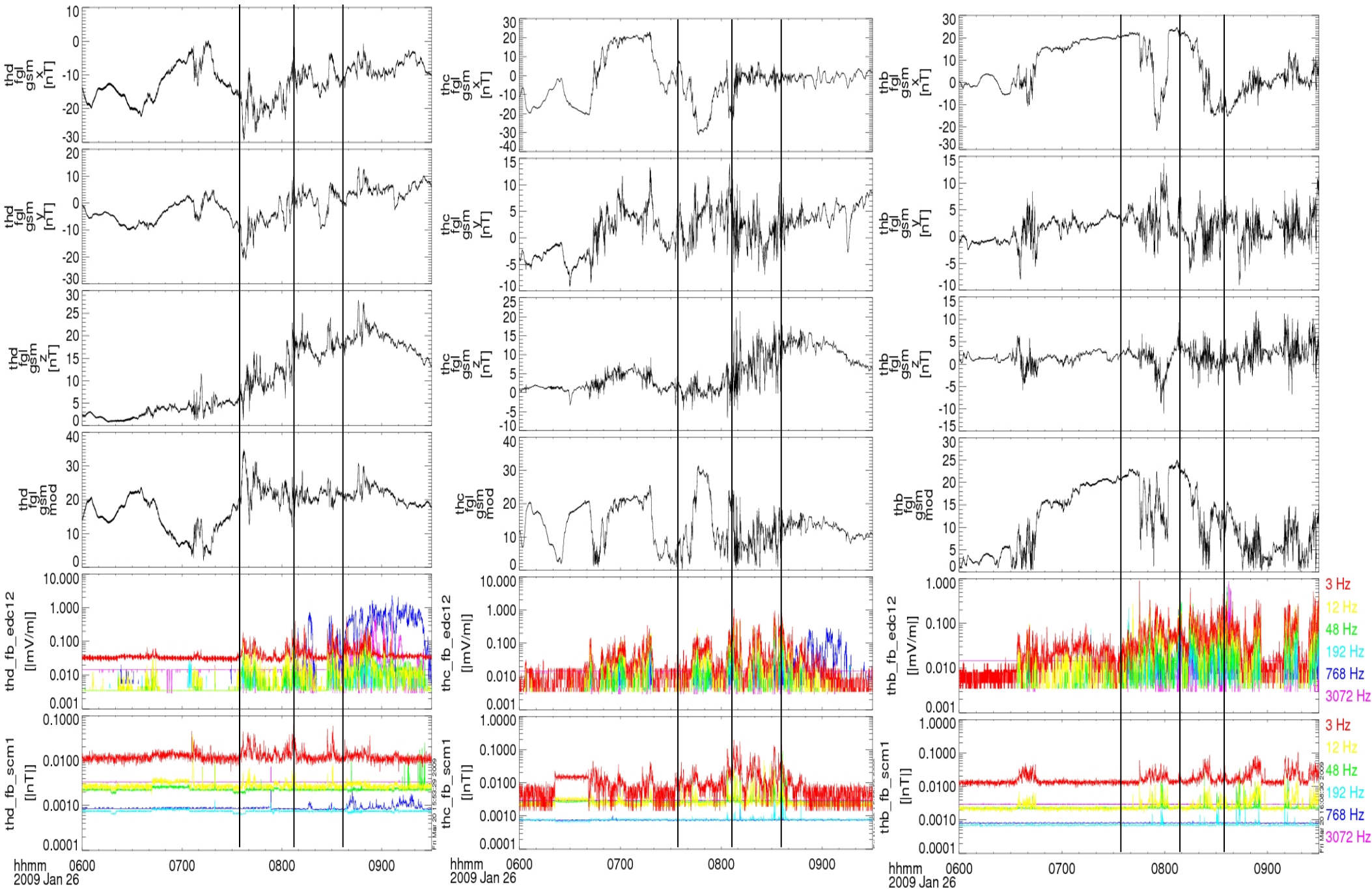
$V_{y,i}$

$V_{z,i}$





Electromagnetic wave activity



- All events but two (#0,#1) correspond to high latitude arcs
- Low-latitude arc intensification for event #0 is well correlated with dipolarization detected by near-earth probes
- Event #1 could correspond to a small substorm
- High-latitude arc intensifications are correlated with large ion velocities on THB&THC but various signatures are also detected by near-earth probes
- Longitude locations make difficult to draw conclusions about timing (but anyway no big substorm)
- Electromagnetic wave activity up to fce is associated with current sheet oscillations through the magnetotail (THD, THC, THB)
- Filter banks data need to be included into AMDA in order to carry out wave/particle statistical studies

To be continued ...