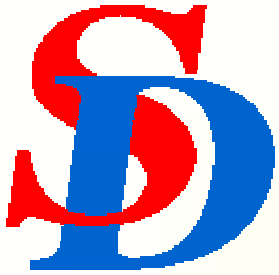

La Trobe UNIVERSITY

Valdez, Alaska 2002

Signatures of the midnight Open-Closed magnetic field-line Boundary (OCB) during balanced dayside and nightside reconnection

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The nightside SWB problem:

- **Here we investigate the behaviour of a persistent, sharp spectral width boundary (SWB) located in the midnight sector near –69°Λ during 1215 to 1500 UT, 10 Dec. 1999.**
- **The SWB was observed using the TIGER SuperDARN radar in the "Z_TIGER99" mode. i.e., full scans with beam 4 soundings interlaced using 3-s integration times.**
- **Some particularly relevant studies:**
  - **Blanchard et al., *J. Geophys. Res.*, 102, 9697-9703, 1997**
  - **Lewis et al., *Ann. Geophysicae*, 15, 289-299, 1997**
  - **Dudeney et al., *Geophys. Res Lett.*, 25, 2601-2604, 1998**
  - **Yeoman et al., *J. Geophys. Res.*, 104, 14,867-14,877, 1999**
  - **Lester et al., *Ann. Geophysicae*, 19, 327-339, 2001**
  - **Woodfield et al., Submitted to *Ann. Geophysicae*, 2002**

Morphology of the Nightside Magnetosphere

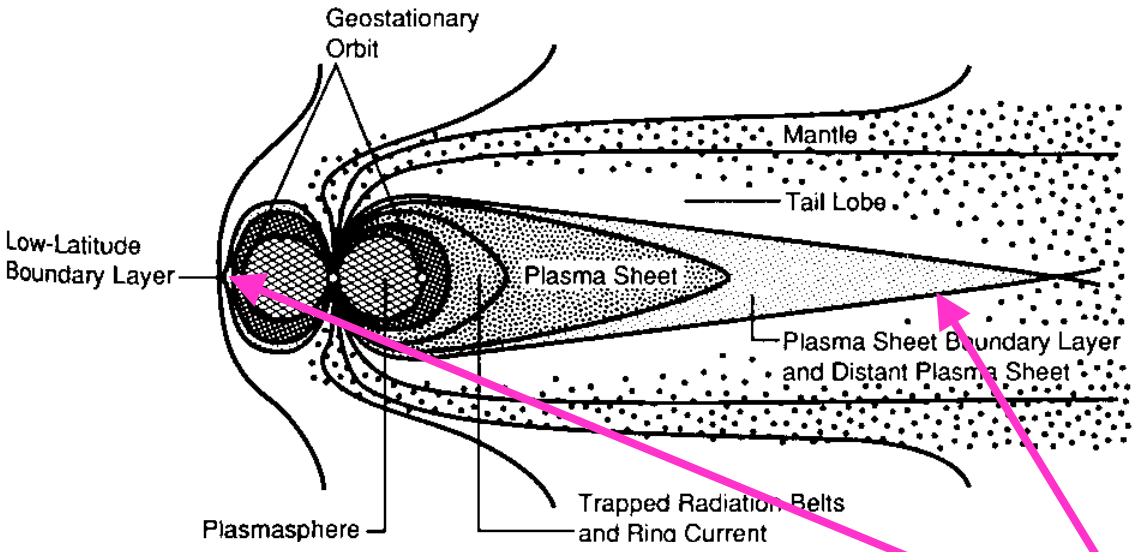


FIG. 10.4. Schematic diagram of plasma regions of the earth's magnetosphere as viewed in the noon–midnight meridian plane. The plasmasphere typically occupies much of the same region of space as the radiation belts. Frequently there is little or no gap between the inner edge of the plasma sheet and the outer boundary of the trapped radiation belts.

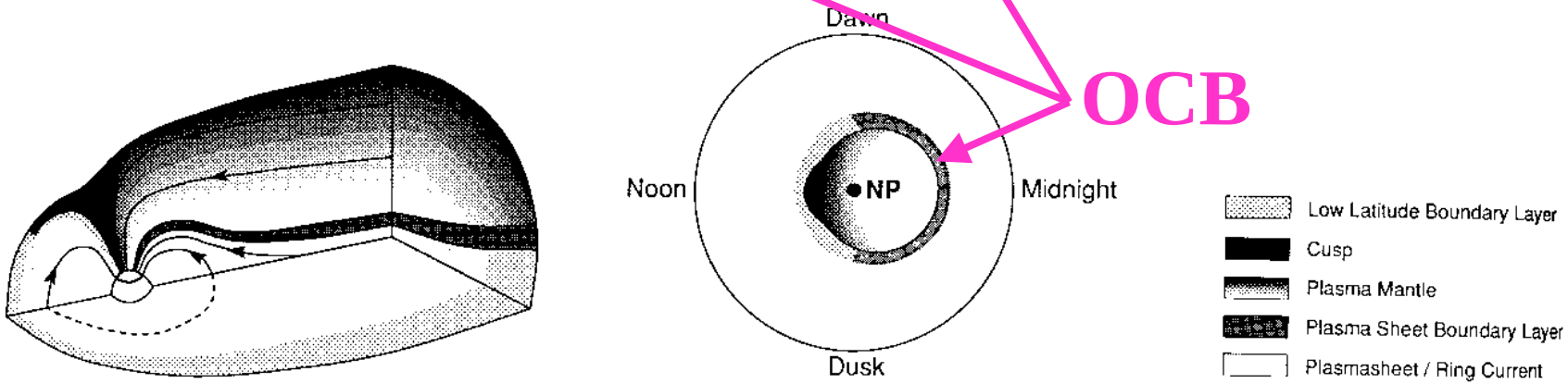


FIG. 9.18. (top) Polar projection of the magnetopause showing the types of magnetopause crossings observed by *HEOS 2*. Note how the observations of low-latitude boundary-layer plasma (open circles), entry-layer plasma (solid circles), and plasma mantle (triangles) divide into three distinct spatial regions on the magnetopause. (Adapted from Haerendel et al., 1978). (bottom) Vasyliunas's (1979) mapping of the plasma boundary layers down to the high-latitude ionosphere.

M. Kivelson & C. Russell (Eds.), *Introduction to Space Physics*, Cambridge Univ. Press, 1995

Dayside, Nightside, and Balanced Reconnection

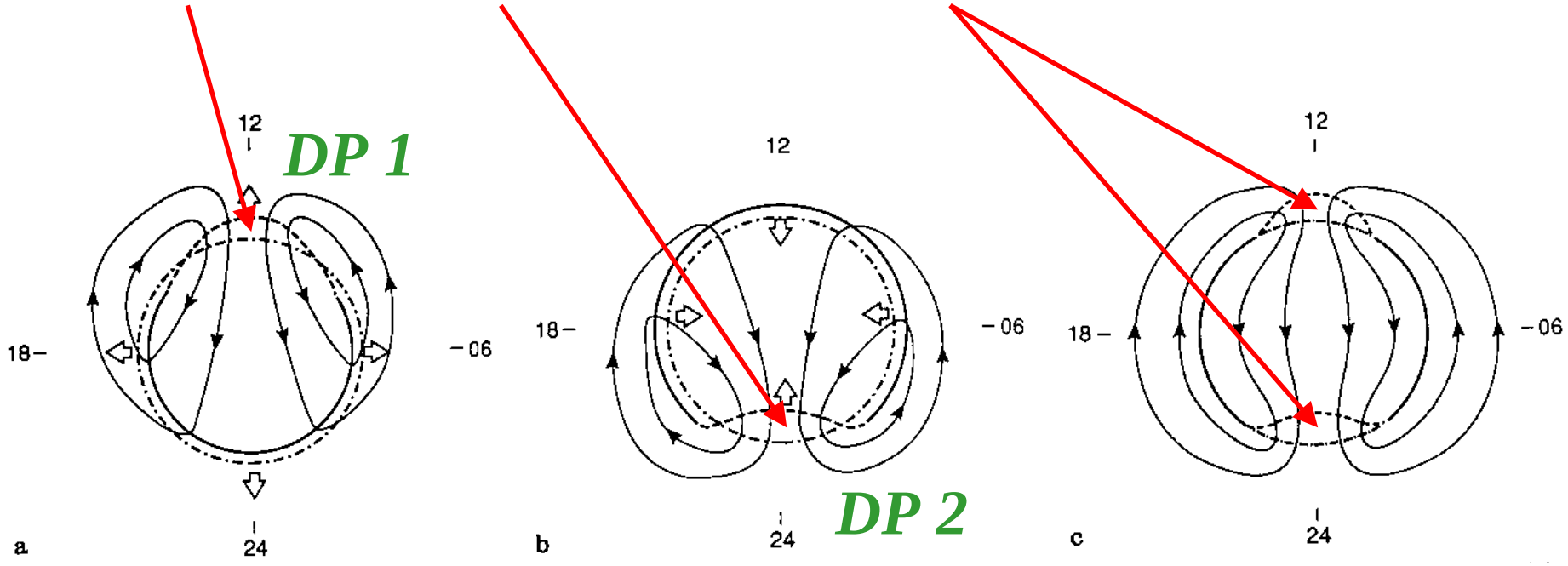
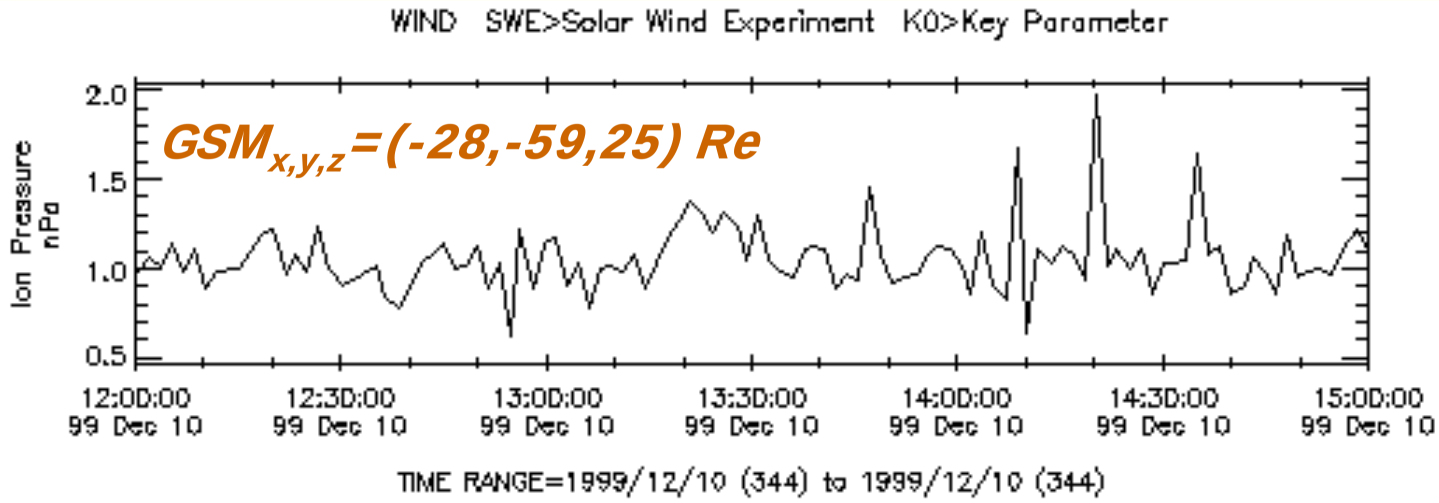


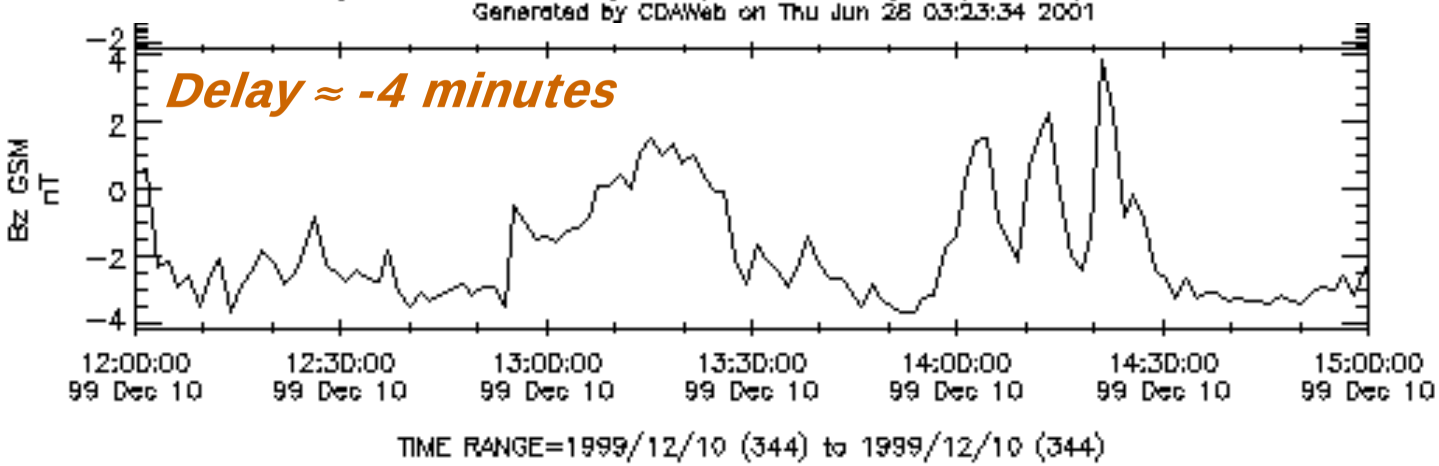
Fig. 8a–c. Interpretation of the flows driven by **a** steady unbalanced dayside reconnection and **b** steady unbalanced nightside reconnection, previously shown in Fig. 3, in terms of the zero-flow equilibrium boundary picture. In each case the *dashed line* corresponds to the merging gap, the *solid line* to the open-closed field line boundary which moves with the plasma flow, and the *dot-dashed line* to the zero-flow equilibrium boundary which instantaneously contains the same amount of open flux. The *large arrows* indicate the sense of motion of these boundaries. **c** The steady-state flows driven by balanced dayside and nightside reconnection in the same format

Cowley and Lockwood, *Ann. Geophysicae*, 10, 103–115, 1992

Solar-Wind Conditions, Wind Spacecraft



Please acknowledge data provider, K. Ogilvie at NASA GSFC and CDAWeb when using these data.
Key Parameter and Survey data (labels K0,K1,K2) are preliminary browse data.
Generated by CDAWeb on Thu Jun 28 03:23:34 2001



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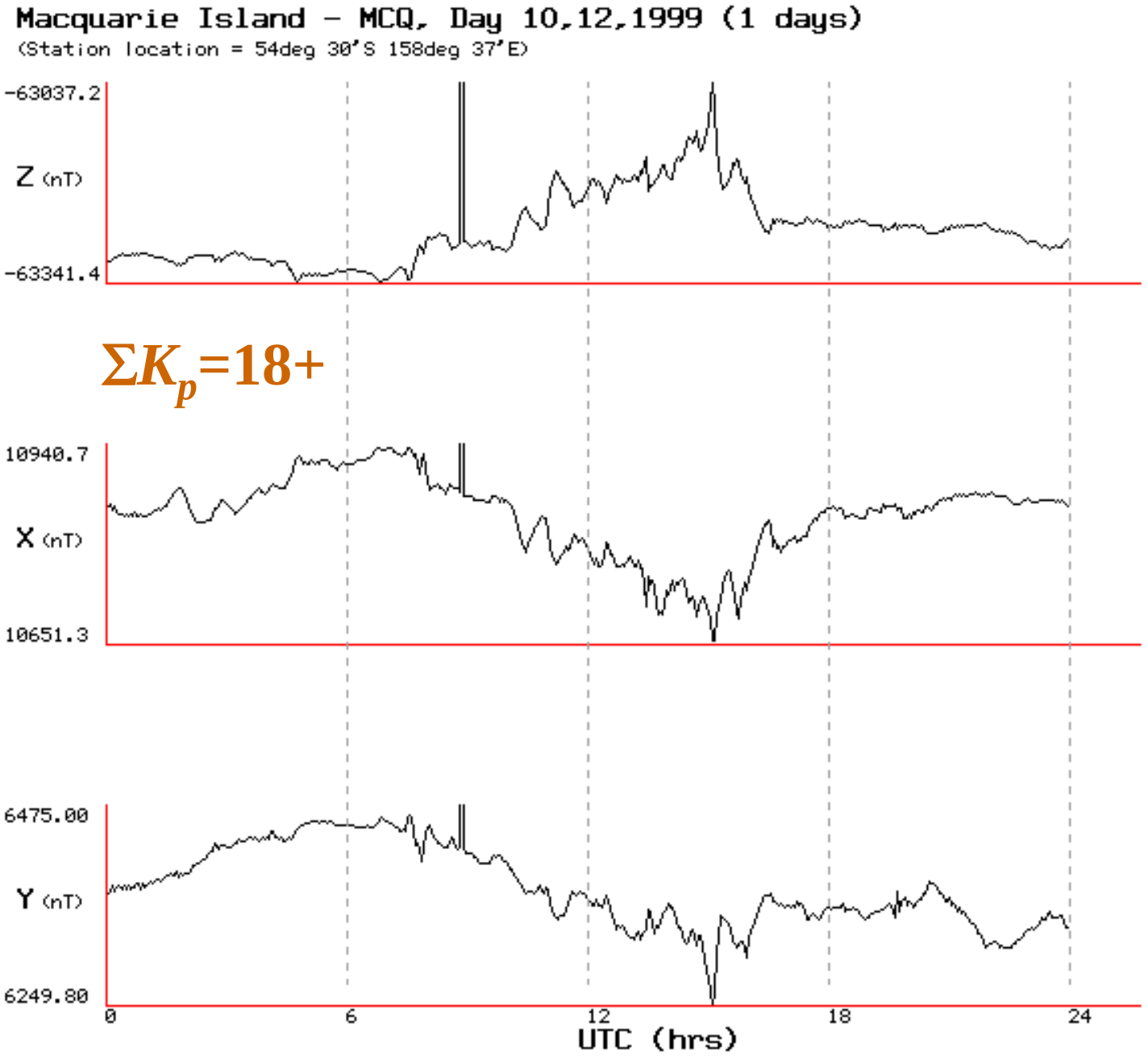
Macquarie Island – MCQ, Day 10,12,1999 (1 days)
(Station location = 54deg 30'S 158deg 37'E)
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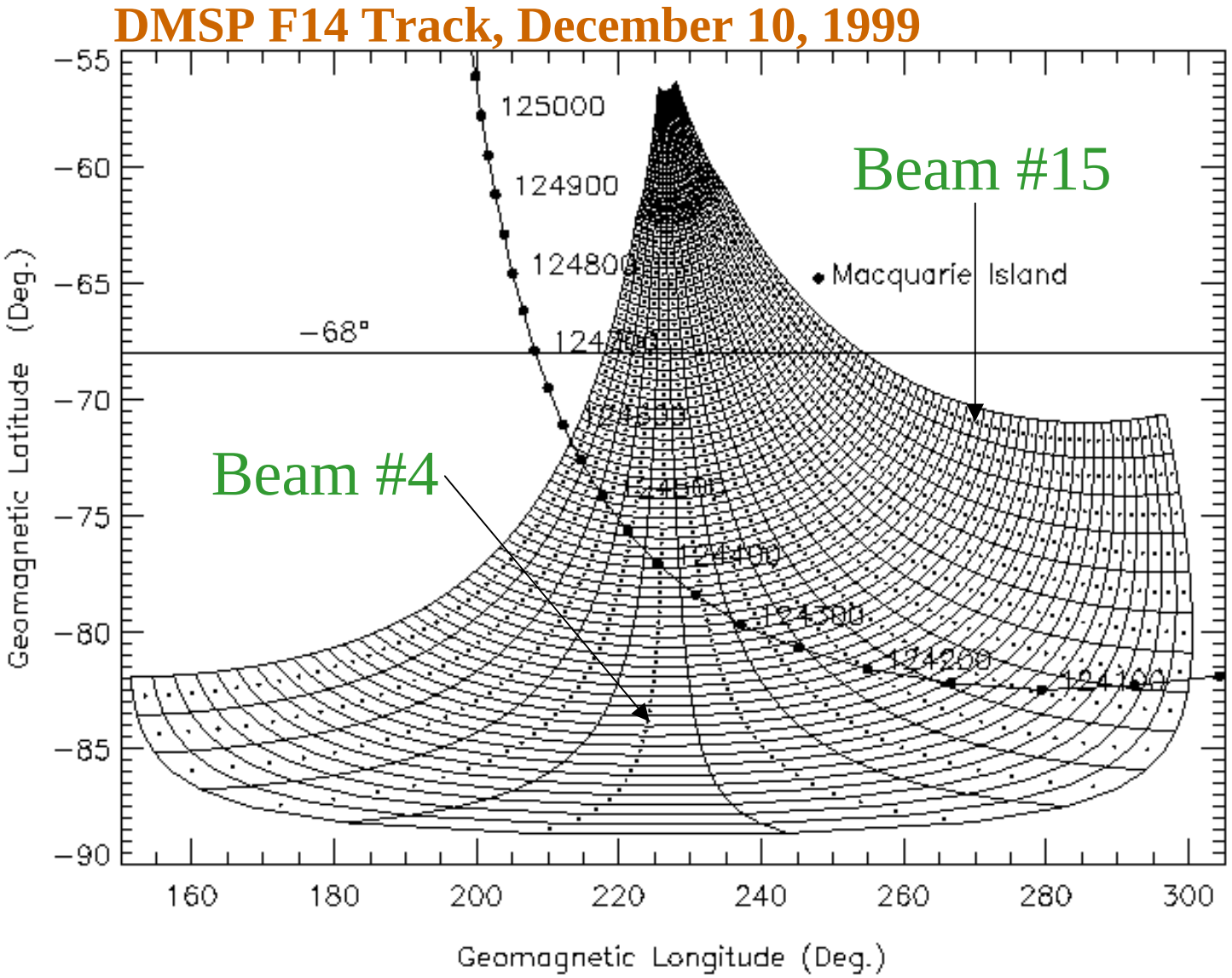
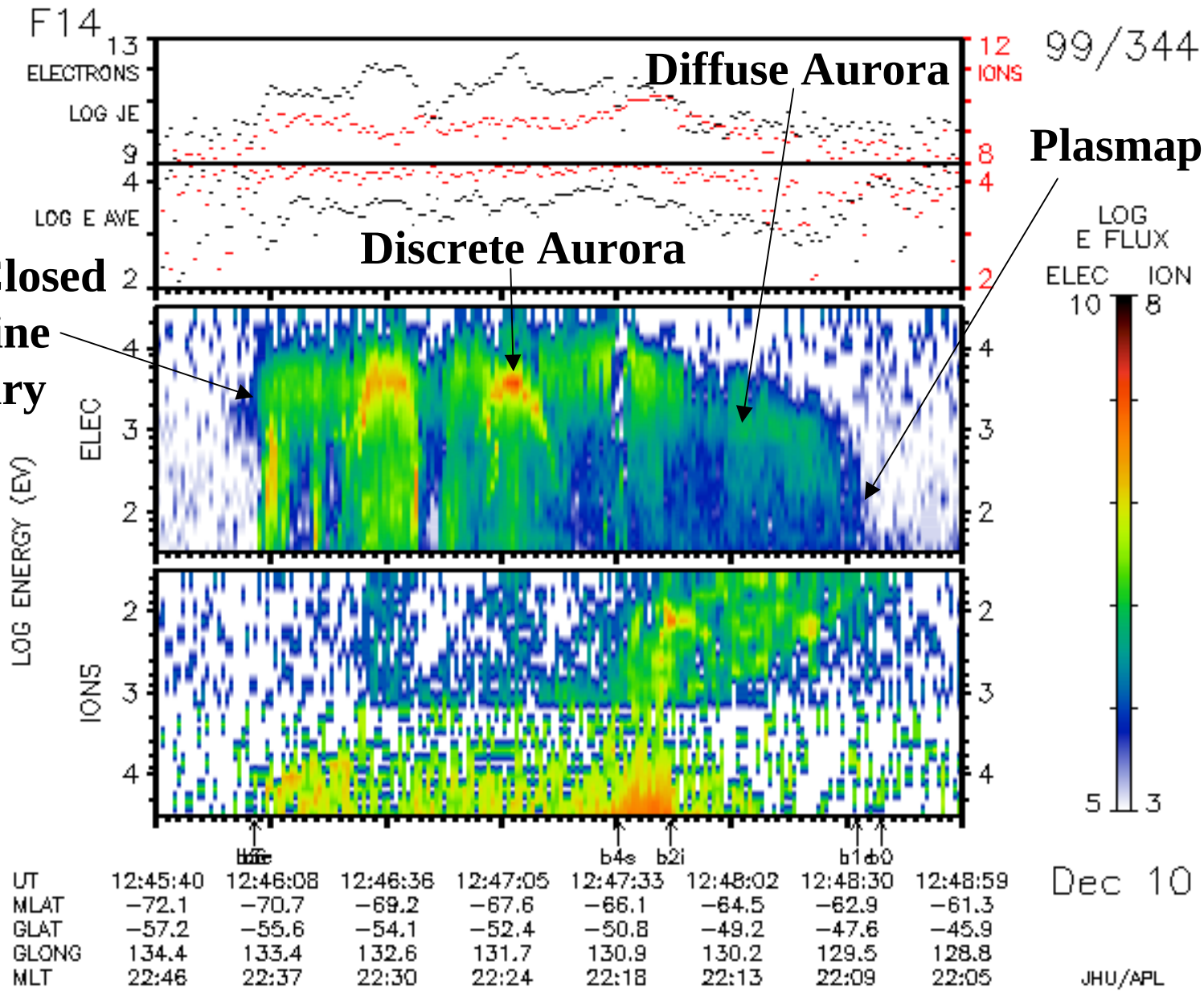
Z (nT)
-63341.4
ΣKp=18+
10940.7
X (nT)
10651.3
6475.00
Y (nT)
6249.80
0
6
12
18
24
UTC (hrs)
(C) 1999 Australian Geological Survey Organisation

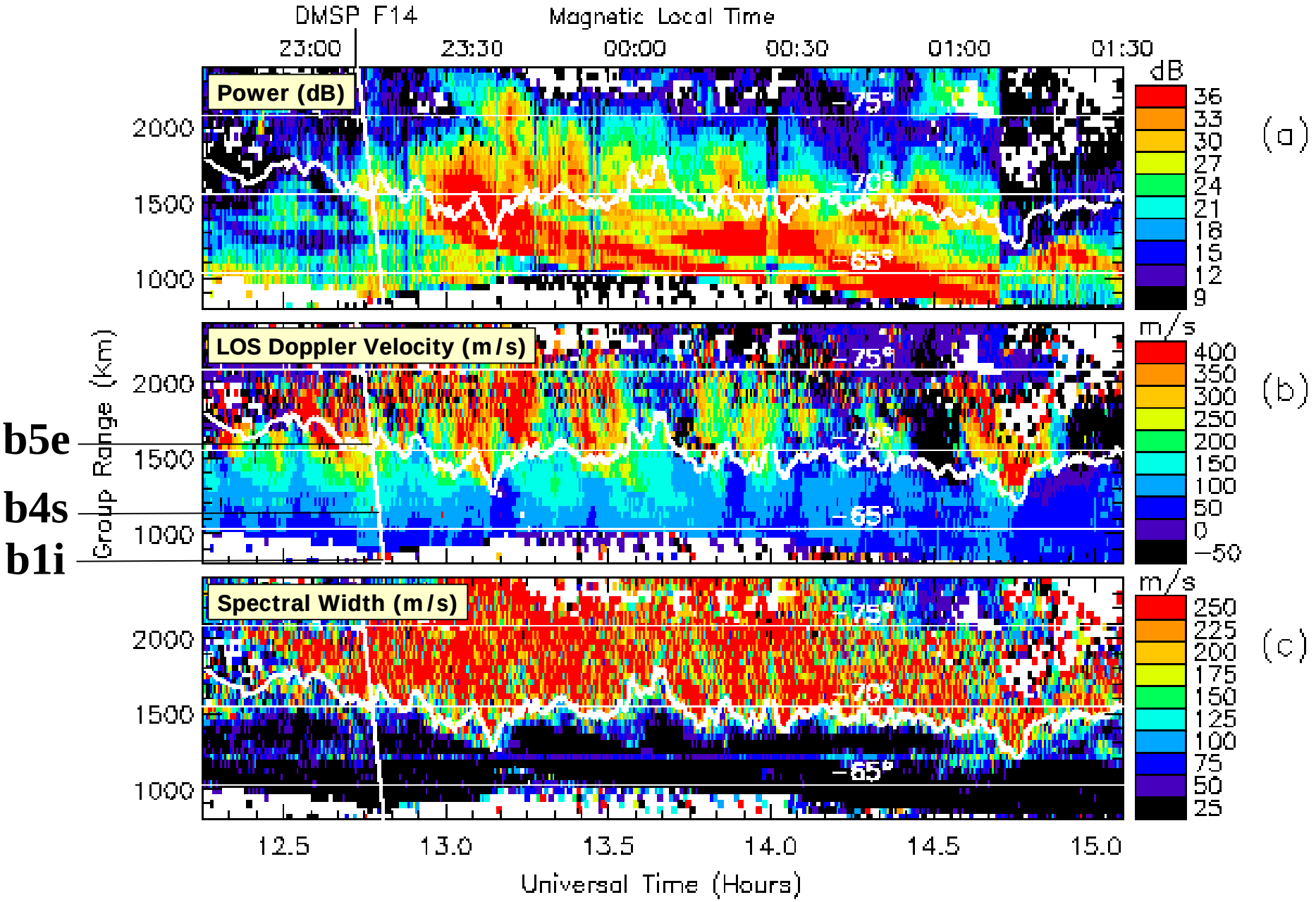
Space-Based Identification of Auroral Oval Boundaries



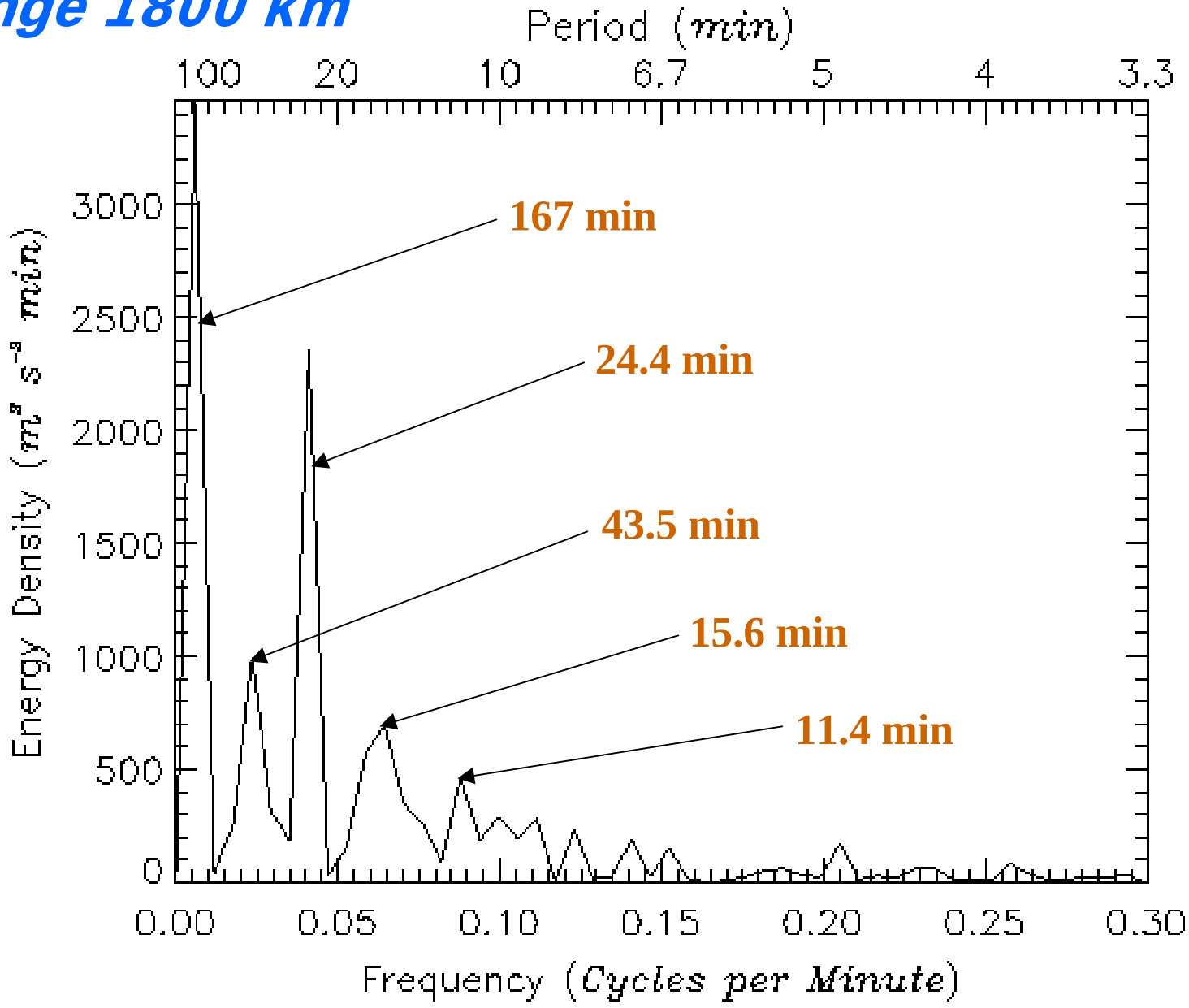
Space-Based Identification of Auroral Oval Boundaries



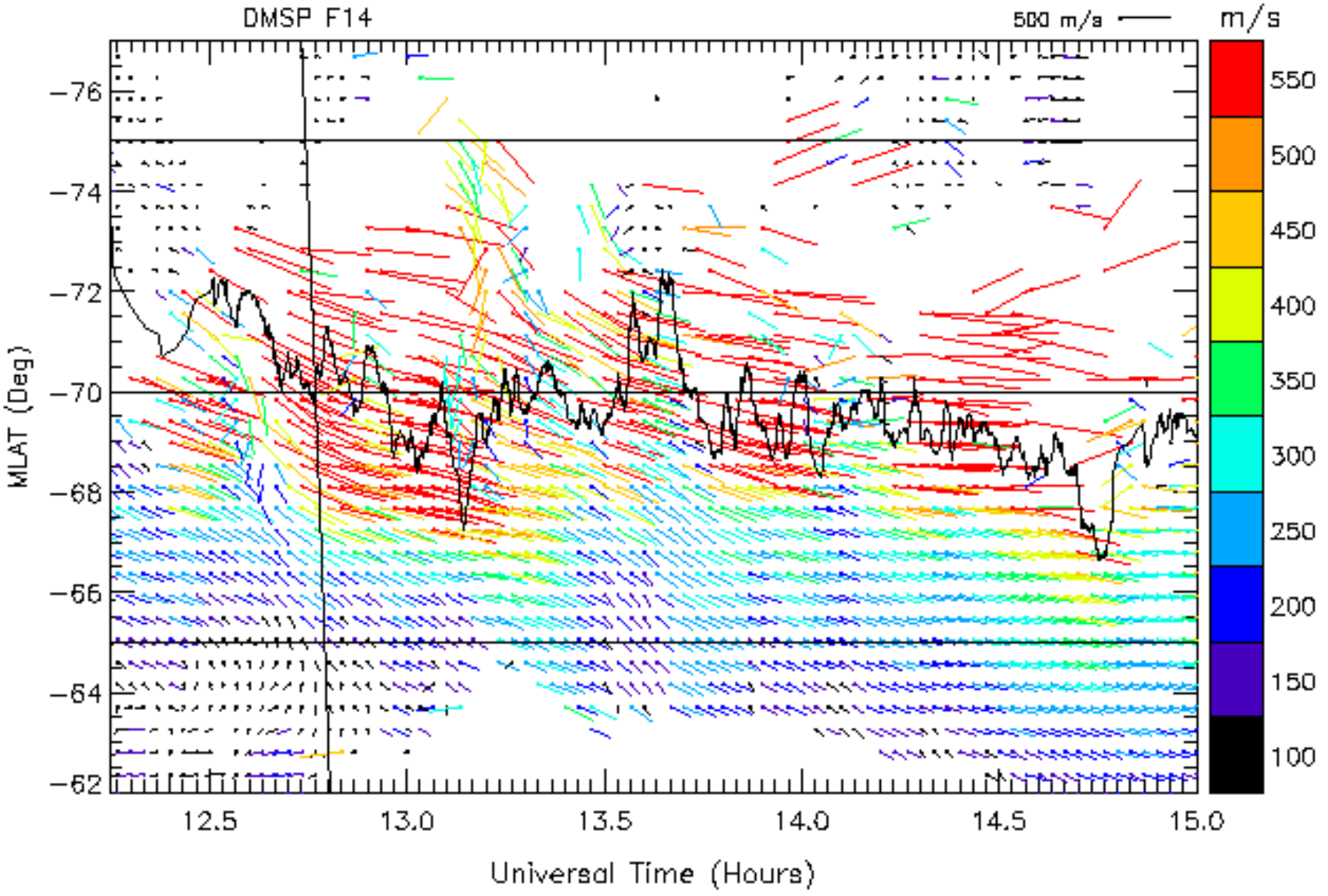
Range-Time Plot, TIGER Oz, Beam #4, 10 December, 1999



Power Spectrum, LOS Doppler Velocities, Beam 4, Range 1800 km



2-D Beam-Swinging Velocities, 10 December, 1999



Some Questions:

- **How often is the radar SWB aligned with the satellite OCB, and under what solar-wind and geomagnetic conditions?**
- **Does the alignment of the radar SWB with the satellite OCB change with MLT?**
- **Down to what spatial and temporal scales is the HF radar SWB an accurate proxy for the satellite OCB?**
- **Does the radar SWB agree with the satellite OCB during ionospheric substorms?**
- **Why is the radar SWB sometimes sharp (<90 km) and sometimes gradual (>>90 km)?**
- **Is there an HF radar signature of the boundary between the BPS (or PSBL) and CPS, and if so, under what geophysical conditions?**

Other Related Questions:

- **How well aligned are the radar SWB, the beam-swinging CRB, and the satellite OCB at dawn and dusk?**
- **To what extent are the enhanced spectral widths caused by small-scale convection vortices or Pc 1-2 activity?**
- **Are the power enhancements poleward of the radar SWB truly a signature of electron density patches?**
- **Why are there sometimes "islands" of large spectral width (>200 m s^{-1}) located equatorward of radar SWB? Does this signify open flux tubes imbedded within predominantly closed flux tubes?**
- **Conversely, why are there sometimes "islands" of low spectral width (<50 m s^{-1}) located poleward of the radar SWB? Does this signify closed flux tubes imbedded within predominantly open flux tubes?**