

# Magnetic field mapping and the Van Allen Probes

Scientific Magnetic Mapping and Techniques  
Focus Group, 2010-2015

Co-leaders: Robyn Millan, Eric Donovan, and I

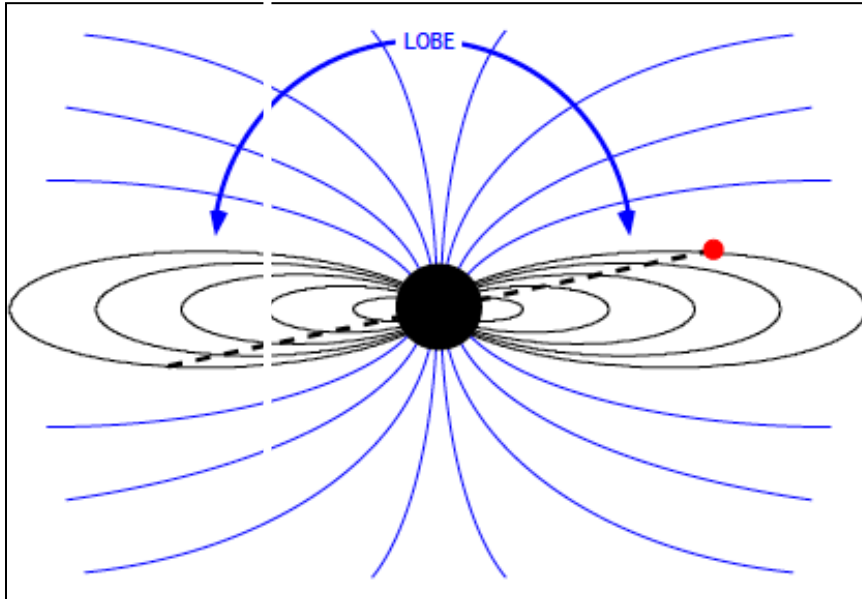
[www.bit.ly/gem\\_mapping](http://www.bit.ly/gem_mapping)

**Elizabeth MacDonald, LANL**

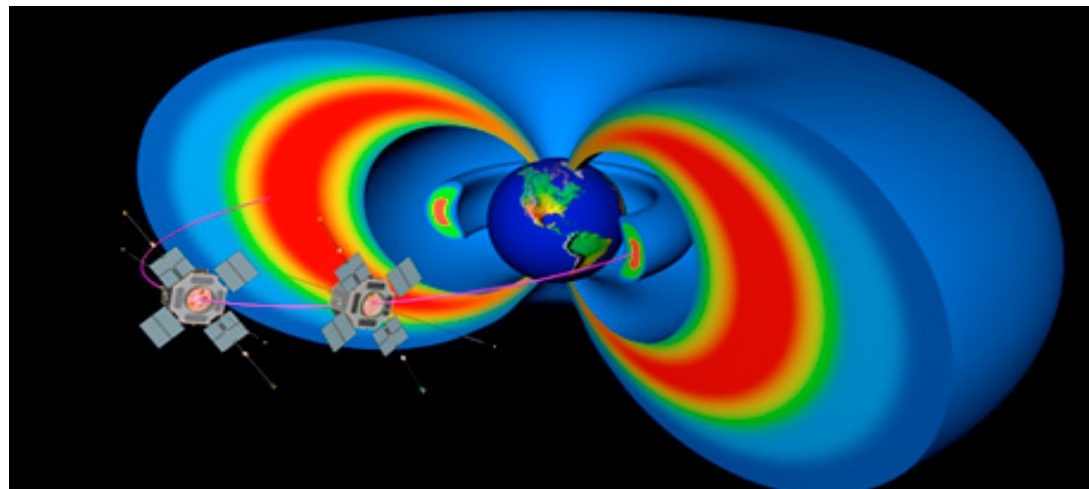
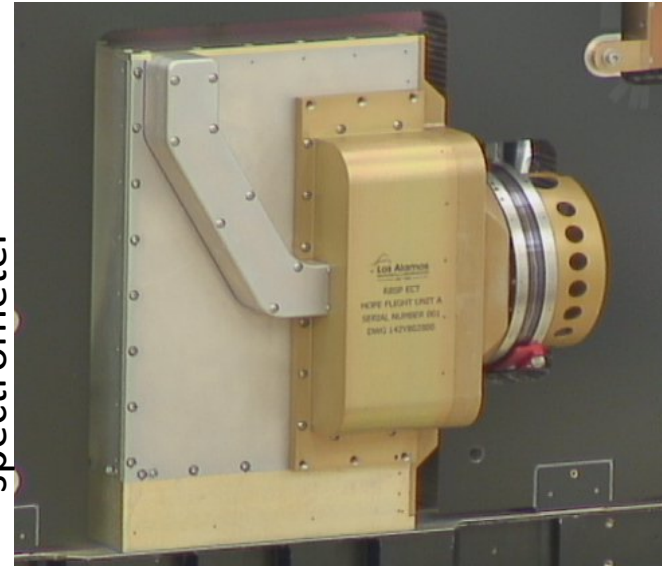
[macdonald@lanl.gov](mailto:macdonald@lanl.gov)

Acknowledgements: Van Allen Probes (everyone)

# Van Allen Probes cross lobes on Nov. 14, 2012

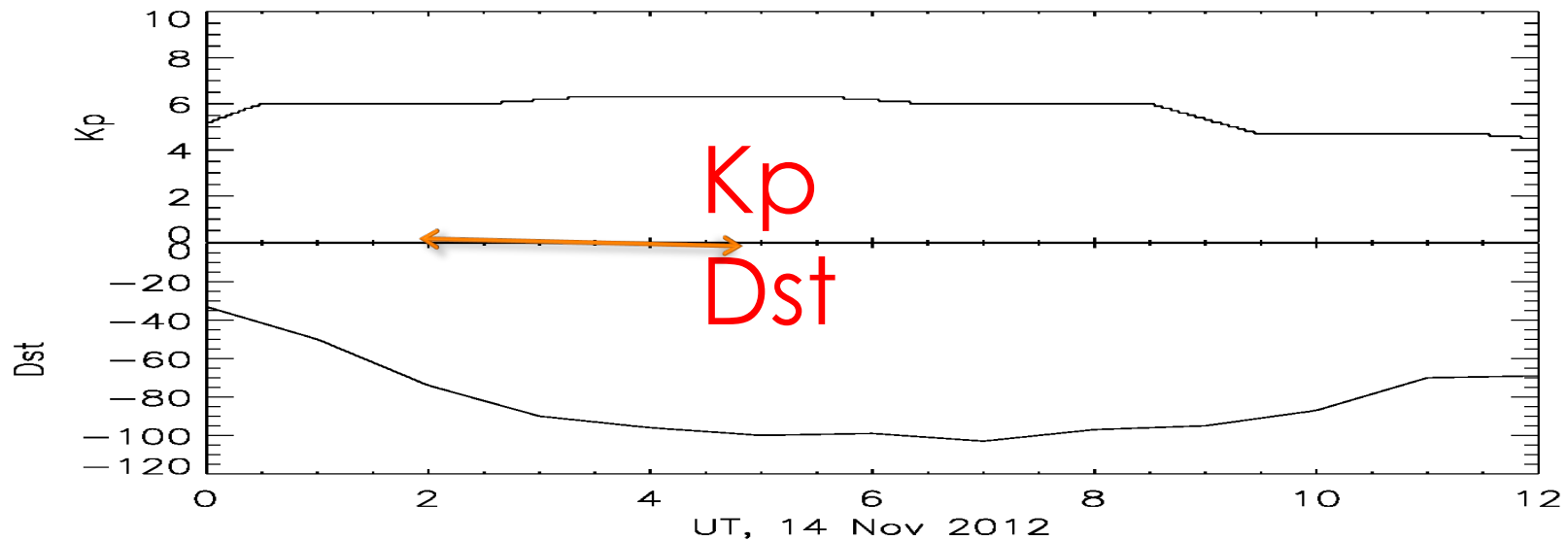


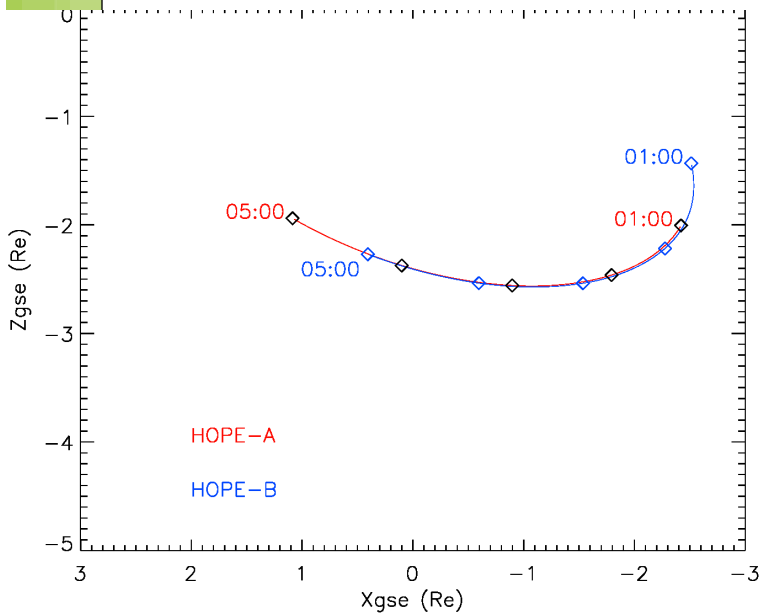
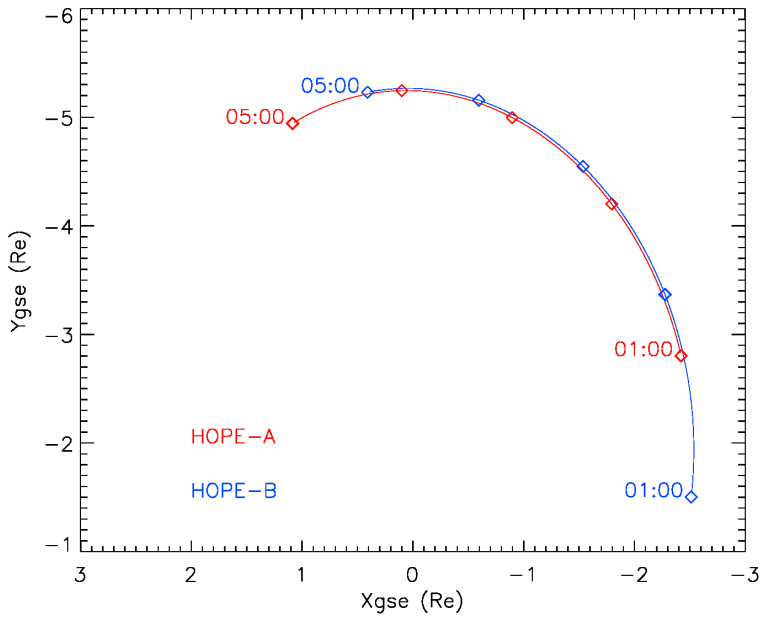
HOPE plasma mass  
spectrometer



# Introduction

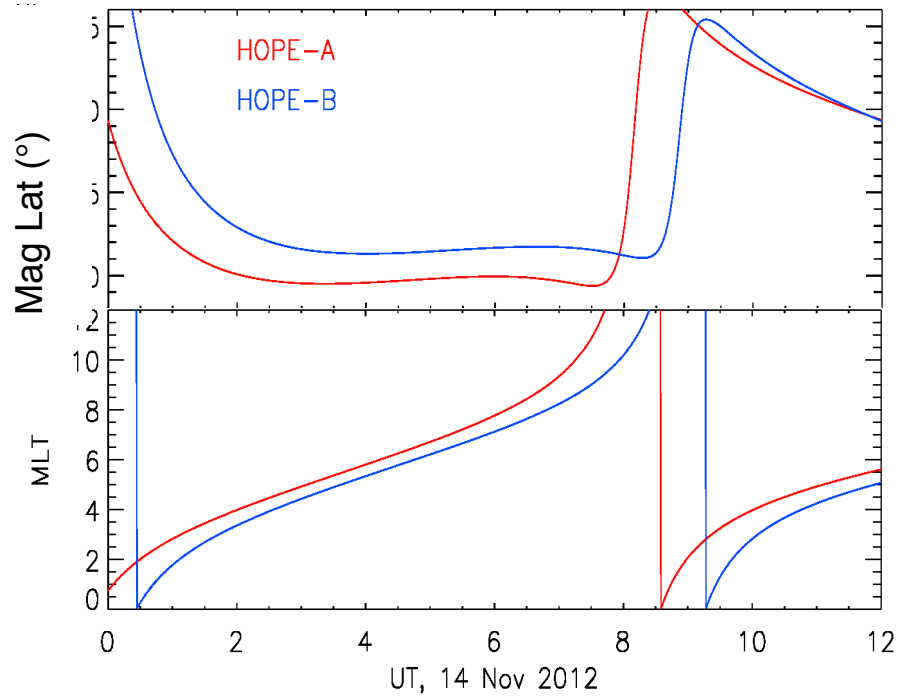
- RBSP dual satellite data
- Interesting event
  - Nov 14, 2012 **main phase** of a storm
  - Lobe crossings aka open field lines



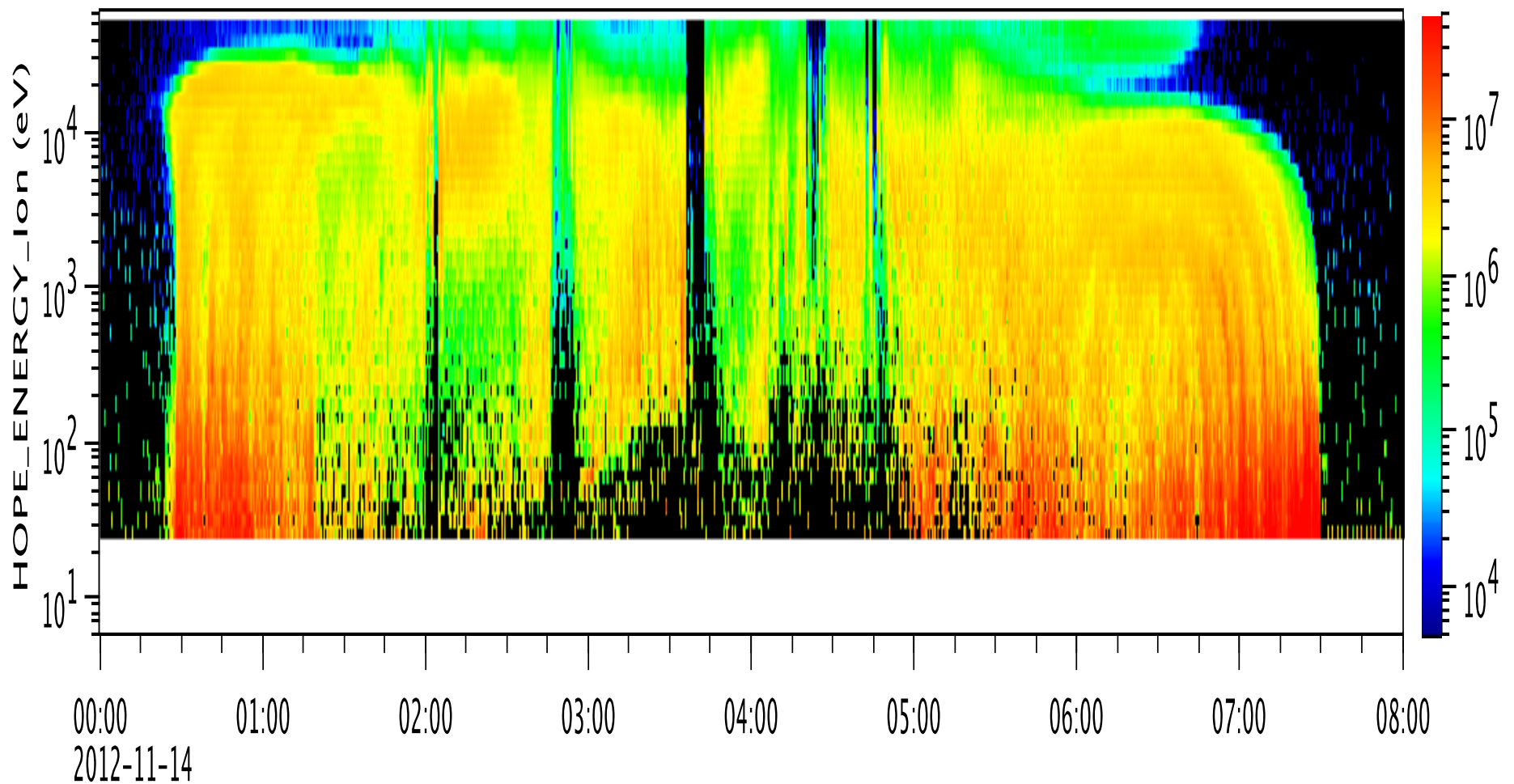


## When and where?

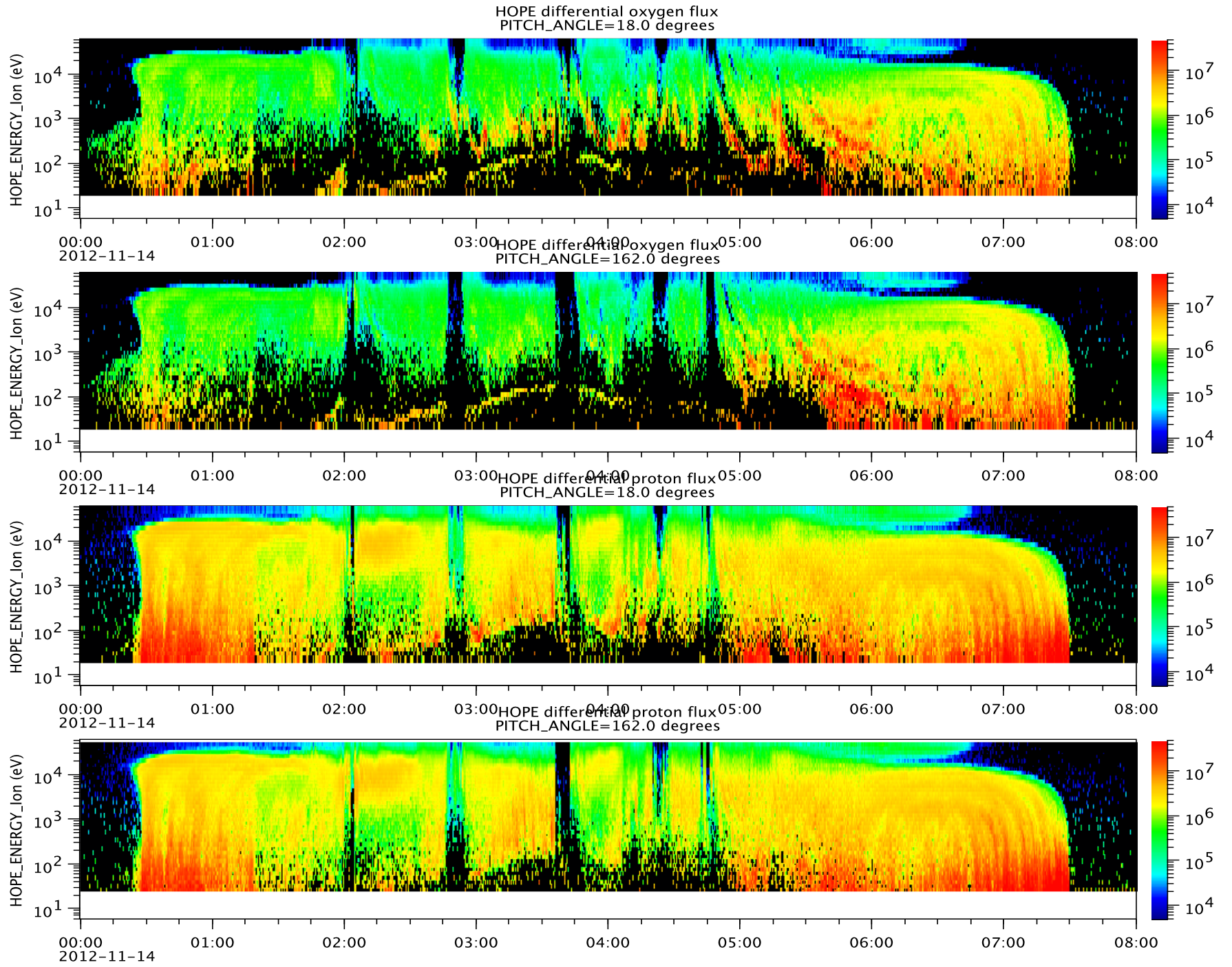
Dawn, less than 1 Re, less than an hour apart

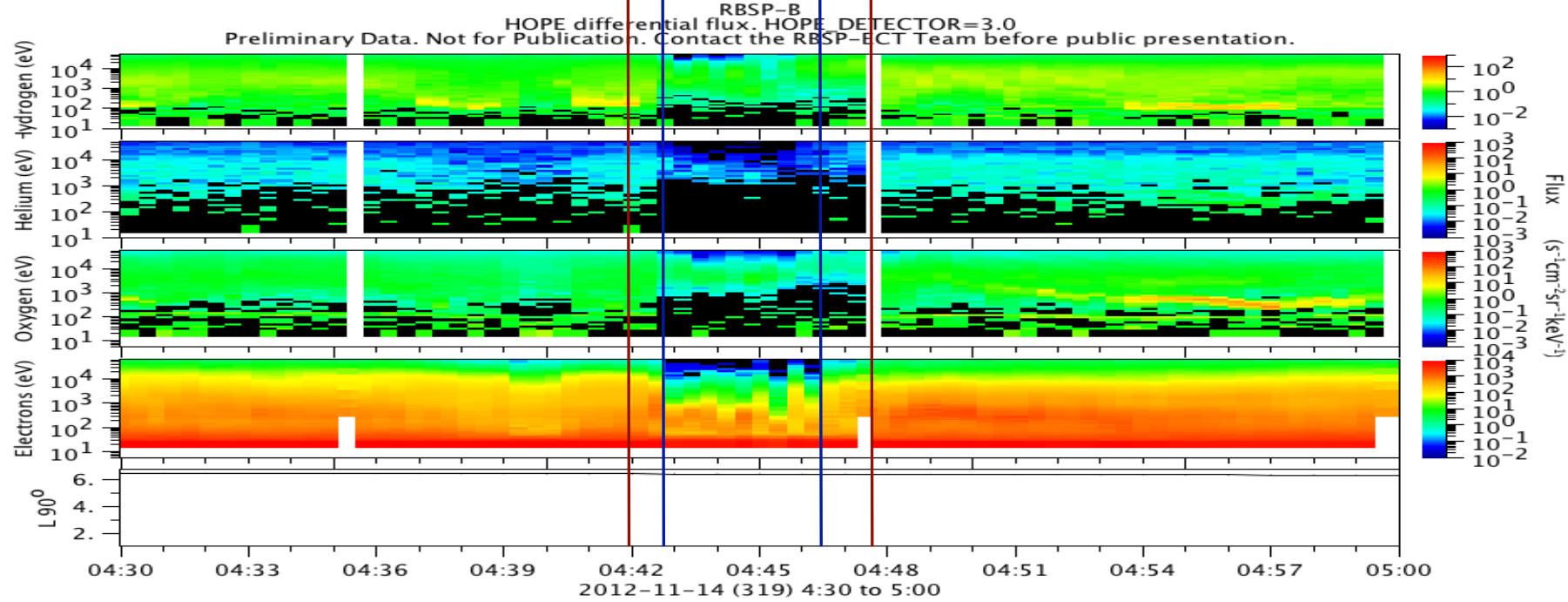
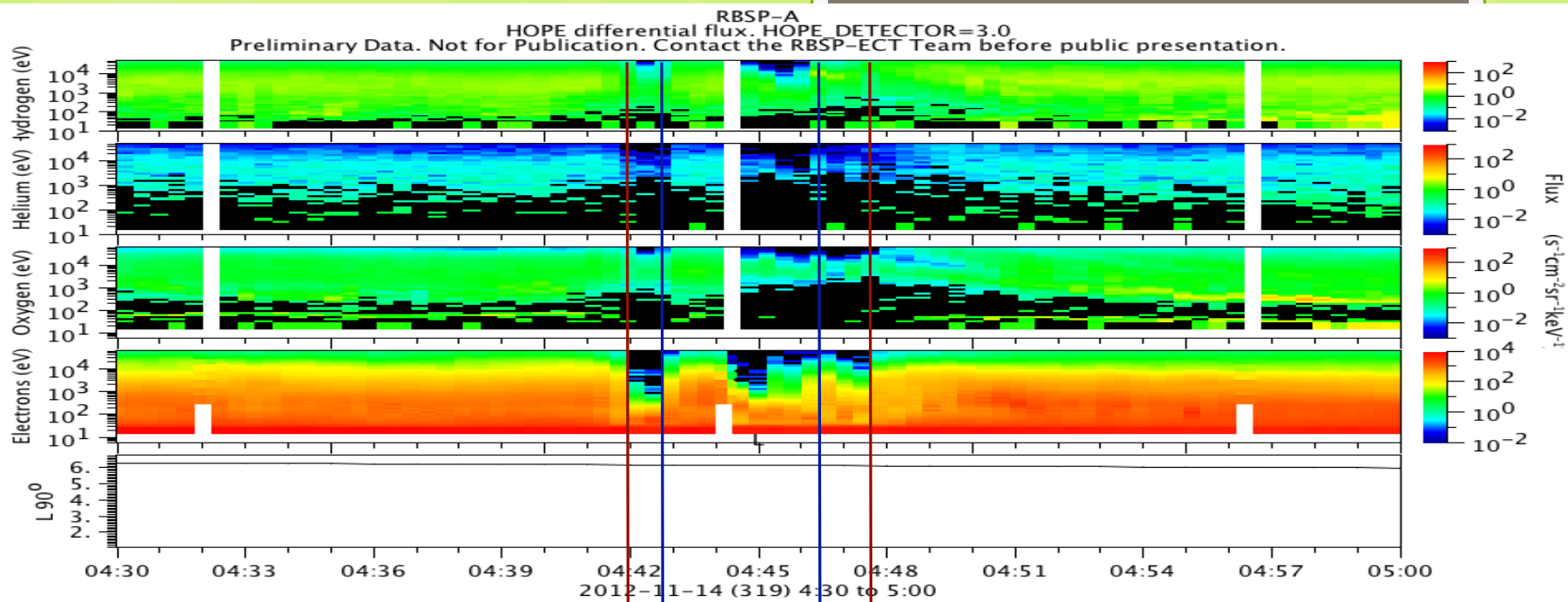


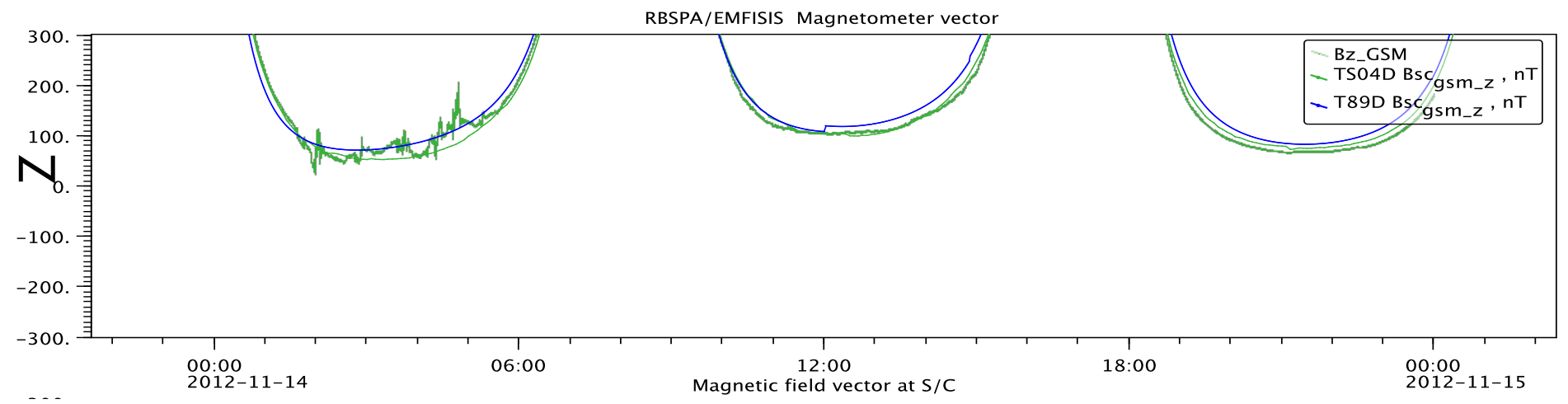
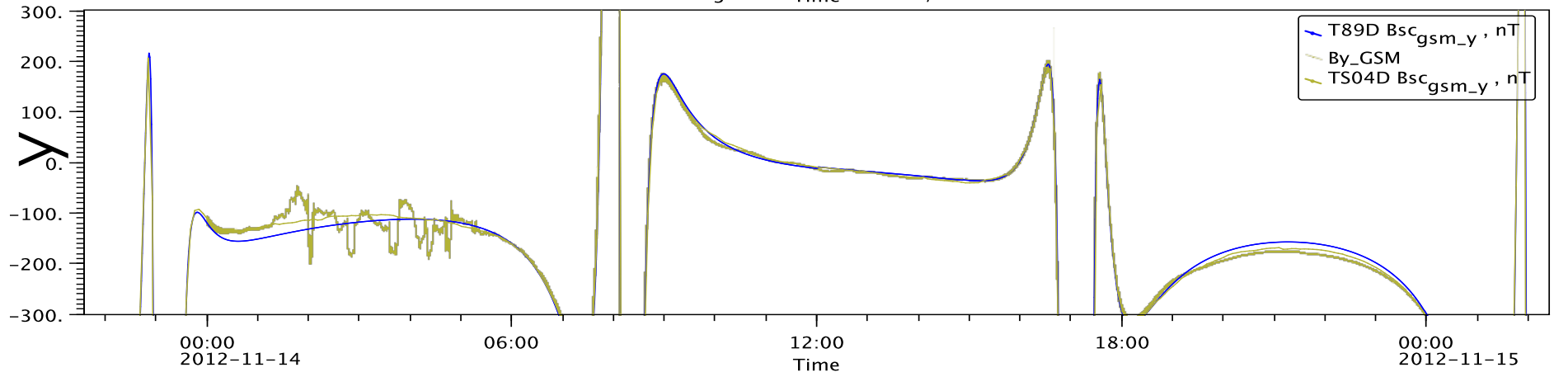
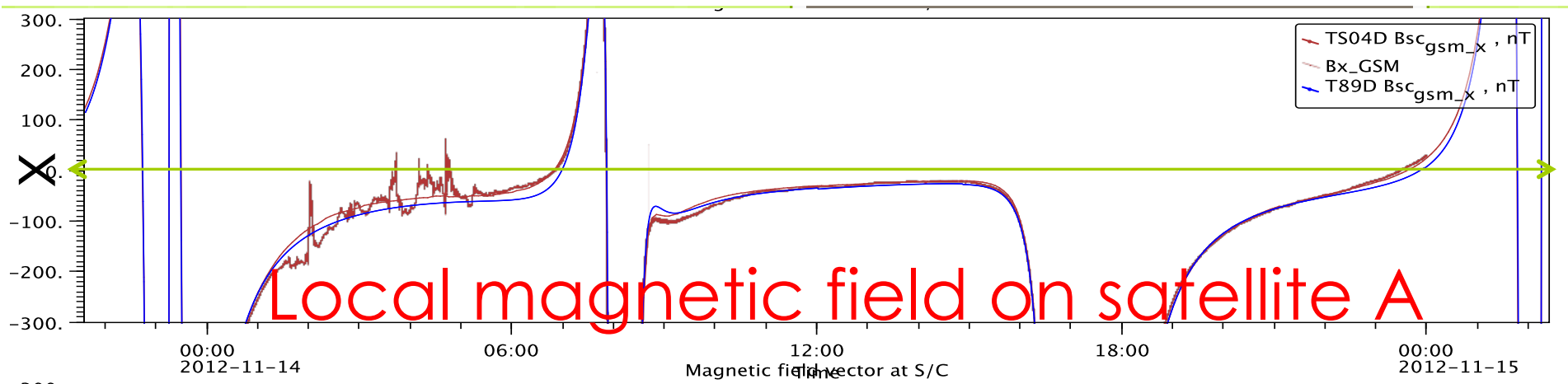
Lobe crossing seen on both spacecraft  
Field-aligned H<sup>+</sup> flux



O+ (18°)  
O+ (162°)  
H+ (18°)  
H+ (162°)





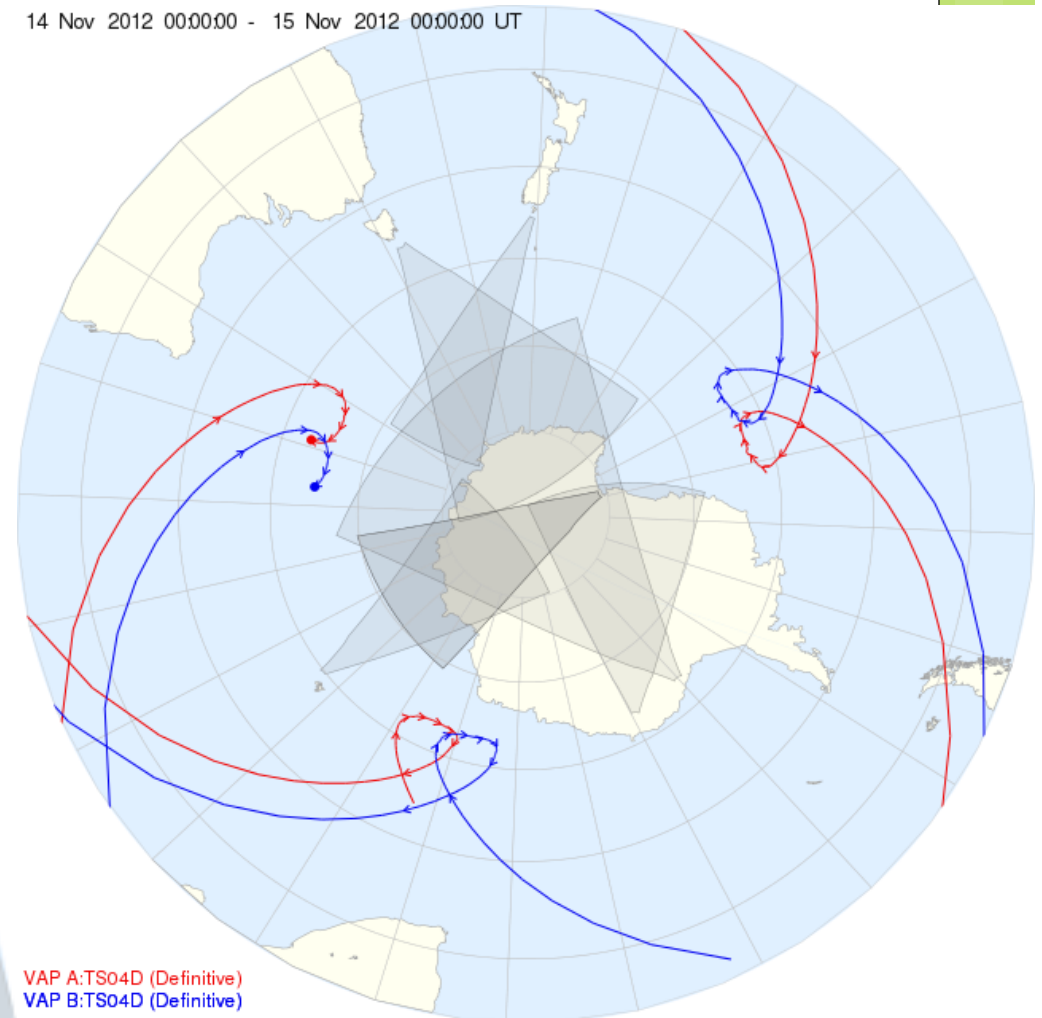




# Mapping is hard!

Are we connected to southern hemisphere?

14 Nov 2012 00:00:00 - 15 Nov 2012 00:00:00 UT



01:00:00 - 07:00:00 UT



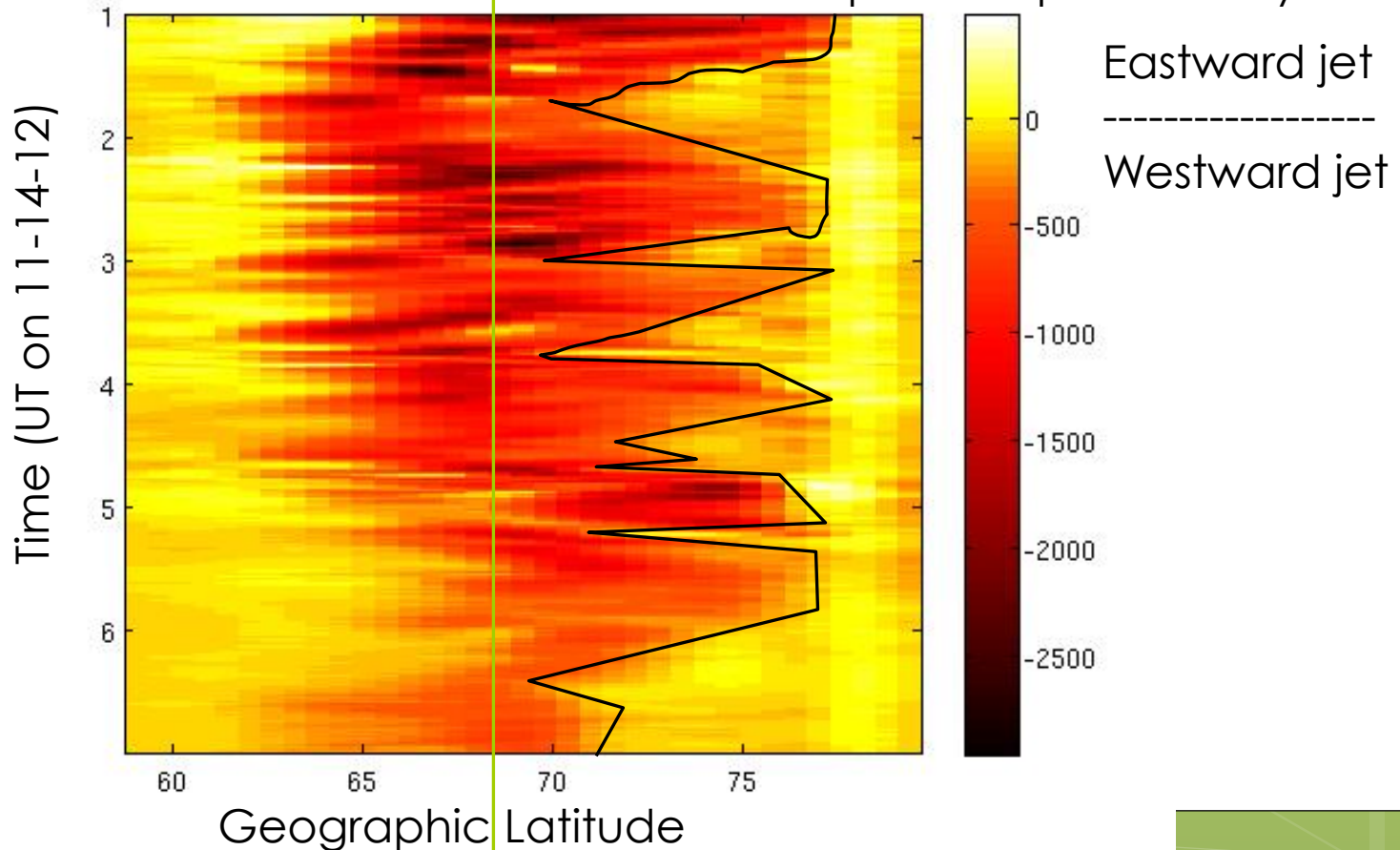
VAP A:TS04D (Definitive)  
VAP B:TS04D (Definitive)

# Equivalent electrojet currents from MIRACLE network of magnetometers

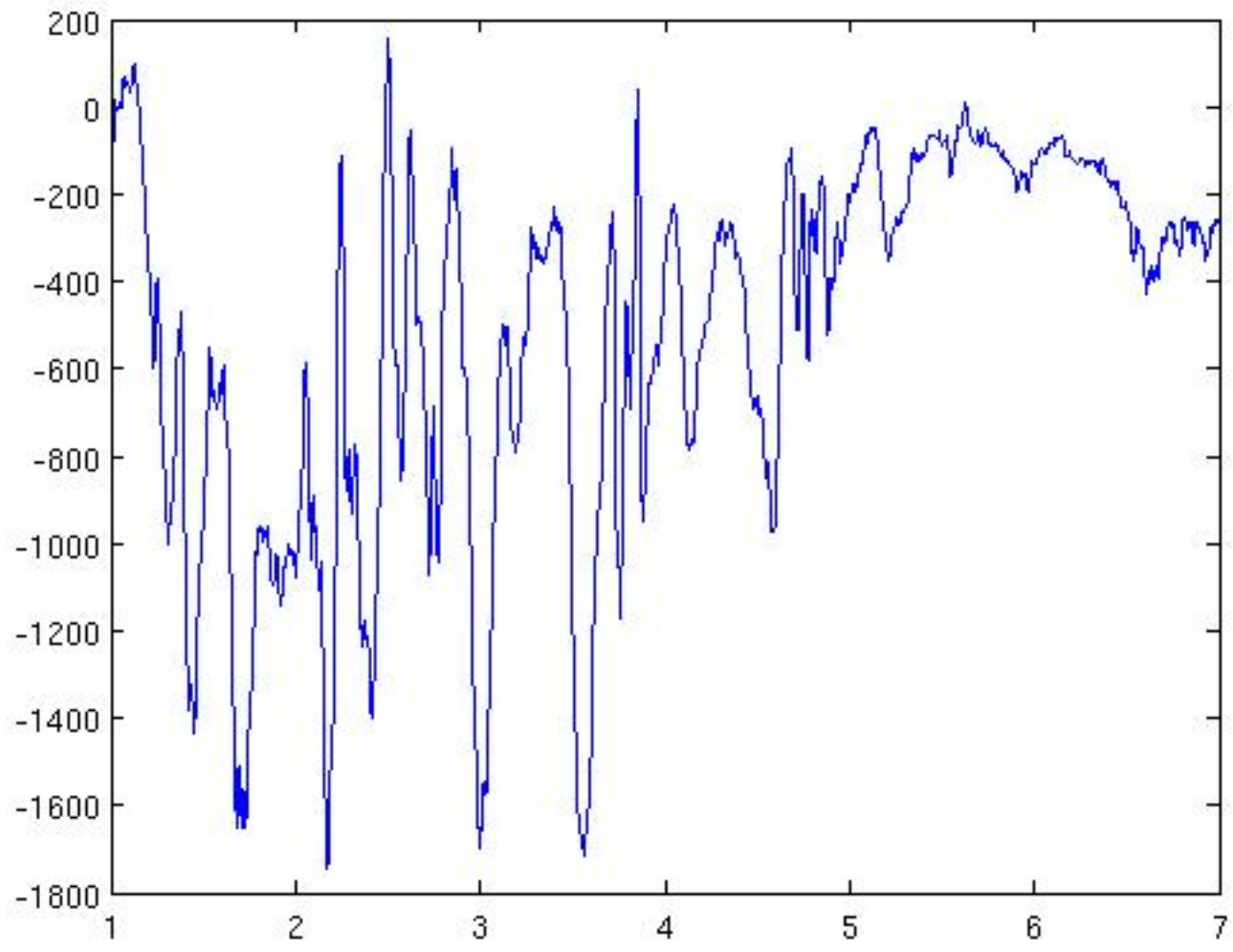
(Data courtesy of K. Kauristie, M. Van de Kamp, FMI)

~ RBSP A & B  
Latitude from 02 –  
05 UT

~ Poleward boundary of  
westward jet. Would this =  
the polar cap boundary?

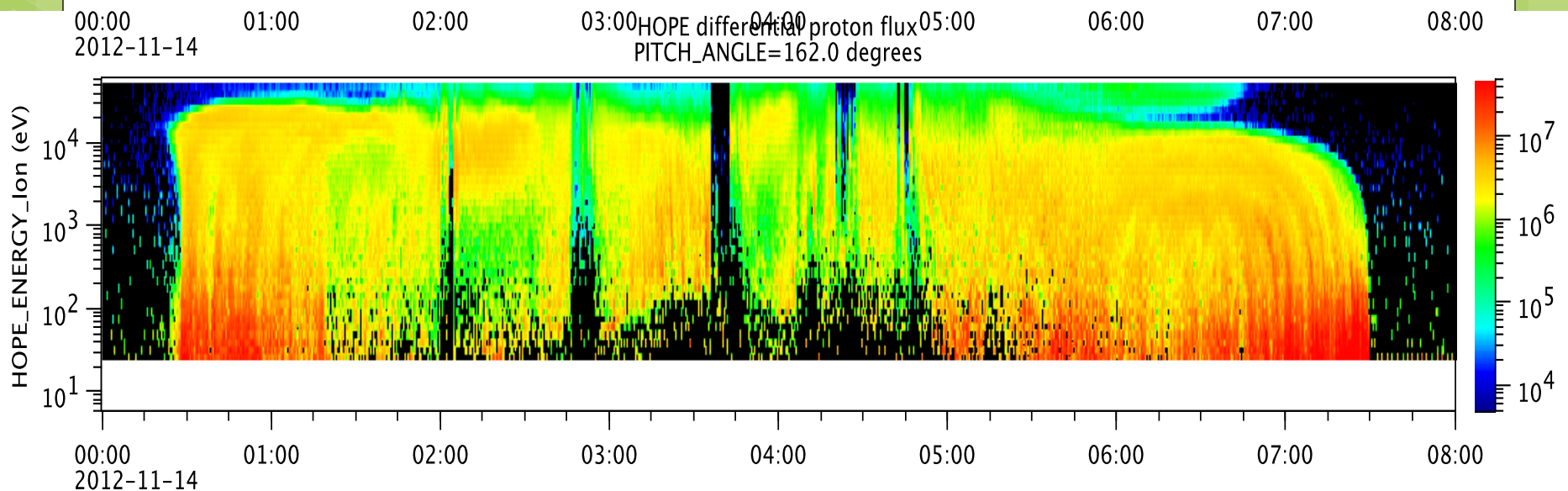


Cut of currents at 65° lat. Is polar cap boundary evident at this lat?



## Will you accept the mapping challenge?

- Can we compare mapping techniques for finding the **open-closed boundary** and compare to Van Allen probes data on 11/14/12?
- Do you have a technique that can be tried? Models, AMPERE, DMSP, RBSP, ASIs, riometers, magnetometer proxies, etc.



# Other mapping & Van Allen Probes

- Mar. 17, SEDs
- BARREL events
- Pulsating aurora mapping on Nov 14