Oblique vs. Perpendicular to B observations of 150-km echoes

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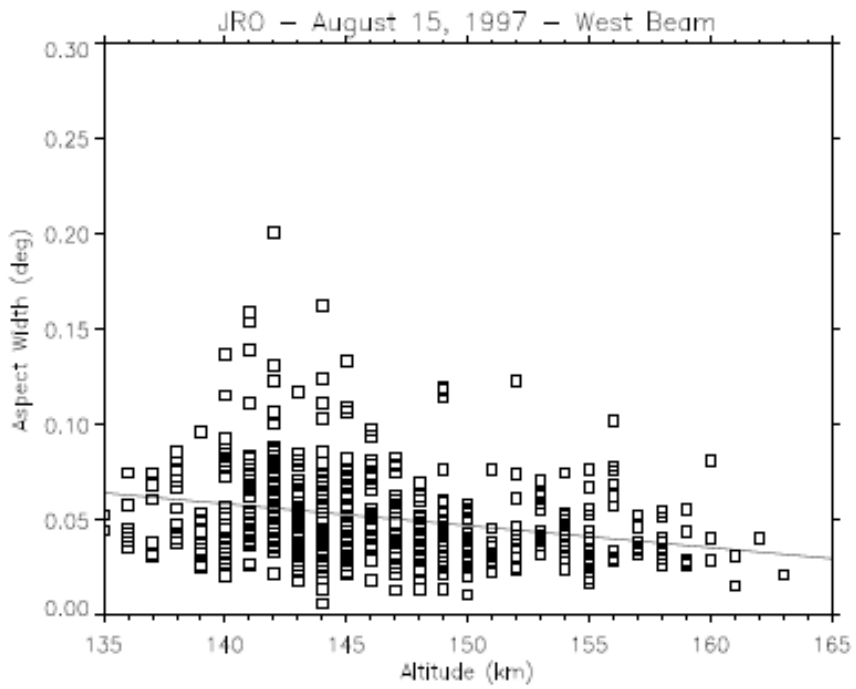
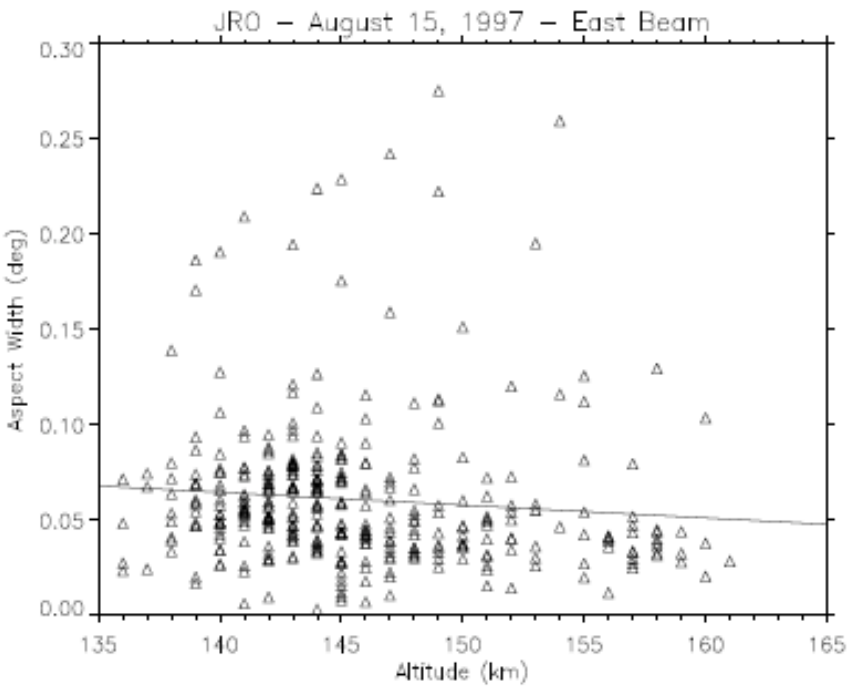
150-km Aspect Sensitivity (1)

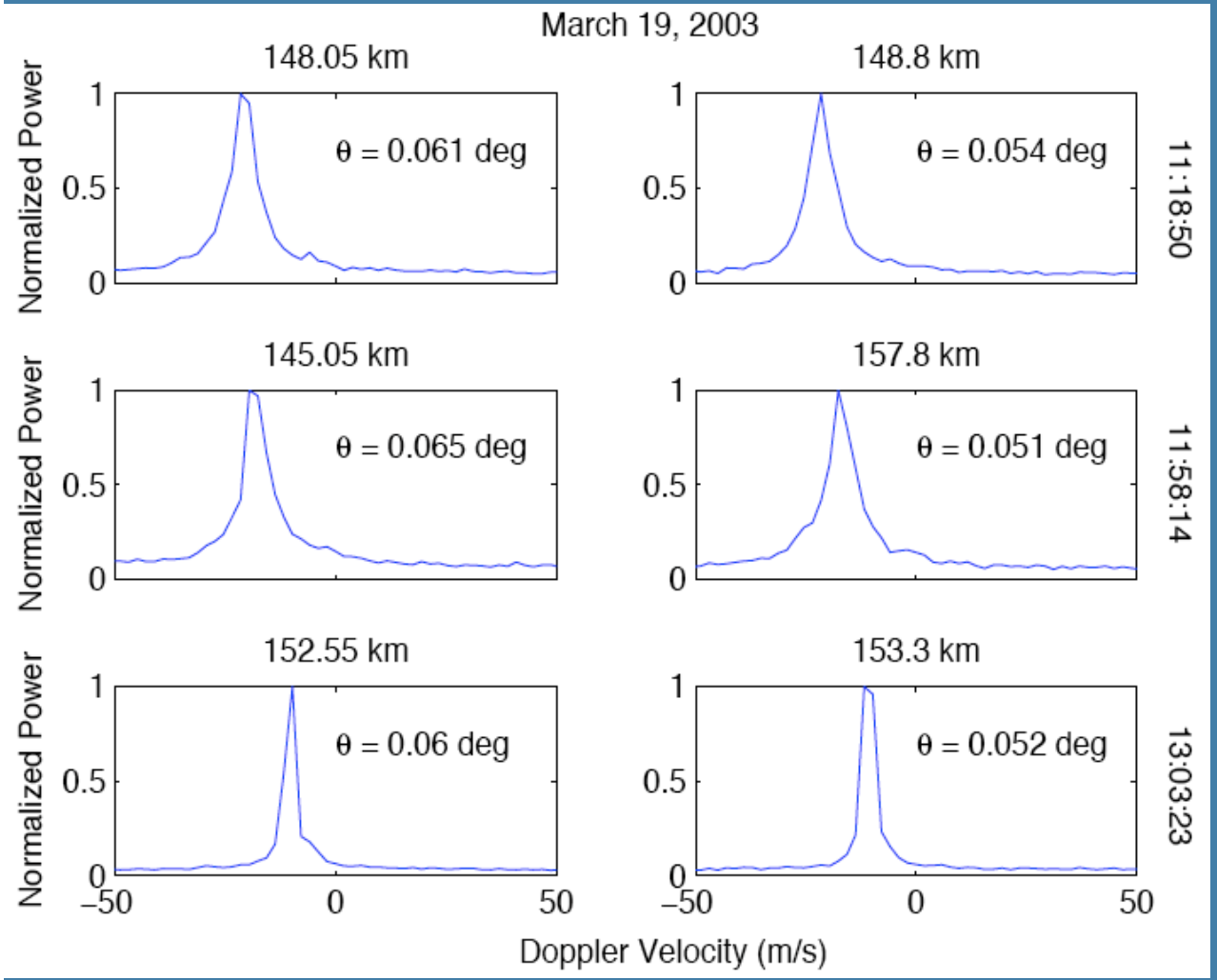




"We conclude that aspect widths of the 150-km echoes are smaller than those of the electrojet and that the central tendency of 0.05° presented above can be considered an upper bound of the aspect width of the 150-km echoes."

[from *Fawcett*, 1999, Ph.D. Thesis]

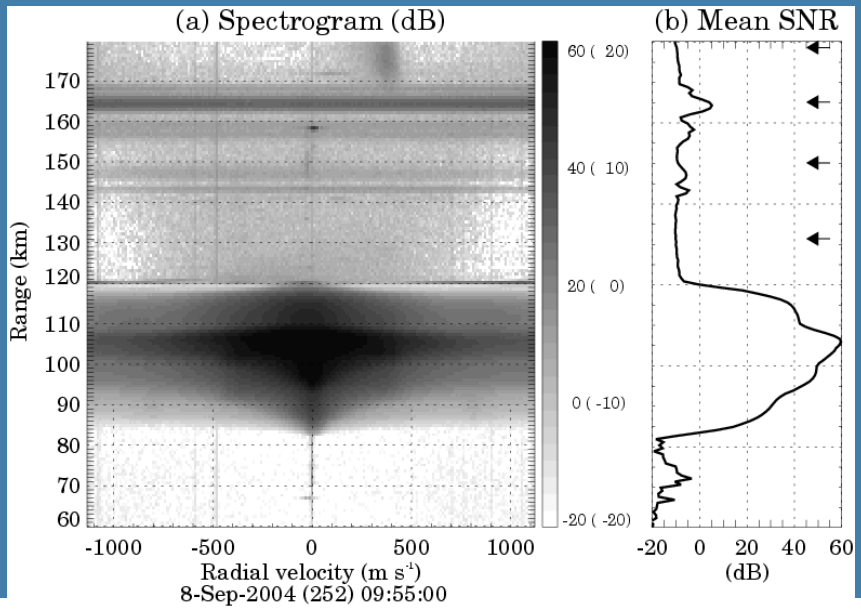
150-km Aspect Sensitivity (2)

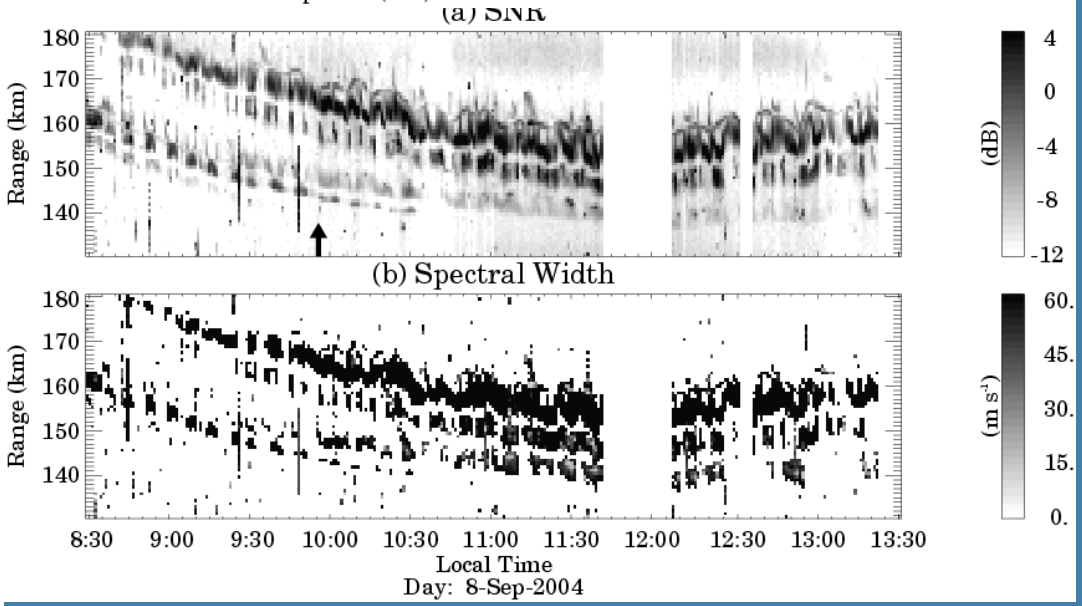


"Also for the first time, aspect sensitivity of 150 km echoes was studied. The aspect angles turn out to be between 0.05 – 0.06°."

[from *Lu*, 2005, Ph.D. Thesis]

Off-perpendicular to B 150-km echoes

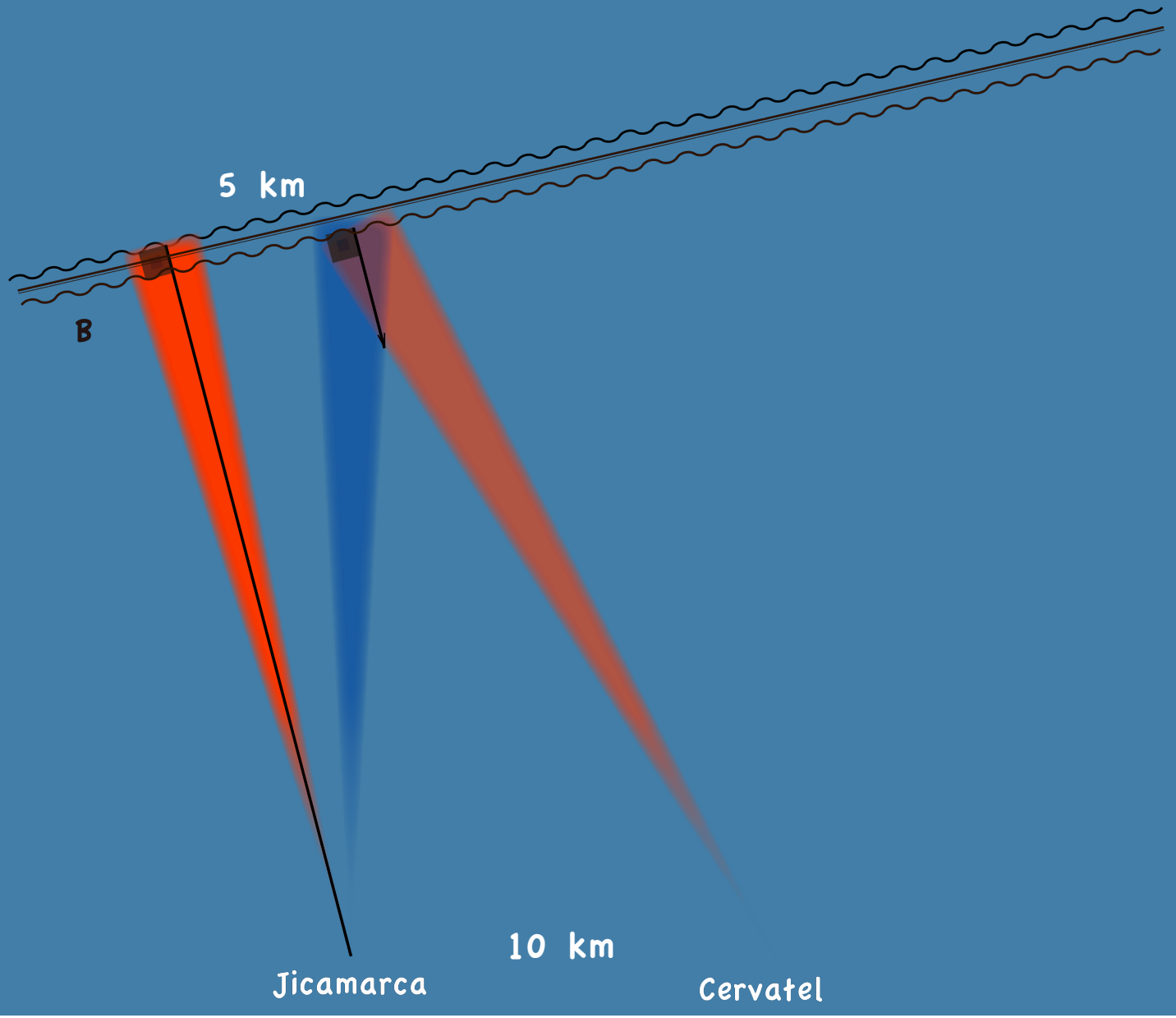




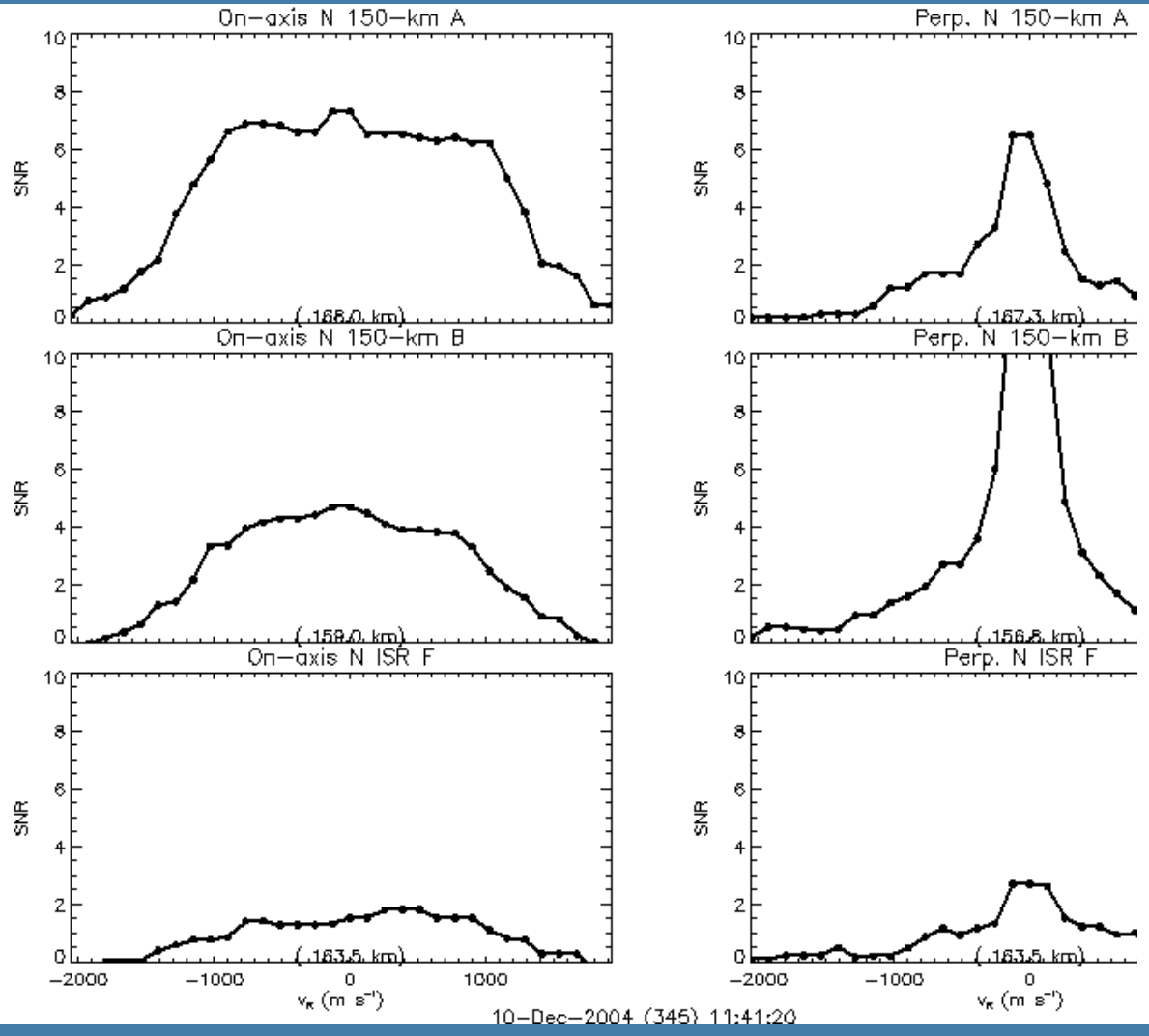
- Surprisingly, 150-km echoes are also observed at few degrees away from perpendicular to B (~1.8°) ("Oblique").
- Oblique echoes present similar altitude-time dependence to Perpendicular observations.
- Oblique 150-km echoes present unexpected wide spectra (spectra widths > 1000 m/s).
- Questions:
  - What is the actual spectrum shape?
  - What is the angular brightness of these irregularities?
  - Are these echoes due to density enhancements?

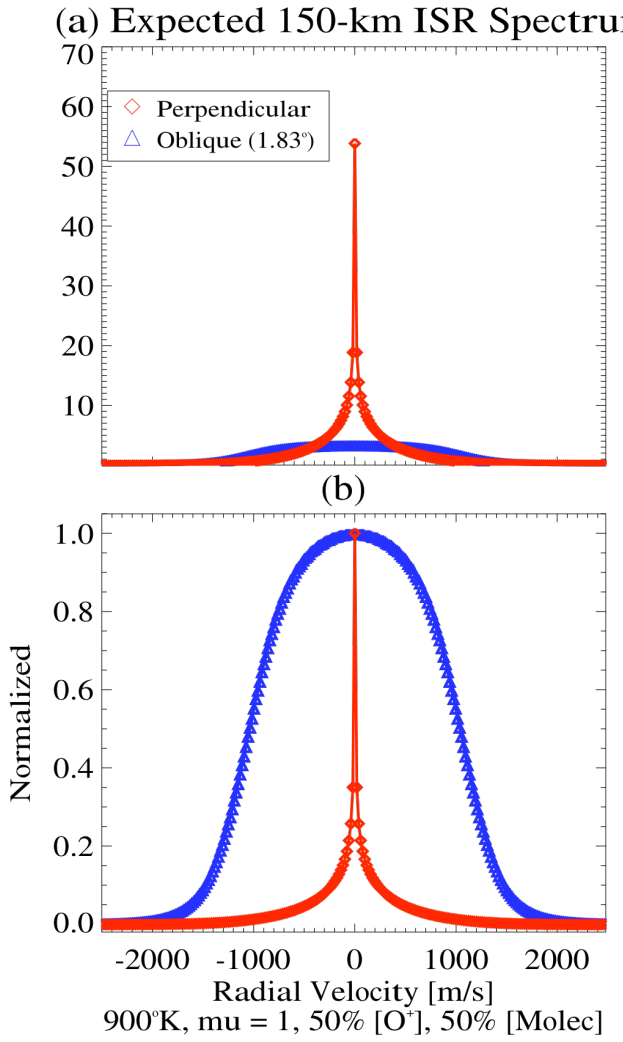
[from *Chau*, 2004]

150-km Experiments: Oblique vs. Perpendicular

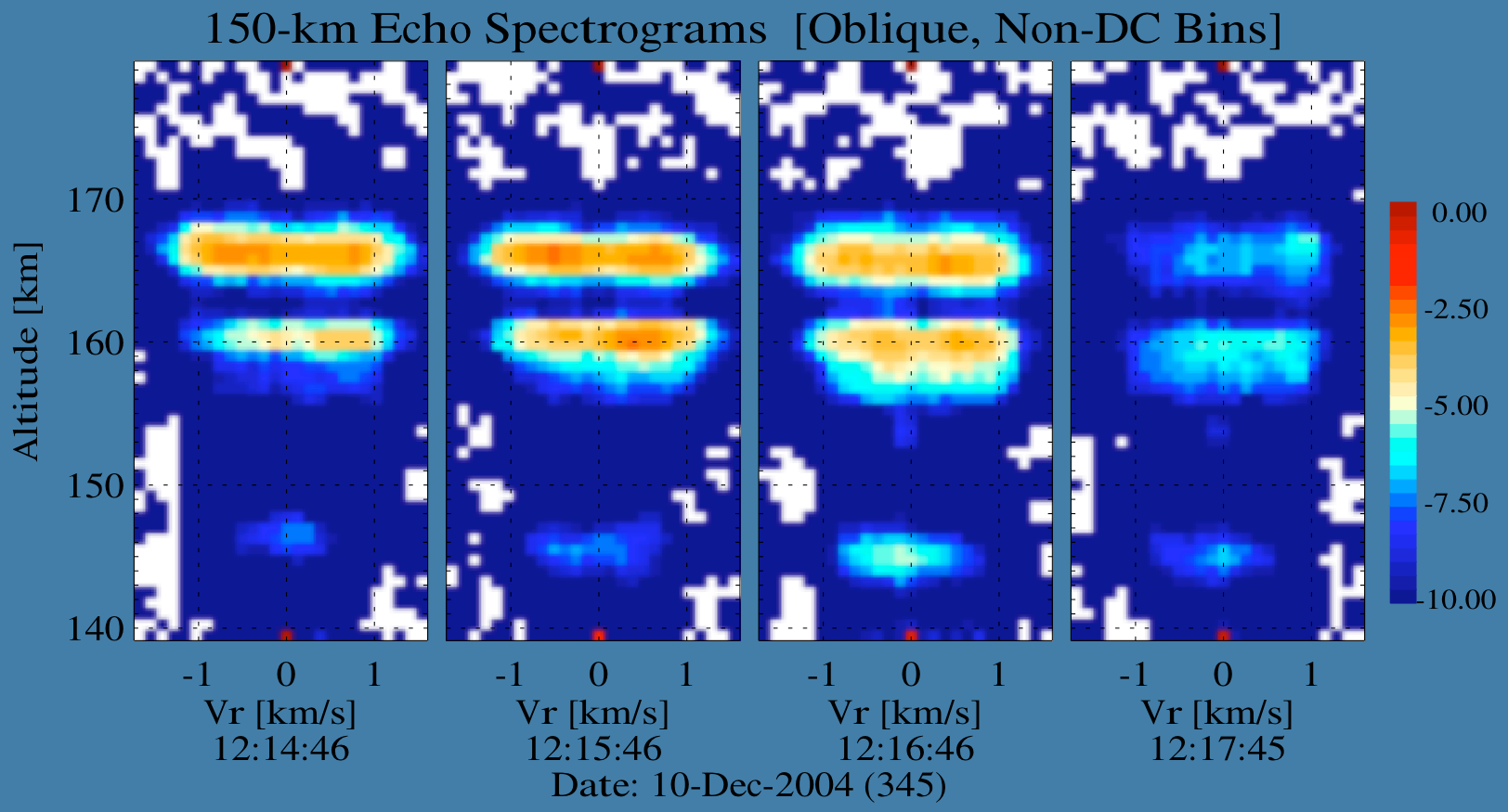


150-km Spectra: Oblique vs. Perpendicular

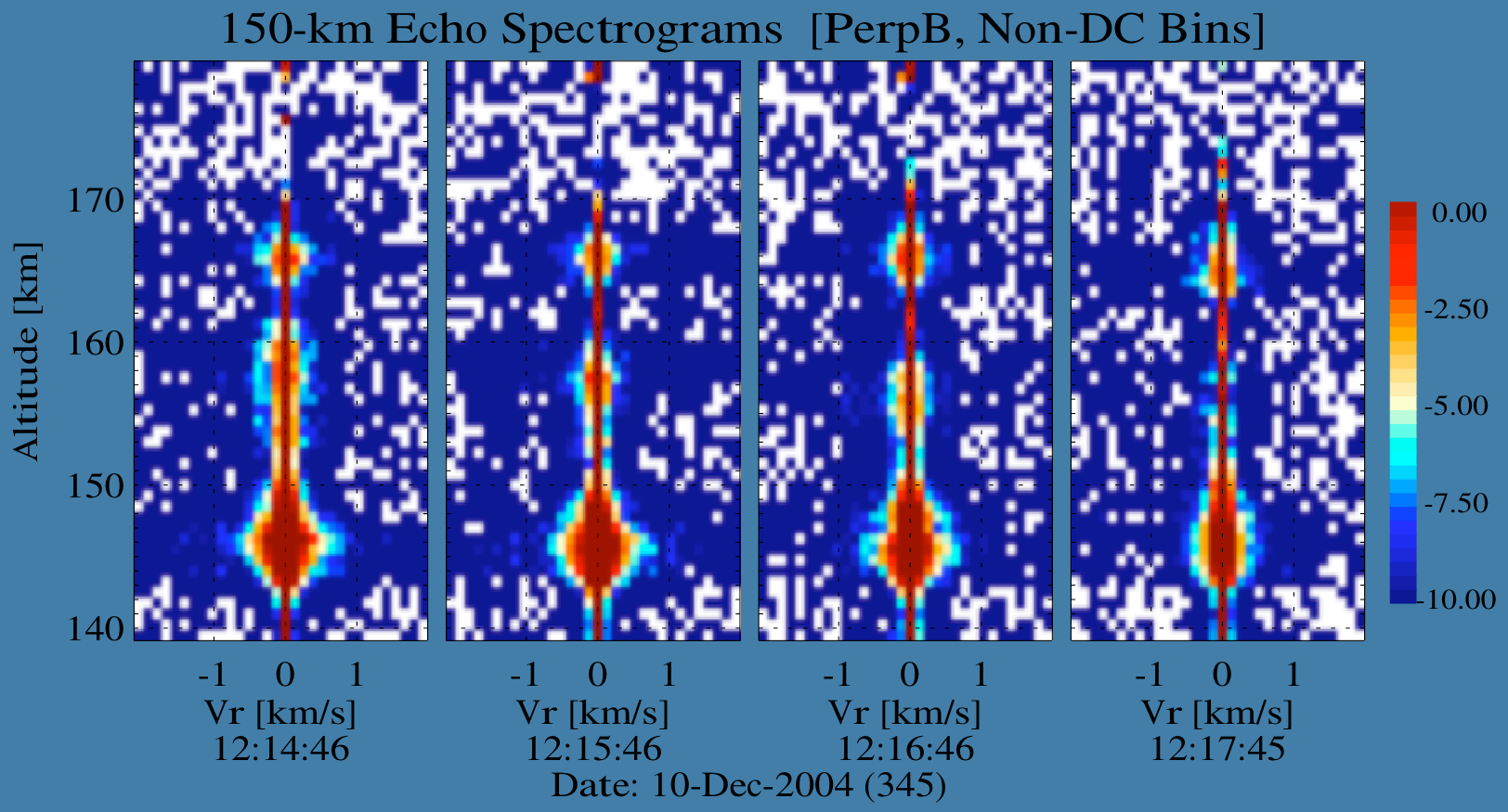




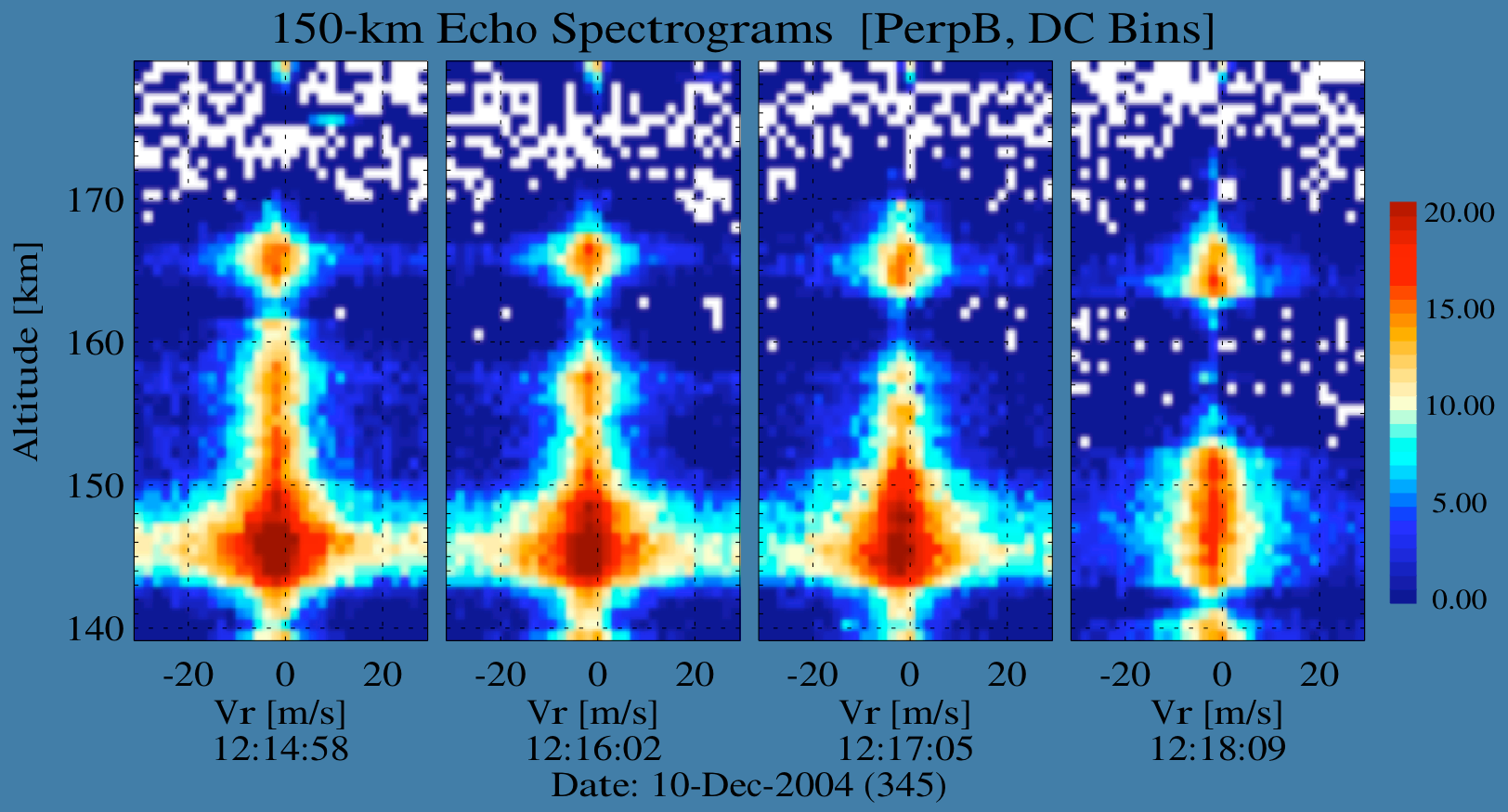
Two-beam: Oblique spectrogram



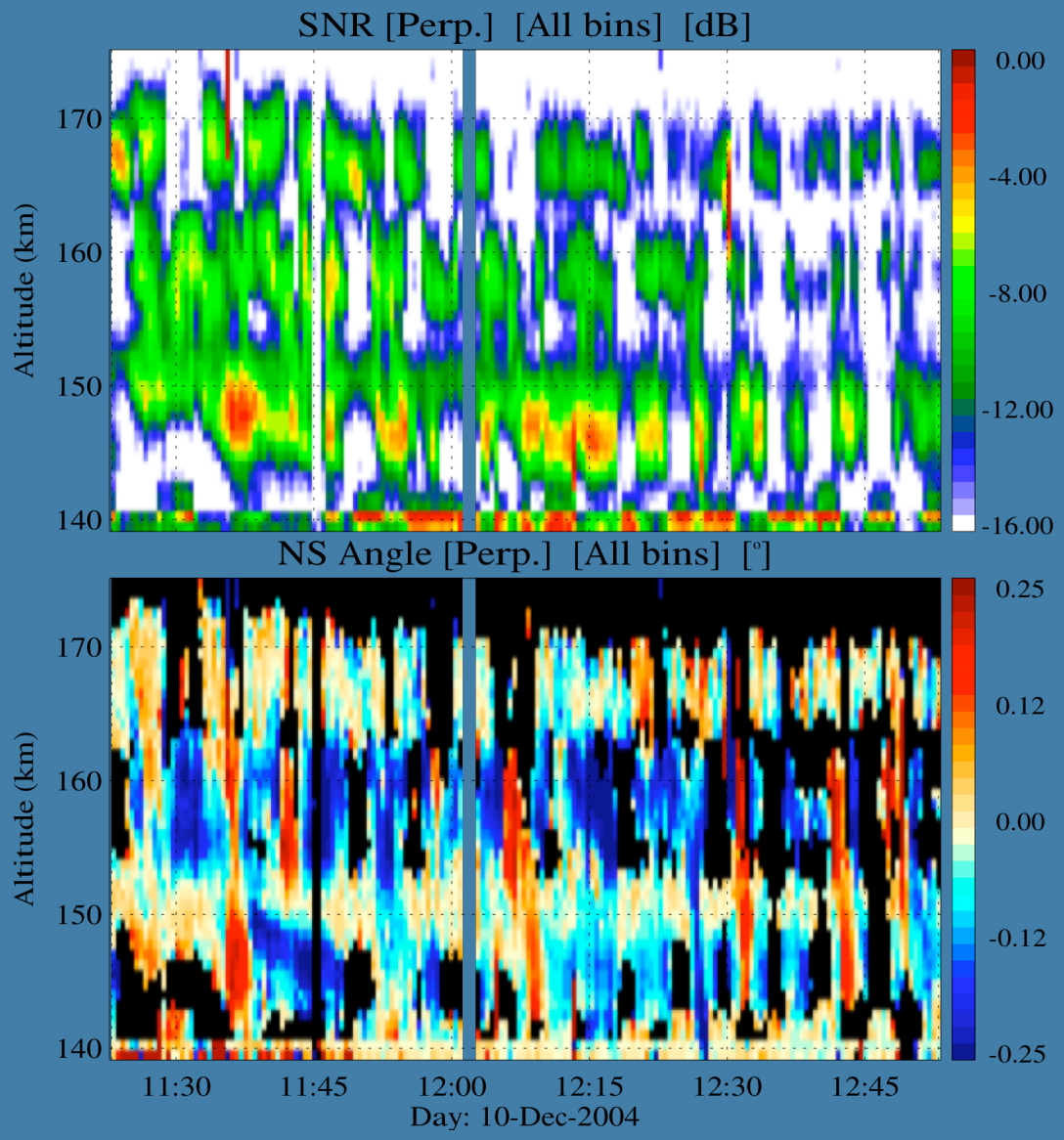
Two-beam: “Perpendicular” Spectrograms



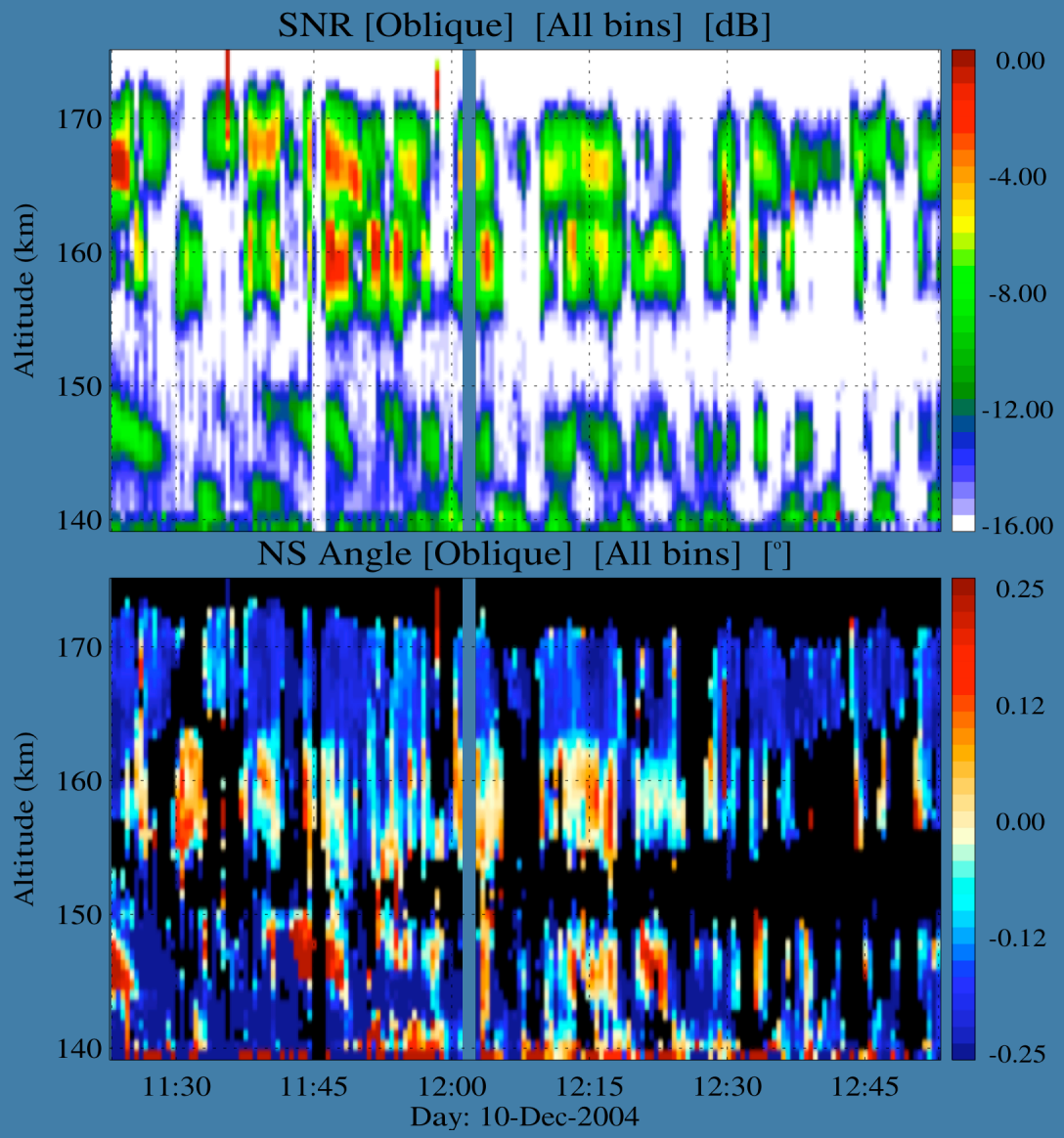
Two-beam: Perpendicular Spectrograms



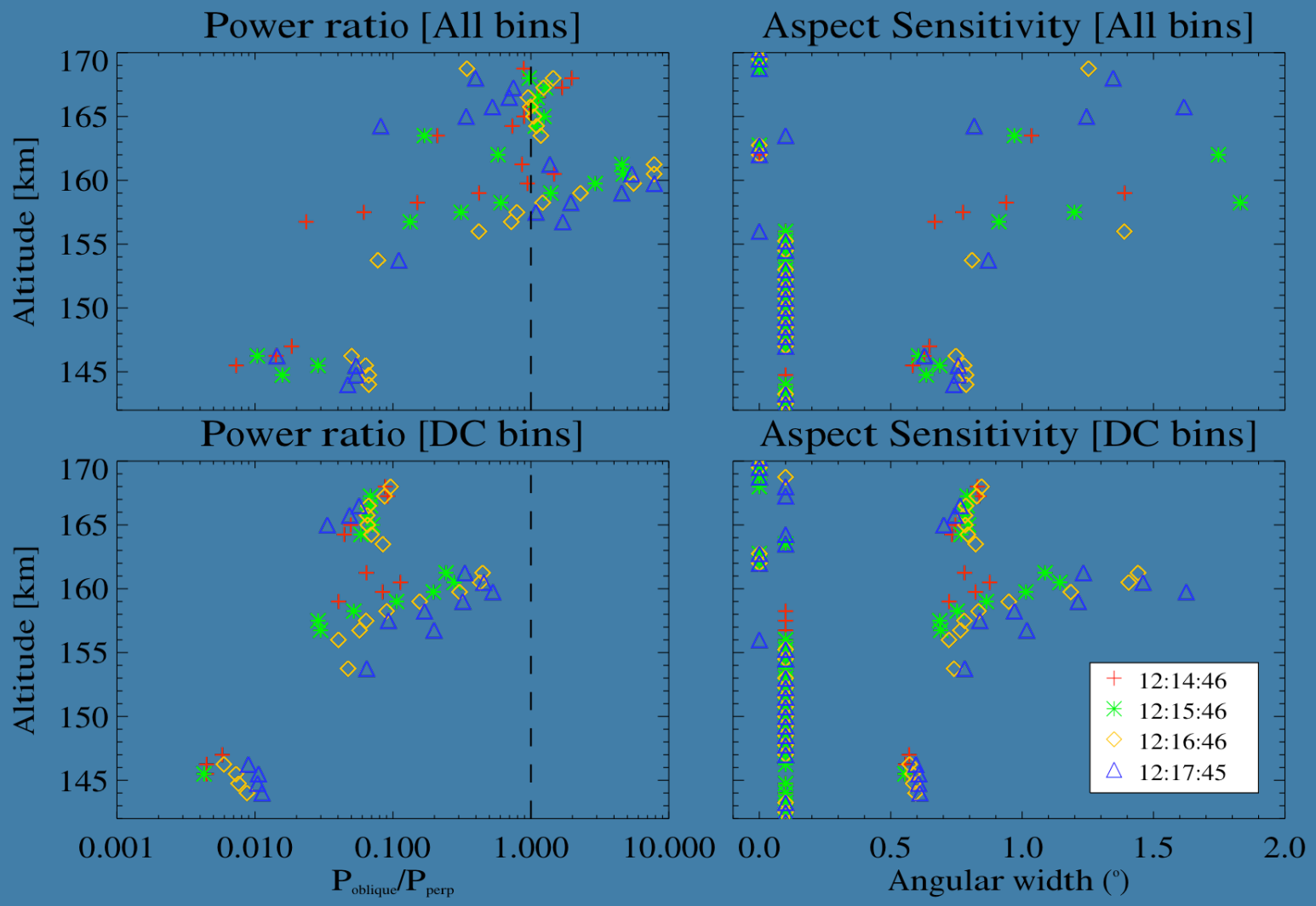
Two-beam: Perpendicular



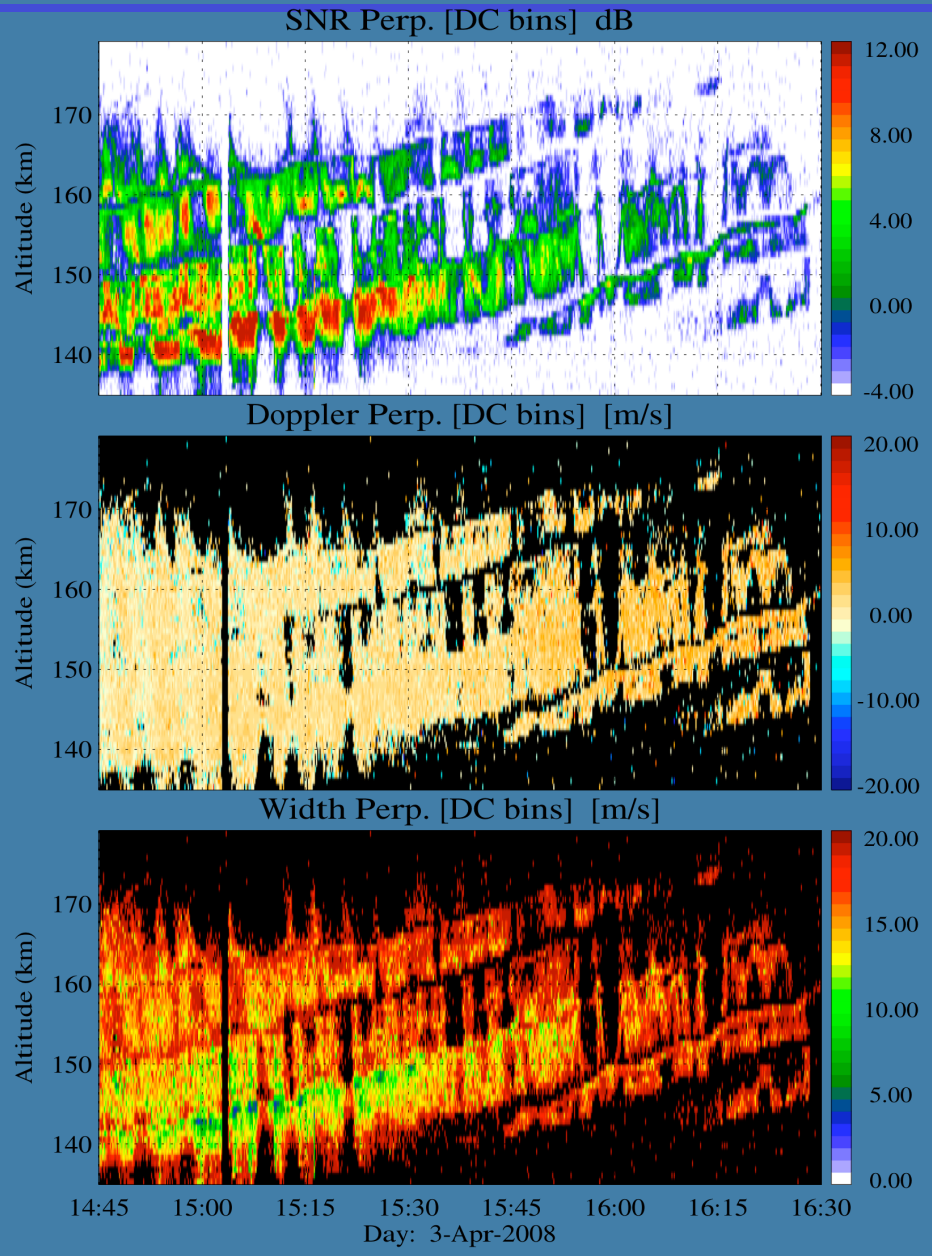
Two-beam: Oblique



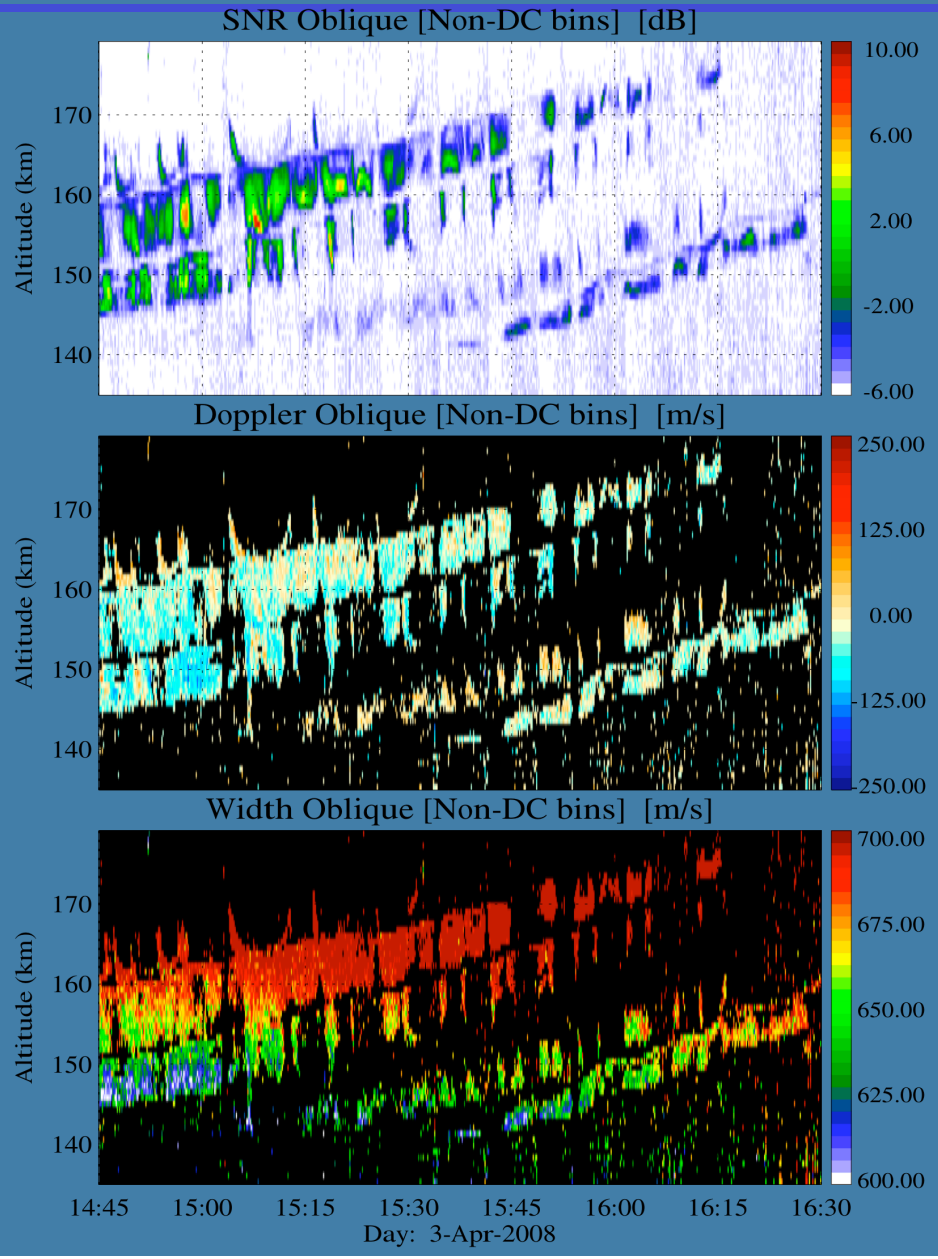
Two-beam: NS Aspect Sensitivity



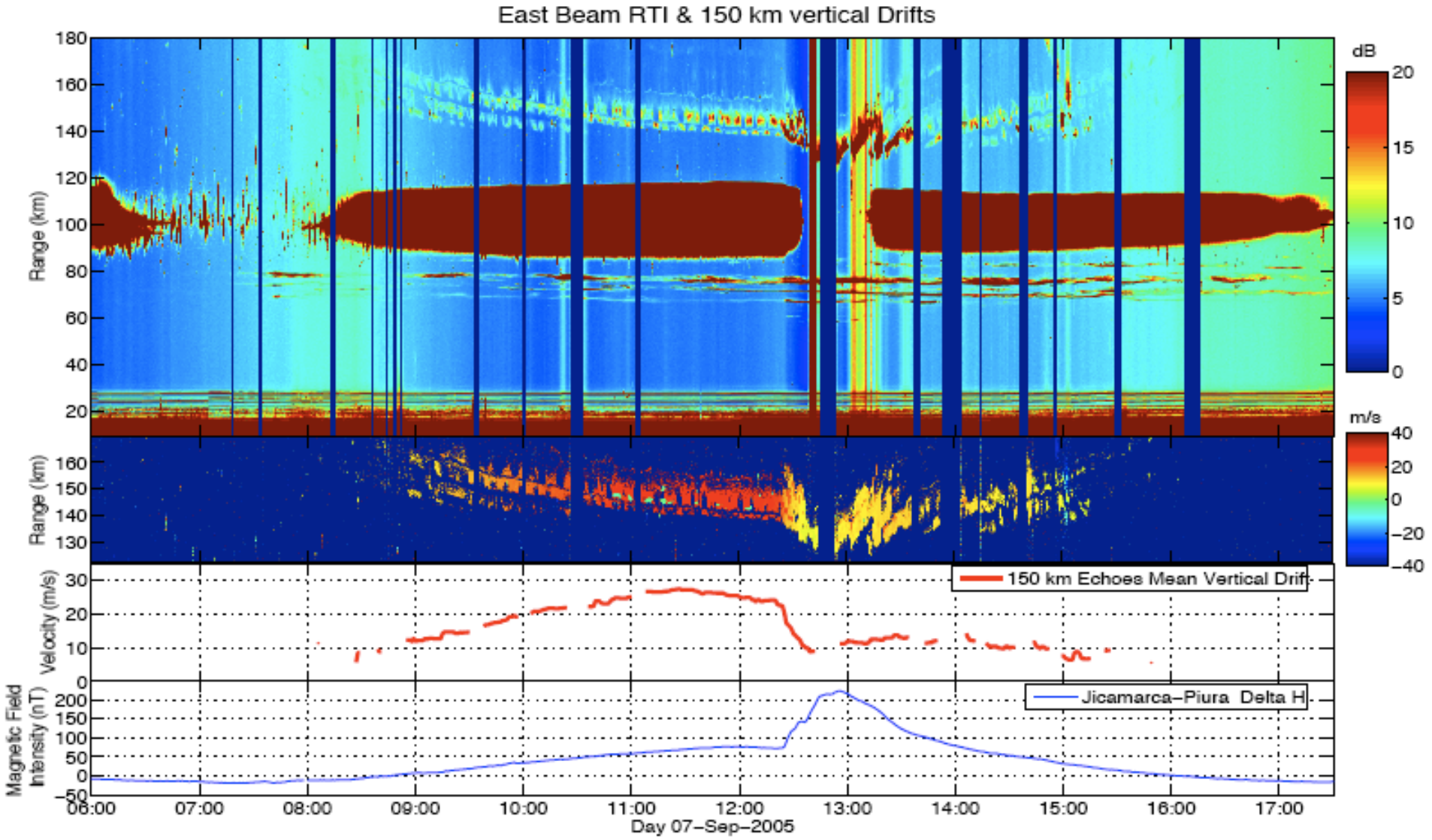
Bistatic: Perpendicular Parameters



Bistatic: Oblique Parameters



Equatorial Irregularities modified by Solar Flares



Solar flare 07-Sep-2005

[Courtesy of P. Reyes]

Summary

- Not all 150-km echoes come from field-aligned irregularities.
- NS Aspect sensitivity is usually larger than 0.5 degrees.
- In some layers, the echoes are stronger away from perpendicular to B.
- Oblique echoes are very wide (ion acoustic velocities).
- What causes the enhancements on 150-km echoes?