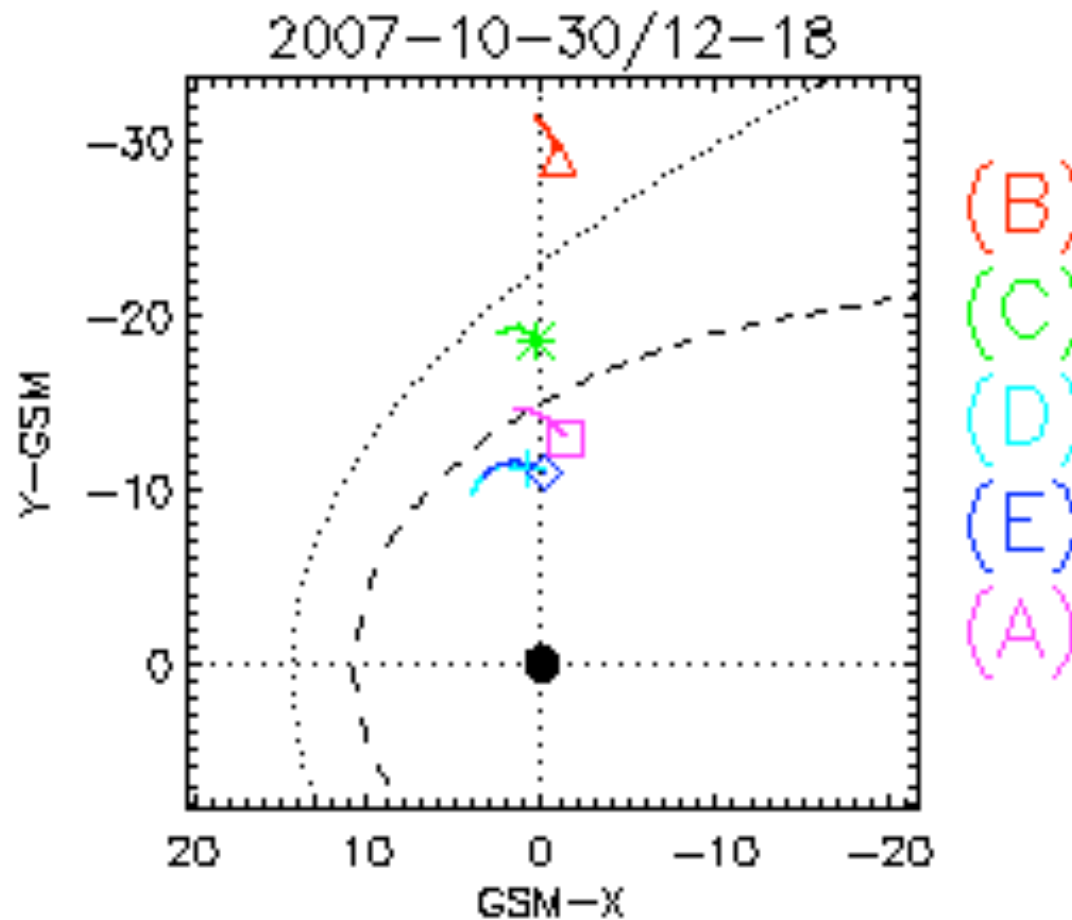


THEMIS observations of extreme magnetopause motion caused by a hot flow anomaly

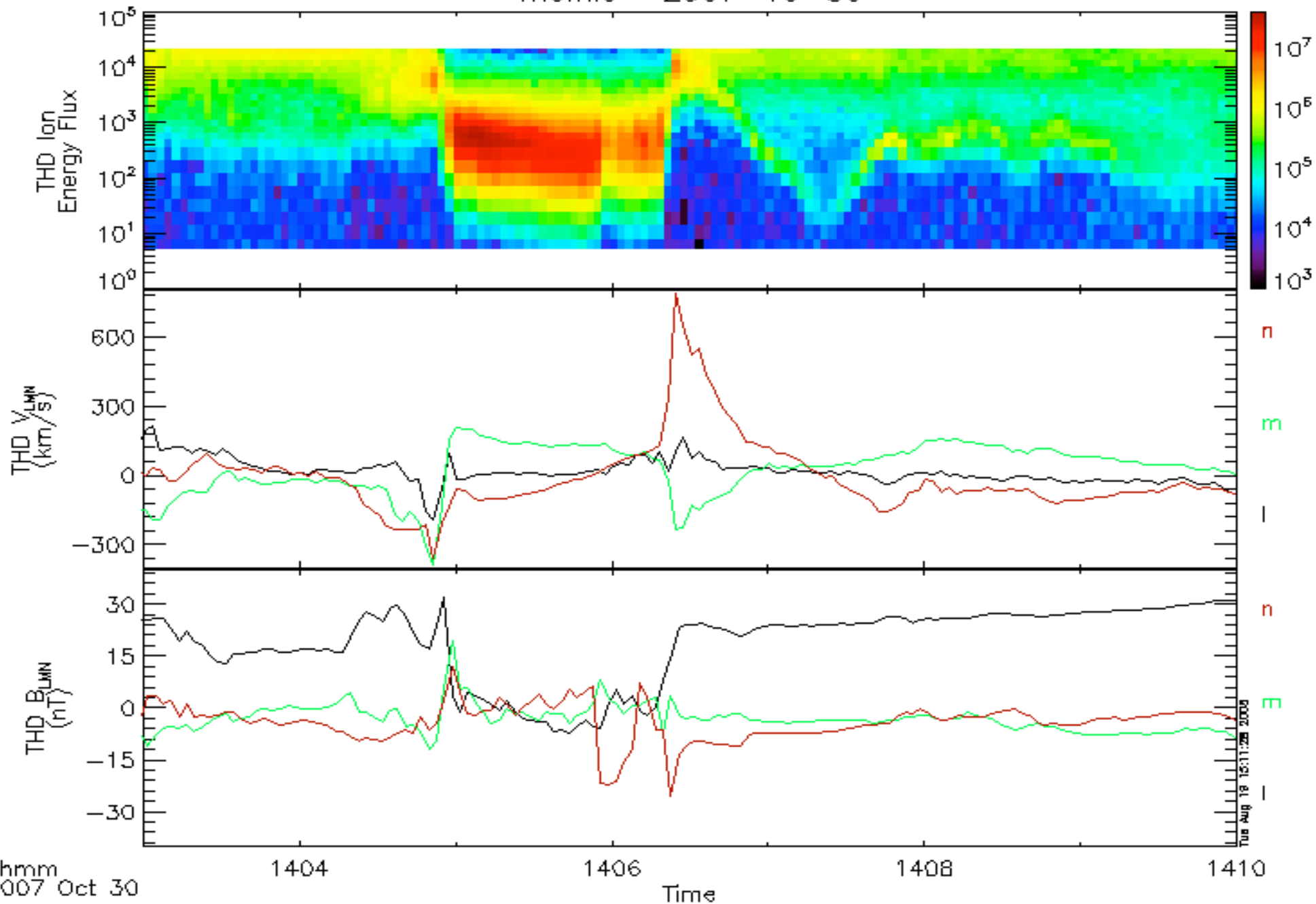
K. S. Jacobsen (1), T. D. Phan, J. P. Eastwood, D. G. Sibeck, V. Angelopoulos, J. P. McFadden, D. Larson, K. H. Glassmeier

(1) University of Oslo, Norway



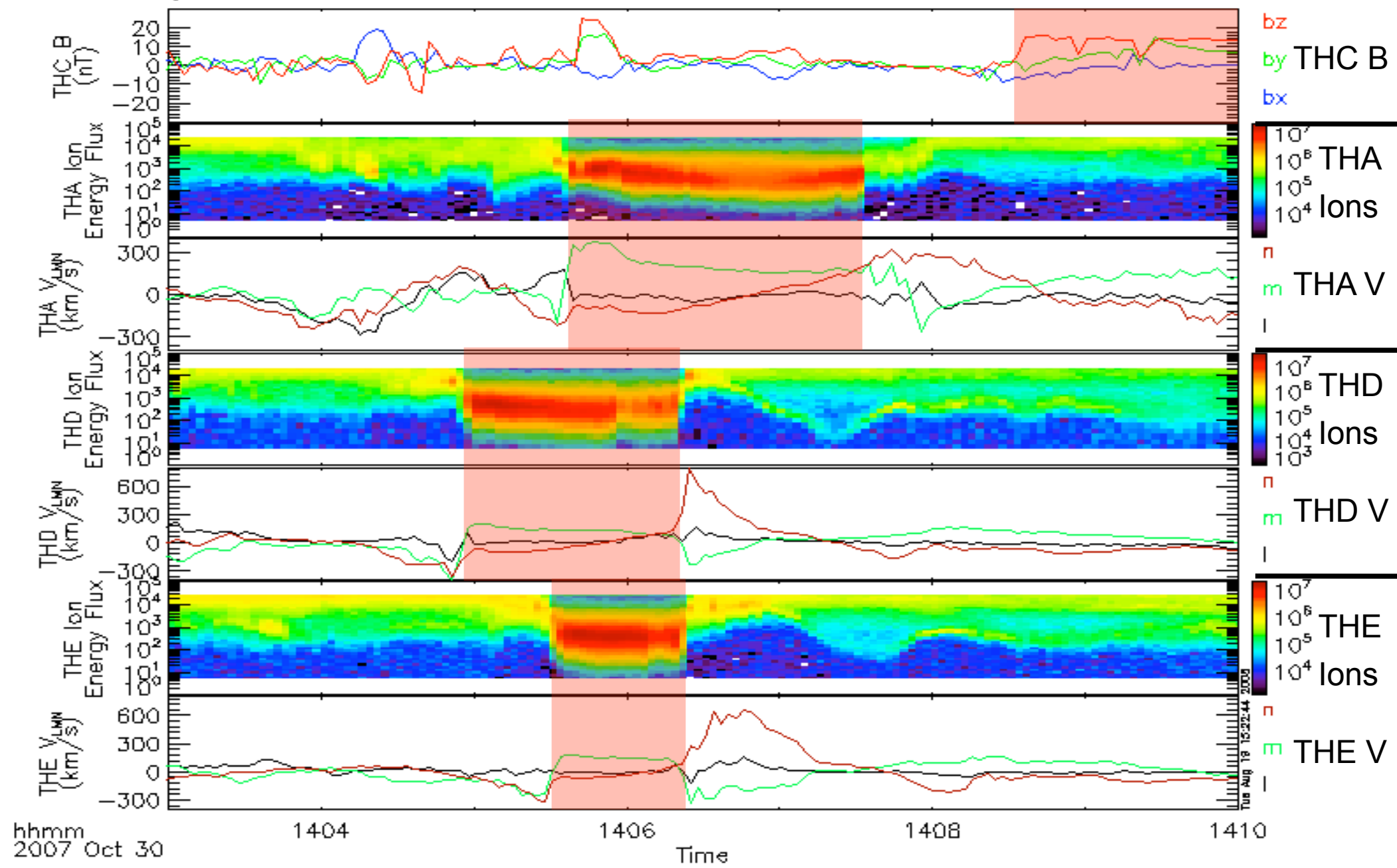
Magnetopause moving at a speed of 800 km/s

Themis 2007-10-30



TH-A,D,E encountered the magnetosheath. THC encountered the magnetosphere.

Themis 2007-10-30



Some quick calculations

Assumption: There is a magnetopause bulge moving past the spacecraft.

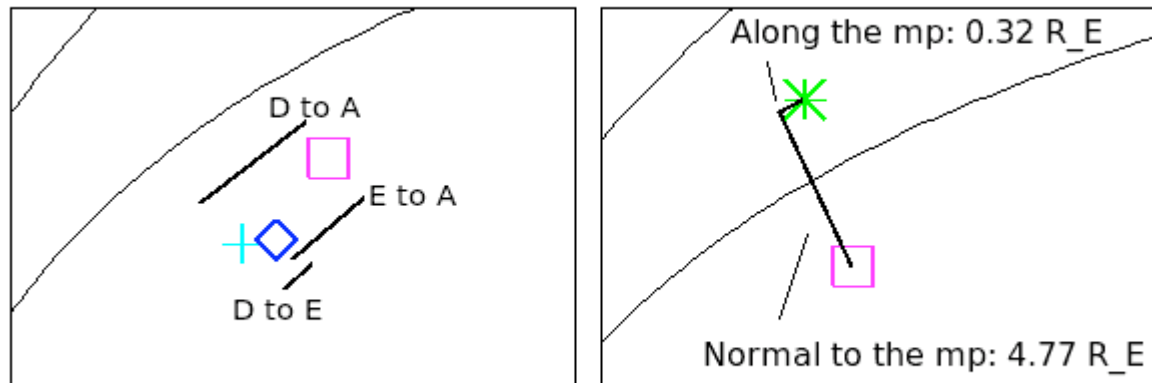
Tailward velocity found by dividing distance along the model magnetopause by the time difference between the middle of the intervals in which the spacecraft were in the magnetosheath.

Tailward velocity of magnetopause bulge: 352, 354, 359 km/s.

THEMIS A and C are separated by $4.77 R_E$ in the normal direction but only $0.32 R_E$ tailward along the model magnetopause. This makes them suitable for direct observation of the normal motion of the magnetopause.

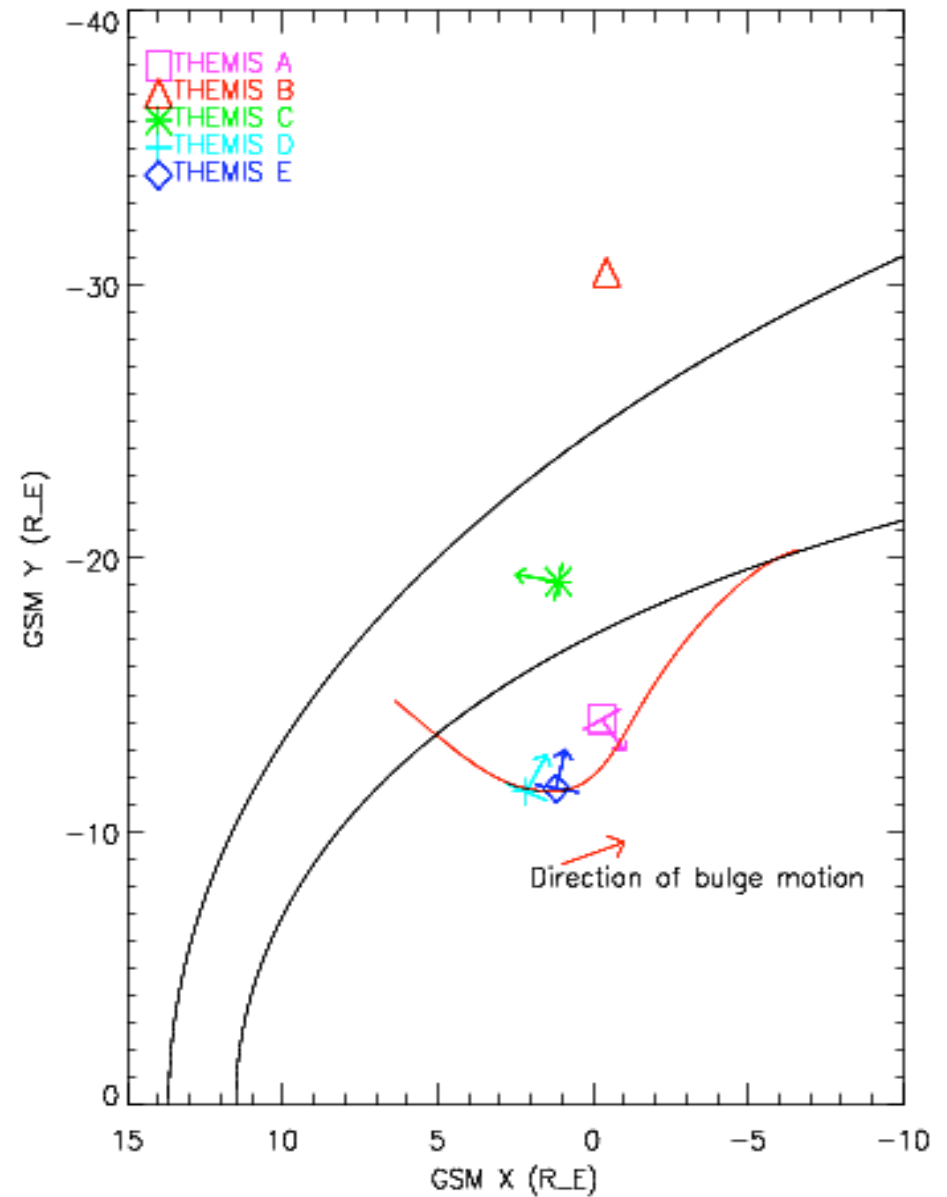
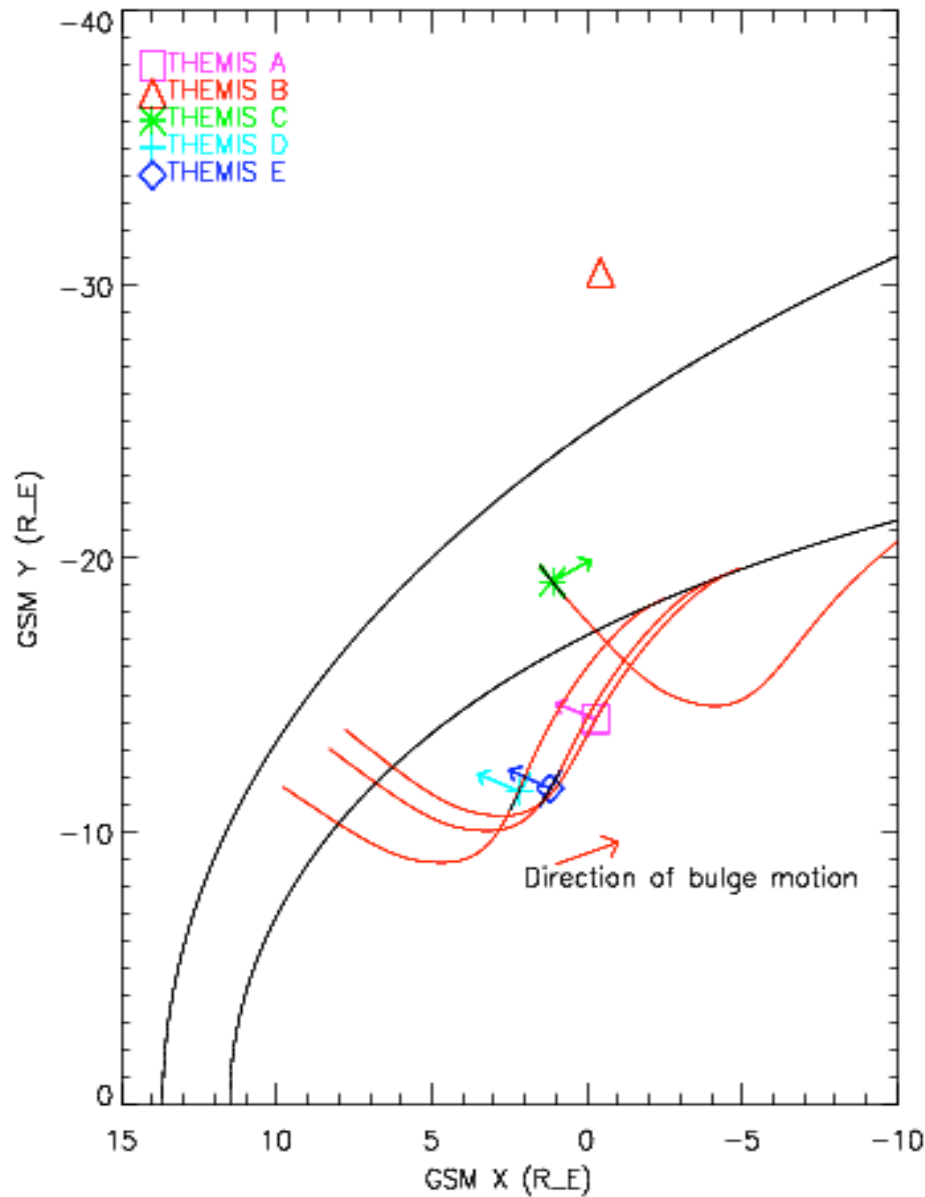
Average normal velocity of the magnetopause from THEMIS A to C: 515 km/s

Distance between spacecraft along the model magnetopause

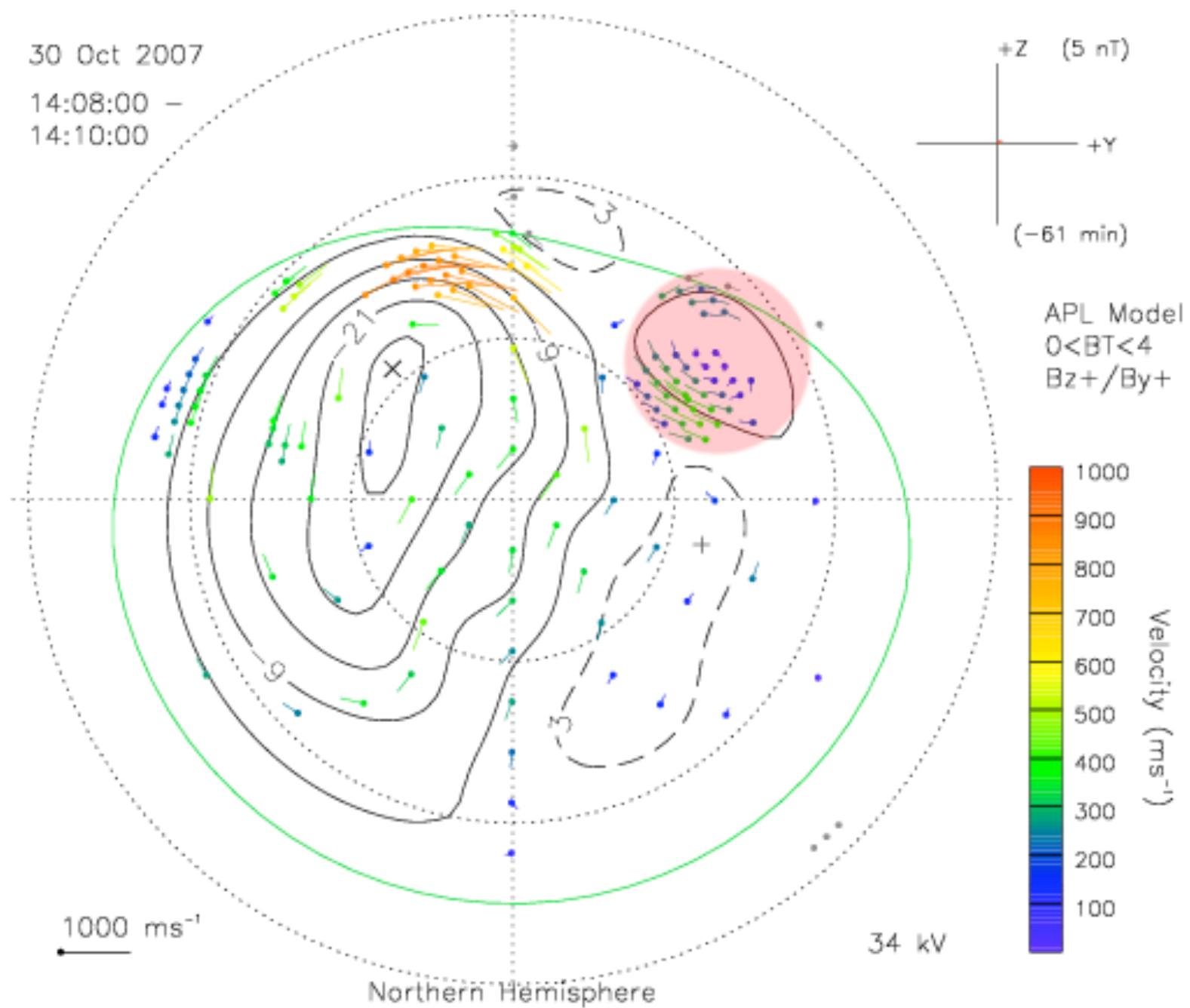


□ THEMIS A * THEMIS C + THEMIS D ◇ THEMIS E

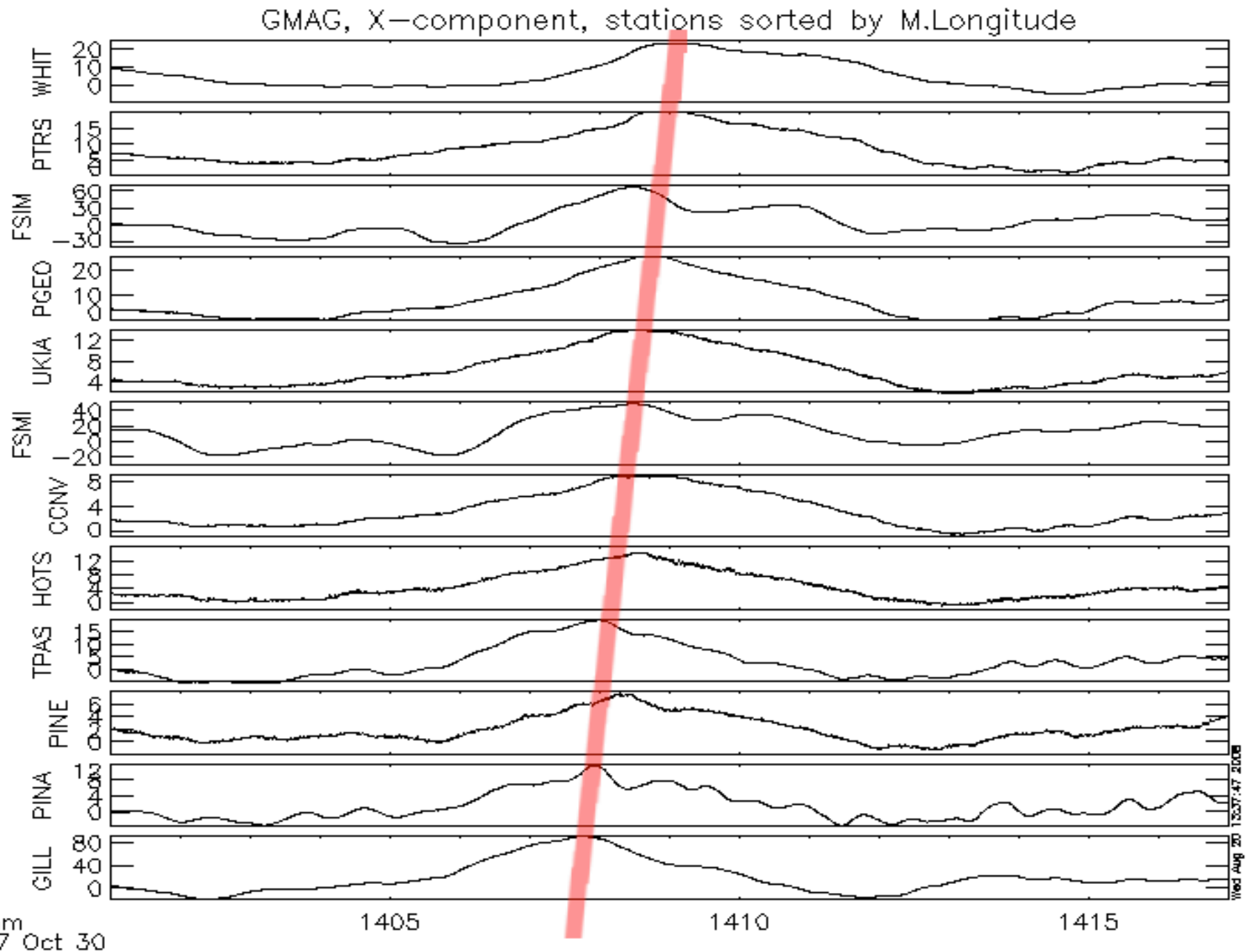
Multi-spacecraft analysis is used to find the shape of the inward bulge



SuperDARN observed convection vortices

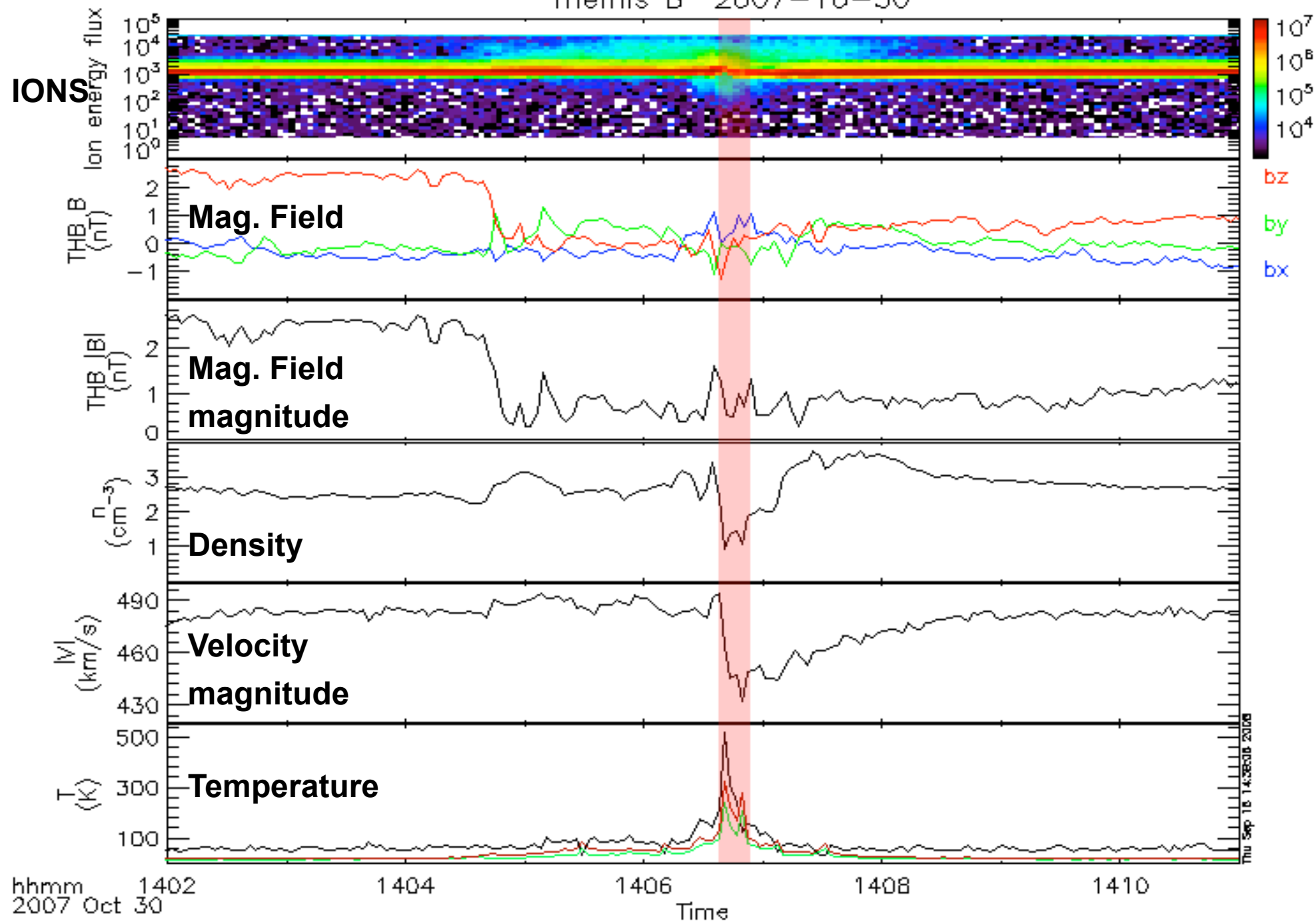


Ground magnetometers detected a westward-moving MIE



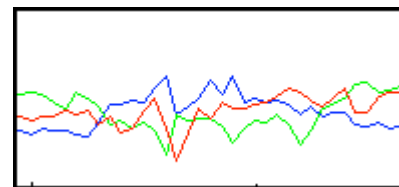
THB observed a HFA in the upstream solar wind.

Themis B 2007-10-30

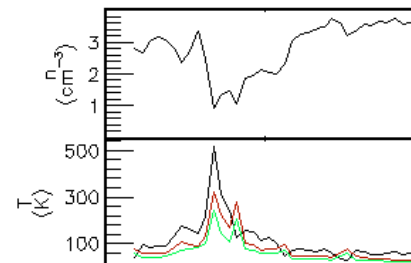


Summary of our interpretation of the events on 30.Oct-2007

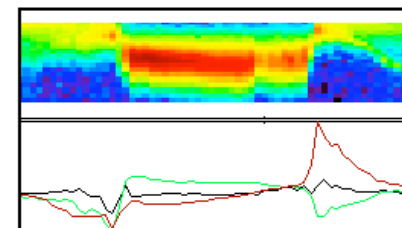
* A discontinuity in the IMF hits the bow shock.



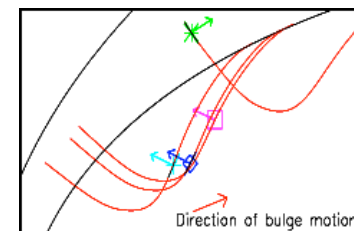
* It produces a HFA, which is observed by THEMIS B.



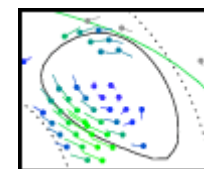
* Magnetosheath pressure variations created by the HFA hits the magnetopause. In response, the magnetopause moves in and out.



* As this bulge moves tailward it is swept past the THEMIS spacecraft.



* The transient magnetopause displacements cause TCVs in the ionosphere.



* As the bulge moves tailward, the TCVs move westward.

