CHILL radar Overview

February 25, 2004
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CSU-CHILL System Characteristics

Antenna:

Shape: Parabolic

Diameter: 8.5 m

Feed type: Scalar

Gain: 43 dB (includes waveguide loss)

3 dB Beamwidth: 1.1 deg

Maximum sidelobe: -27 dB (In worst f plane.)

Inter-channel isolation: -45 dB (limited by orothomode transducer)

ICPR (two-way): -34 dB

Transmitters:

Wavelength 11.01 cm

Peak Power: 800-1000 kW

Final PA Type VA-87B/C (Klystron)

PRT Range: 800 - 2500 micro-seconds

Pulse width: 0.3 - 1.0 ms

Available Polarizations: Horizontal, Vertical, slant 45o/135o,

right / left circular

Receivers / Digital Signal Processing:

Noise Figure ~3.4 dB

Noise Power @SNR=1 ~ -114.0 dBm

Dynamic range ~96 dB

Bandwidth 750 KHz typ. with programable filter

Output Range Resolution: 50, 75, 150 m

Maximum range gates: estimated to be > 3000

Useful Definitions

- **PLAN POSITION INDICATOR(PPI)**

  azimuth is scanned while the elevation is stepped through a sequence of fixed angles

- **RANGE HEIGHT INDICATOR (RHI)**

  elevation angle is scanned while the azimuth is held fixed

- **SWEEP**

  collection of all the rays output for a single fixed angle

- **VOLUME OR VOLUME SCAN**

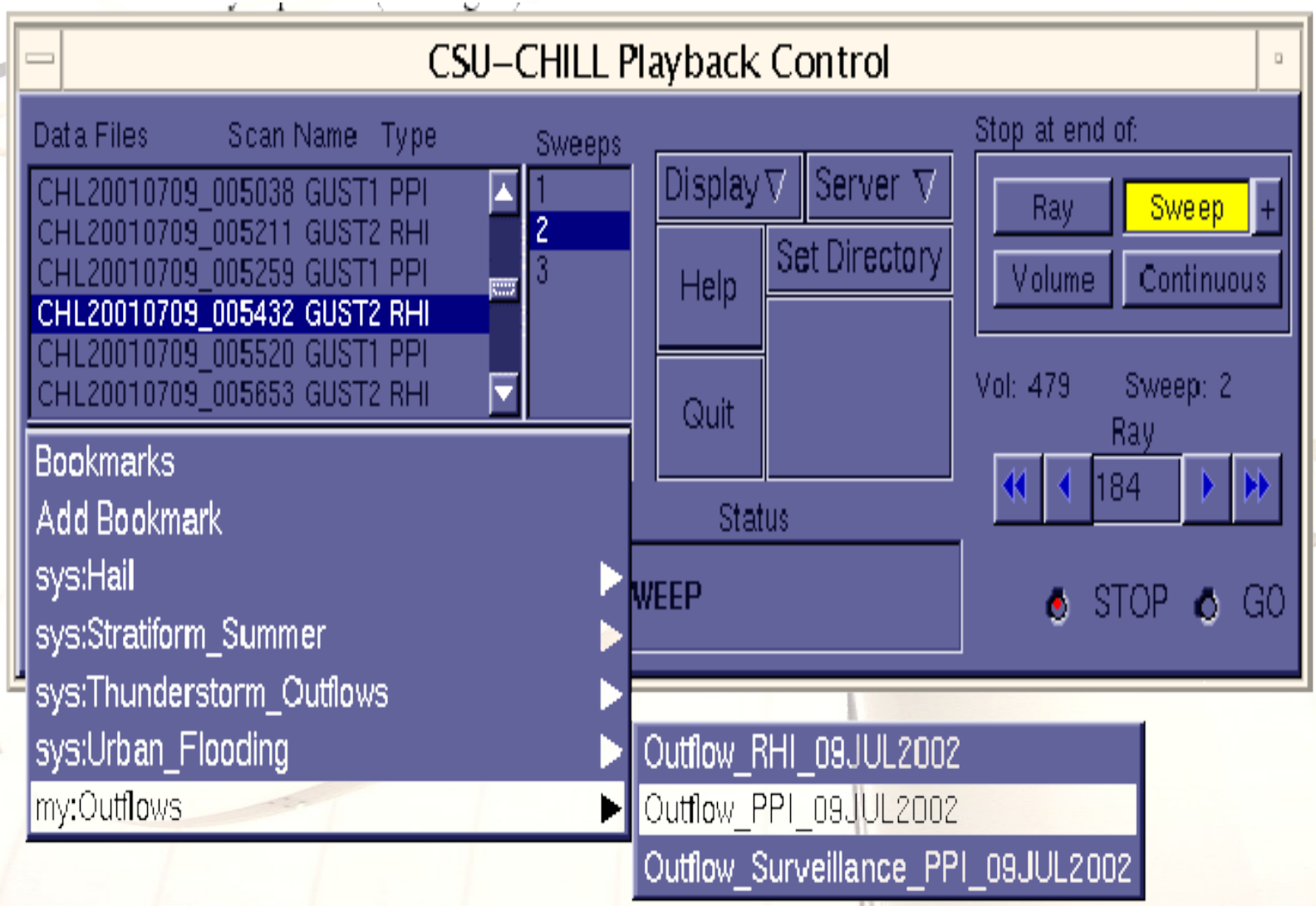
  collections of a complete set of sweeps

Operation Modes

The radar can transmit four polarization sequences.

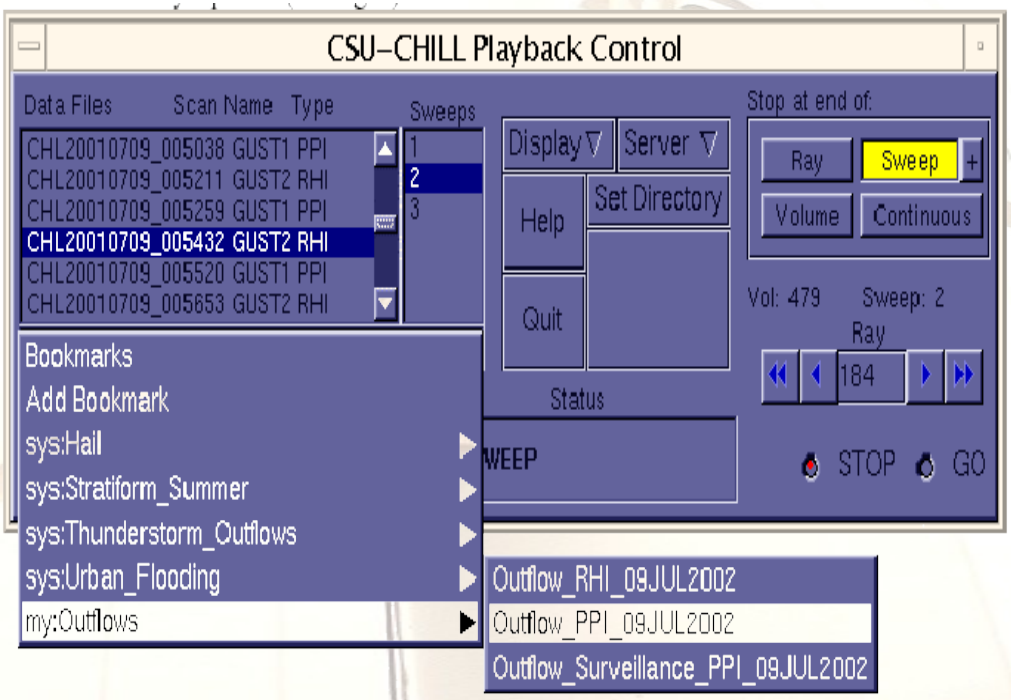
- Horizontal only
- Vertical only
- VH alternating pulse to pulse
- VHS (simultaneous V and H or hybrid mode)

V-CHILL
Accessing archived data: Replay



CSU-CHILL Playback Control

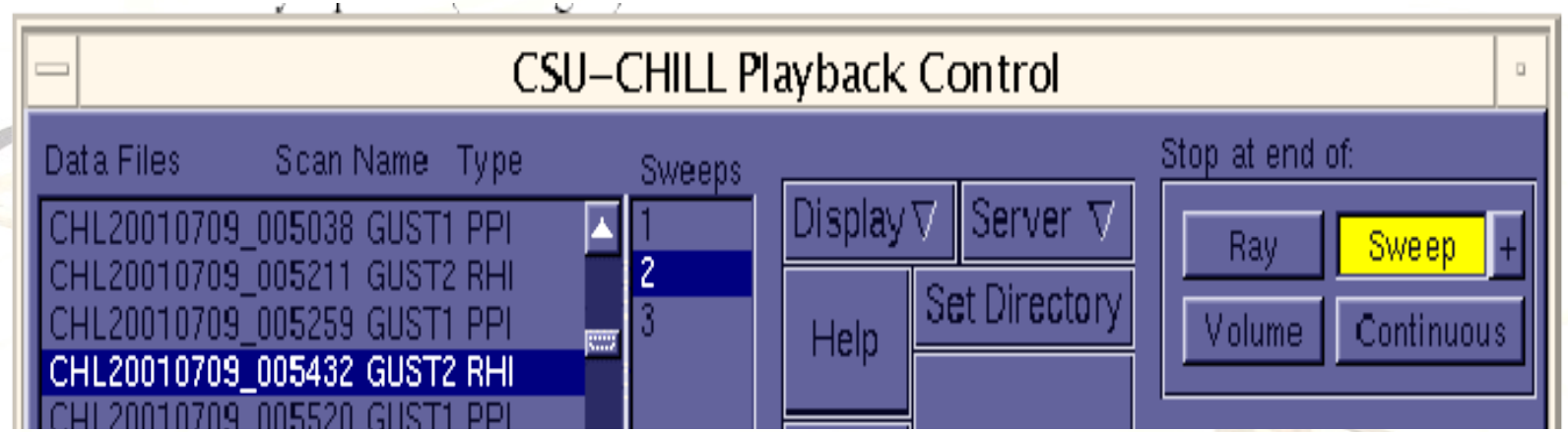
- **Files names** used by CSU-Chill have special structures
  - CHL Year Month day _hour minute and second
    - For example: CHL20010624_155702



CSU-CHILL Playback Control

- **Scan Name** listed often contains a clue as to the purpose of the scan, and/or processor mode:
  - DOP1 or DOP2 are sector scans covering storms in one of the doppler lobes.
  - any name containing SUR is a 360 degree surveillance scan
  - any name containing VHS is done in simultaneous transmit mode
  - any name containing a Q is done in quick scan mode
  - any name containing TS is a time series scan.
  - SUN scan is a ppi scan centered on the sun for az/el calibration
  - SUNM scan is a scan fixed on the sun for calibration
  - BLUE, DOCAL, DOCAL2 are calibration scans.
  - VERT scan is a vertically pointing calibration scan.

CSU-CHILL Playback Control



- **Type** indicates the scan type
  - PPI
  - RHI
  - MANual
- **Sweeps** column indicates the number of sweeps recorded.

UF files field mnemonics

For data collected in **alternating H, V** transmit mode:

- DZ -> H Reflectivity
- DR -> ZDR (differential reflectivity)
- VE -> Radial velocity
- LH -> LDR (linear depolarization ratio): co-pol = H, cross-pol = V
- LV -> LDR: co-pol = V, cross-pol = H
- DP -> Propagation differential phase (phidp)
- RH -> H V correlation at zero lag (rhoHV(0))
- NC -> Normalized coherent power
- CH -> H receiver co-polar returned power (dBm)
- CV -> V receiver co-polar returned power (dBm)
- XH -> H receiver cross-polar returned power (V transmit)(dBm)
- XV -> V receiver cross-polar returned power (H transmit) (dBm)

UF files field mnemonics

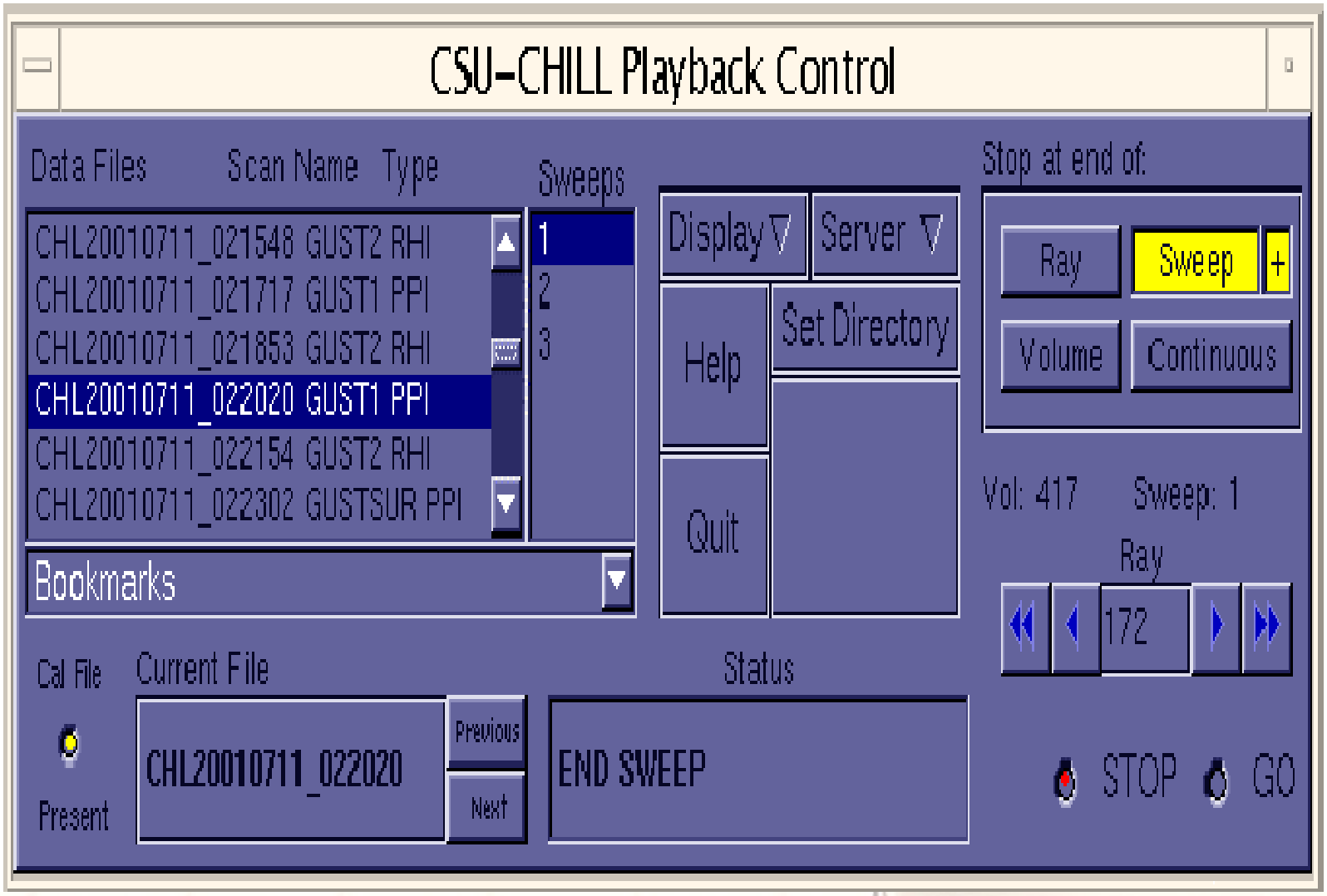
For data collected in **simultaneous H + V** transmit mode:

- DZ -> H Reflectivity
- DR -> ZDR
- VE -> Radial velocity
- W2 -> Velocity spectrum width
- DP -> Propagation differential phase (phidp)
- RH -> H V correlation at zero lag (rhoHV(0))
- NC -> Normalized coherent power
- CH -> H receiver co-polar returned power (dBm)
- CV -> V receiver co-polar returned power (dBm)

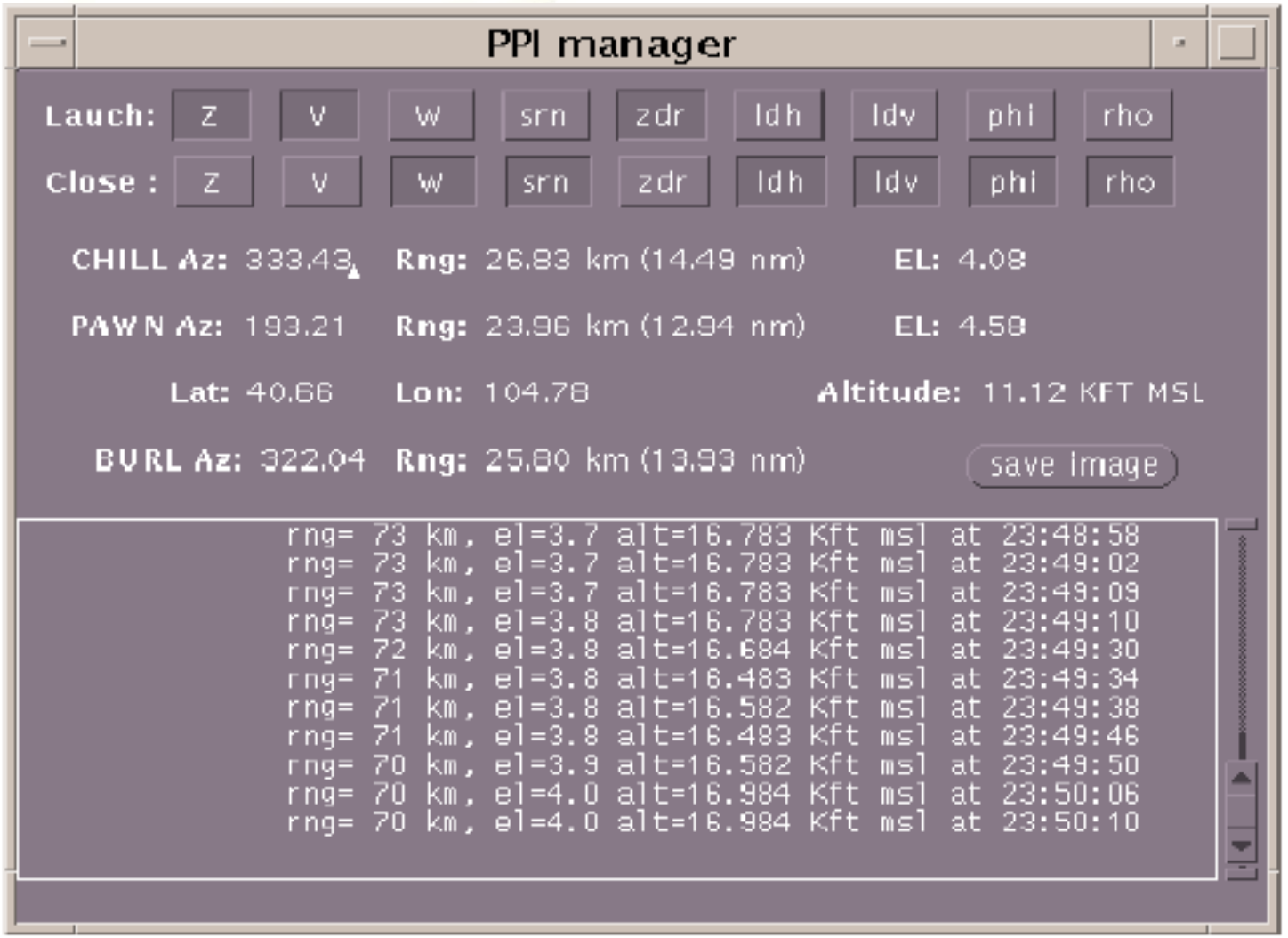
EXAMPLE

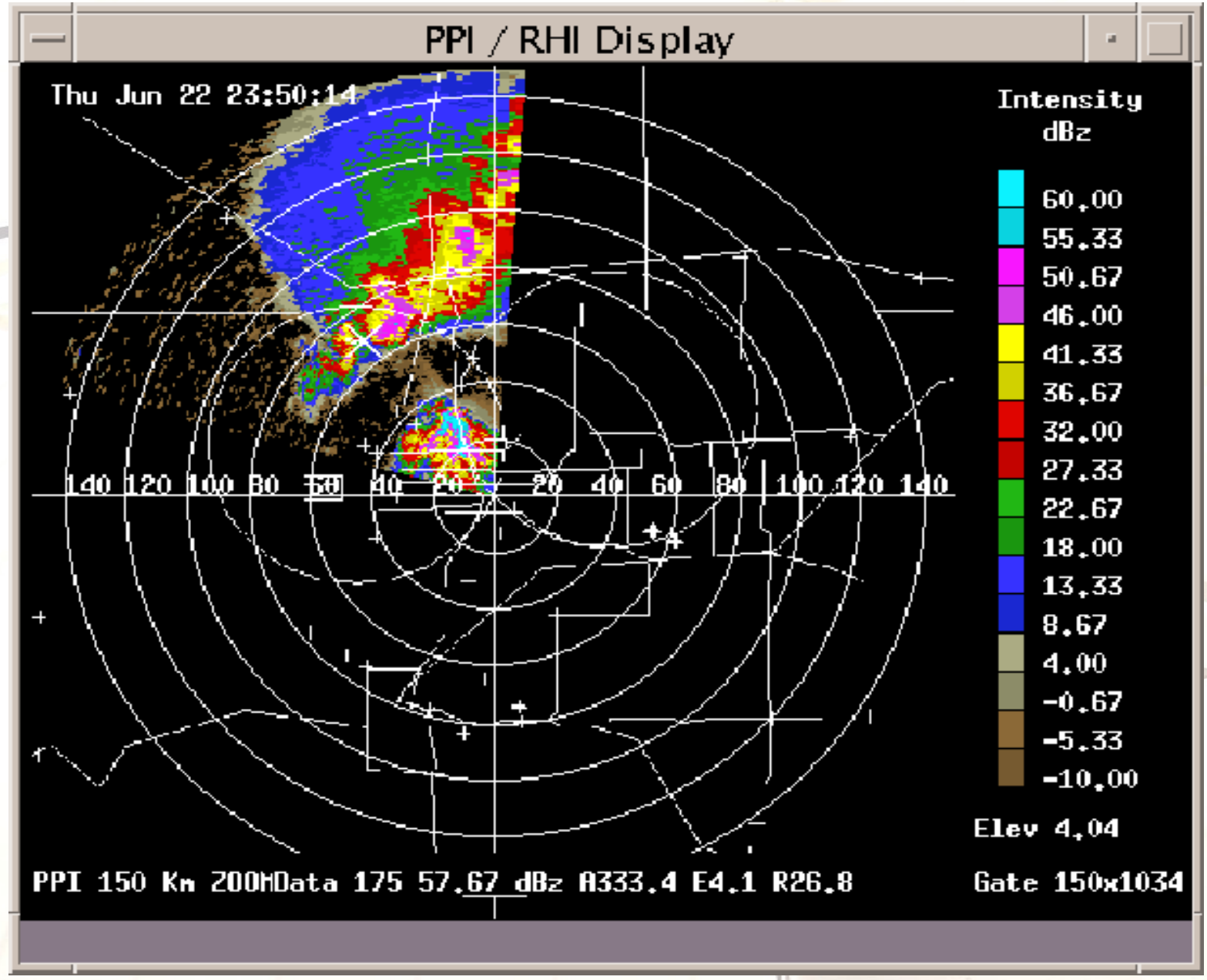
- CSU-CHILL Image

Example Windows V-CHILL



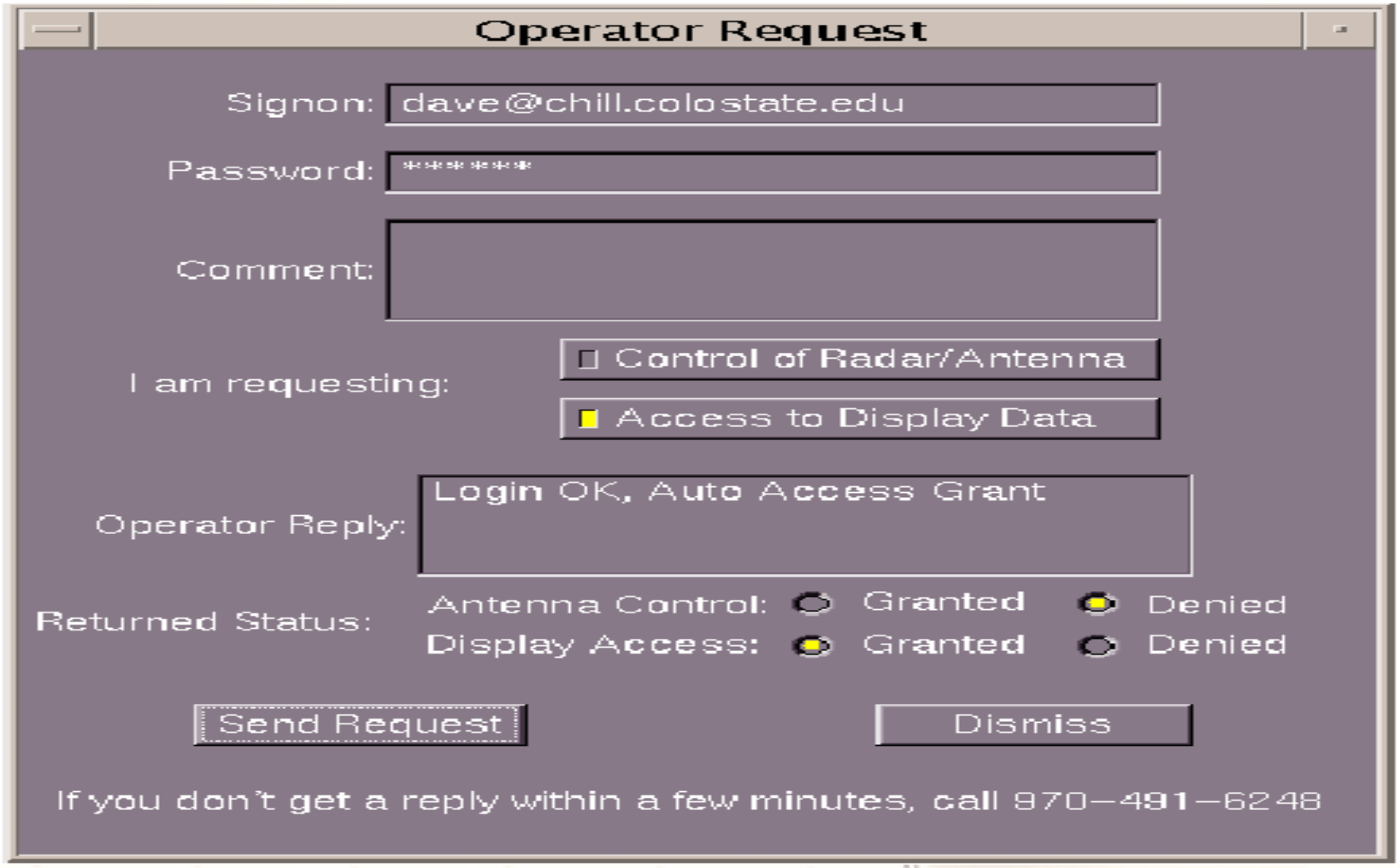
PPI MANAGER


PPI manager
Lauch: Z V W srn zdr ldh ldv phi rho
Close : Z V W srn zdr ldh ldv phi rho
CHILL Az: 333.43 Rng: 26.83 km (14.49 nm) EL: 4.08
PAWN Az: 193.21 Rng: 23.96 km (12.94 nm) EL: 4.58
Lat: 40.66 Lon: 104.78 Altitude: 11.12 KFT MSL
BVRL Az: 322.04 Rng: 25.80 km (13.93 nm)
save image
rng= 73 km, el=3.7 alt=16.783 Kft msl at 23:48:58
rng= 73 km, el=3.7 alt=16.783 Kft msl at 23:49:02
rng= 73 km, el=3.7 alt=16.783 Kft msl at 23:49:09
rng= 73 km, el=3.8 alt=16.783 Kft msl at 23:49:10
rng= 72 km, el=3.8 alt=16.684 Kft msl at 23:49:30
rng= 71 km, el=3.8 alt=16.483 Kft msl at 23:49:34
rng= 71 km, el=3.8 alt=16.582 Kft msl at 23:49:38
rng= 71 km, el=3.8 alt=16.483 Kft msl at 23:49:46
rng= 70 km, el=3.9 alt=16.582 Kft msl at 23:49:50
rng= 70 km, el=4.0 alt=16.984 Kft msl at 23:50:06
rng= 70 km, el=4.0 alt=16.984 Kft msl at 23:50:10


PPI / RHI Display
Thu Jun 22 23:50:14
Intensity
dBz
60.00
55.33
50.67
46.00
41.33
36.67
32.00
27.33
22.67
18.00
13.33
8.67
4.00
-0.67
-5.33
-10.00
140 120 100 80 60 40 20 0 20 40 60 80 100 120 140
Elev 4.04
PPI 150 Km 200MData 175 57.67 dBz A333.4 E4.1 R26.8
Gate 150x1034


PPI/RHI Configuration
Moment: Z V W snr zdr ldrh ldrv phi rho
Range (km): 30 75 120 150 240
RHI Height (km): 2.5 5.0 10.0 25.0
Range ring (km): 5 10 20 50
Zoom: 1:1 1:2 1:4
Overlay: range/height geographic map
Scaling: Automatic user specified (following)
Z min (dBz): -10.00
Z max (dBz): 60.00
Freeze
Apply
Save image
Quit

Accessing Real-Time Data



Photos
Nov. 2003