

Kiljava, Finland
2003



FINNISH METEOROLOGICAL INSTITUTE
GEOPHYSICAL RESEARCH



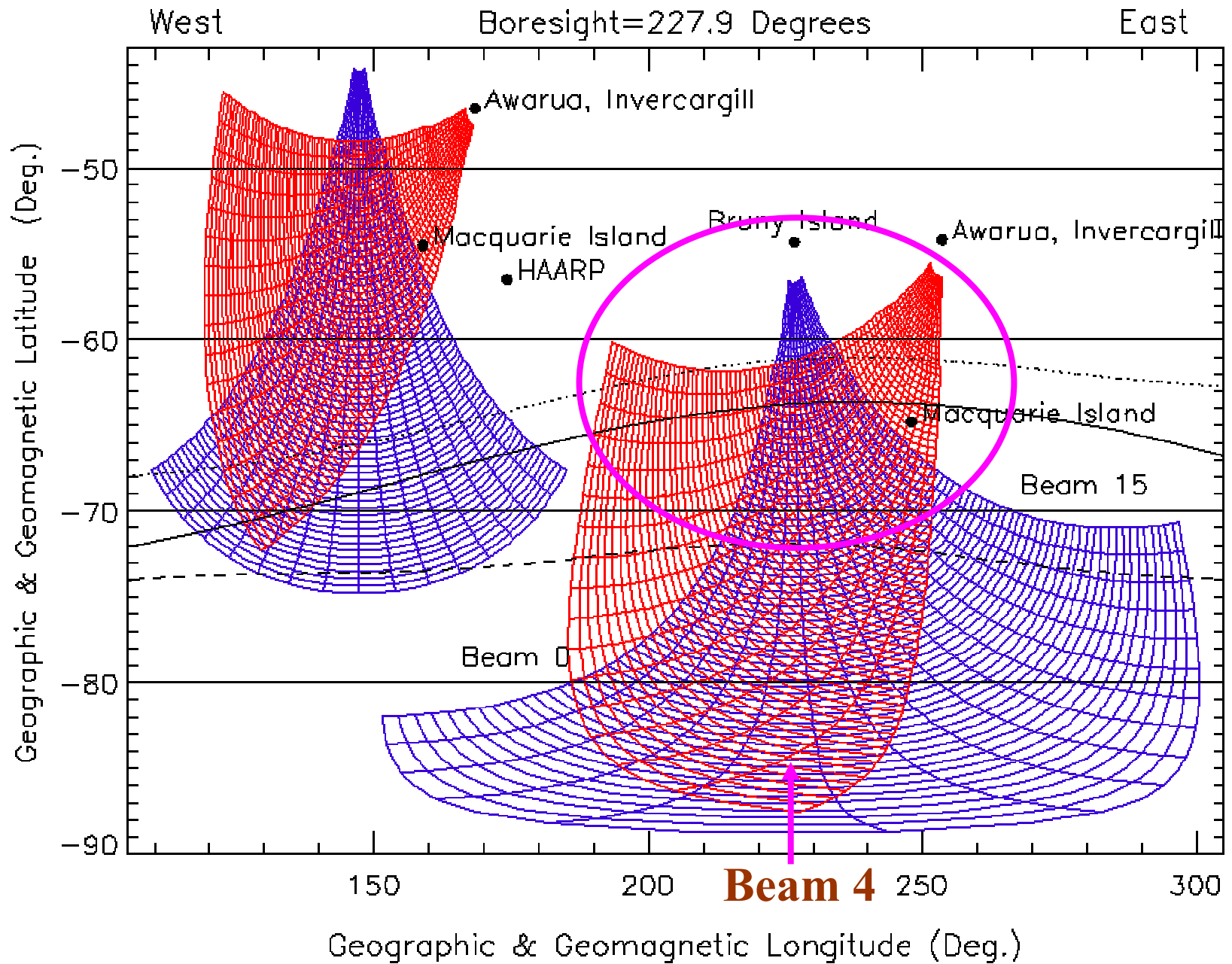
La Trobe
U N I V E R S I T Y

***Observations of ionospheric echoes
with extreme Doppler spectral width
in the nightside auroral and
sub-auroral ionosphere***

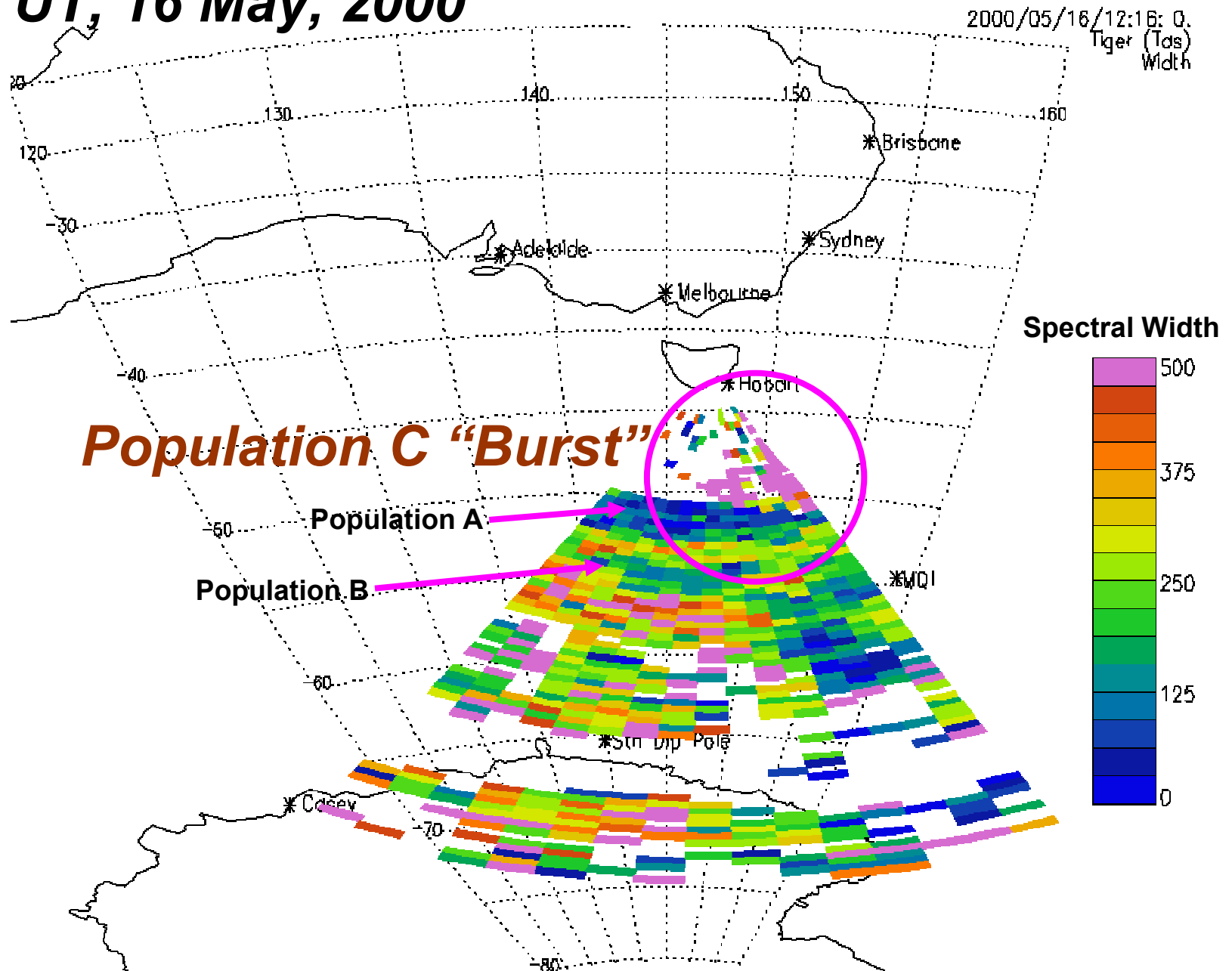
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TIGER I & II Field of Views:

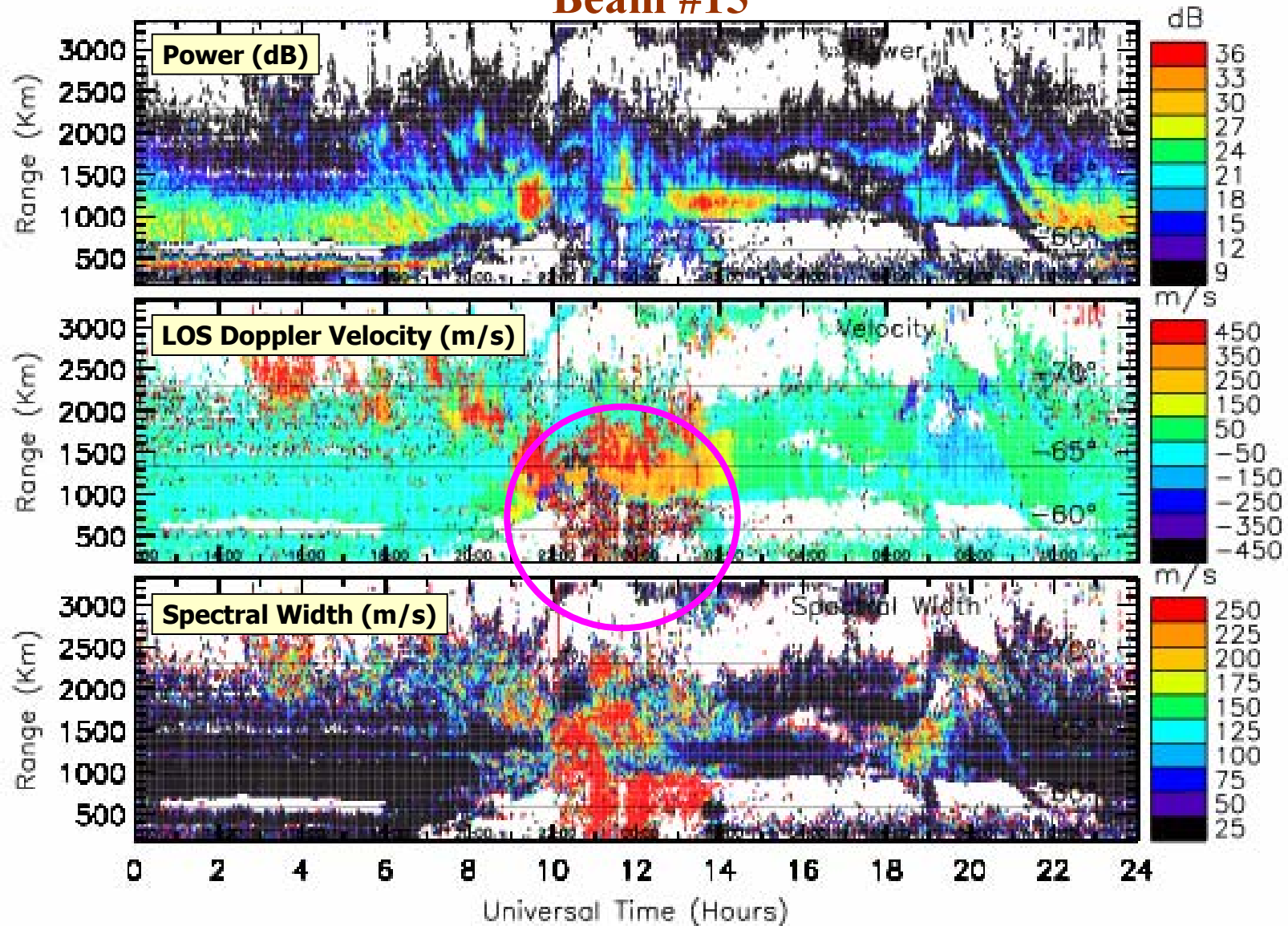


TIGER Tasmania Ionospheric Scatter, 12:16 UT, 16 May, 2000

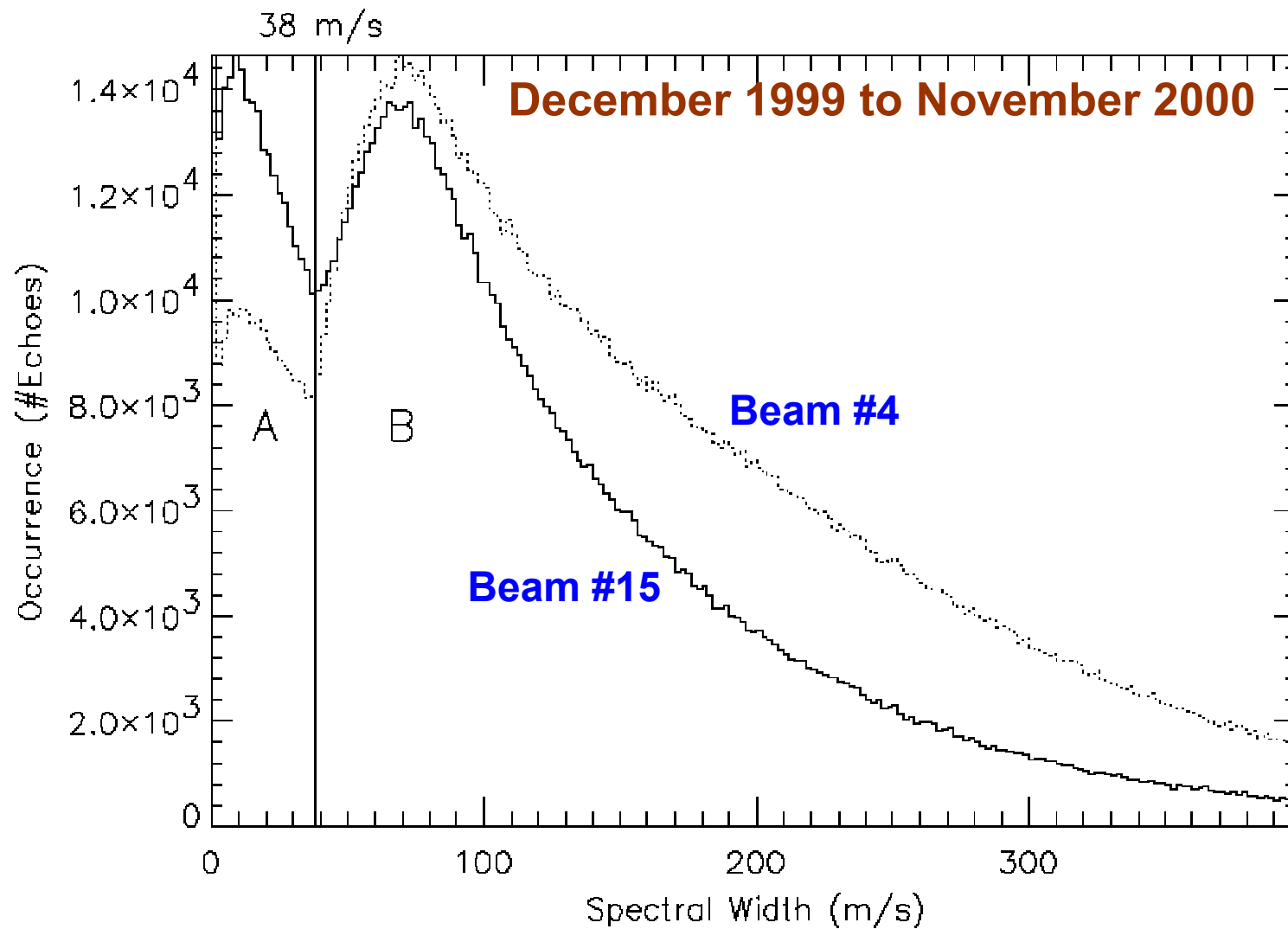


TIGER Tasmania Range-Time Plot, 16 May, 2000

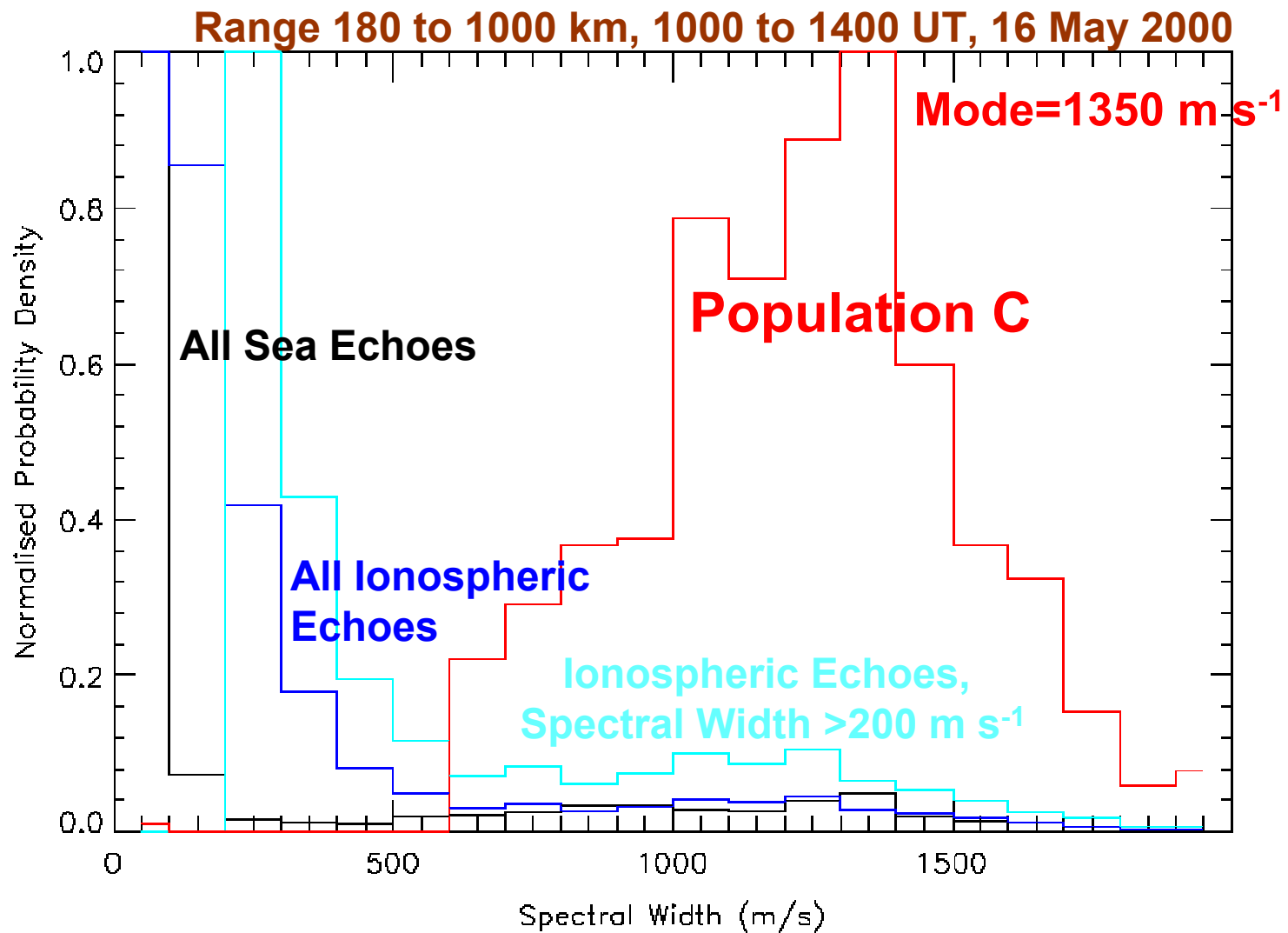
Beam #15



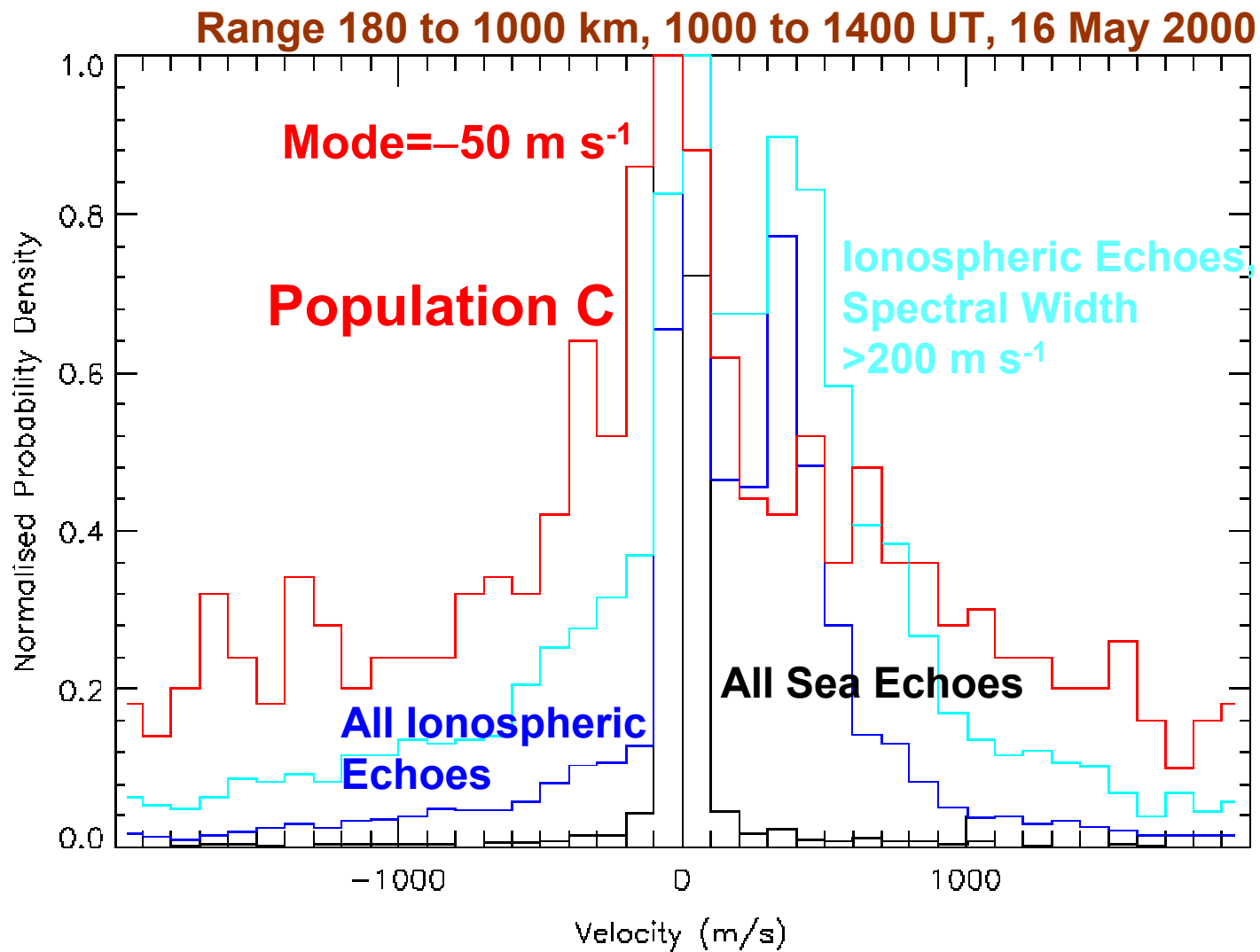
Population A (Auroral & Sub-Auroral) and Population B (Polar Cap) F-Region Ionospheric Echoes



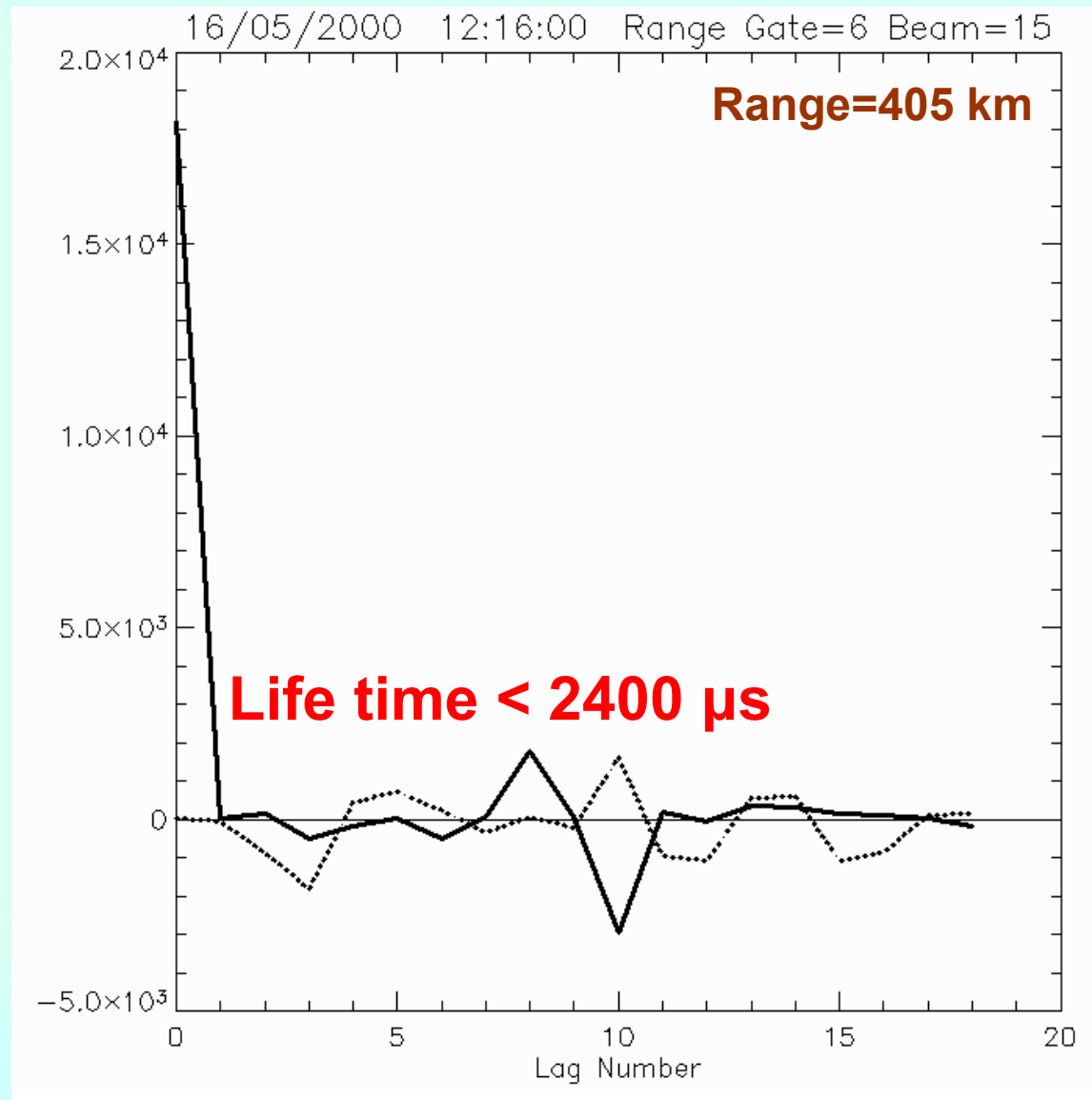
Population C Echoes with Extreme Doppler Spectral Width (Auroral & Sub-Auroral)



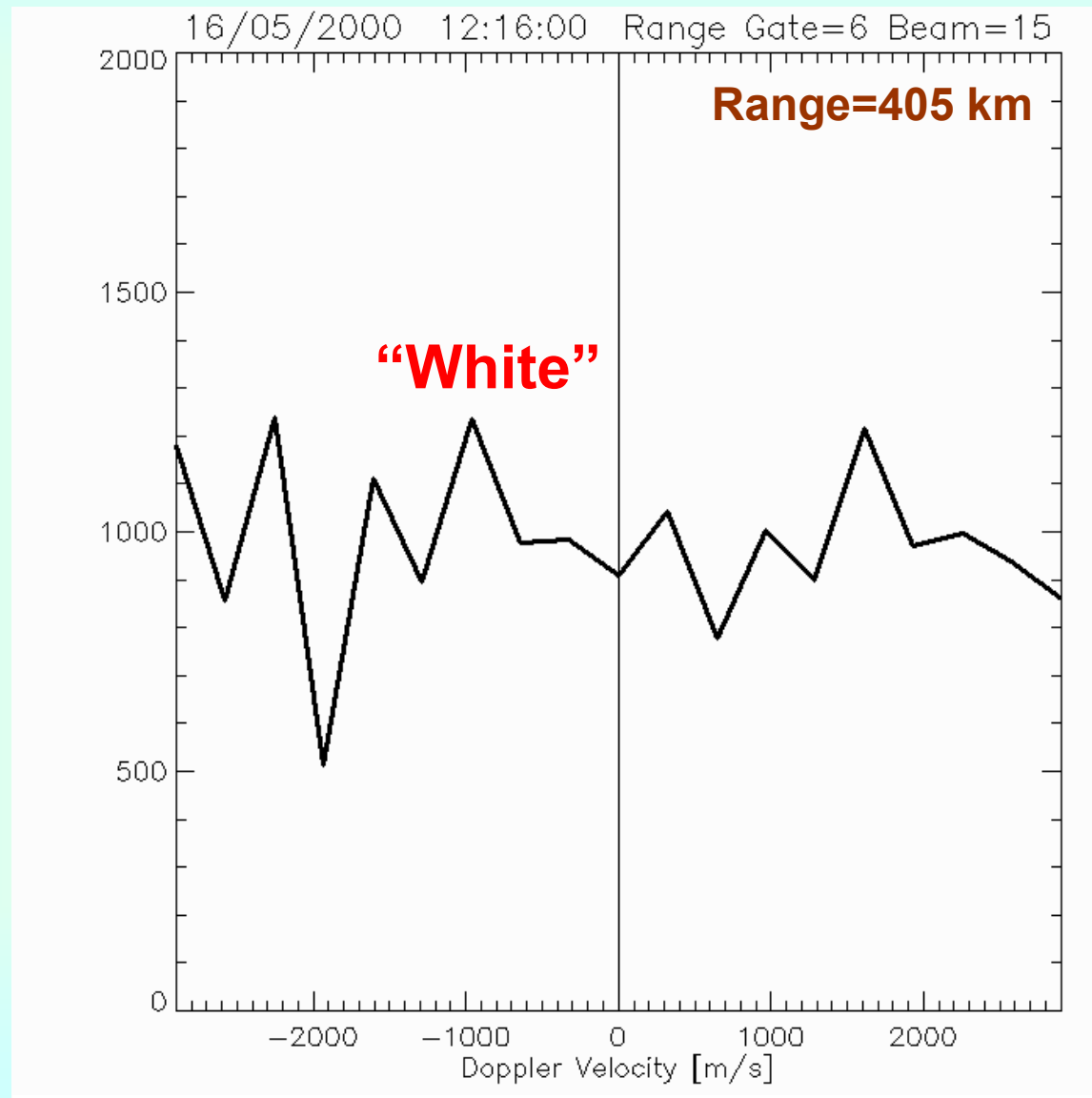
Population C Echoes with Extreme Doppler Spectral Width (Auroral & Sub-Auroral)



Population C: Representative Auto Correlation Function



Population C: Representative Doppler Spectrum

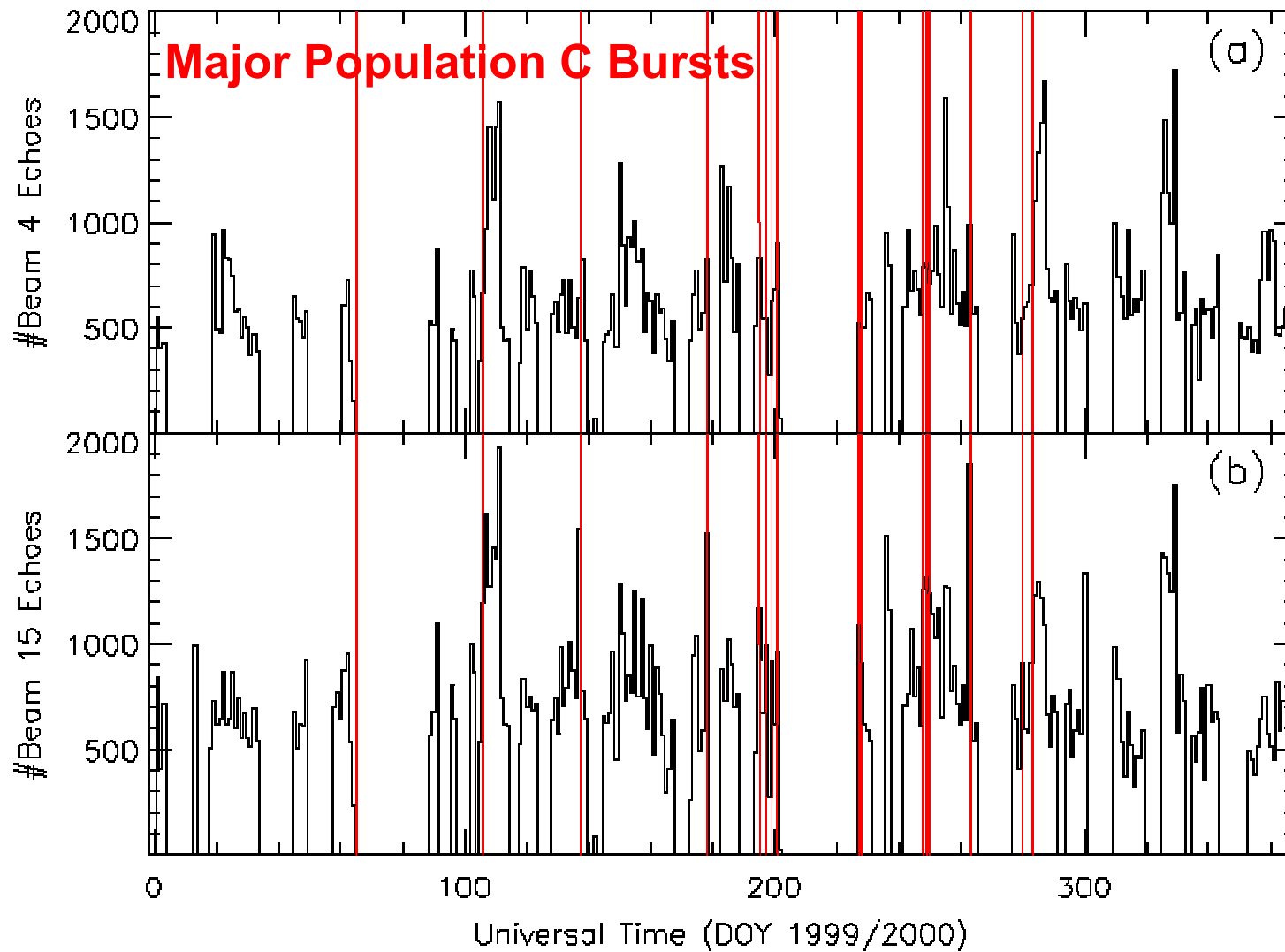


Major Population C "Bursts", Year 2000:

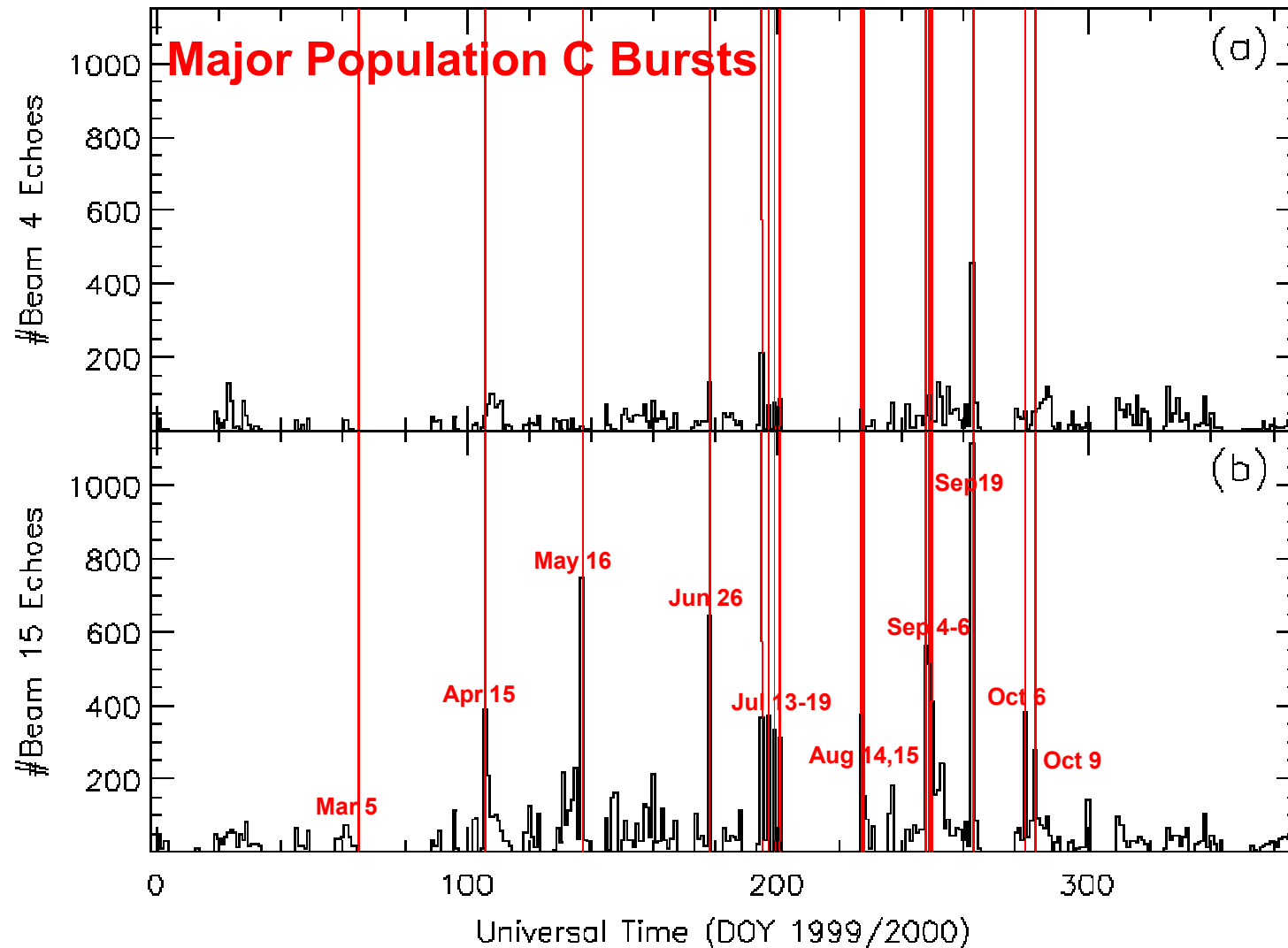
March 5, Day 65, 156 ¹ , $K_p=1, 1+^2$	August 14, Day 227, 375, $K_p=1, 2+$
April 15, Day 106, 391, $K_p=2-, 1+$	August 15, Day 228, 153, $K_p=2-, 1+$
May 16, Day 137, 749, $K_p=3, 3-$	September 4, Day 248, 565, $K_p=2-, 3-$
June 26, Day 178, 644, $K_p=5, 5+$	September 5, Day 249, 515, $K_p=1, 1+$
July 13, Day 195, 368, $K_p=6-, 7$	September 6, Day 250, 413, $K_p=0+, 2+$
July 15, Day 197, 370, $K_p=4+, 8$	September 19, Day 263, 1115, $K_p=5, 6$
July 17, Day 199, 335, $K_p=2+, 2+$	October 6, Day 280, 381, $K_p=0+, 1$
July 19, Day 201, 312, $K_p=1, 2$	October 9, Day 283, 280, $K_p=0+, 1+$

¹ Number beam 15 echoes between 10:00 and 14:00 UT at range ≤ 1440 km with spectral width ≥ 1000 m s⁻¹, ² K_p values for 9 to 12 UT and 12 to 15 UT.

Occurrence of Ionospheric Echoes, Doppler Spectral Width ≥ 1000 m s⁻¹

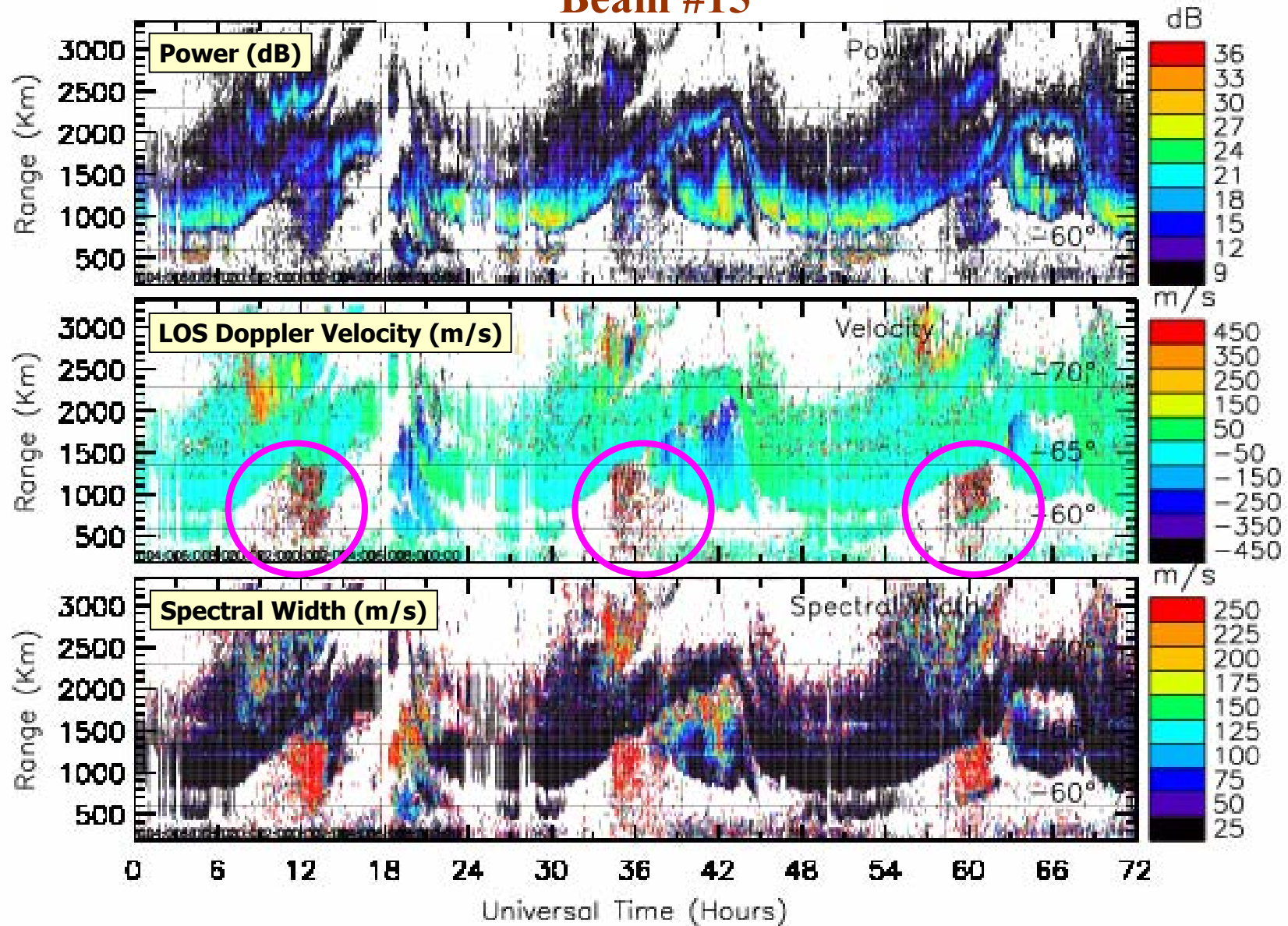


Number of echoes between 10:00 and 14:00 UT at range ≤ 1440 km with spectral width ≥ 1000 m s⁻¹

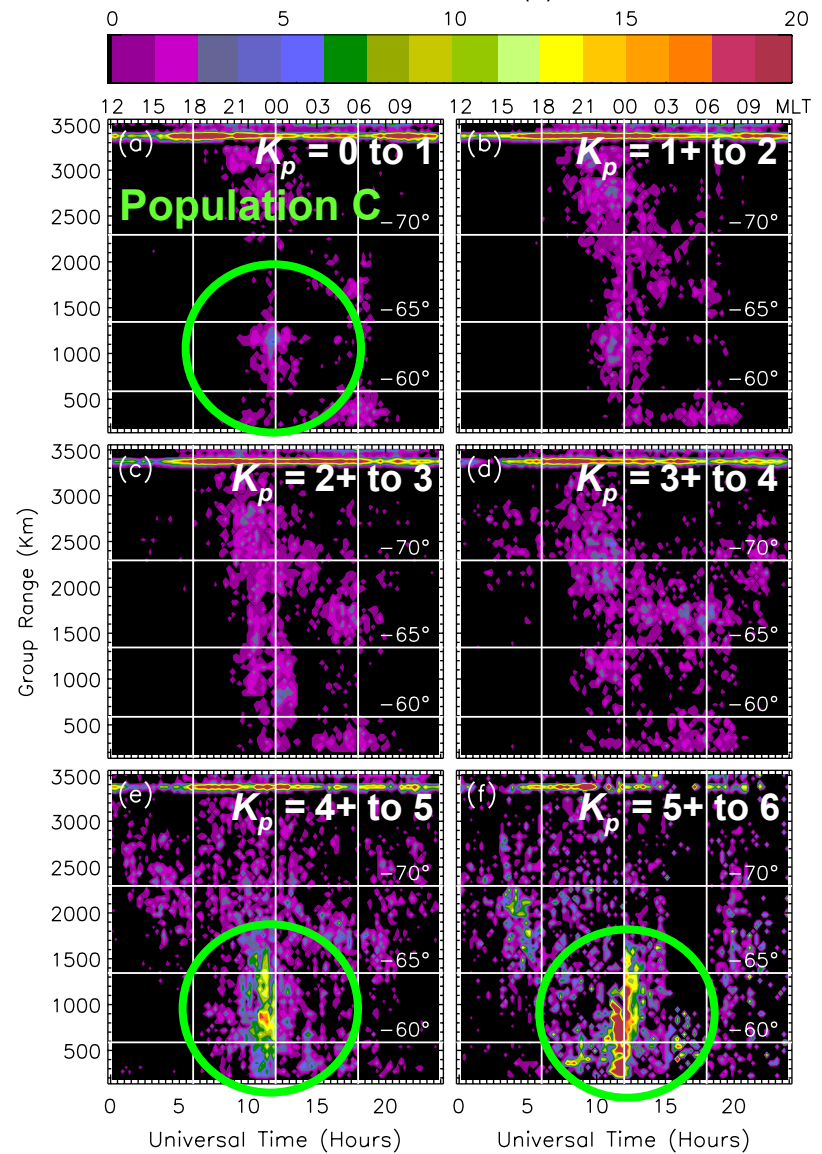
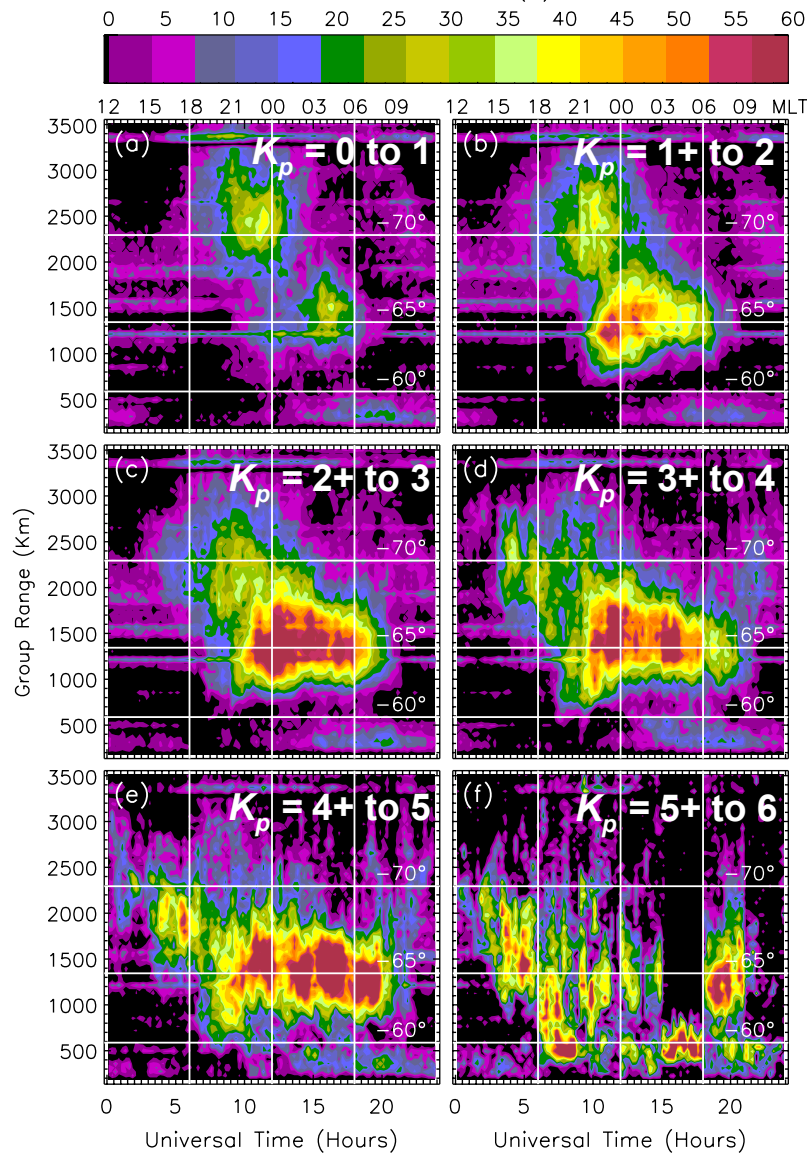


TIGER I Range-Time Plot, 4-6 September, 2000

Beam #15



Beam 15 Ionospheric Echoes, Spectral Width $>0 \text{ m s}^{-1}$ (left), Ionospheric & Sea Echoes, Spectral Width $\geq 1000 \text{ m s}^{-1}$ (right)



Characteristics of Population C Echoes:

- They occur intermittently throughout the year, but are sometimes concentrated in “bursts” during ~1000 to 1400 UT (~2030 to 0030 MLT).
- The bursts occur during geomagnetic quiet conditions, but they are more likely to occur during disturbed conditions.
- They occur at ranges <1485 km (range bin ≤ 29). That is, on closed field lines in the auroral and sub-auroral ionosphere.
- More of them occur on the zonal eastward beam numbers (15, 14, etc.)
- The line-of-sight Doppler velocities take on randomly large positive and negative values.
- The spectral widths are extremely large, with mode values of $\sim 1300 \text{ m s}^{-1}$.
- The ACFs de-correlate very rapidly, usually within a single lag length of $2400 \mu\text{s}$.

