

# Cascades 2 Science Meetgin

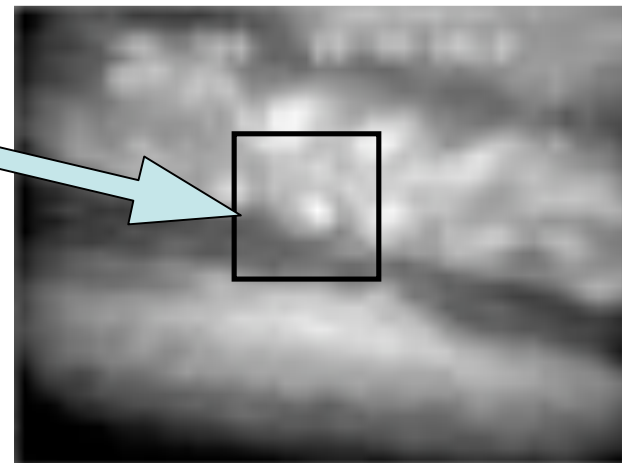
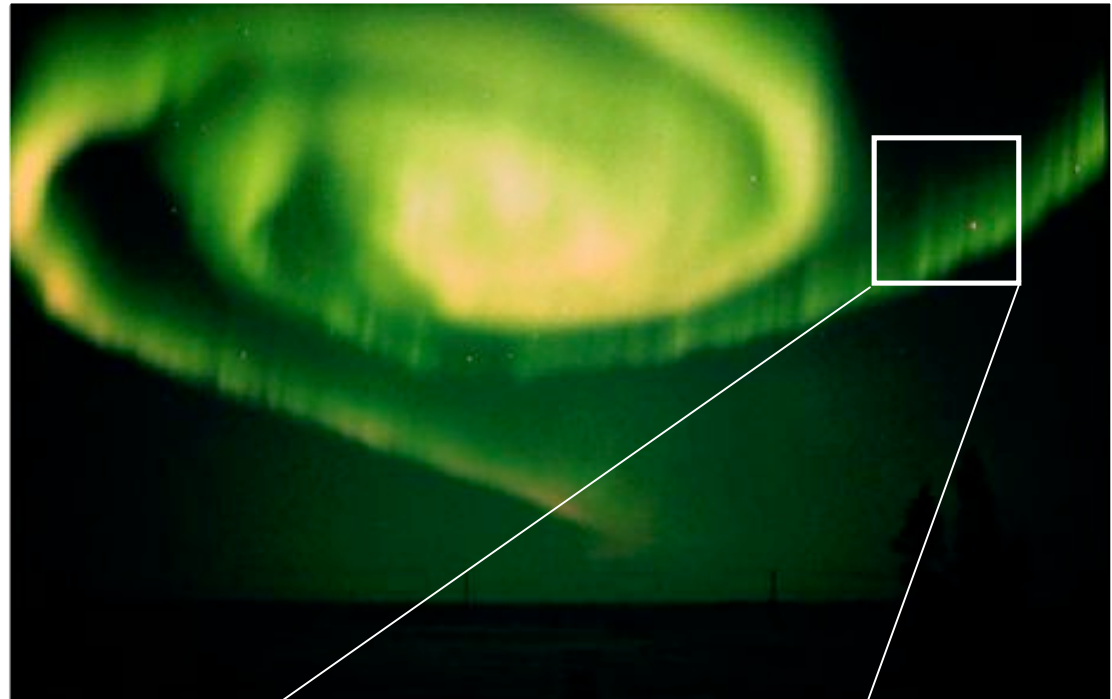
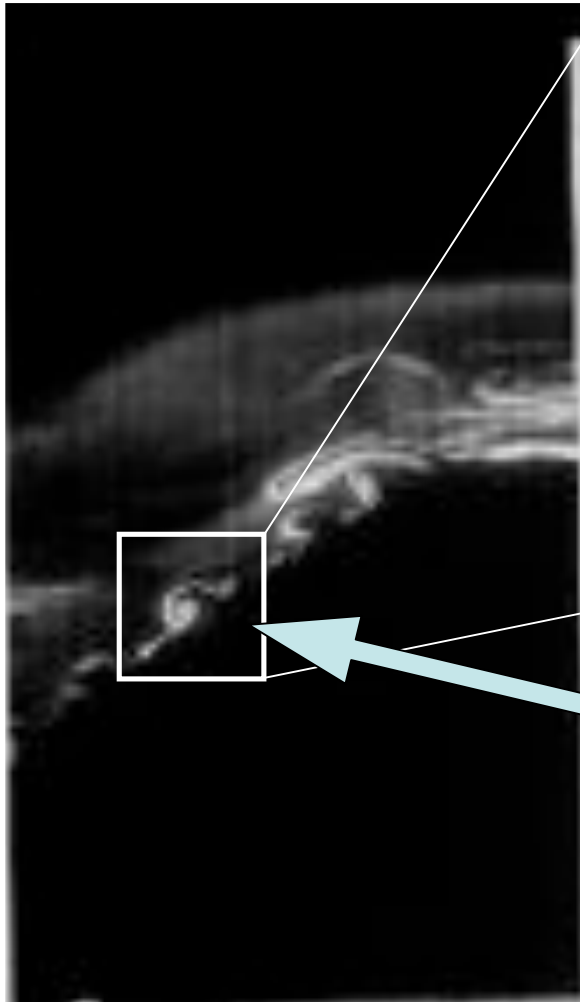
Slides presented by

Joshua Semeter

Boston University ([jls@bu.edu](mailto:jls@bu.edu))

# In the aurora, vorticity happens

2000 km



26 km

# PBI over Sondrestrom, Greenland



Photo by C. J. Heinselman

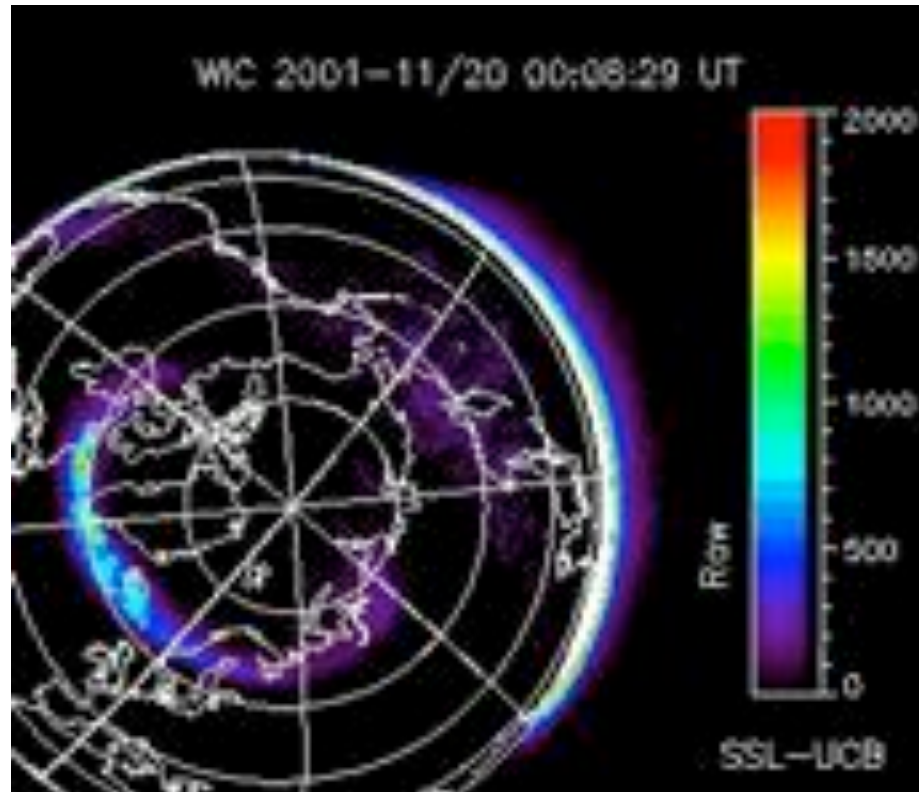
# Another view



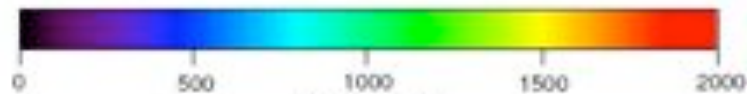
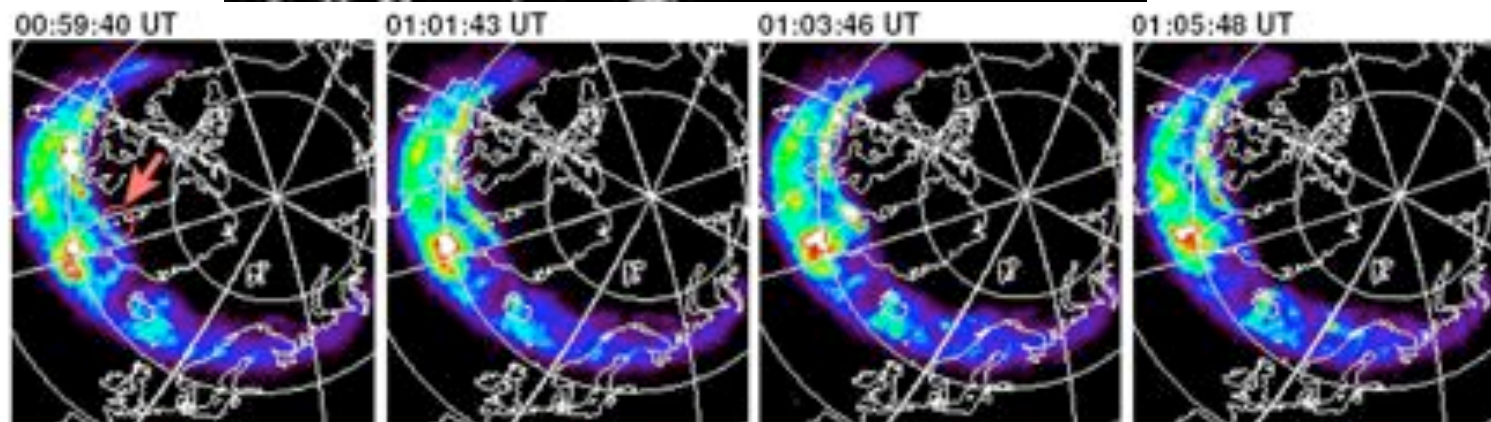
Photo by C. J. Heinselman



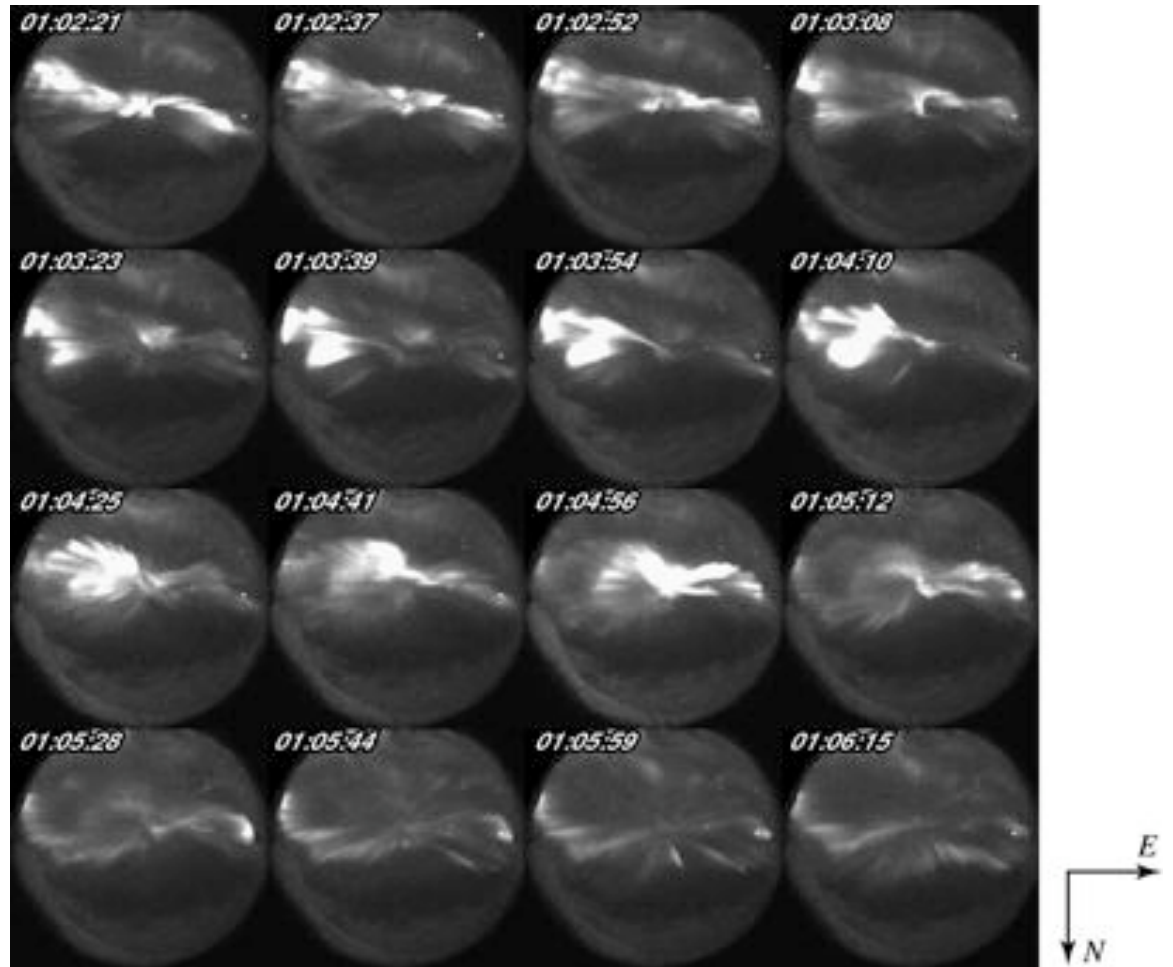
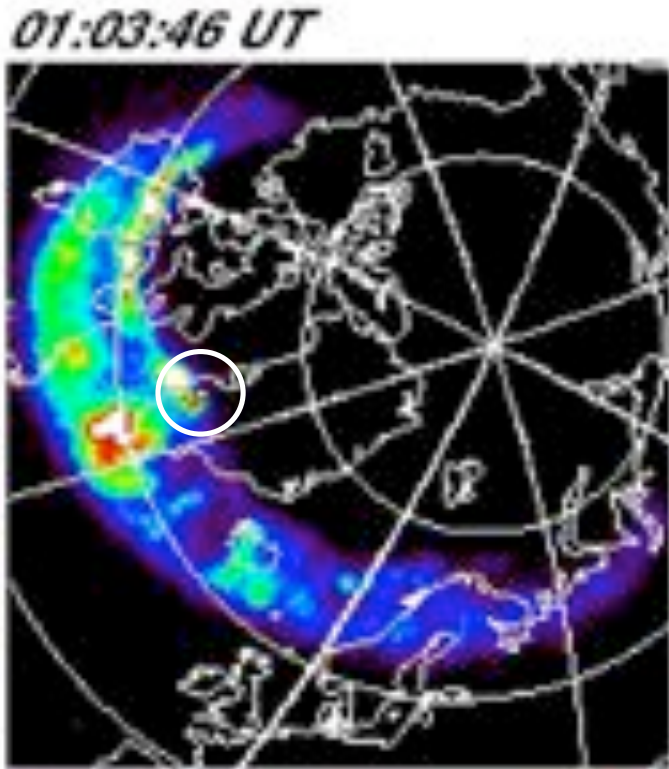
# IMAGE WIC sensor



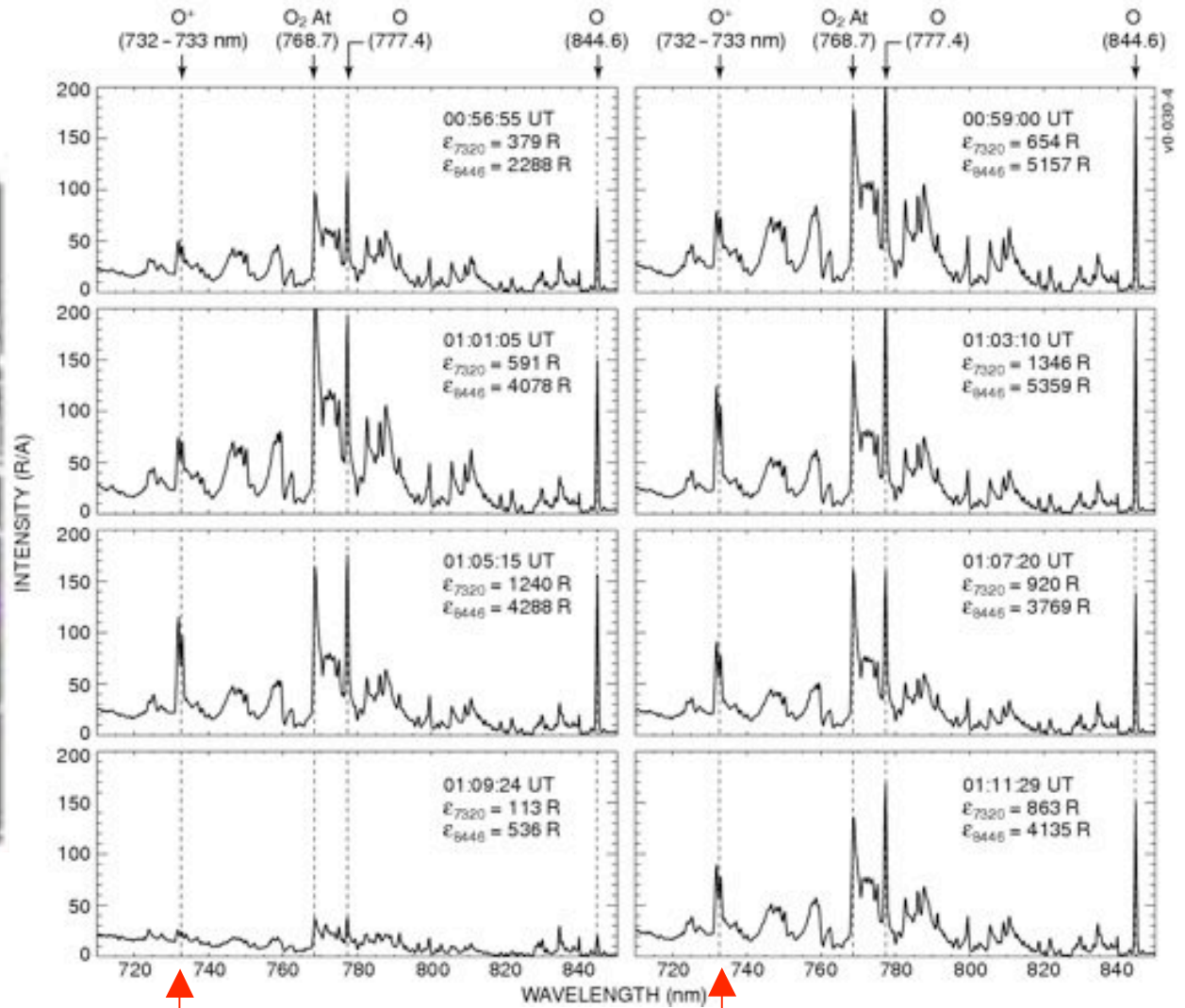
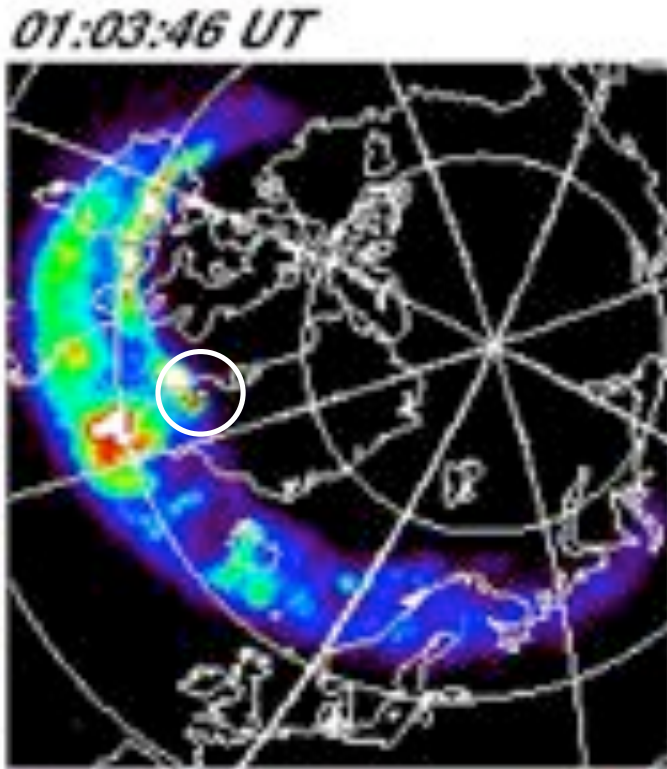
WIC camera is sensitive to LBH bands of  $N_2^+$  produced by electrons with  $>1\text{keV}$  field-aligned energy (10,000 km/s)



# PBI: All-sky Camera perspective



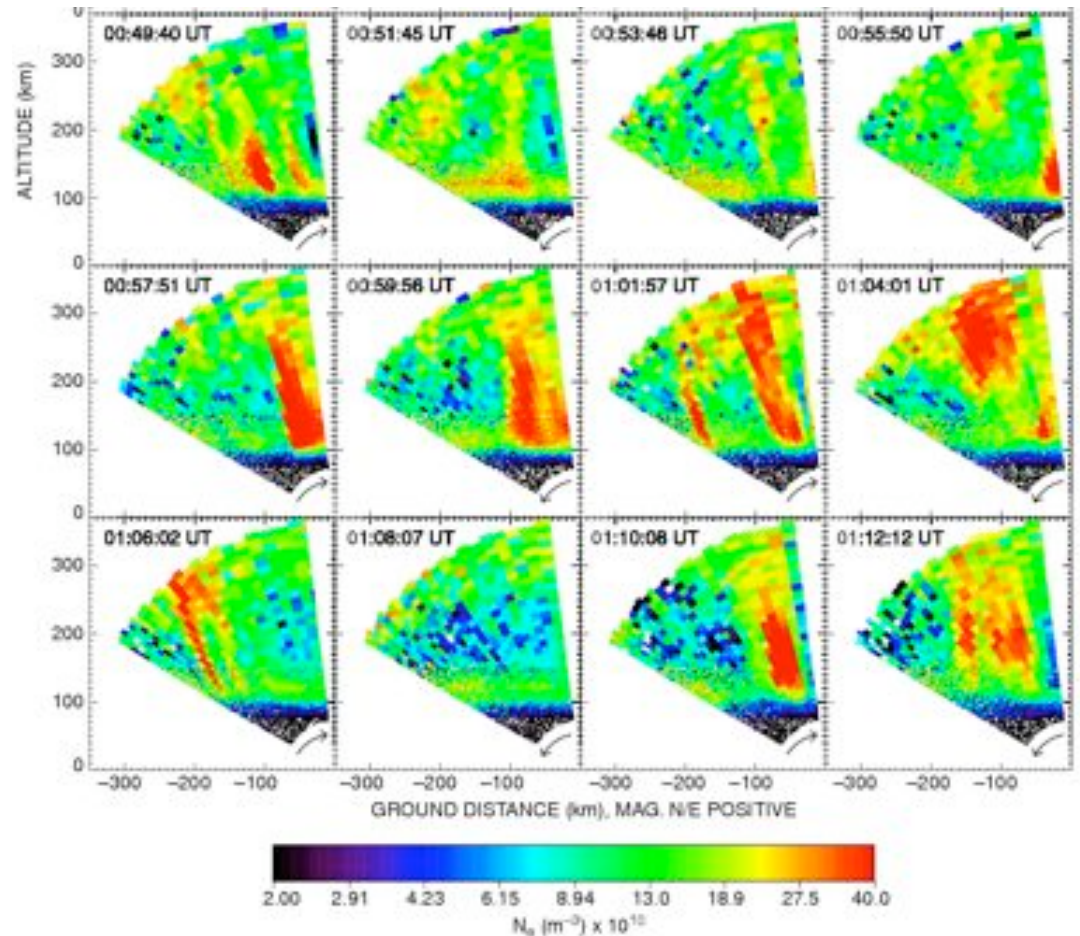
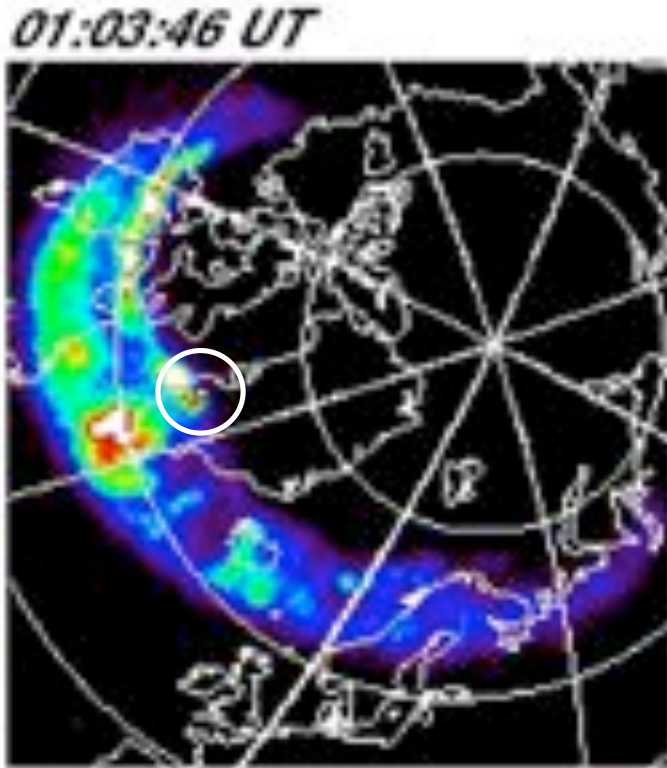
# PBI: Zenith spectrometer perspective



$O^+$  production



# PBI: Incoherent Scatter Radar

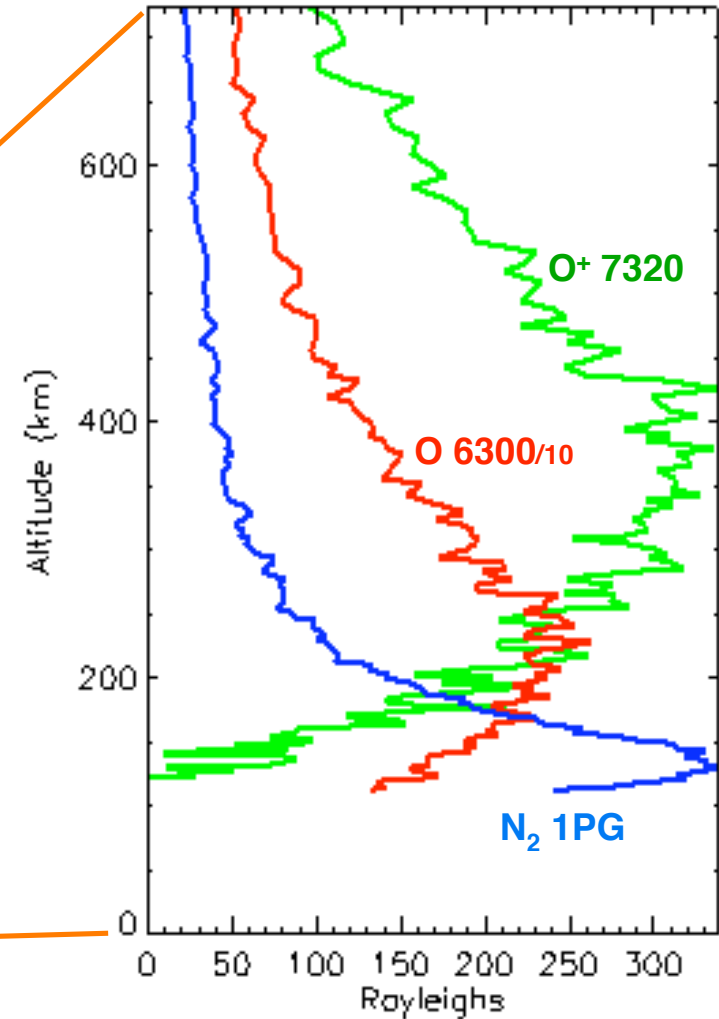
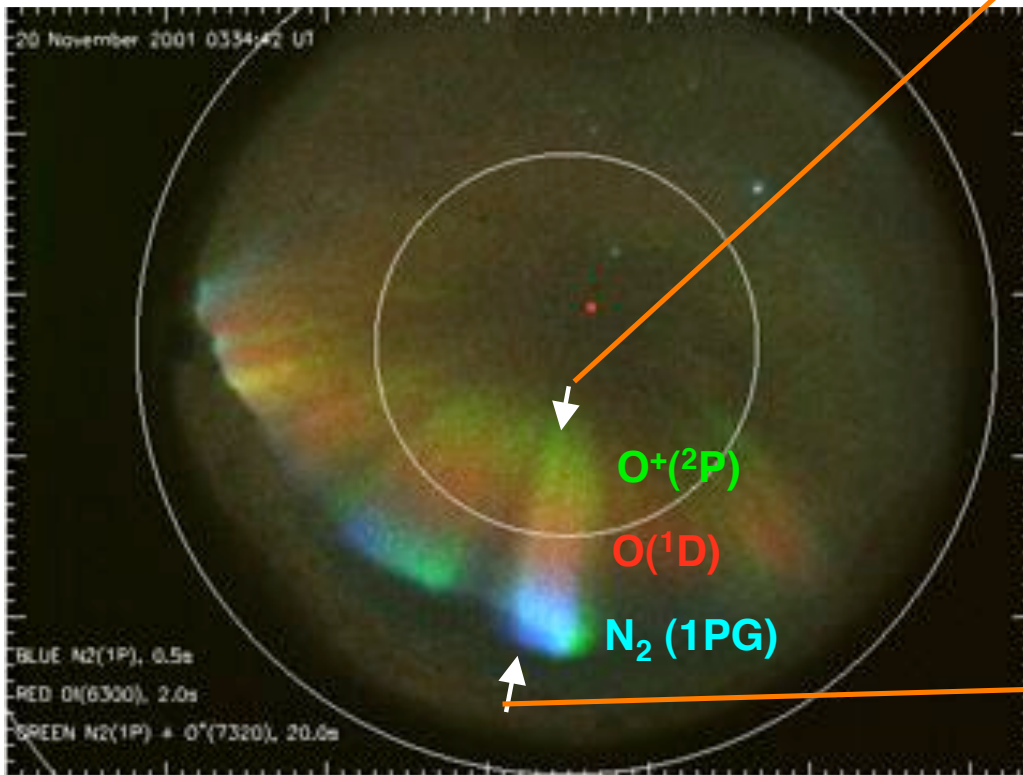


Tall columns of ionization within PBI suggest a stable, structured precipitating electron source with energies ranging from thermal (a few eV) to  $\sim 10$  keV. Can we be sure *F*-region portion is aurorally produced?



# PBI: Multi-spectral Perspective

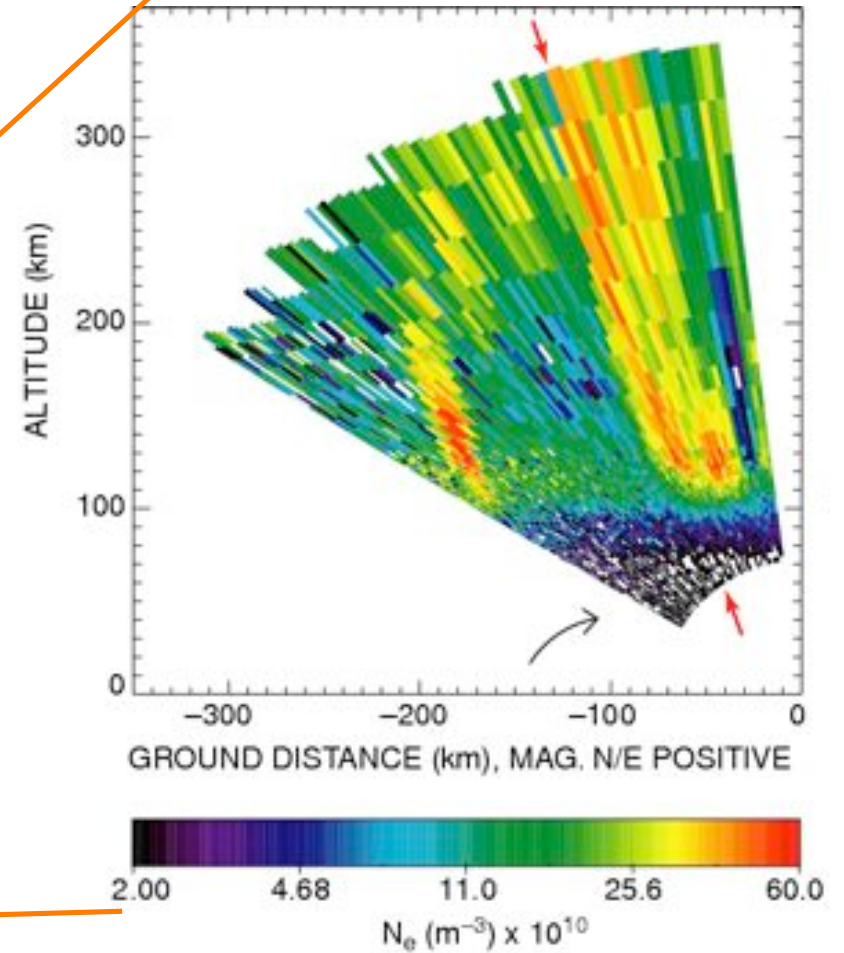
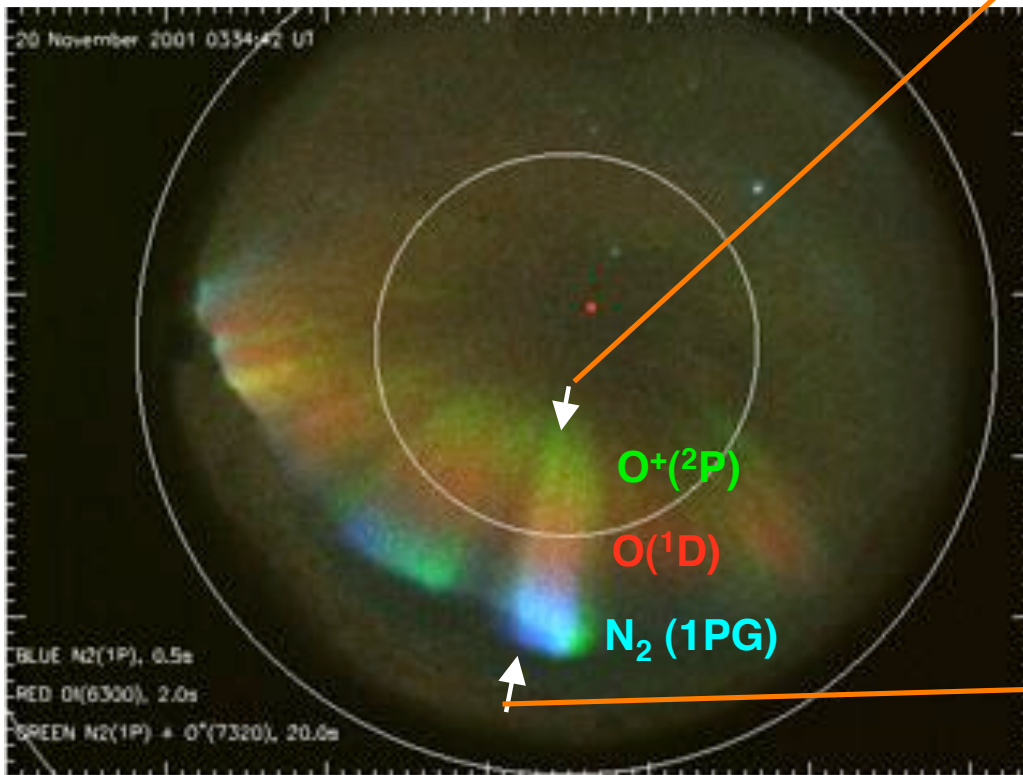
Composite allsky image:



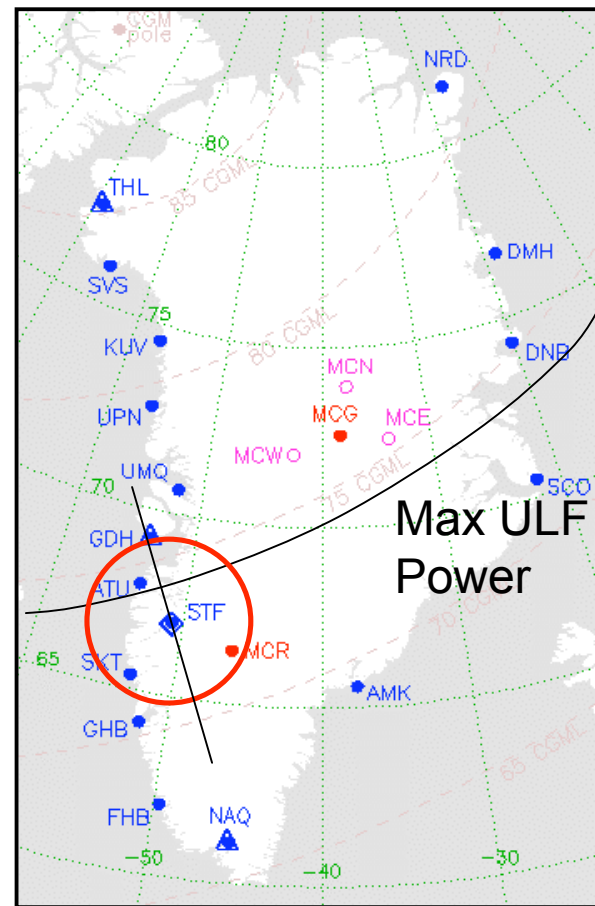
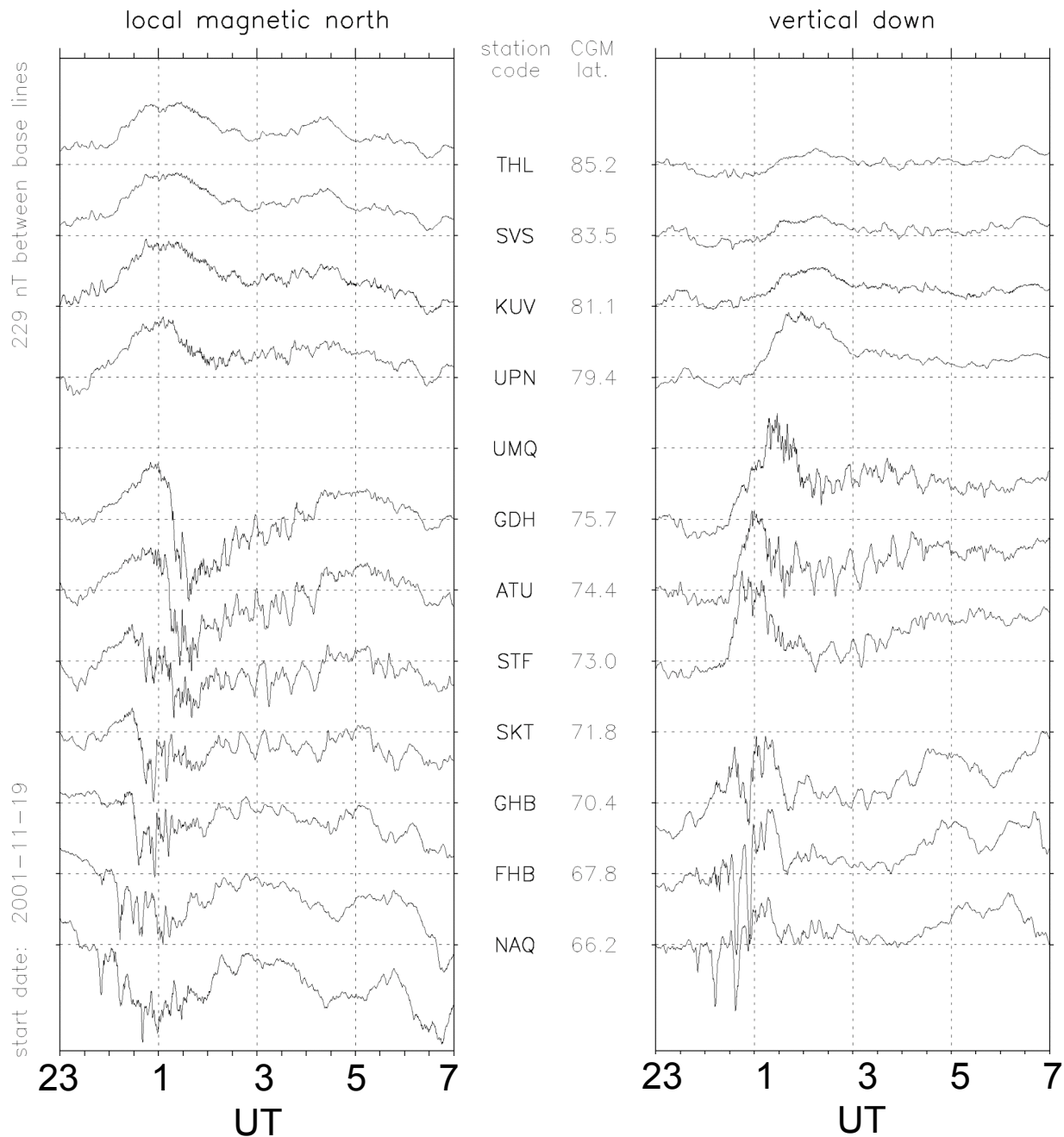
630nm (redline) emission layer was expected, owing to presence of low energy particle flux. But  $O^+$  732nm emission has not been “imaged” in the aurora before and its high altitude (above redline layer) was not expected.

# PBI: production-response Perspective

Composite allsky image:



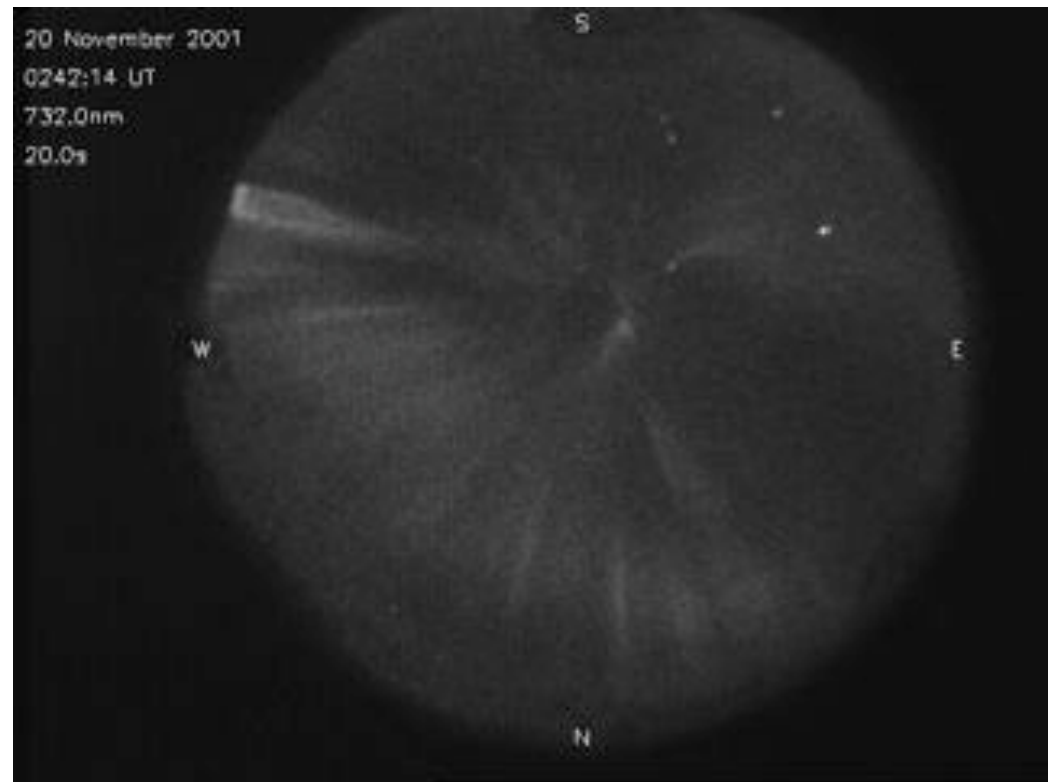
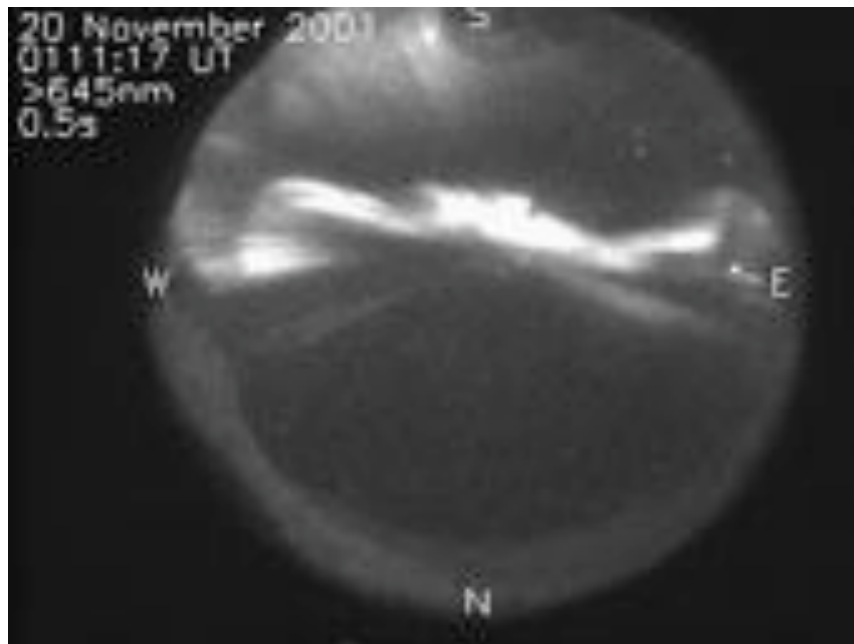
# Greenland Magnetometer Chain



Courtesy Jurgen Waterman, DMI

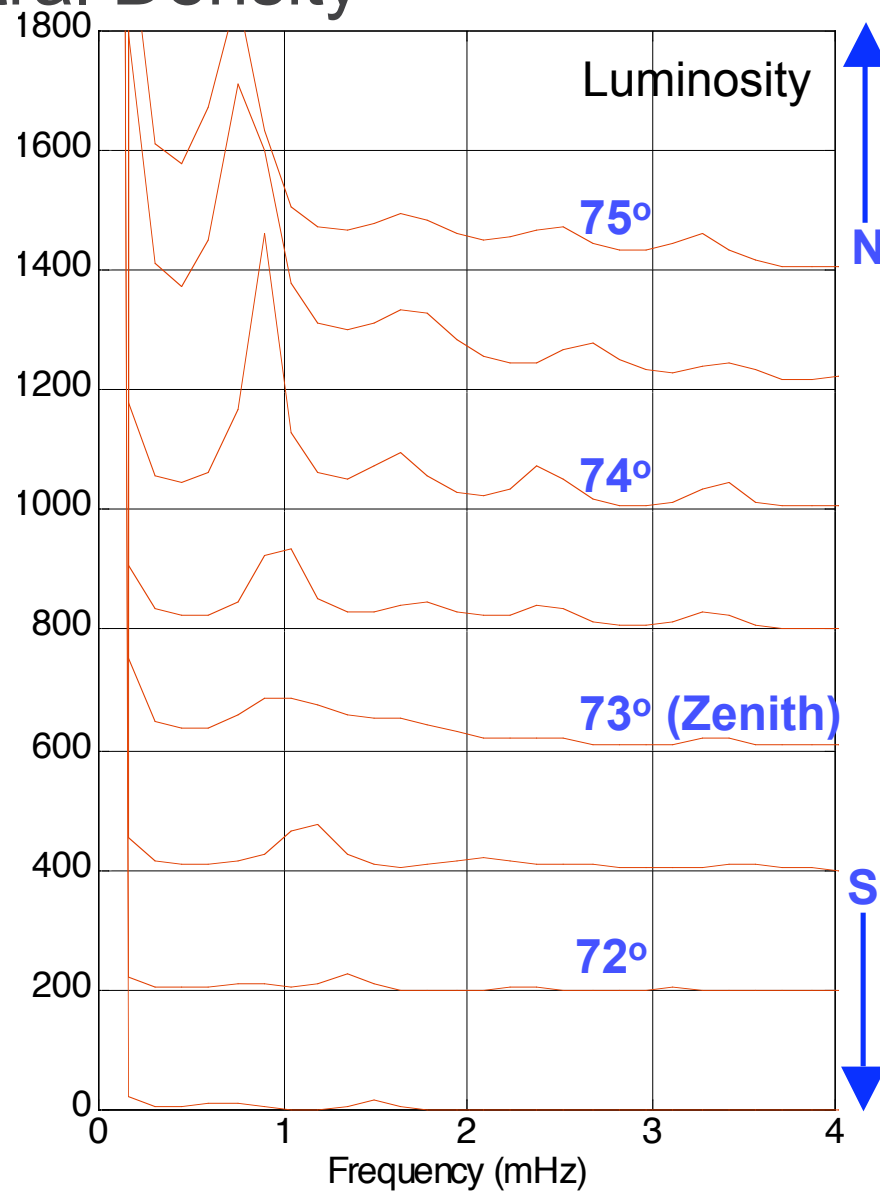
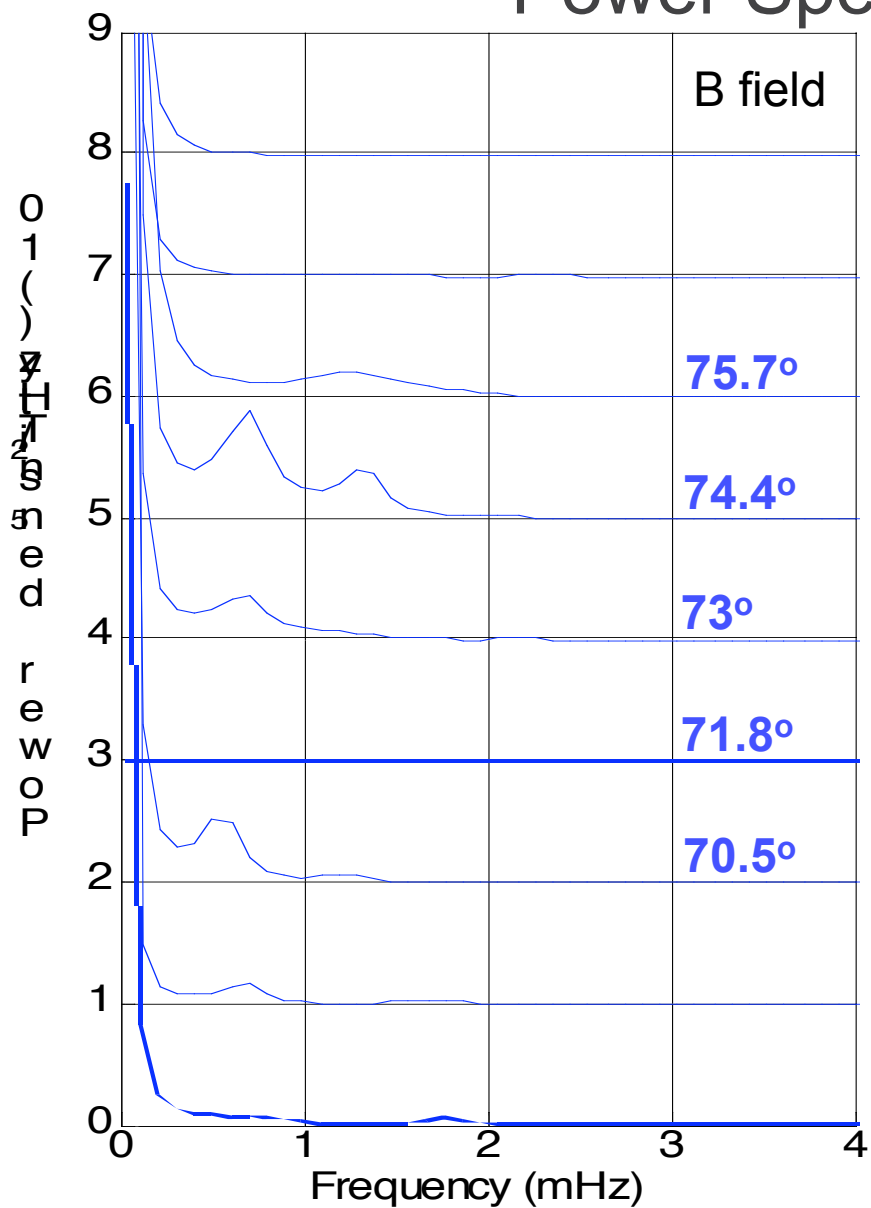


# Imaging auroral $O^+$ and $N_2^+$ production



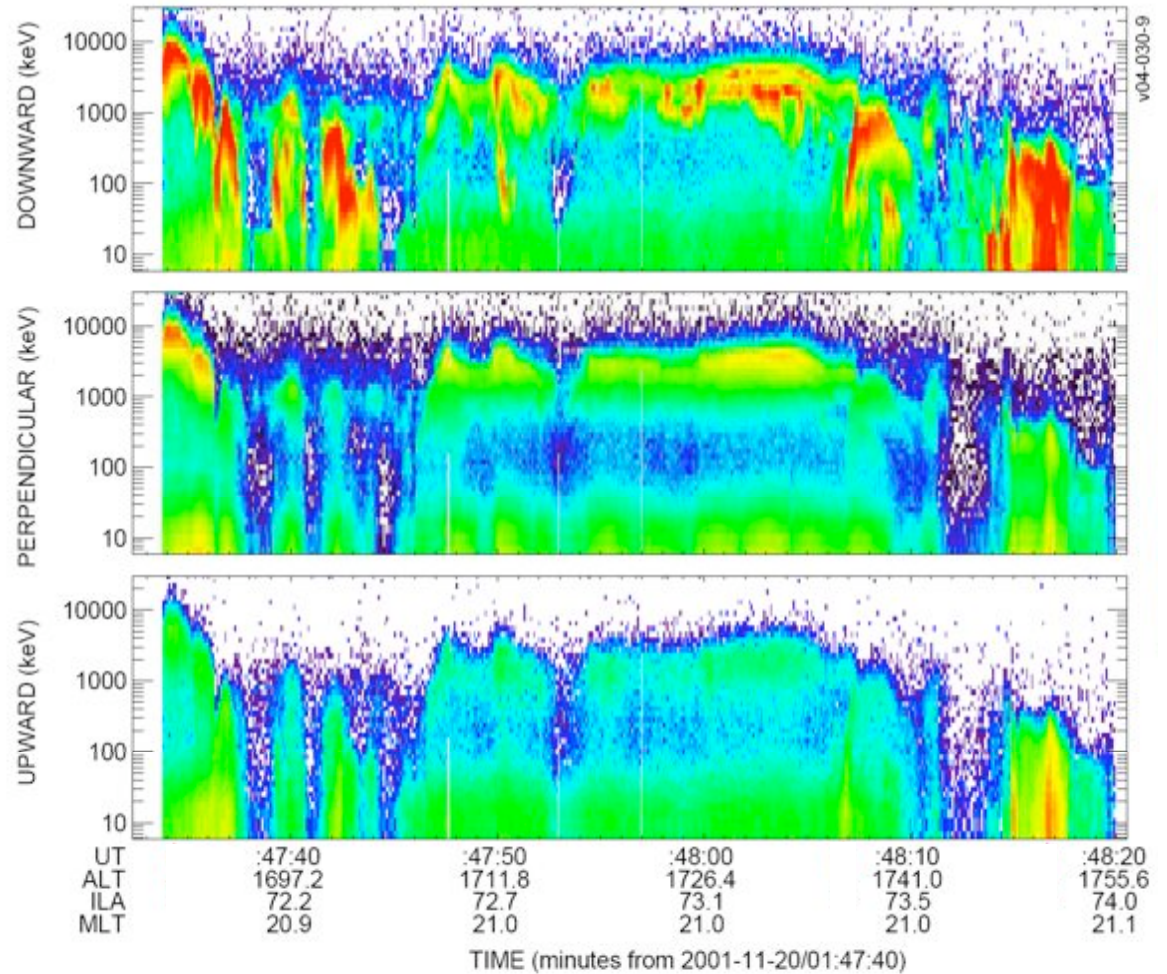
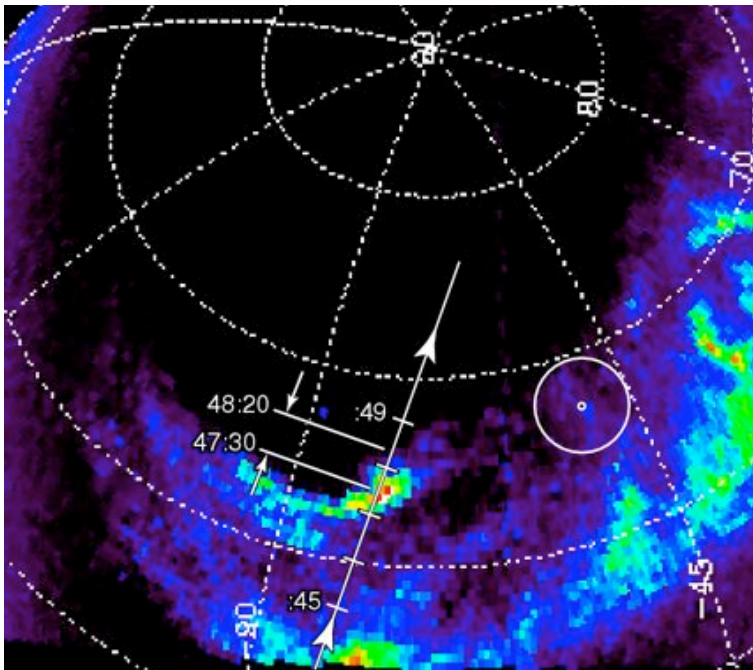
500 km  
T=26 s, 15 Frames/s  
(400 x real time)

# Power Spectral Density



0.6 mHz and 1.3 mHz present in both magnetic and optical sensors.

# Electron spectra, nightside PCB, substorm recovery, 1700 km altitude



ster s eV



