

Wind, Radar and Rainbows

Group 2 ISR results

Date: 7/22/2011

We imagined a simple measurement



interstellartlight.smugmug.com

But we learned
nothing is simple.

Methods

SONDRESTROM

Option 2

- alternating code
 - 3 km range resolution
 - Ne, Te, Ti, Vi
- long pulse
 - 50 km range resolution
- barker code
 - 600 m range resolution
 - Ne from power only
 - pulse-to-pulse spectra

EISCAT

Common Program 2

- 3-4 position scan
- tides
- time resolution: 3-6 minutes
- moderate range resolution 3 km
- Height profiles Ne, Te, Ti, Vi
- E+F region 90-150 km

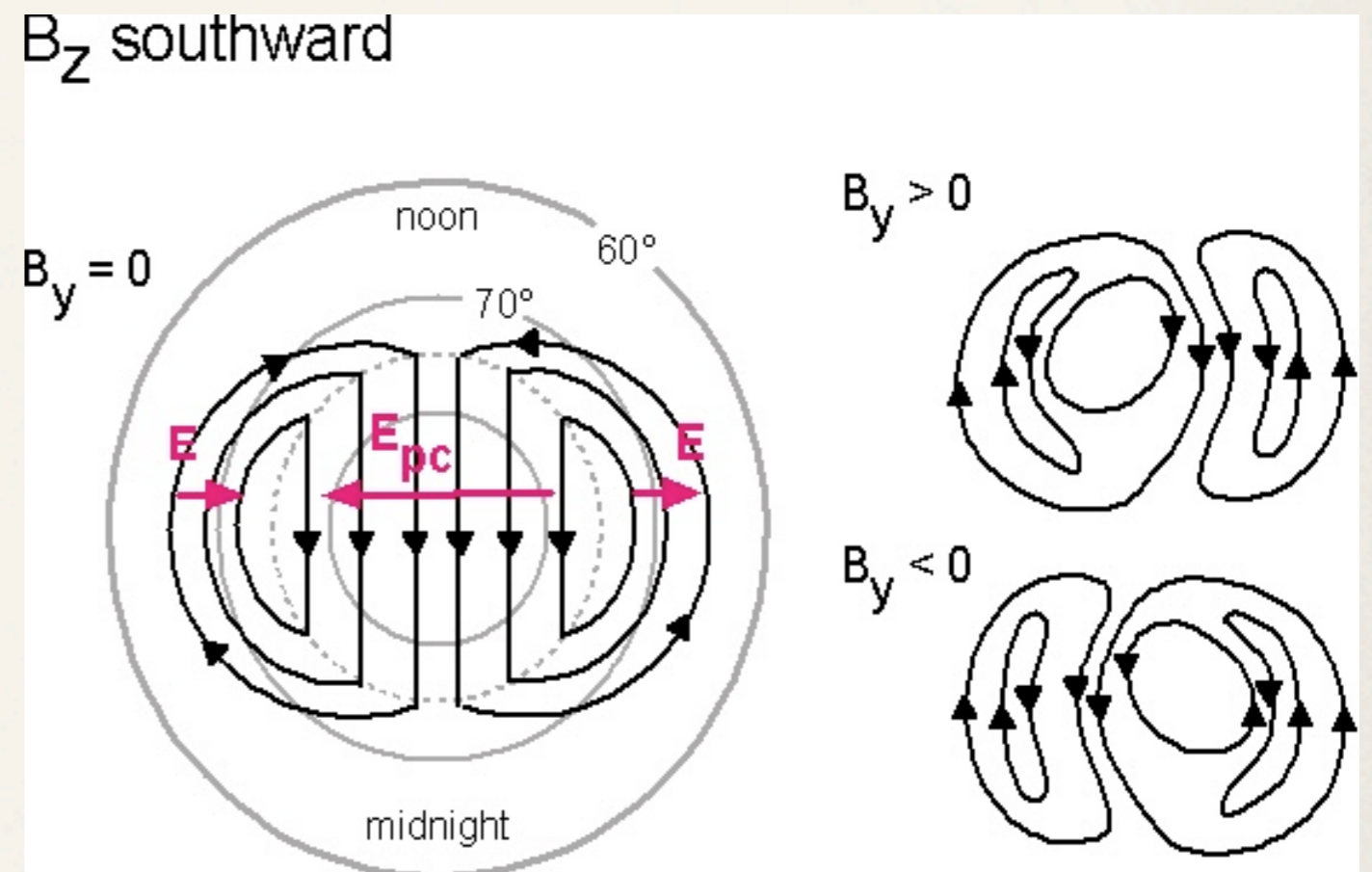
Beata:

- radar UHF
- pulses 32x20 AC
- sampling 10 μ s
- resolution 1.5-3 km
- range 46-694 km
- plasma line 1x3x2.5 MHz
- time resolution 5s

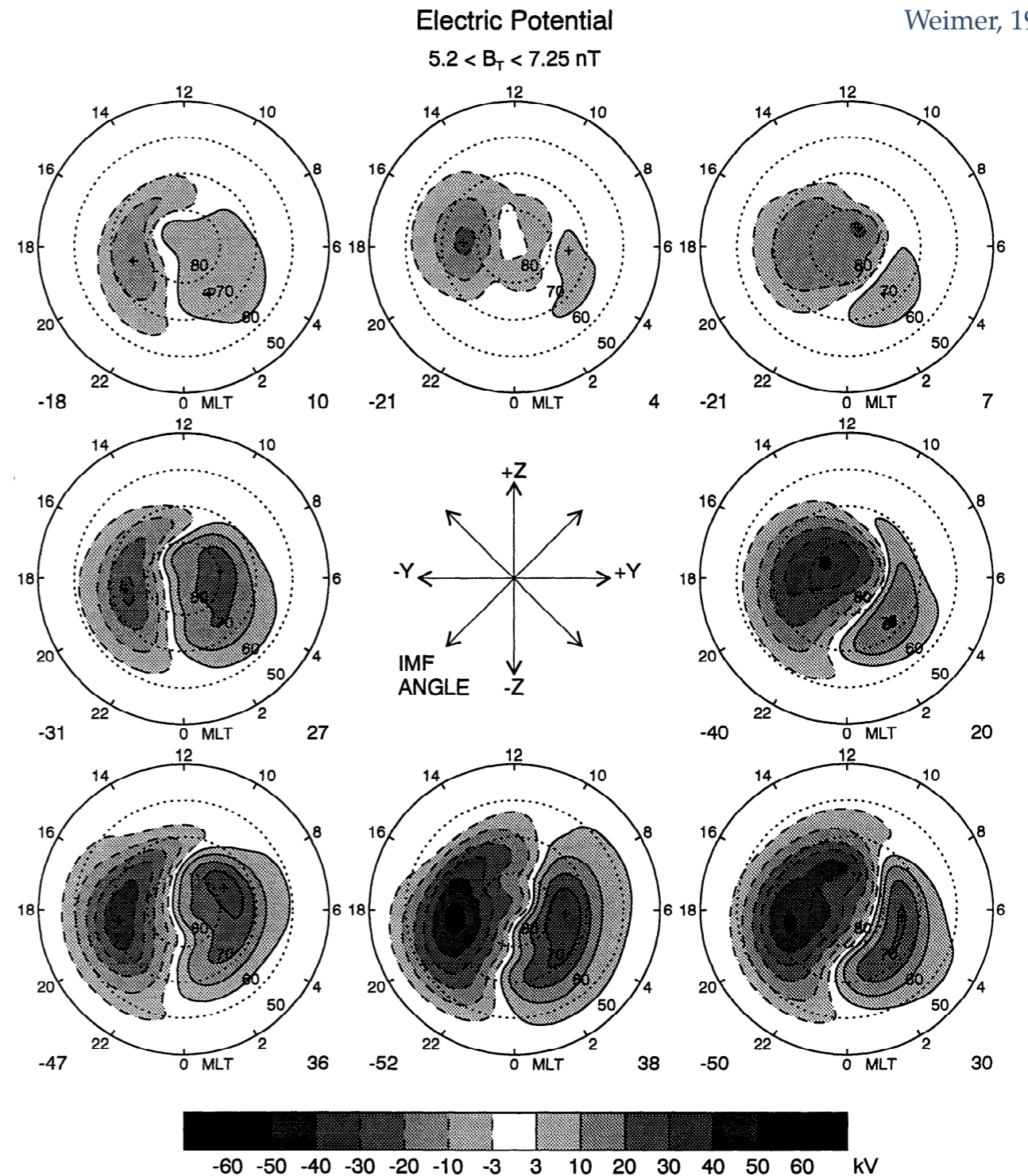
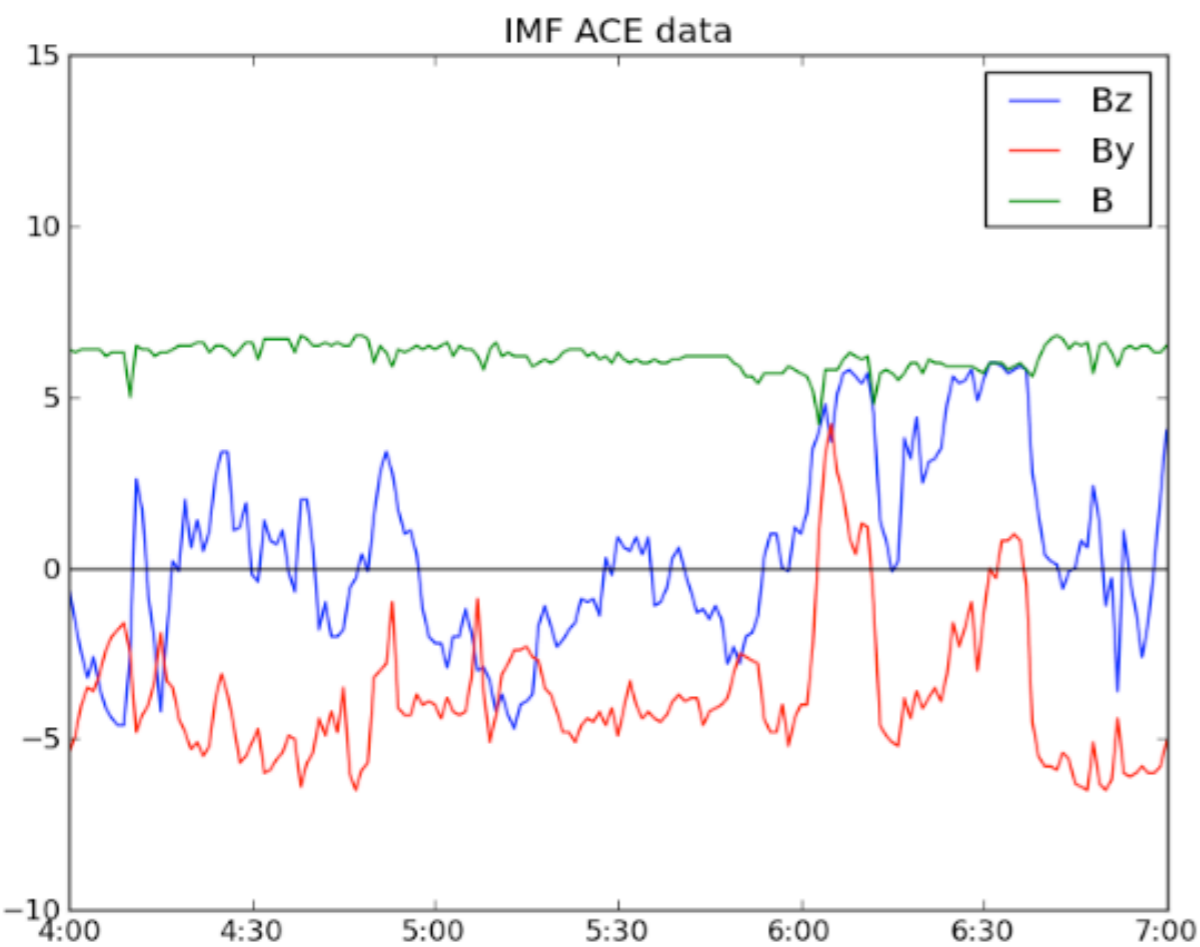
Results

Solar Wind data and convection

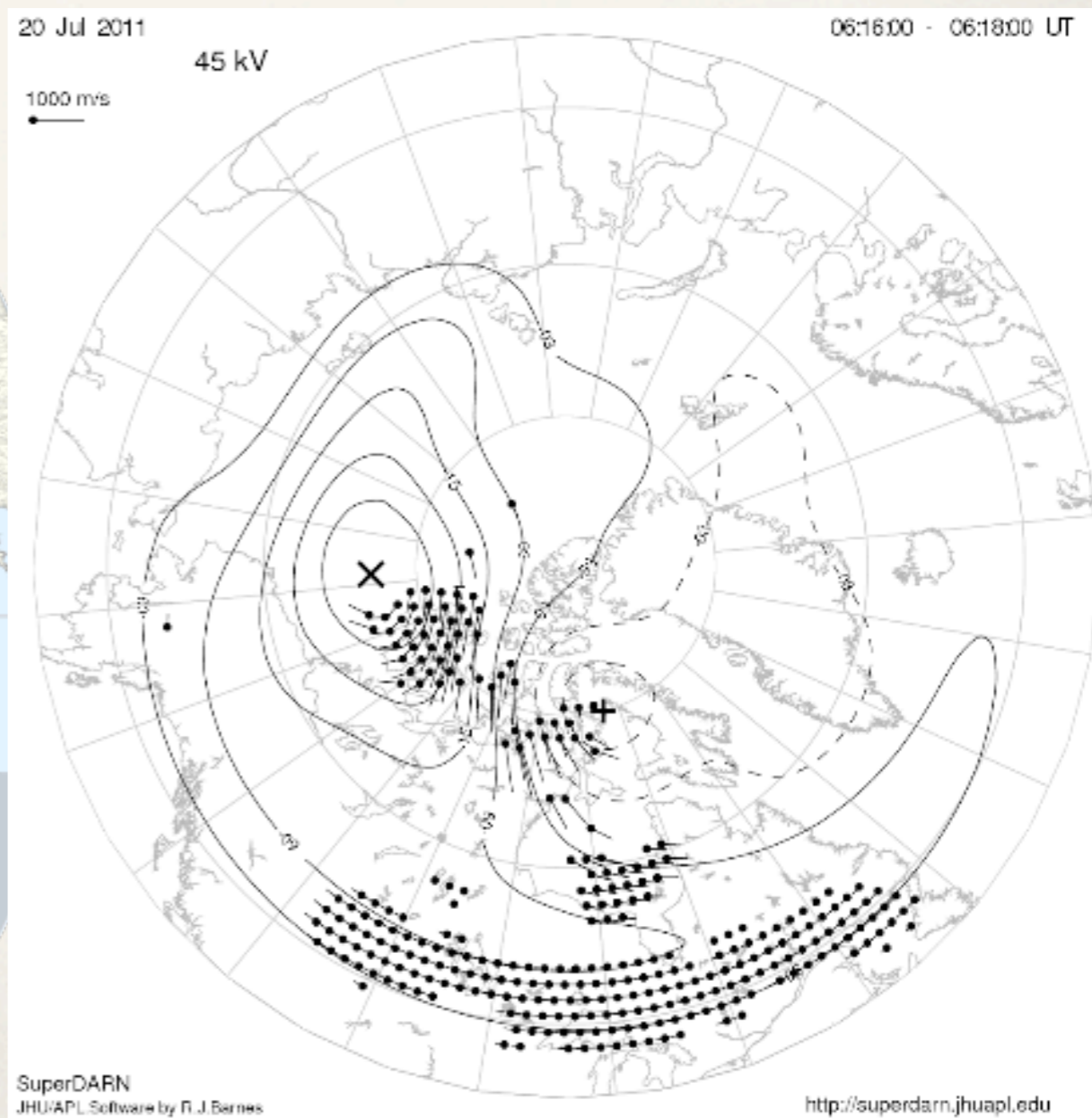
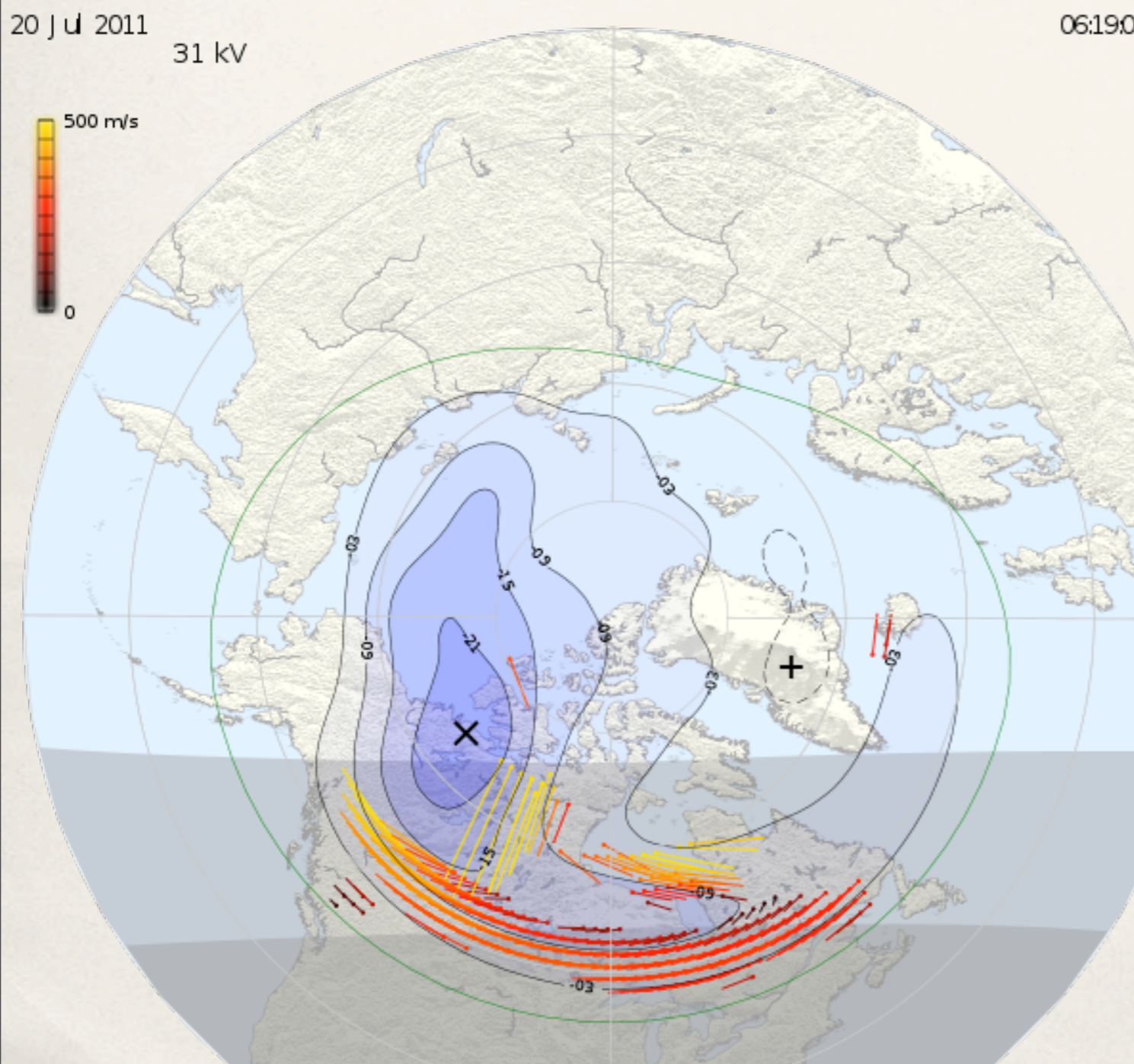
- E-fields maps to the ionosphere causing $E \times B$ drift (convection)
- Two cell convection pattern
- Antisunward with sunward return flow
- ACE: Variable B_z , negative B_y



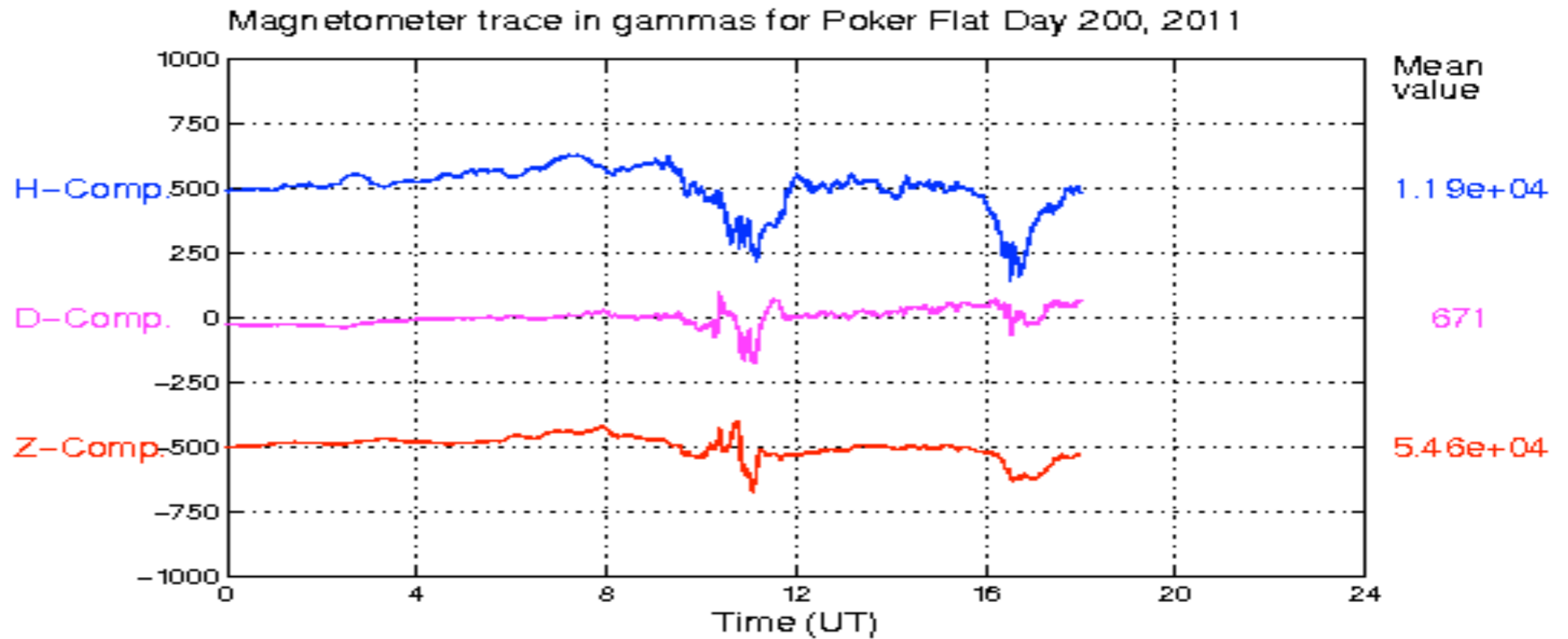
ACE Spacecraft Data



SuperDARN Convection Pattern at $\sim 300\text{km}$

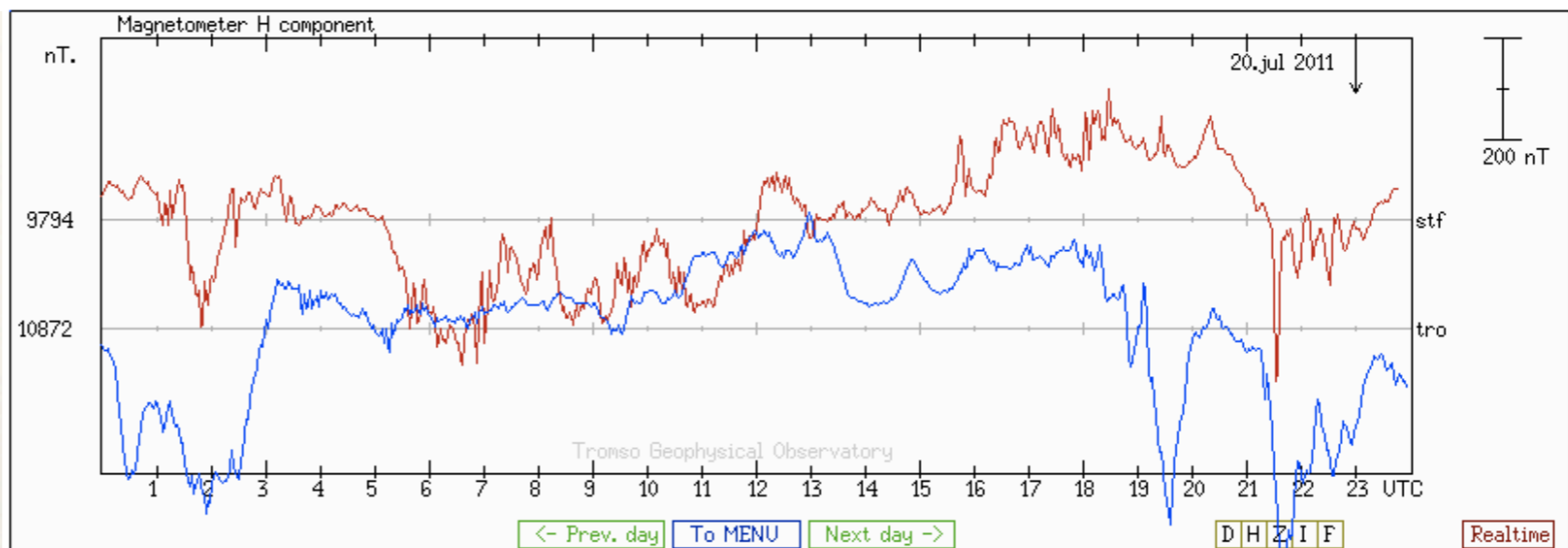


Magnetometers

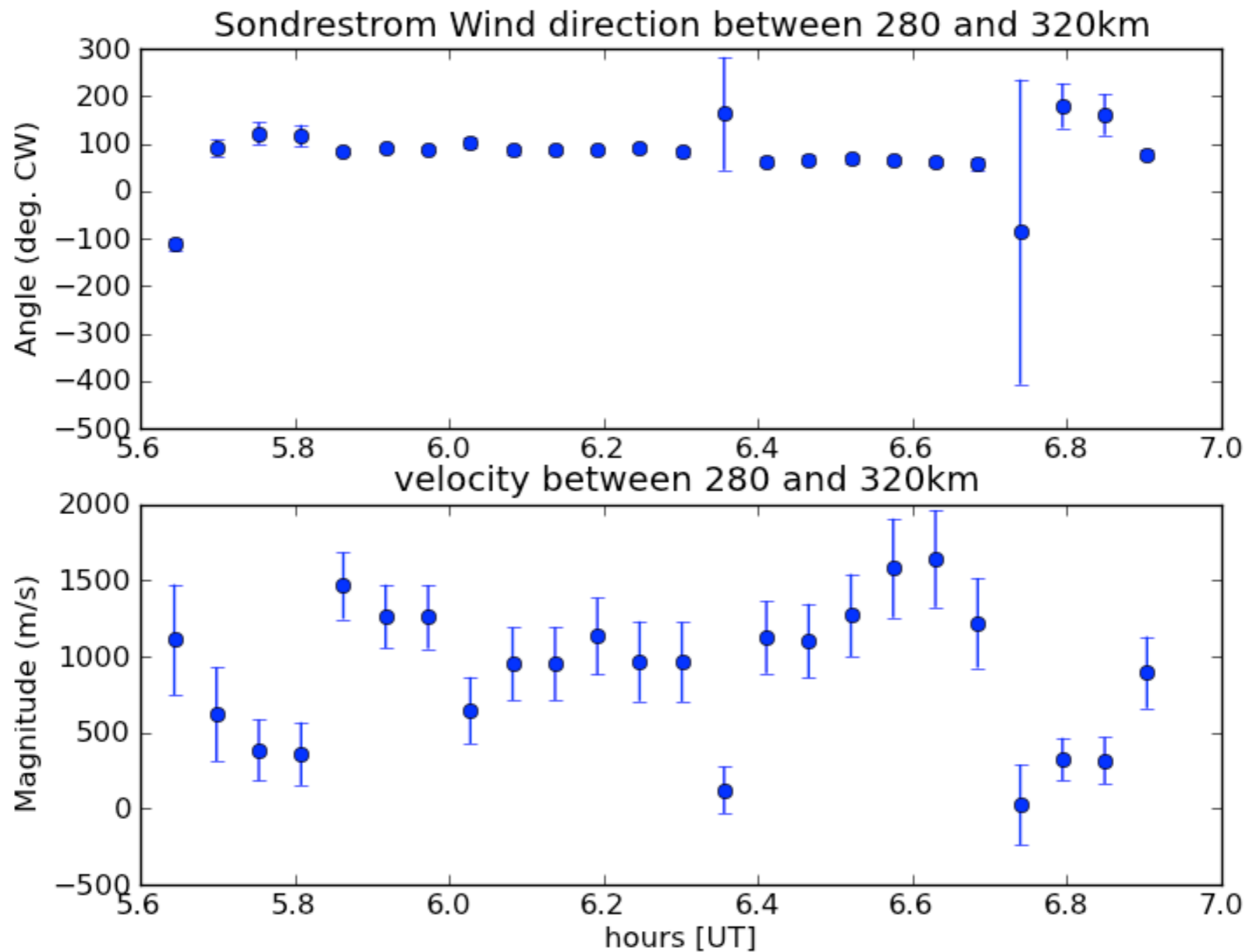


Poker Flat

Sondrestrom (Red)
Tromsø (Blue)



Wind at SuperDARN altitude



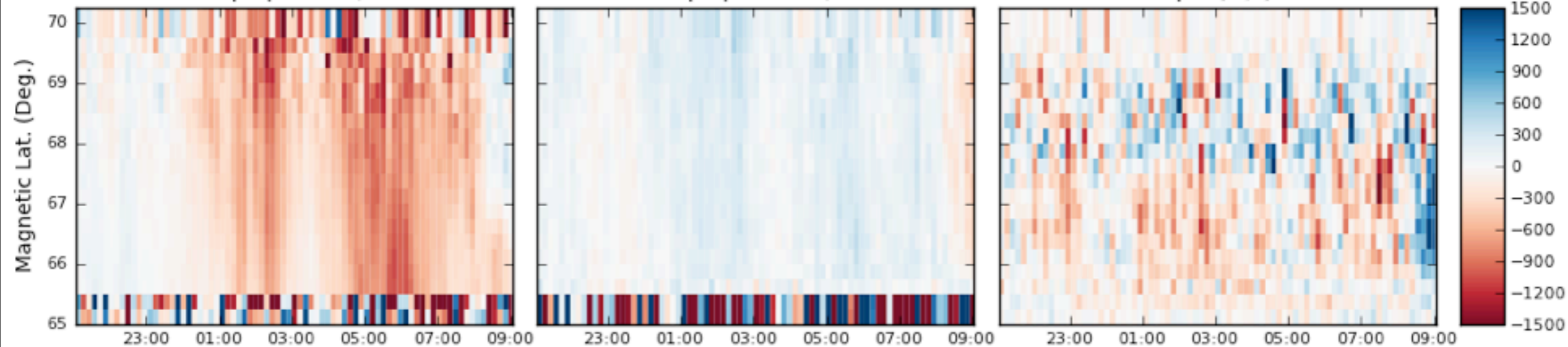
Poker Flat Summary

Vector Velocities 7-19-2011

V perp east m/s

V perp north m/s

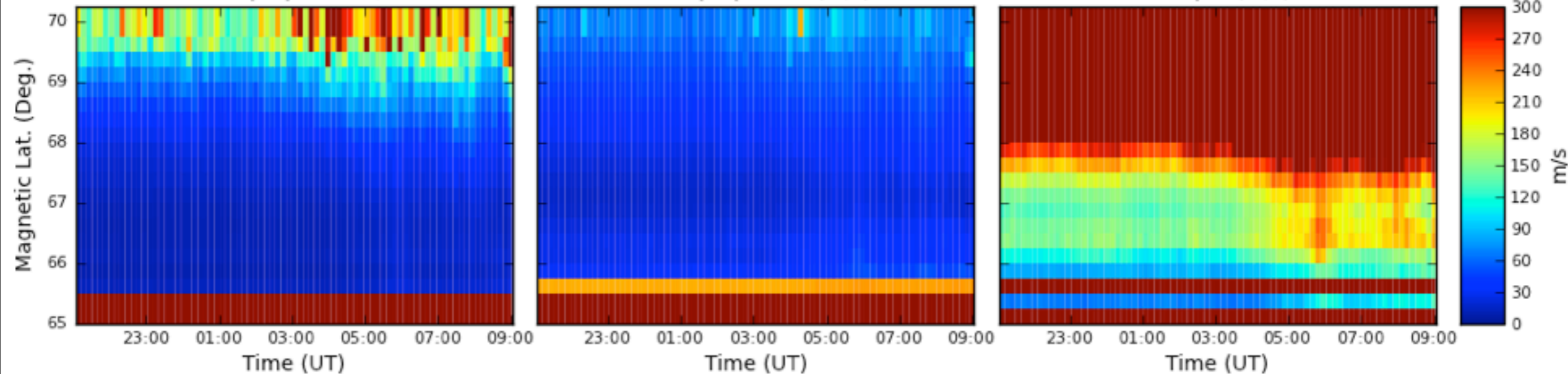
V anti par (m/s) x 10



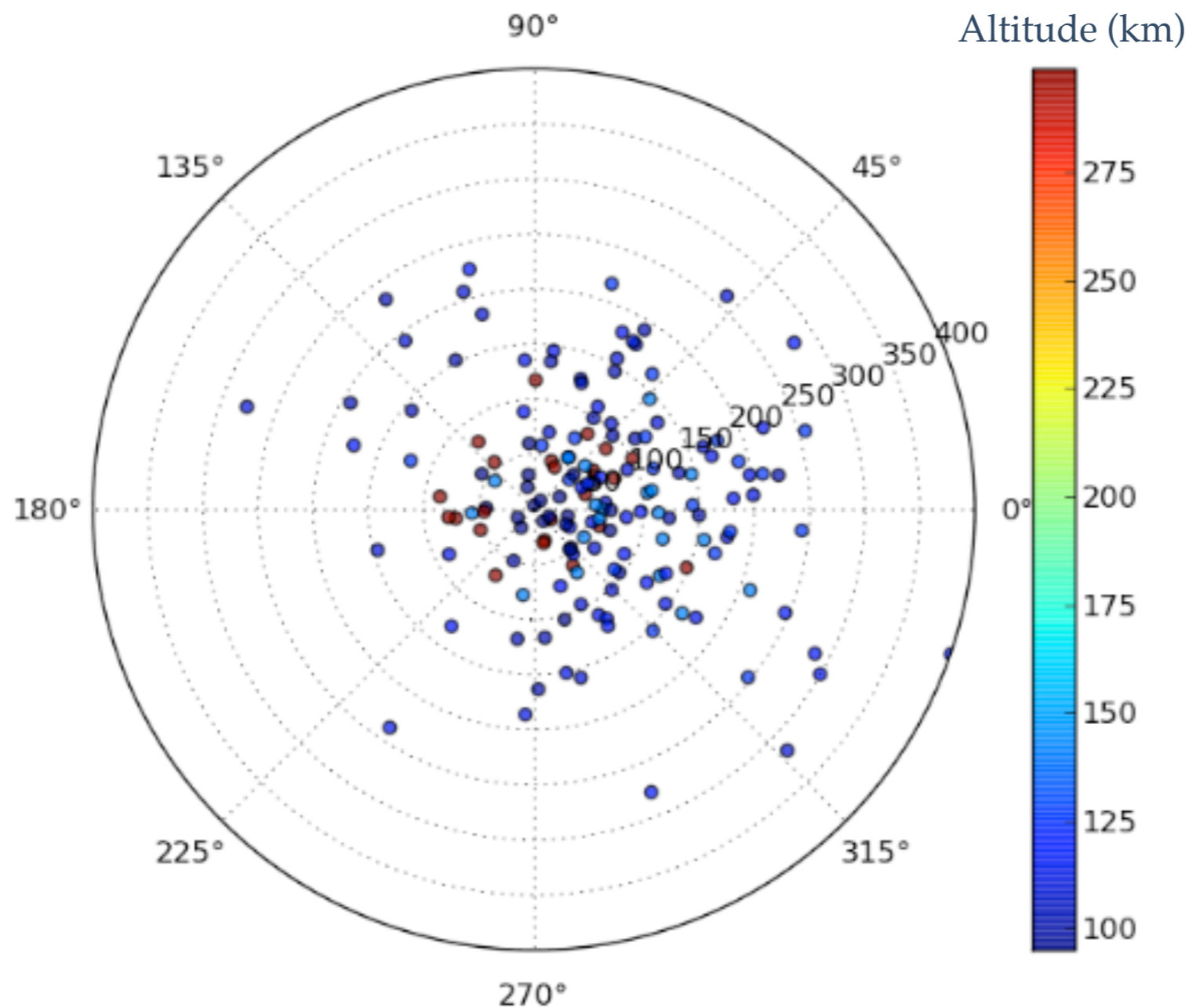
err V perp east m/s

err V perp north (m/s)

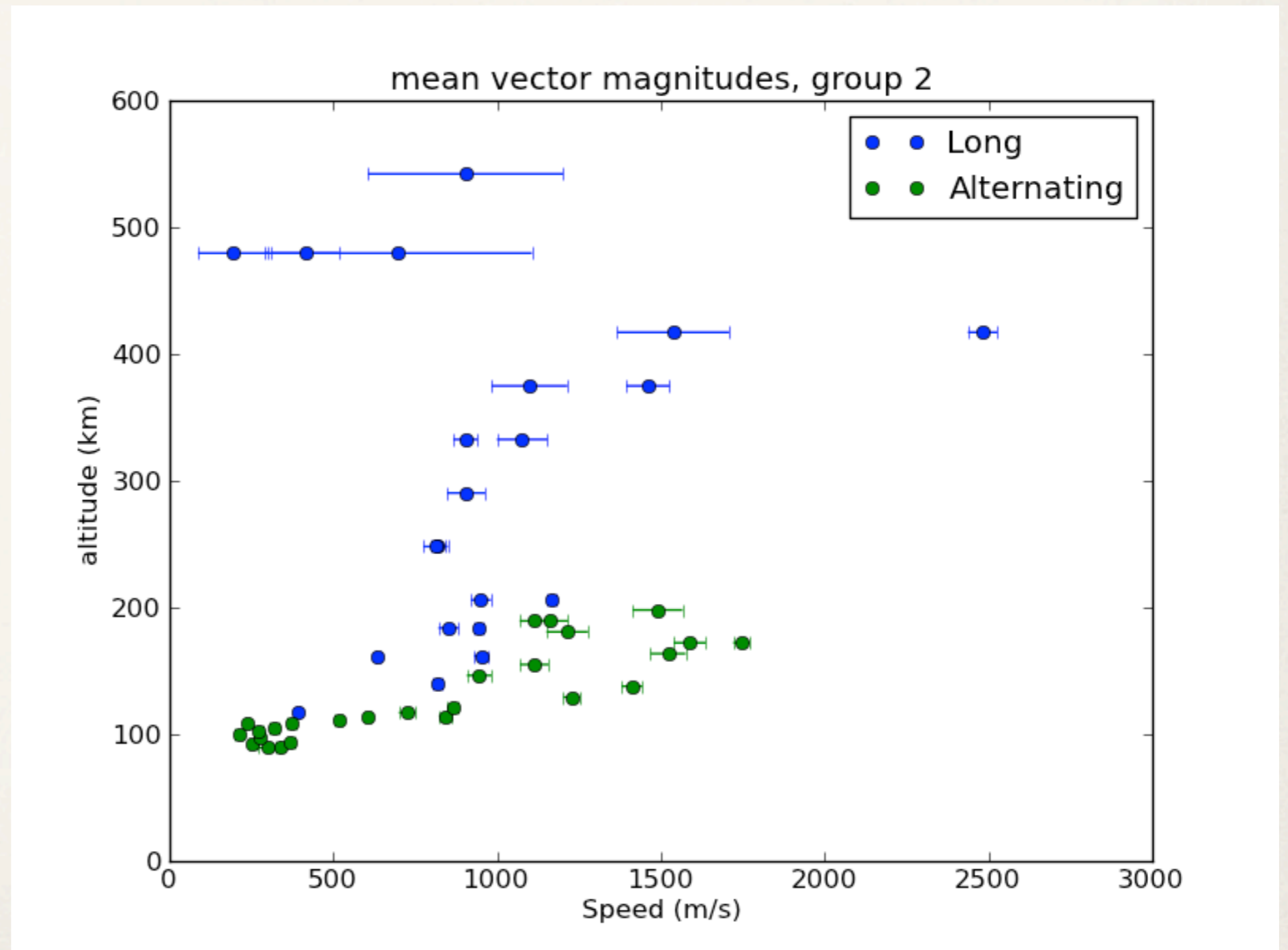
err V anti par (m/s) x 10



Simultaneous EISCAT CP2 Velocity Measurements

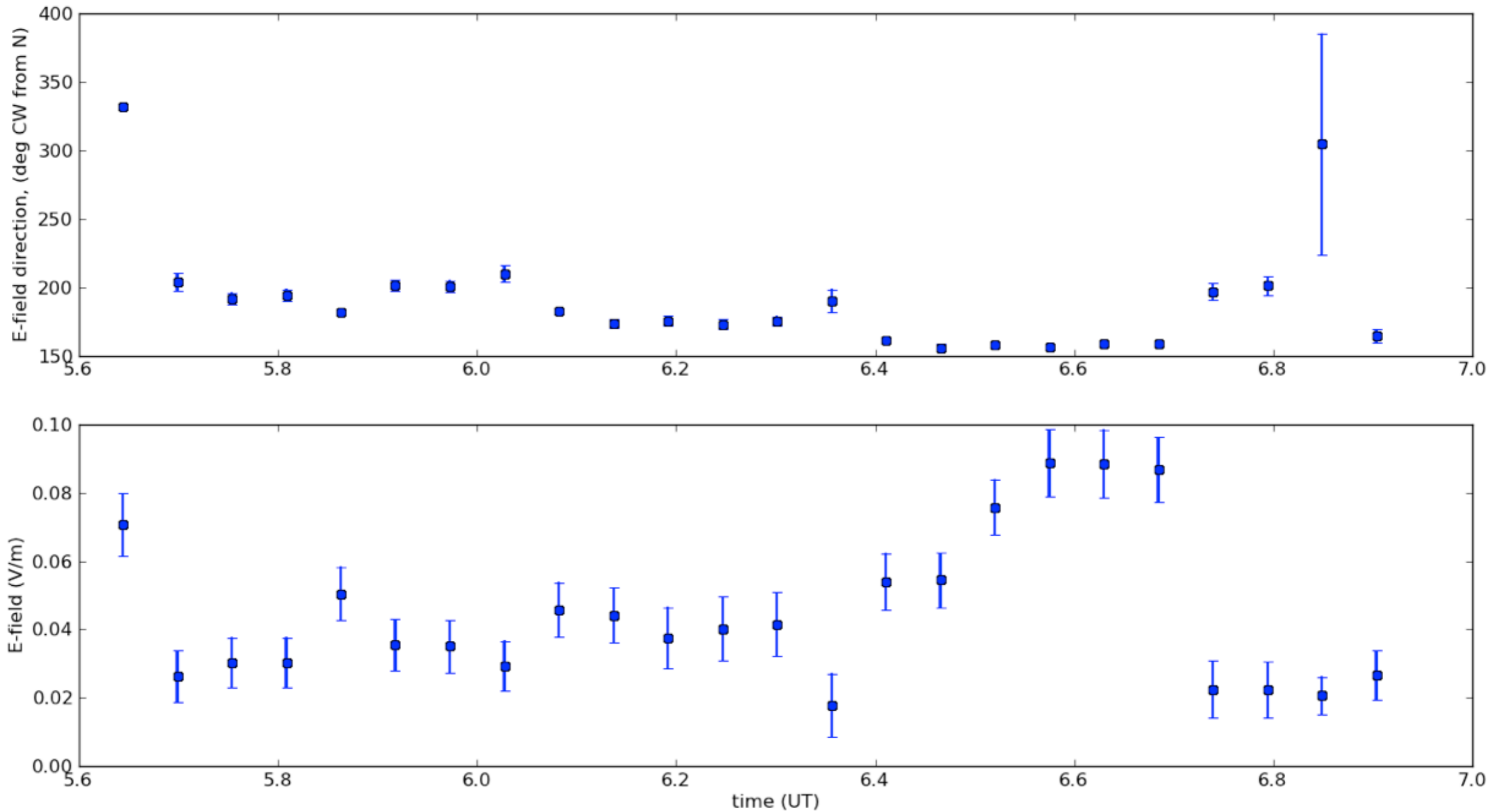


Mean Vector Magnitudes: Long Pulse vs. Alternating Code

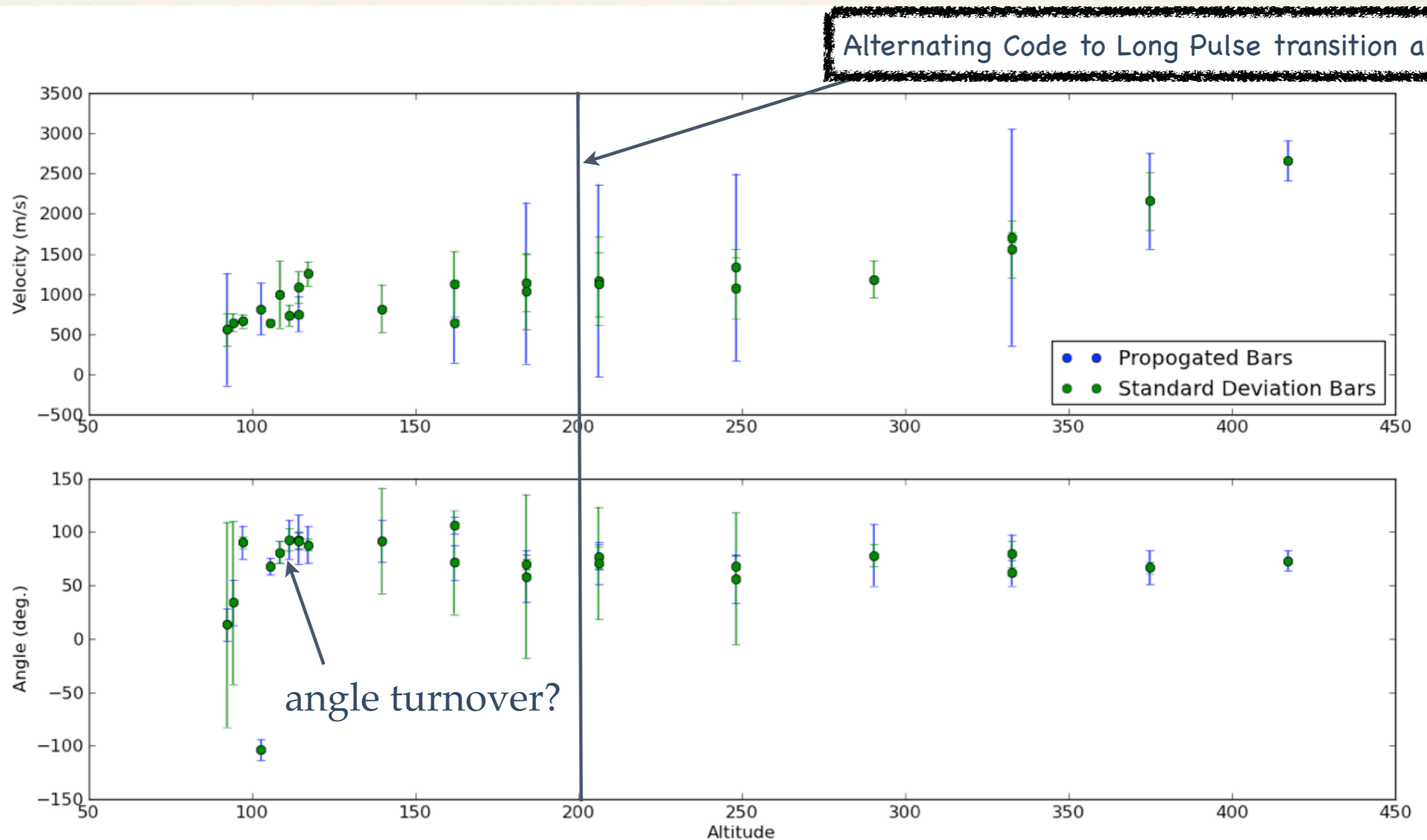


Does Alternating
show real
structure?

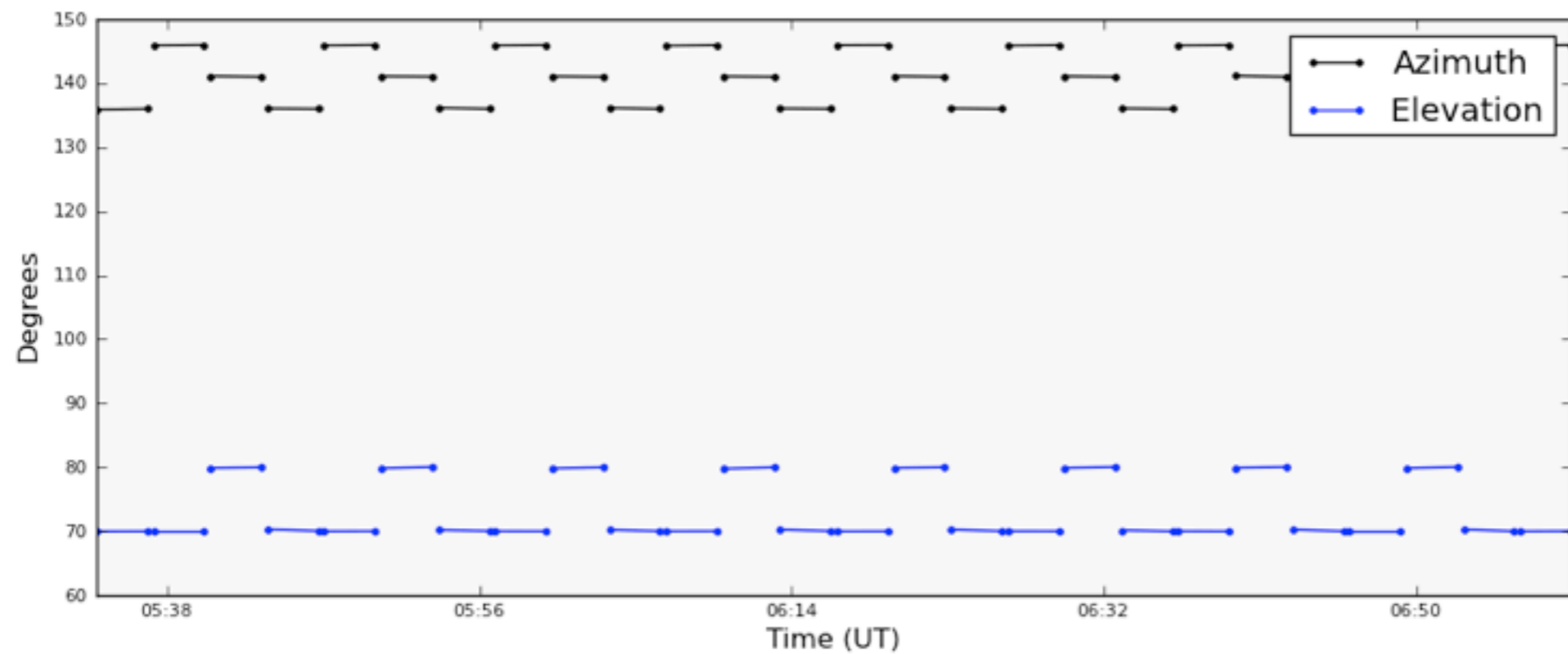
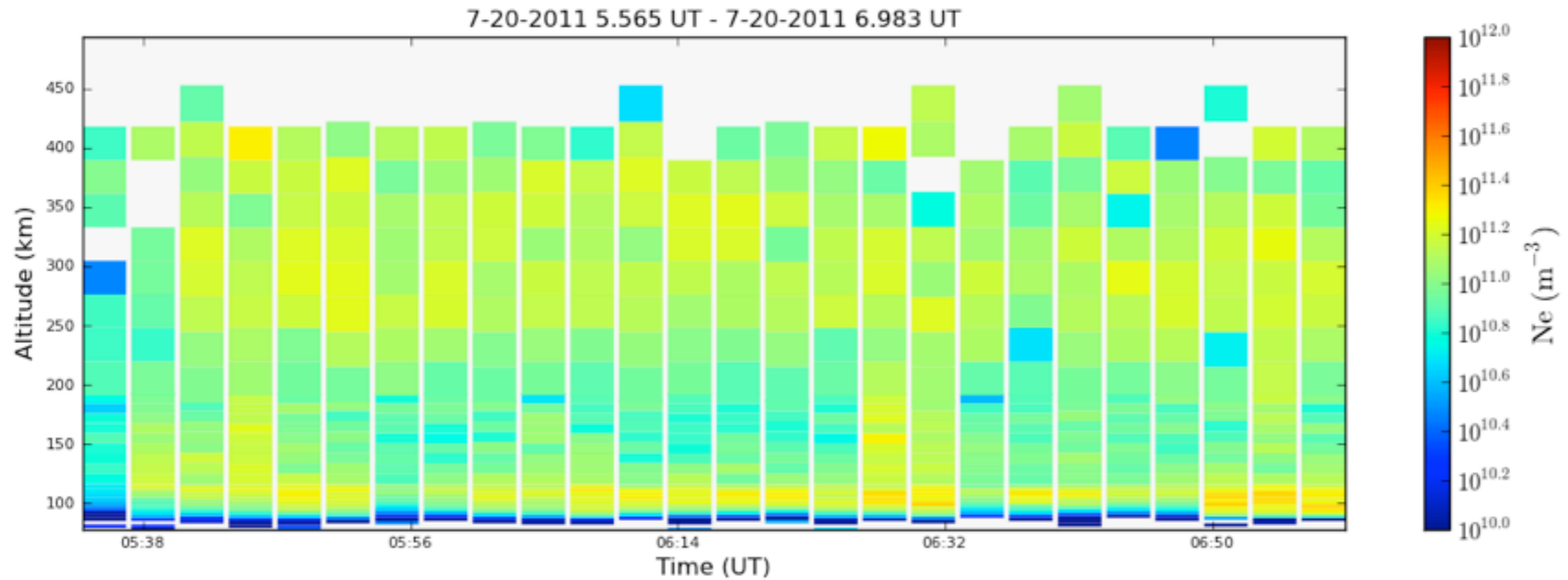
Electric field vector at Sondrestrom



Mean velocities and directions during our run

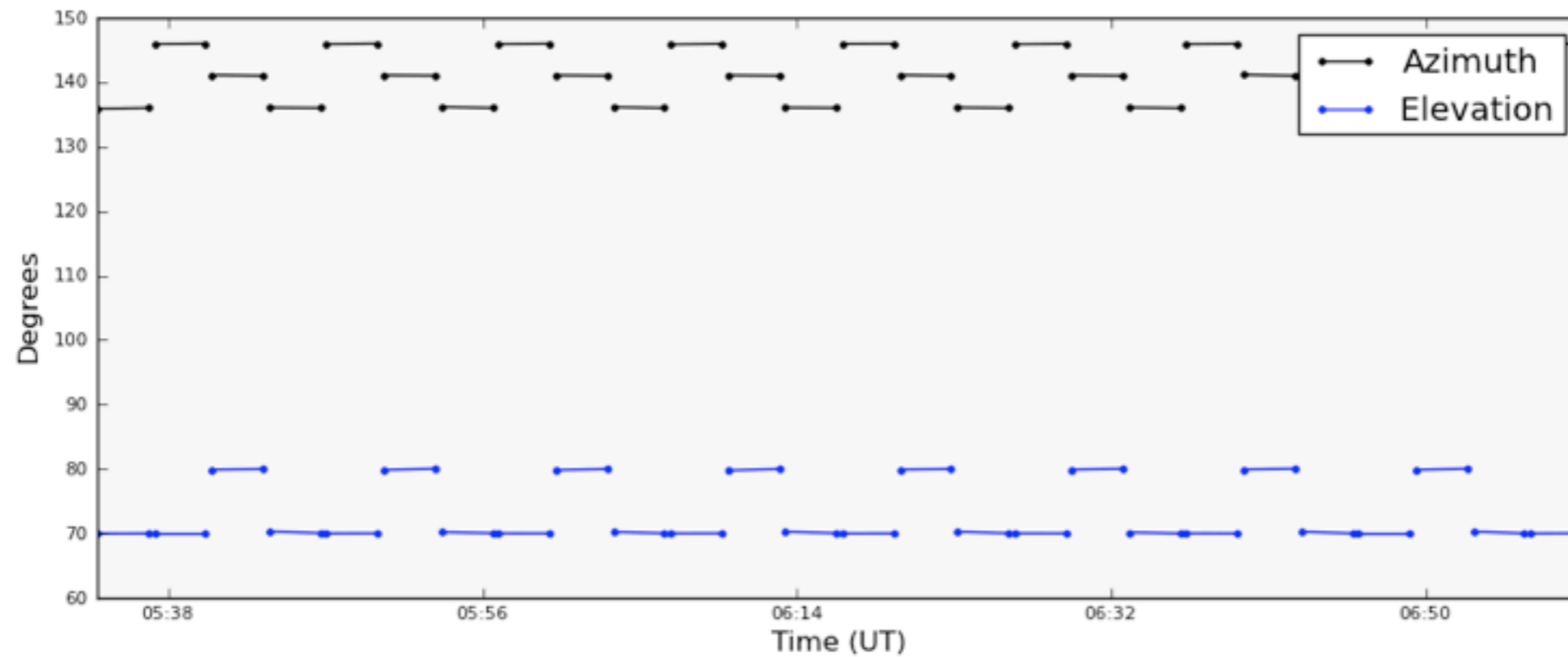
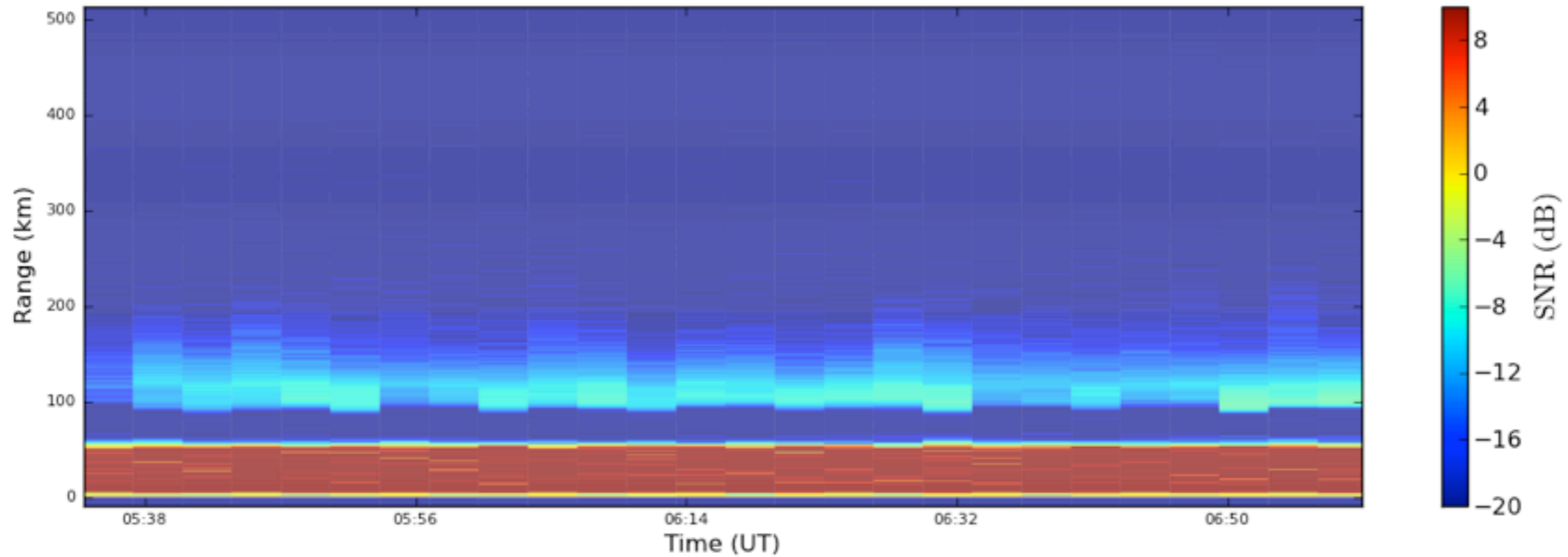


Electron Density



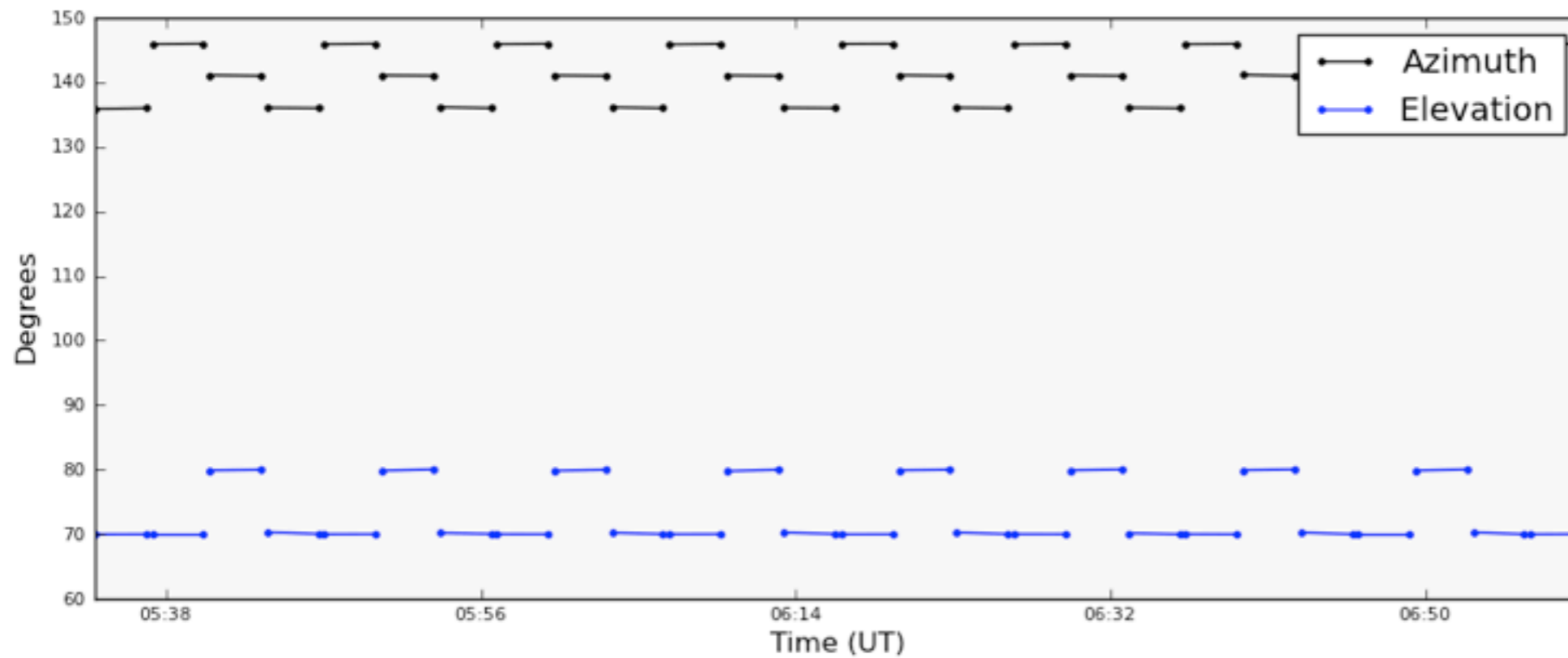
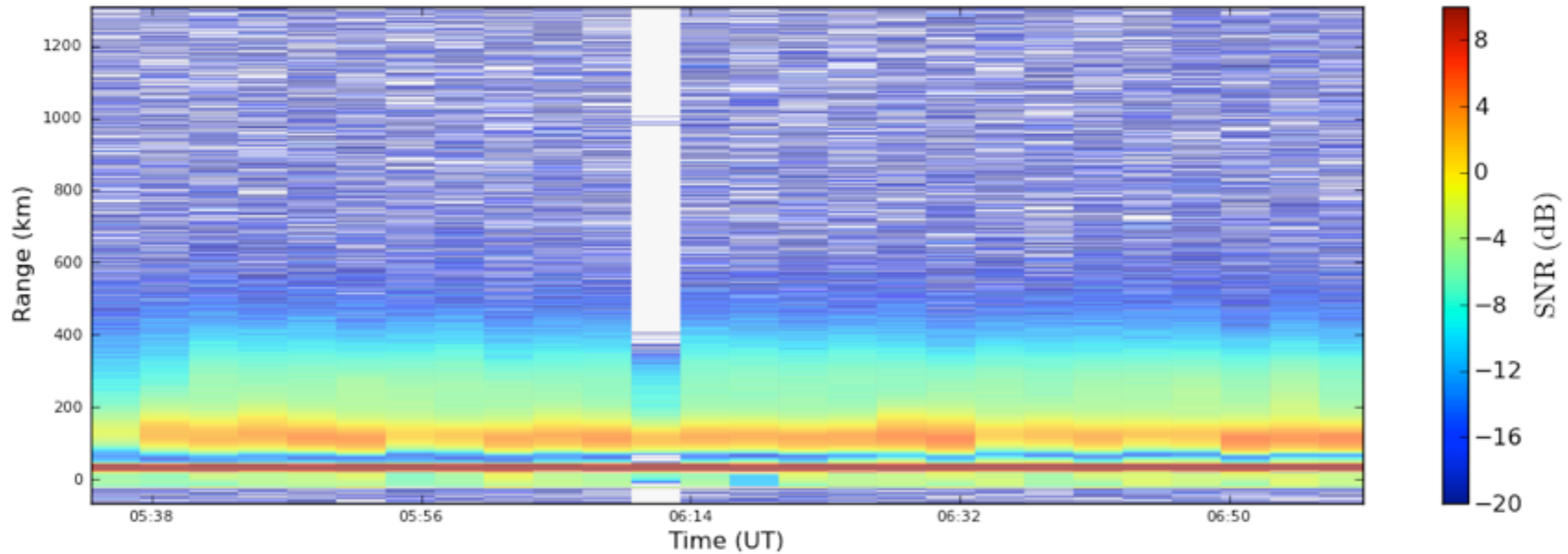
Alternating Code Signal-to-Noise-Ratio

7-20-2011 5.565 UT - 7-20-2011 6.983 UT

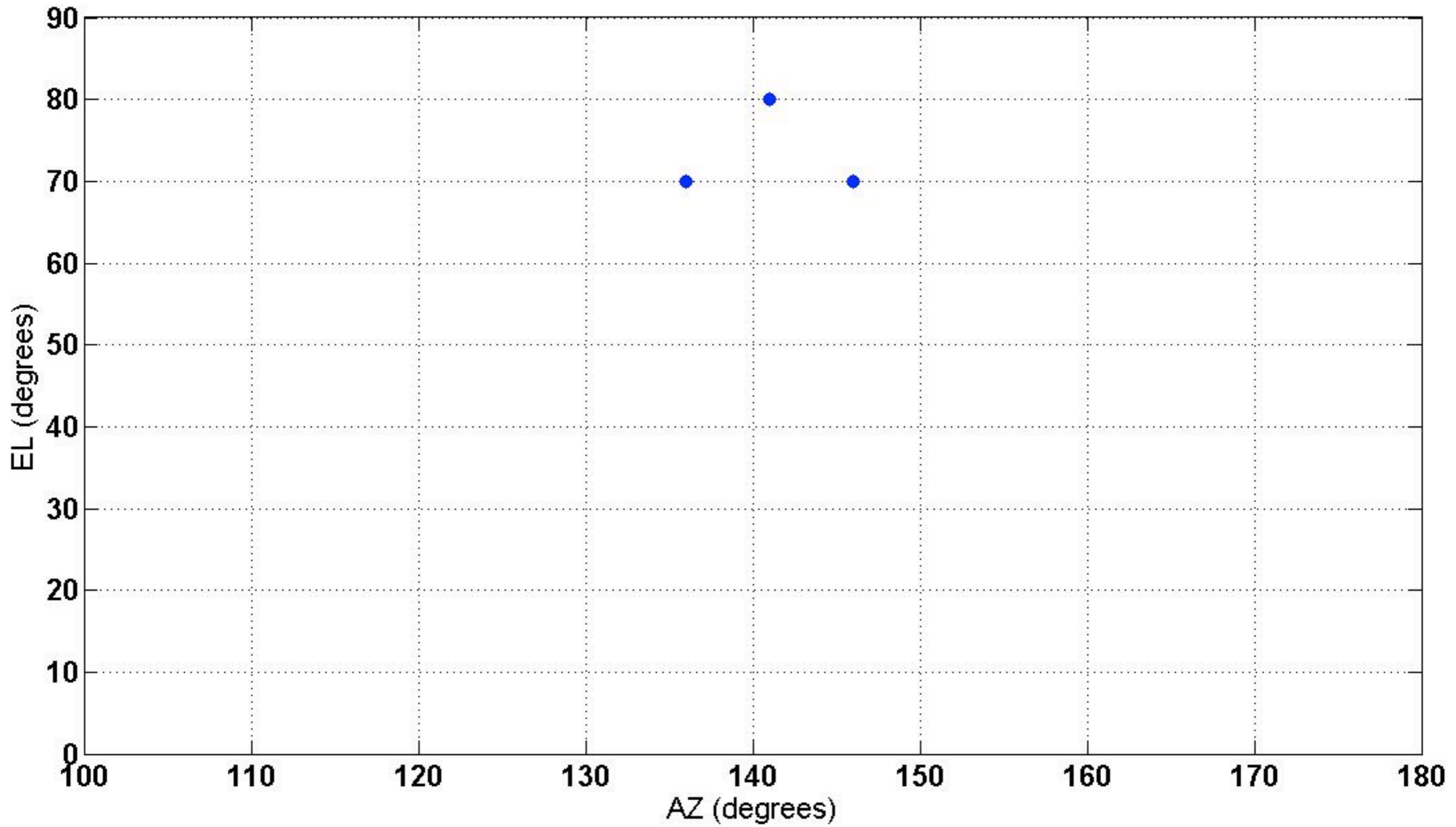


Long Pulse Signal-to-Noise-Ratio

7-20-2011 5.565 UT - 7-20-2011 6.983 UT



Sondrestrom Pointing Directions





20 Jul 2011

06:16:00 - 06:18:00 UT

45 kV

1000 m/s

