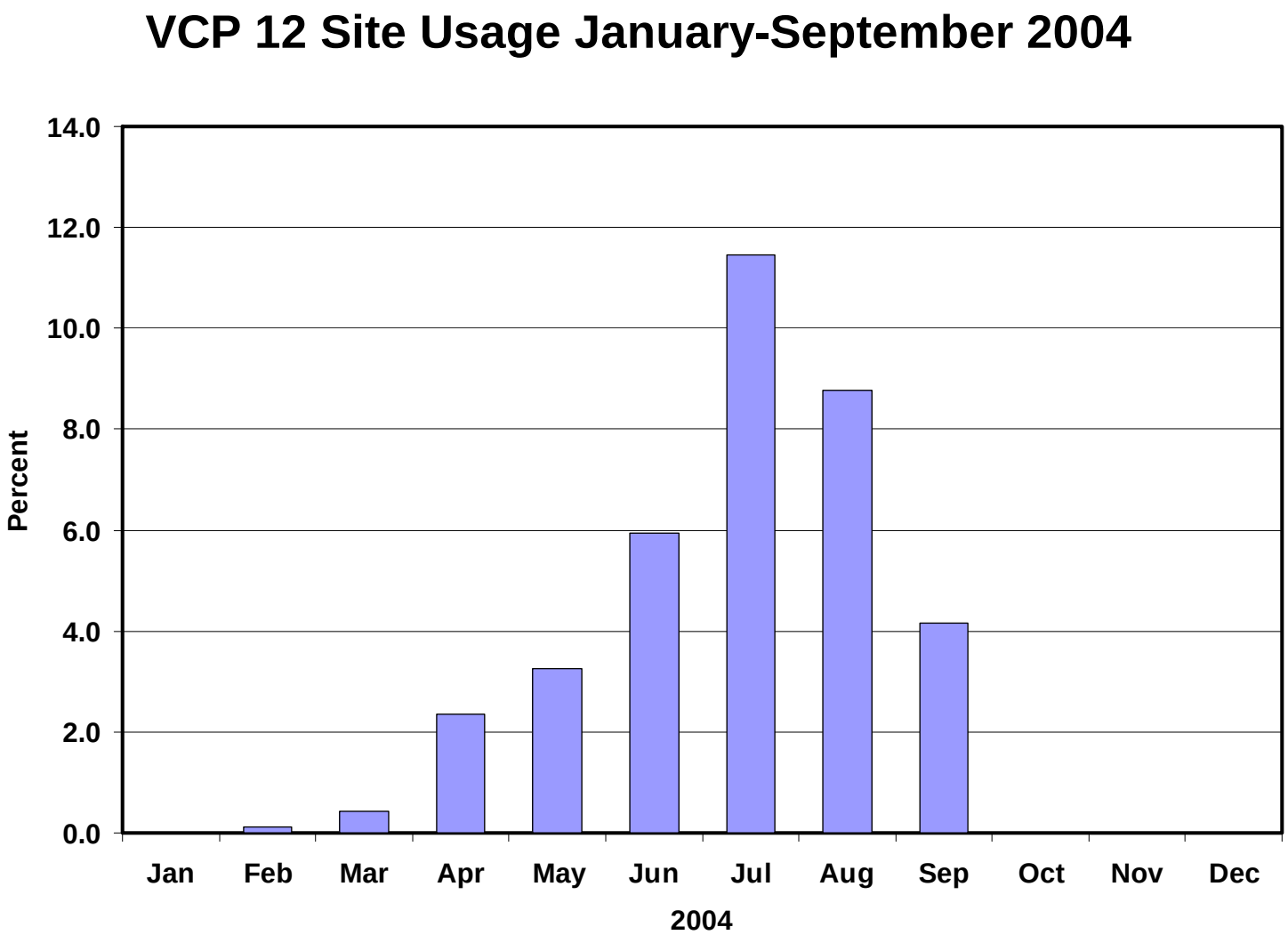
# VCPs 12 and 121 Usage

Technical Advisory Committee
21-22 October 2004
Lt Col Randy George
Chief, Applications Branch
Radar Operations Center

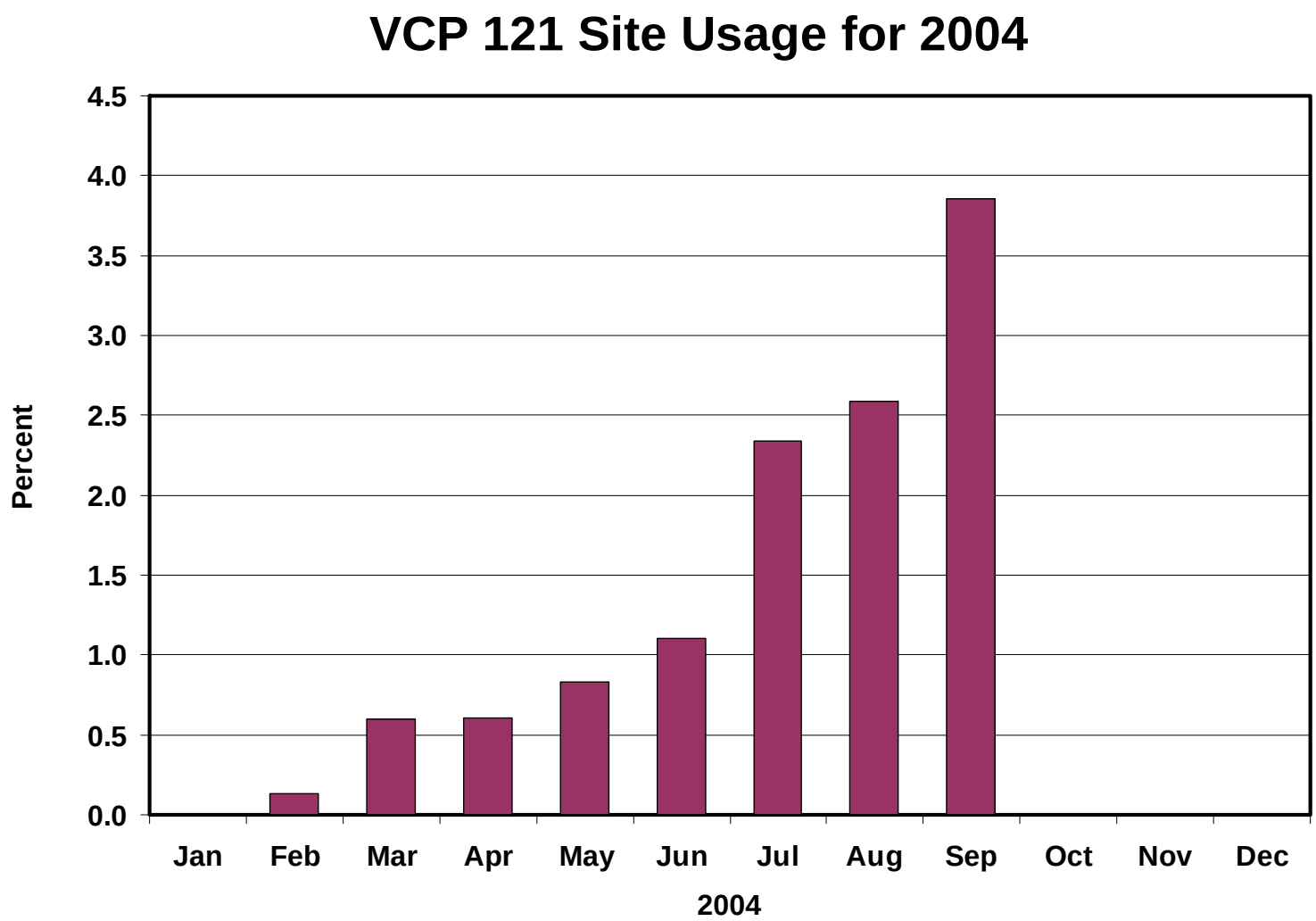
# Overview

- Usage statistics
- Testimonials and examples
- Enhancements to VCPs 12 & 121
- Summary

# VCP 12 by Month

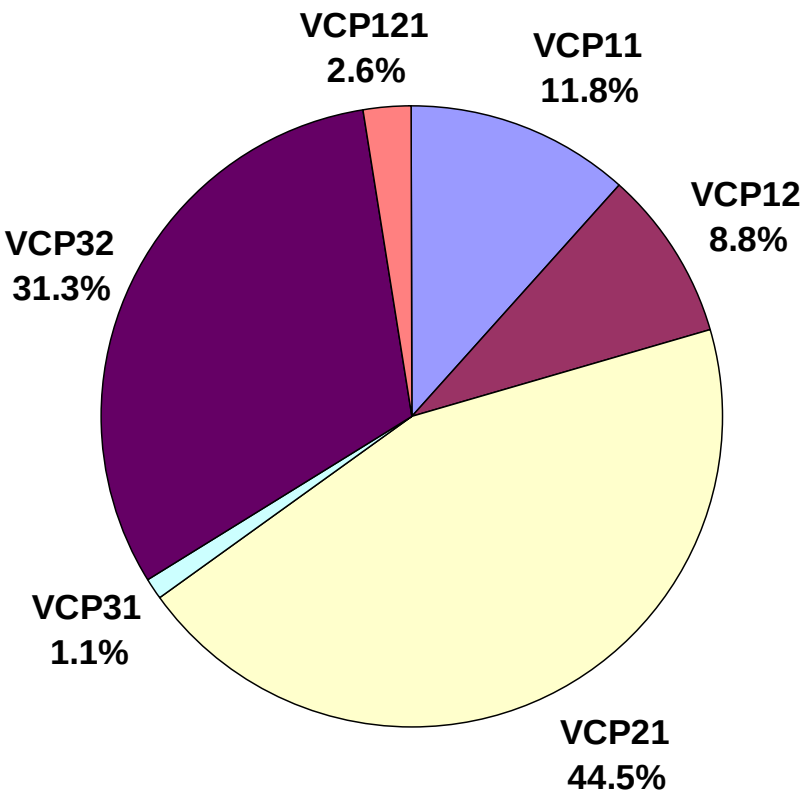


# VCP 121 by Month

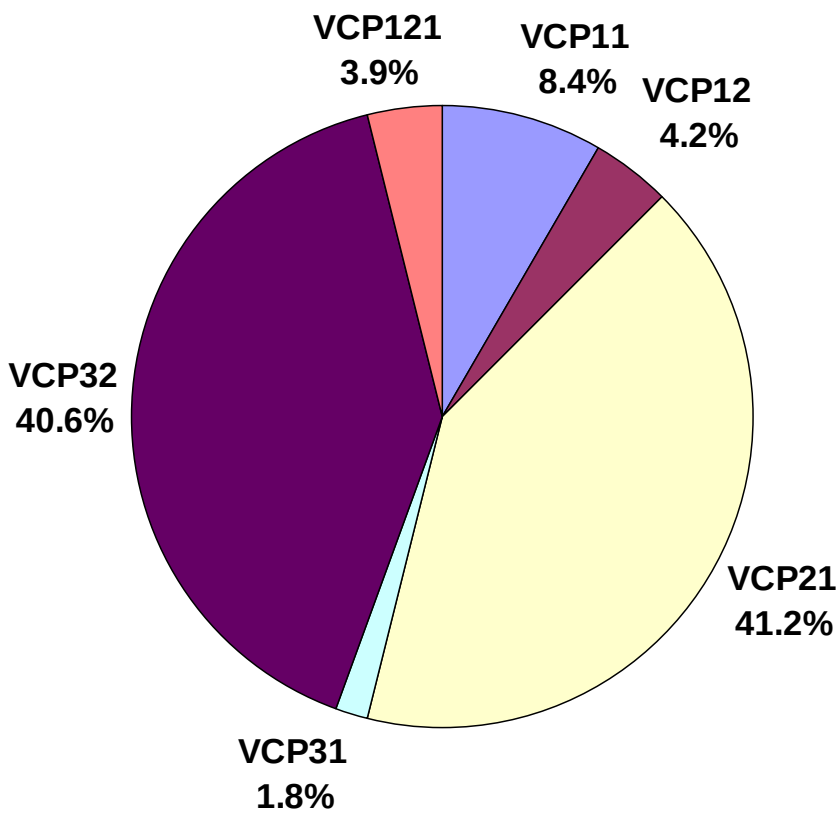


# VCP Usage for Past Two Months

## August




## September



# Some good press for VCP 121 from Andy Devanas, Science and Operations Officer, Key West, FL.

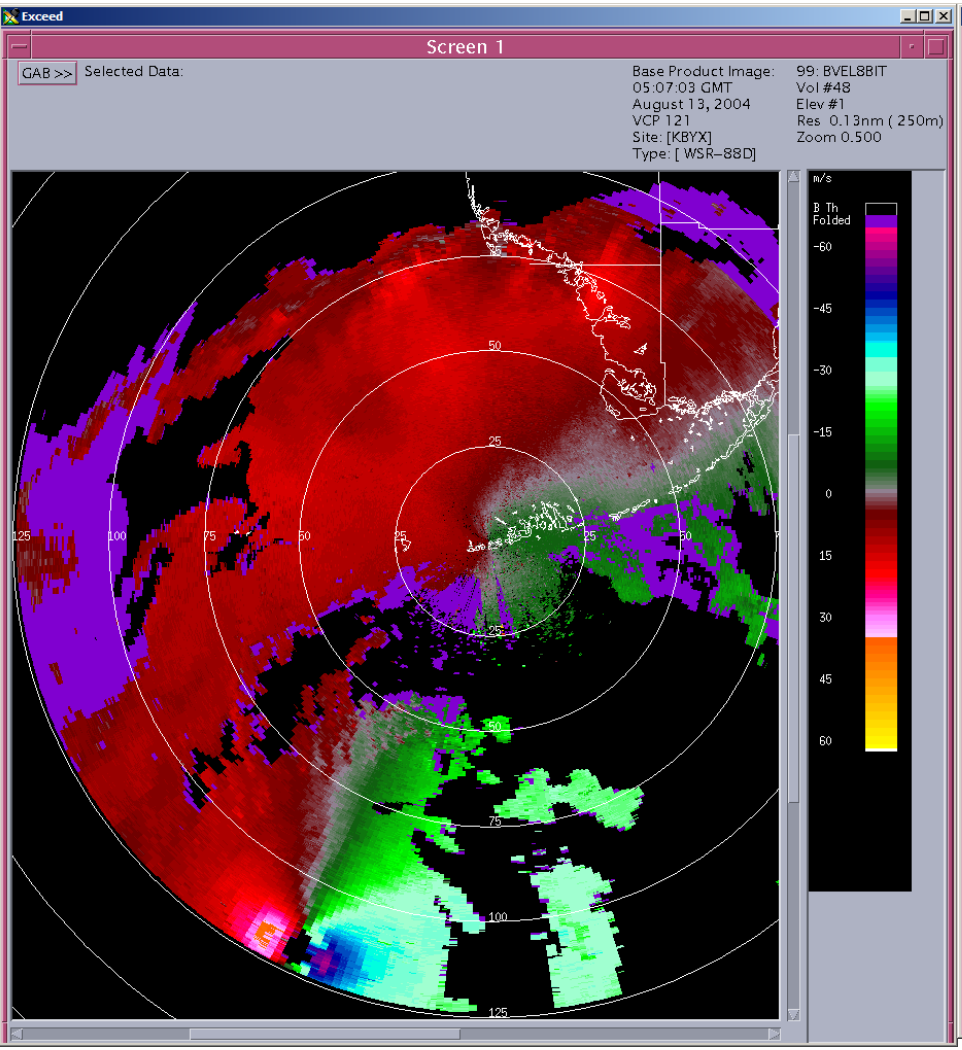
"All –

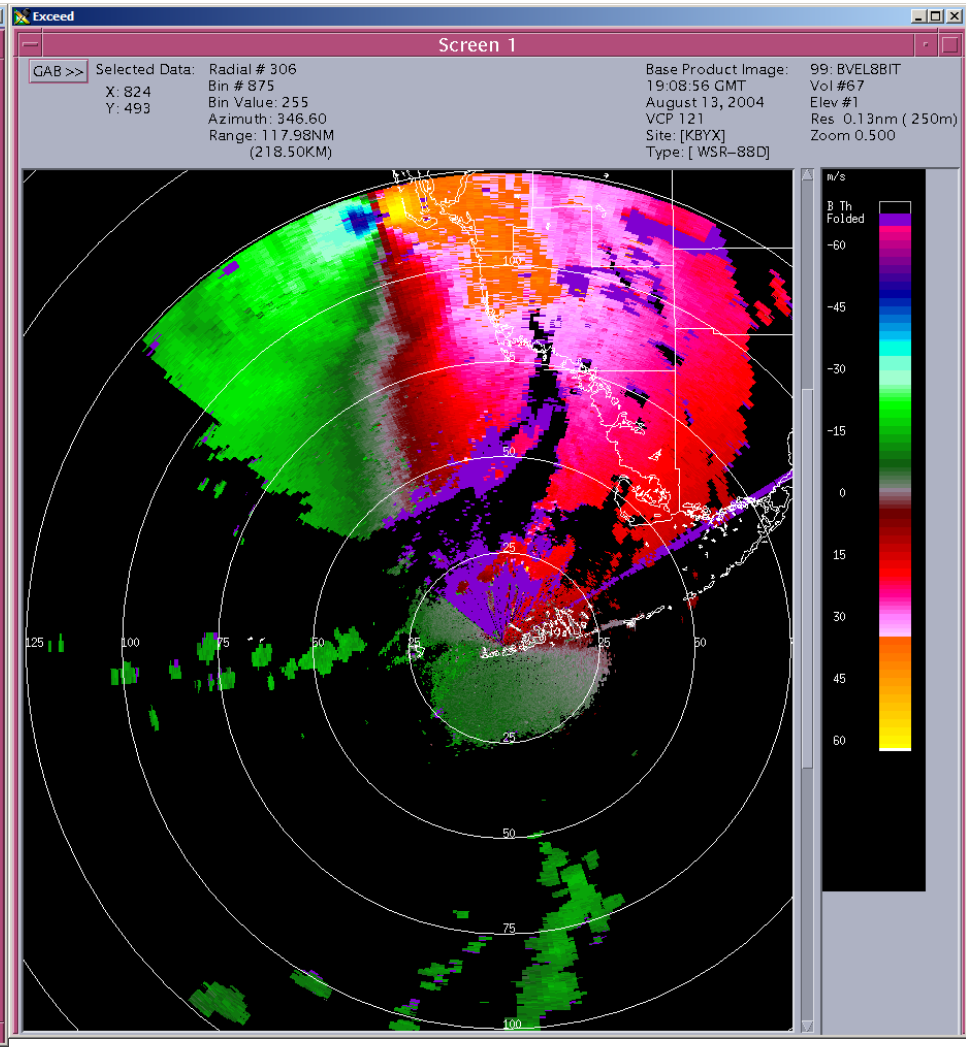
We stayed in VCP 121 throughout the entire event - and it was exceptionally useful. In fact - given the tropical nature of the weather here in EYW, we find ourselves using 121 almost exclusively since Charley! I'm sure when we get out of the wet season, we'll probably be a little more interested in storm structure and volumetric products – and swith [sic] back to VCP 12...but right now 121 is definately [sic] a gift to tropical meteorologists!!

-andy. [Devanas]"

Presenter's note: Key West used VCP 121 93 percent of the time during September

Hurricane Charley as seen by Key West WSR-88D. At 05:07Z eye has moved within range of radar (left) while at 19:08Z (right) shows eye just before landfall about leave velocity coverage. Product is 8-bit velocity, 0.5 m/s resolution; range rings are 25 n mi.



# More good press for VCP 121 from Jacksonville, FL, Science and Operations Officer, Pat Welsh.

Pat Welsh wrote:
"To all,

I would like briefly to share our experience
with VCP 121 in Hurricane >Charley for two reasons:
1) It runs against the conventional wisdom.
2) It worked, and in fact, it REALLY helped.

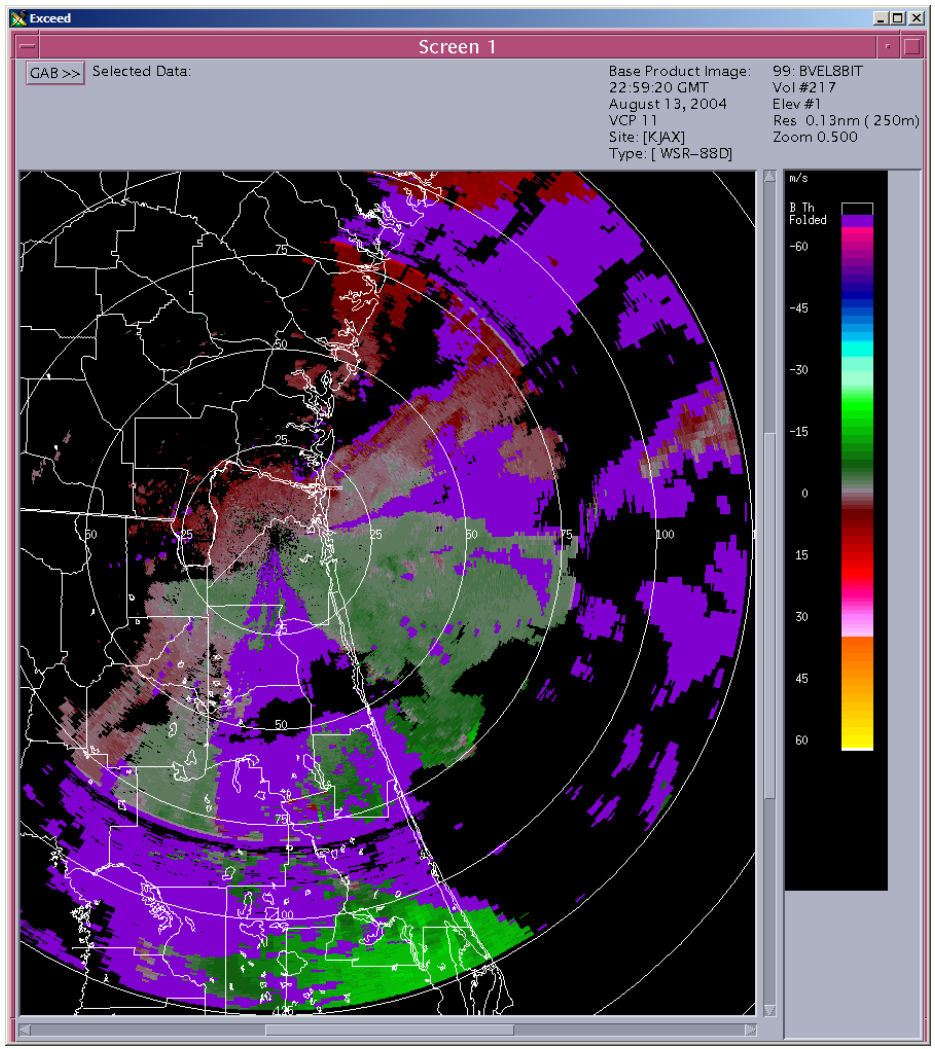
…We had seen a caution about using VCP 121 in tropical systems in the literature <somewhere>, but I would like to contrast our experience in T.S. Bonnie with the old VCP 11 and the results of our switch to VCP 121 during Hurricane Charley.

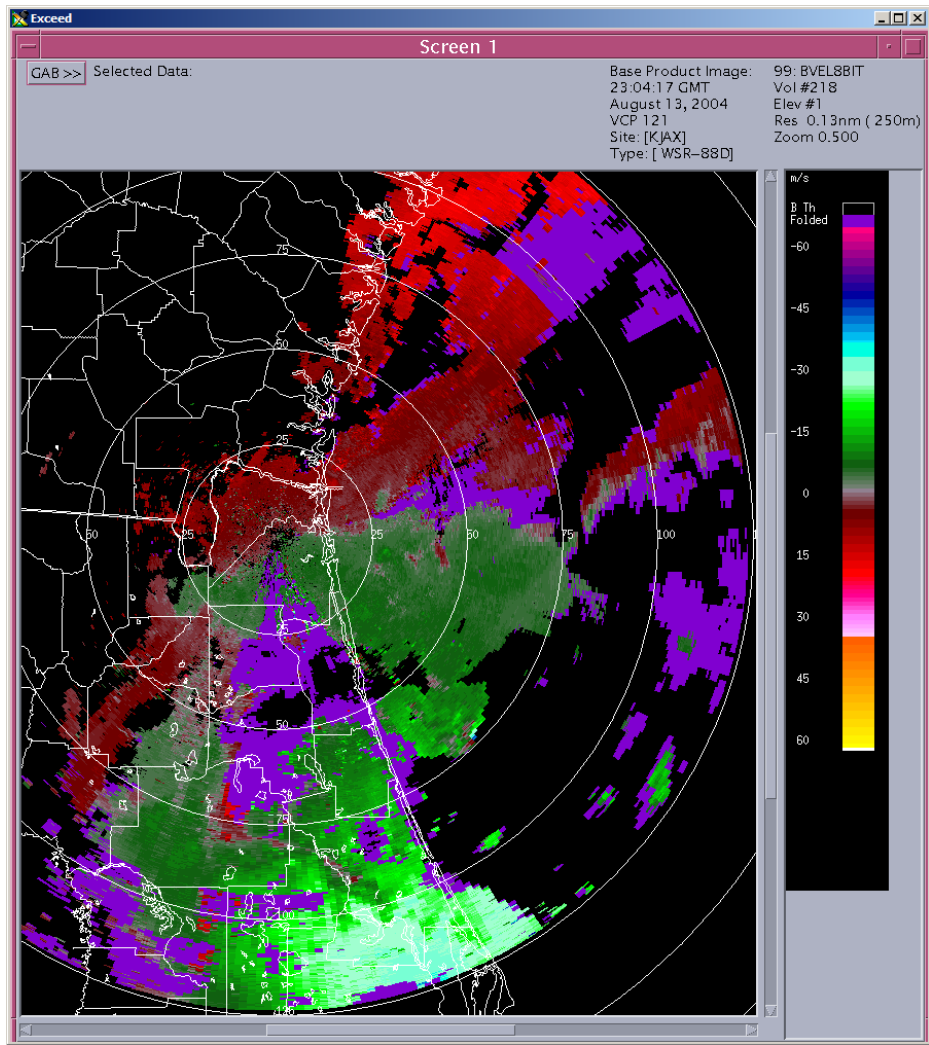
During Bonnie and initially during Charley we had huge problems with range folding probably covering 40 % of the precipitation field, with attendant velocity aliasing along the range folding boundaries. To say the least, this makes a very difficult presentation in which to find, track and monitor small tropical cyclone tornado rotational couplets embedded in rainbands.

In contrast, during Hurricane Charley, when we had an almost unuseable [sic]
presentation, we switched to VCP 121...and the difference in one volume scan was amazing. Almost all of the range folding and aliasing cleared...and needless to say...we remained in that mode through the rest of the storm.

We intend to make VCP 121 our preferred tropical storm mode from now on."

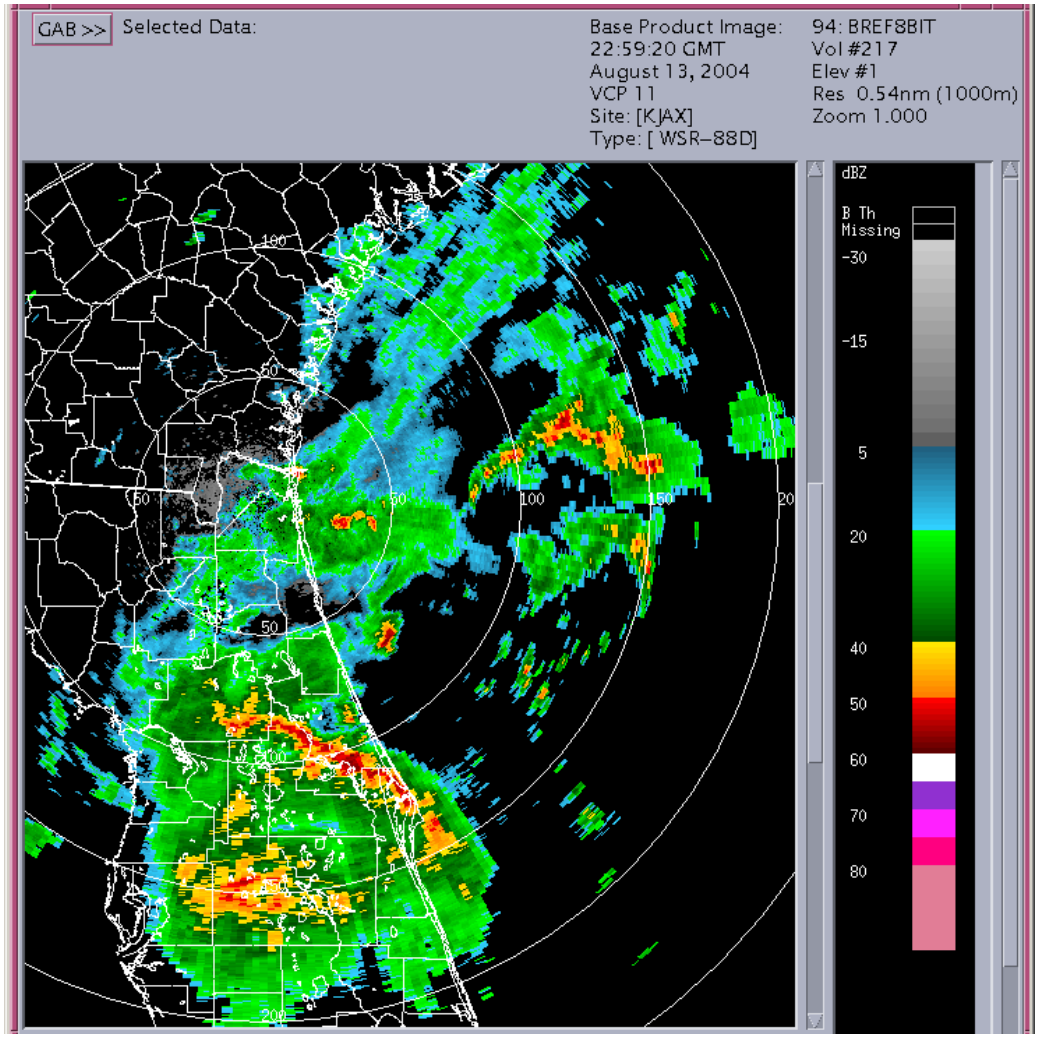
# Jacksonville, FL WSR-88D 8-bit velocity product images from Hurricane Charley, 13 August 2004 about 23Z.

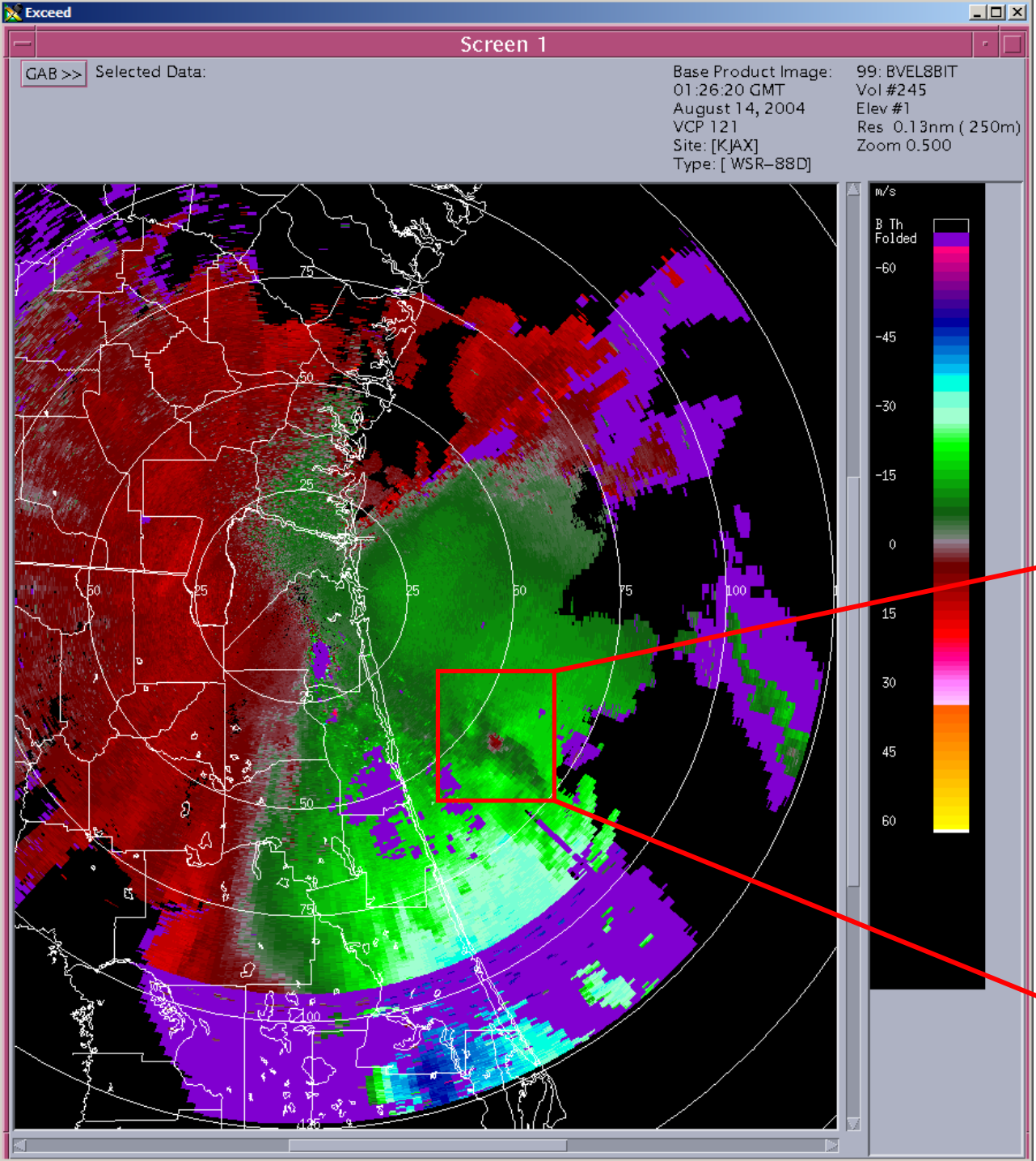



Note VCP 11 (left) has 1 m/s velocity resolution while VCP 121 (right) has 0.5 m/s resolution which causes it to appear to have stronger velocities.

# 8-bit Reflectivity Product from Jacksonville, FL WSR-88D 13 Aug 04 22:59Z

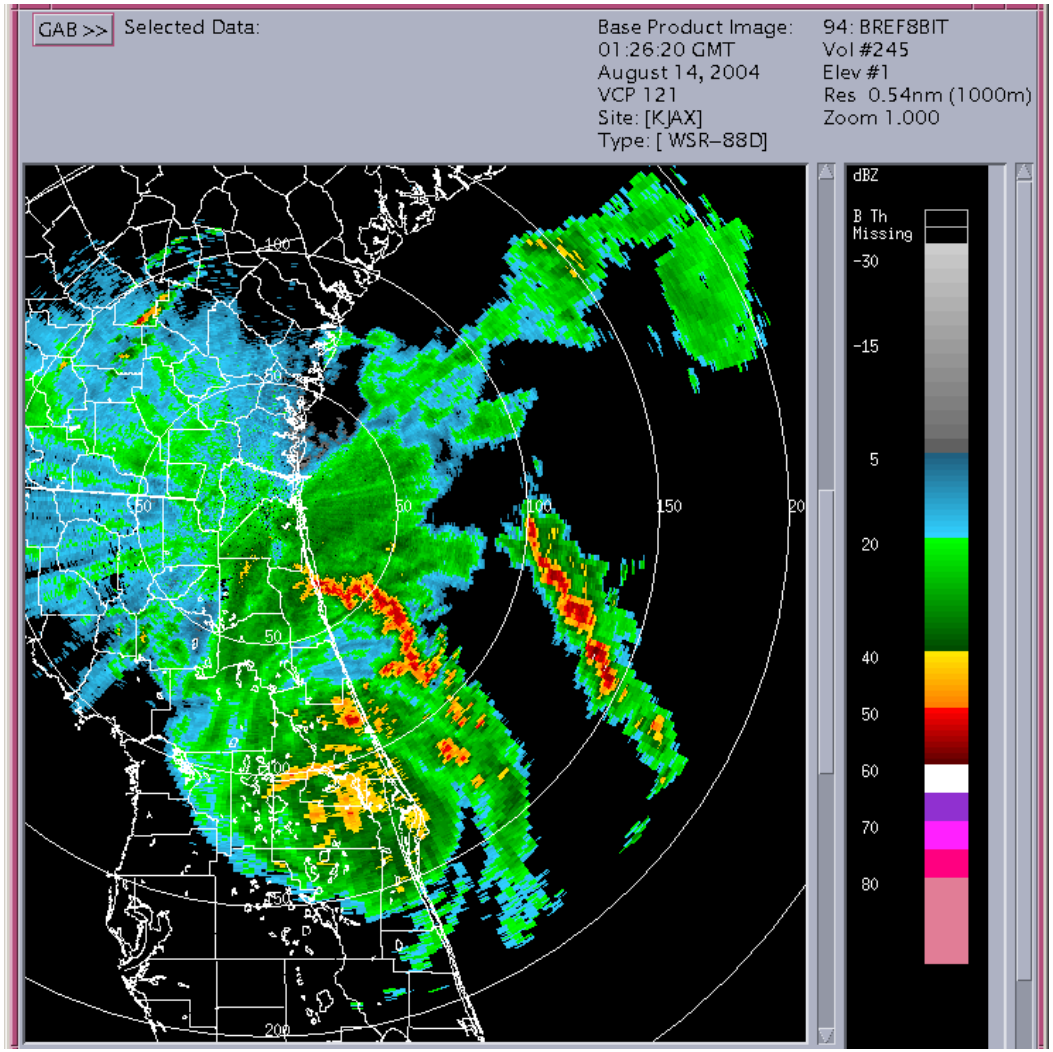





Hurricane Charley
KJAX WSR-88D
14 August 2004
01:26Z, VCP 121
8-bit Velocity Product

Zoomed in area shows circulations in front right quadrant.

# 8-bit Reflectivity Product from Jacksonville, FL WSR-88D 14 Aug 04 01:26Z



# Less than favorable press for VCPs 12 and 121 from Tom Matheson, Warning Coordination Meteorologist, Wilmington, NC.

(Data from Hurricane Ivan are being examined by Applications Branch. Liz is Liz Quoetone from Warning Decision Training Branch)

"Liz- The velocity couplets were so subtle that 11 showed them a bit better than 12. Today, for the remnants of Ivan, we're running on 12 with the PRF set for max range."
-TomM

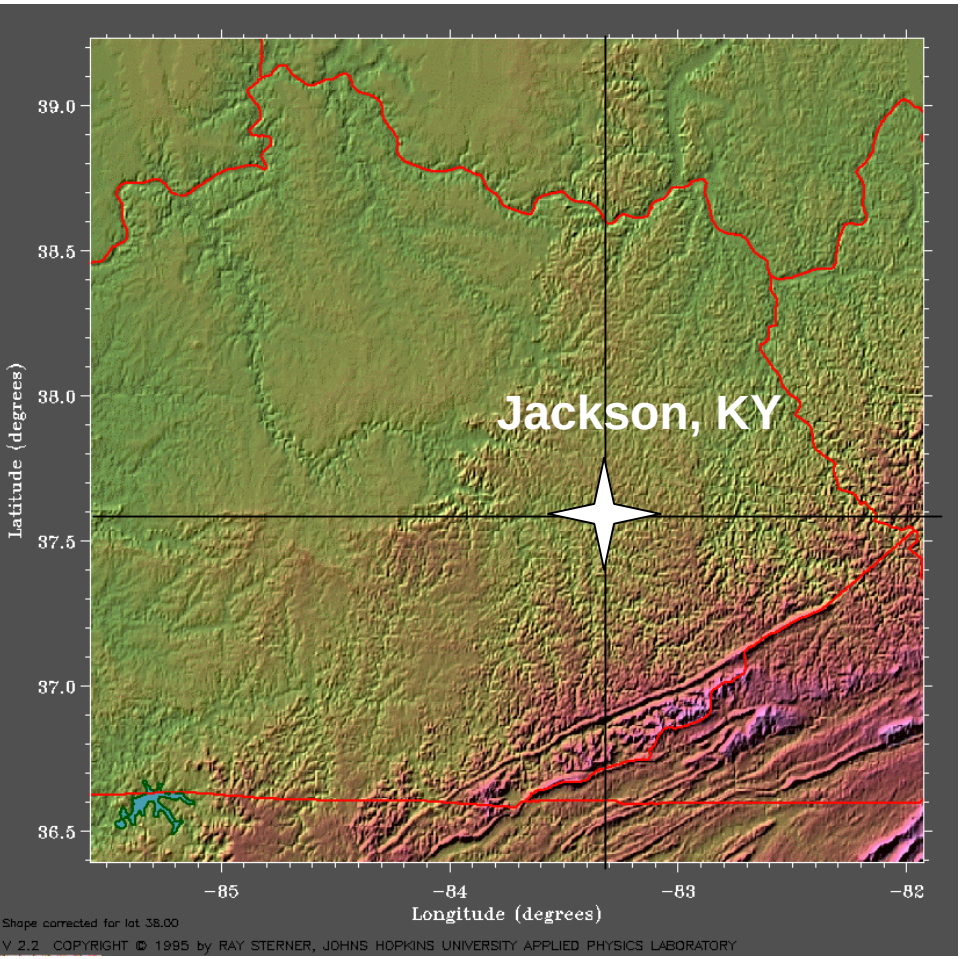
Liz Quoetone wrote:
"Tom,
Since 121 wasn't helping with the velocities, did you consider VCP 12 with has the lowest slices optimized thereby giving you more cuts/data in the lowest few 1000 feet?
Liz"

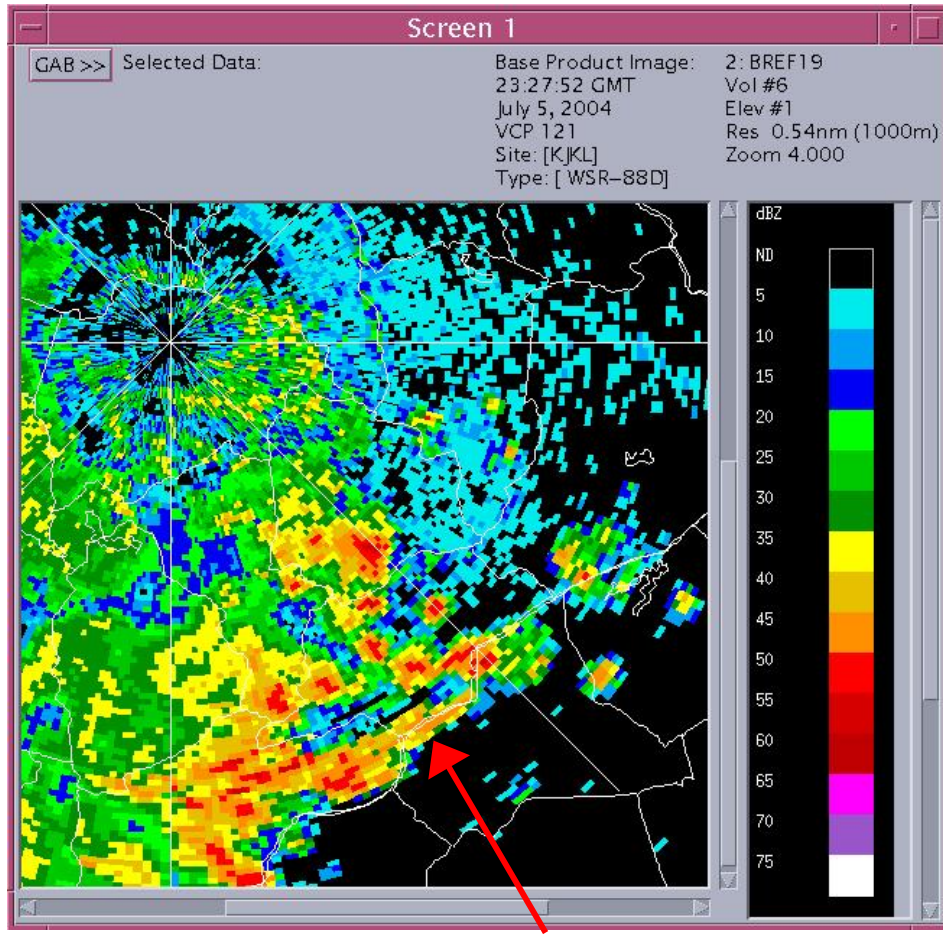
Thomas Matheson wrote:
"HiYa Dan, Hi Ha Liz-
We've been kicking around the idea of a tropical cyclone volume scan strategy of 5 slices through 4.5 deg, then dropping down and doing it over again...and over. The fleeting vortex signatures in tropical cyclones are nothing like midwest tornadoes. The attachment doesn't get too deep into radarology...but vcp 11 with fixed prf was the choice over 121, which didn't catch velocities as well. "

# Mixed press for VCP 121 from Jackson, KY

- I told you that we would give you some feedback about how the new VCP and MPRF worked for us after an event. As luck would have it we have just been through a couple of severe weather events in which we were able to try out the new VCP. We gave it a try as the storms began settling down Monday night. The MPRF that night seriously removed the RF area along the leading edge of an outflow that we were tracking. This was a big help in that it provided us with the missing information and laid our worries to rest with that feature. However, we also noticed the stretching of the cells and storms along the azimuth arc that we were forewarned about. As a result we switched back immediately to the VCP 11 since the cells were moving at a fairly fast clip.

Example of cells being stretched to the southeast seems to line up with high terrain to the southeast. This problem was noted during Build 5 beta testing at other mountainous sites.




Elongated echo due to mountain clutter

# Mixed press cont'd

- The next night, Tuesday July 6th, we had a north to south oriented squall line move right through the CWA and over the RADAR. This line was moving slowly and the lowest slice returns did not suffer as much as the night before when we turned to VCP 121. We also saw a substantial, near 90% reduction, in RF along the leading edge of the area of concern. This was perfect and we left the RADAR in the 121 VCP for the rest of the event.

# Mixed press cont'd

"Here is a quote from the lead forecaster and RADAR operator who worked the event: 'One quick mention...**VCP121 was sampled to help get rid of range folding the last couple of days. It did reduce range folding, however, the reflectivity is kind of wash out and stretched along radial rings.** It seems to work best if the storm aren't moving to [sic] fast. So, if your concern is not with core heights, then this is a fair option. If you suspect high cores, VCP121 is not a good option. Of course, you need to set up separate procedures to accommodate VCP121.'"

"As an aside, are there any plans for a VCP 111 or one that combines VCP 11 and the MPRF feature? Thanks for your work in this area, I see it as a huge benefit to all our warning capabilities! "

Sincerely, Chuck Greif Lead Forecaster @ JKL

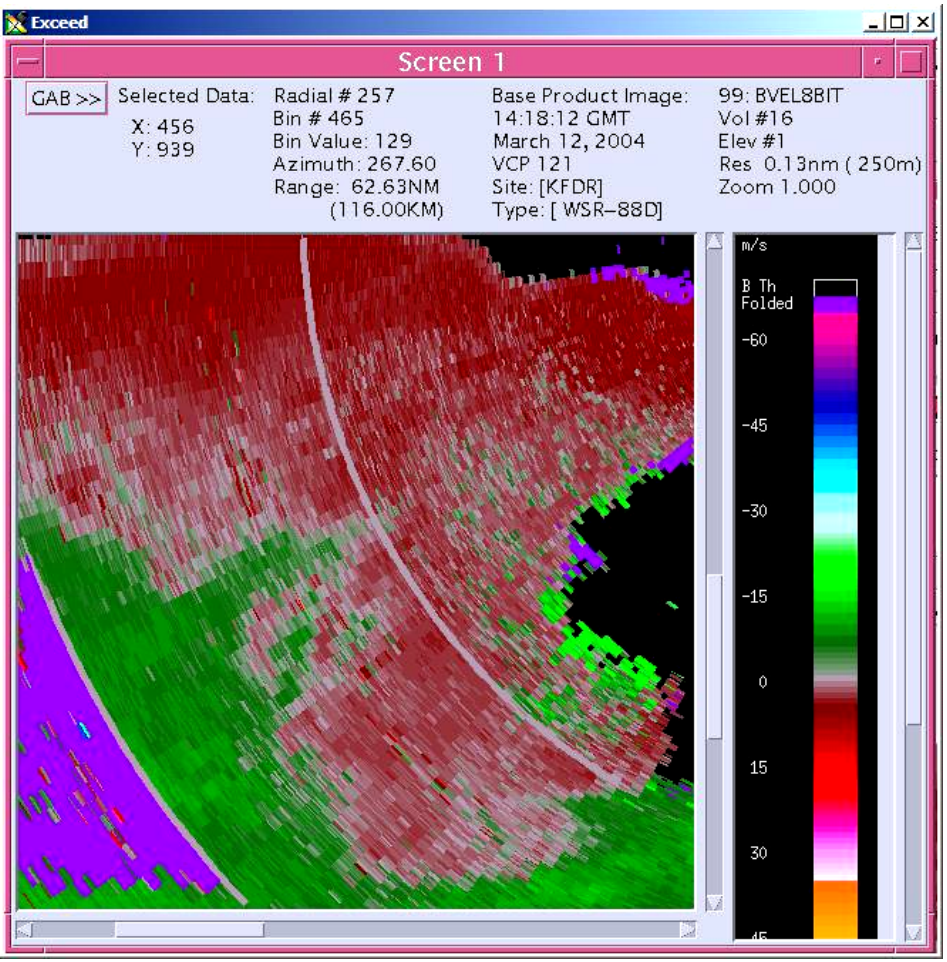
# VCP 12 Build 6 Changes

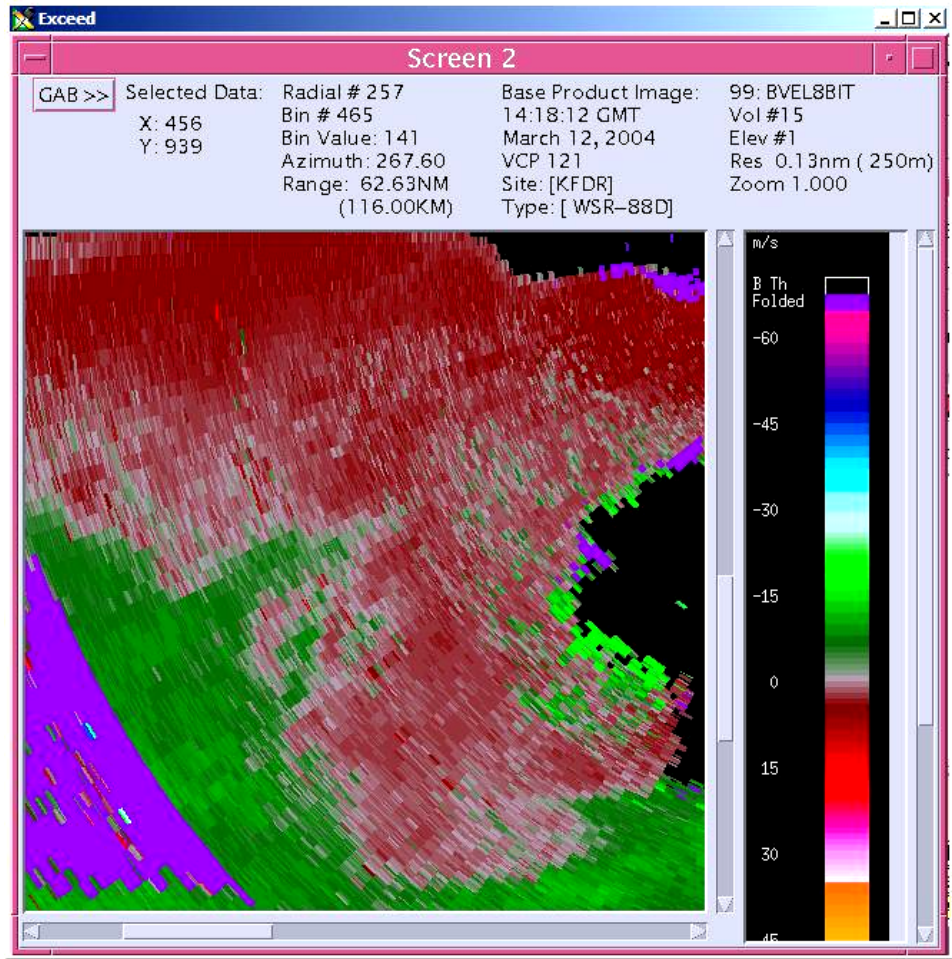
- Improve surveillance coverage at several elevation angles to ensure coverage to 70 Kft.
  - 1.8 deg – use PRF1 instead of PRF2
  - 2.4 deg – use PRF2 instead of PRF3
  - 3.1 deg – use PRF2 instead of PRF3
  - 4.0 deg – use PRF2 instead of PRF3
  - Change 6.4 deg scan from Contiguous Doppler to Batch waveform
  - Adjust rotation speed as needed

# VCP 121 and related Changes in ORPG Builds 6 & 7

- Build 6
  - Eliminate Noisy Rings in data
  - Change categorization of RDA AU Parity errors from red alarm to minor incident (uncolored)
- Build 7
  - Add capability to change to 1 m/s velocity resolution
  - Increase surveillance mode pulses to improve clutter suppression

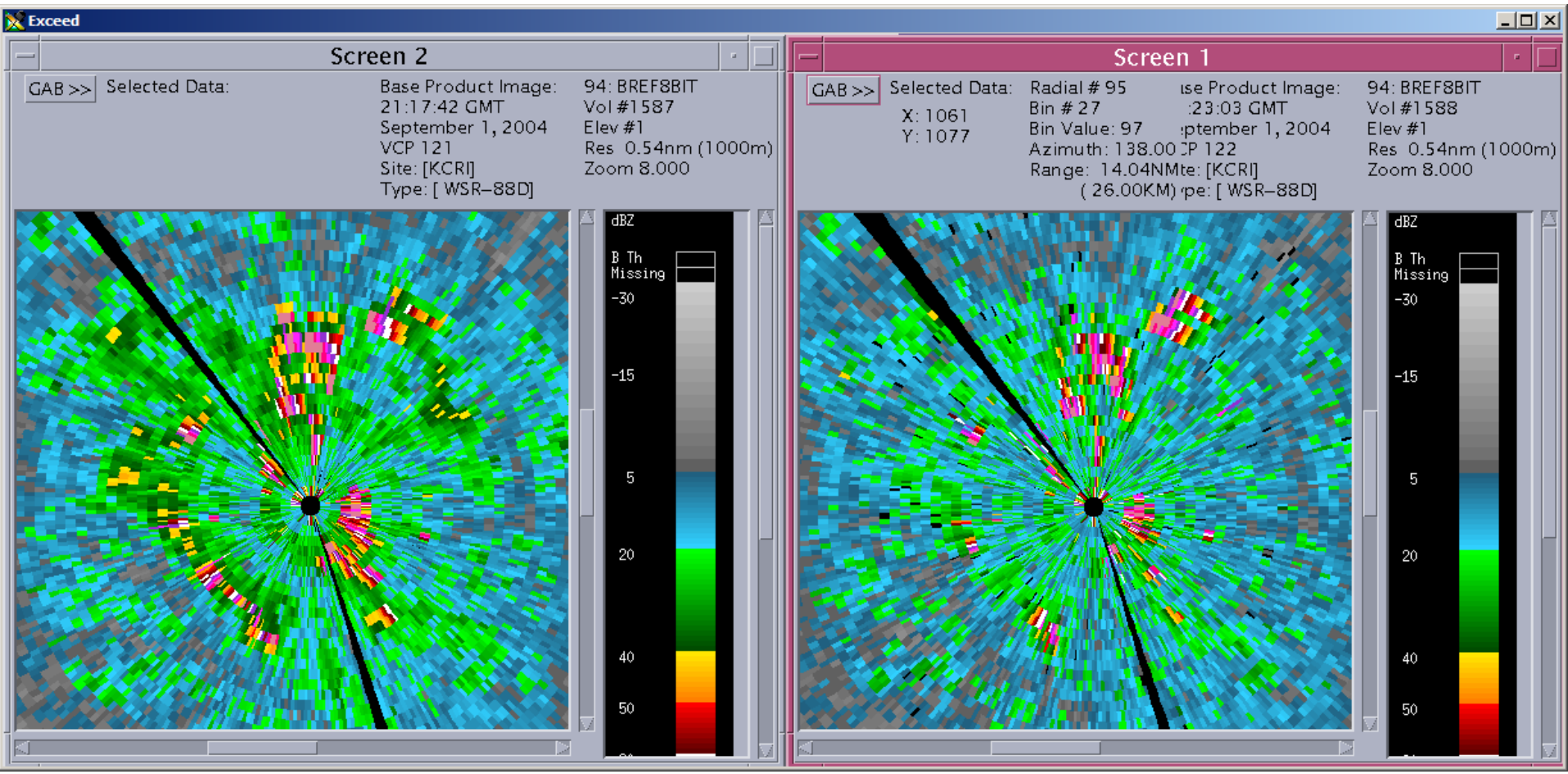
# ORPG Build 6 Software Release Change to VCP 121 and Multi-PRF Dealiasing Algorithm (MPDA) - Eliminate noisy rings via adaptable parameter changes.



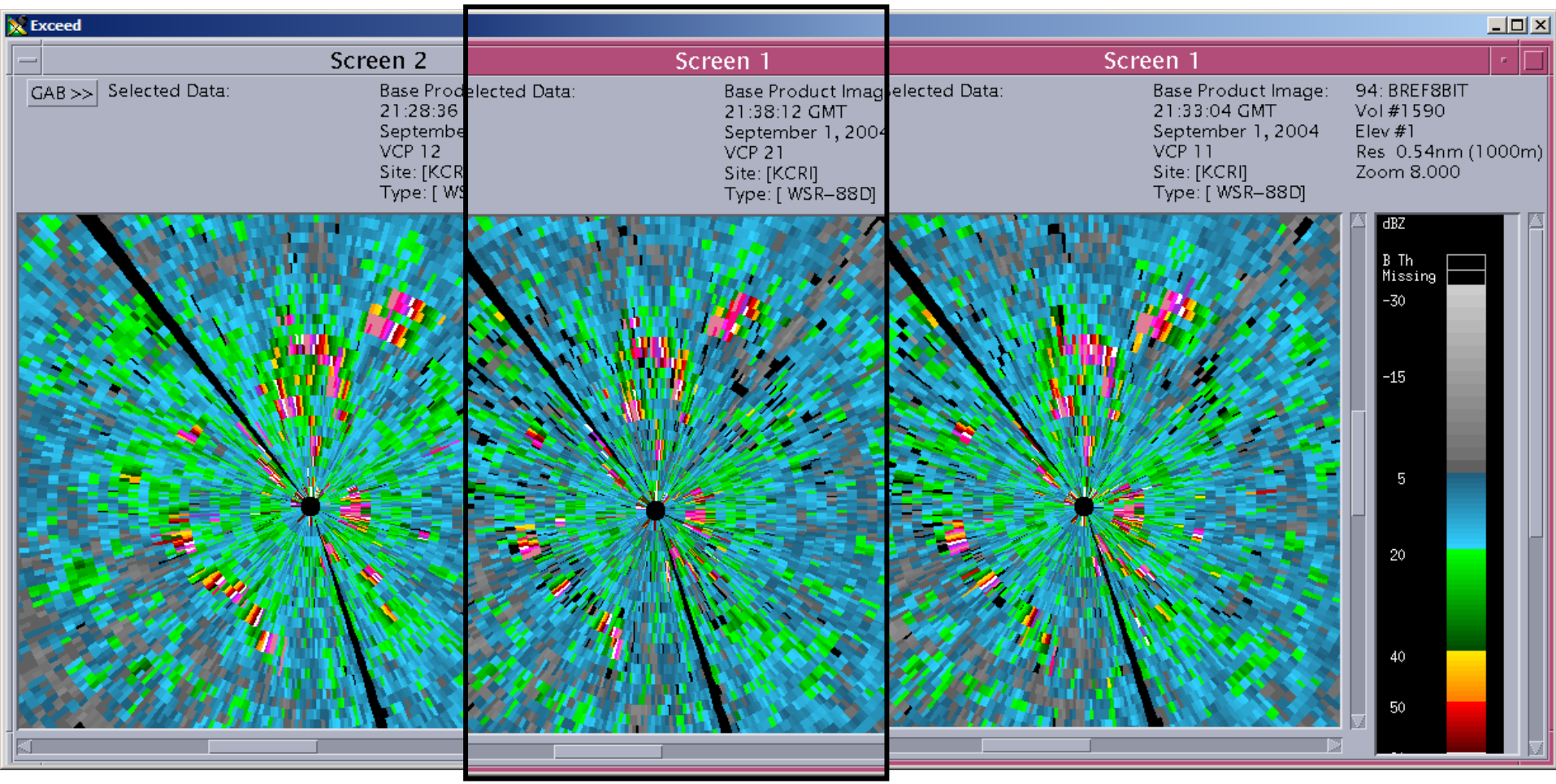
ORPG Build 7 change to VCP 121/MPDA: Increase number of pulses in surveillance cuts at 0.5 and 1.5 degrees elevation from 11 to 15 to improve clutter suppression. (Adds 10 secs to volume scan time.

**VCP 121** **VCP 121 (modified)**



# Clutter Suppression for VCP 121 is now comparable to other Precipitation Mode VCPs

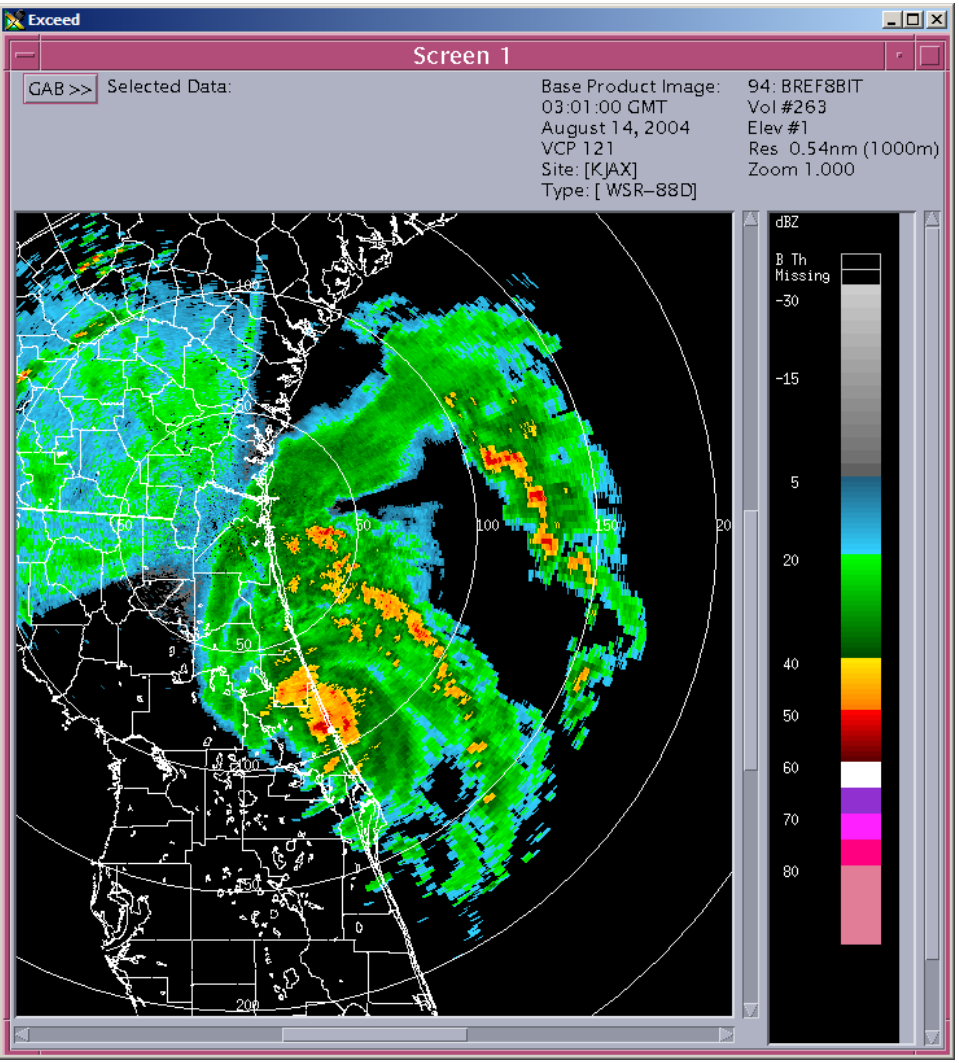
VCP 12 VCP 21 VCP 11

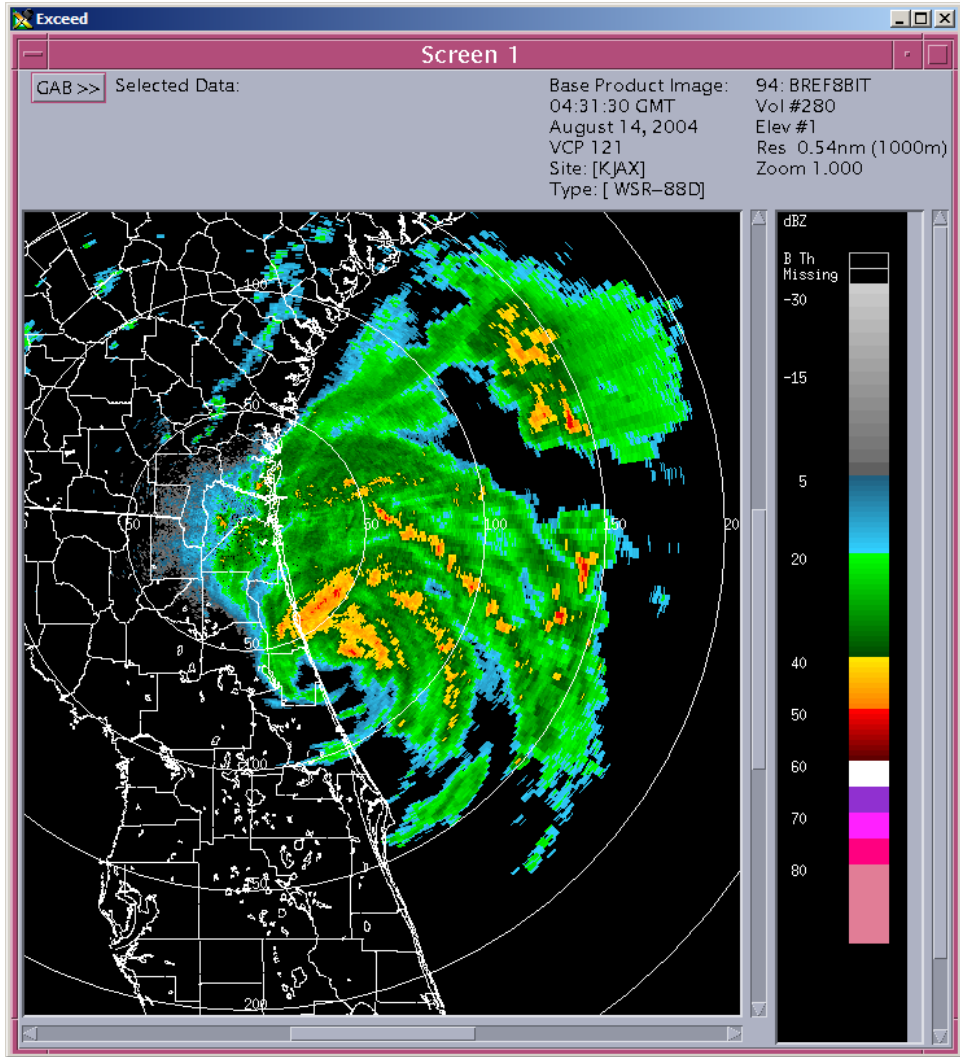
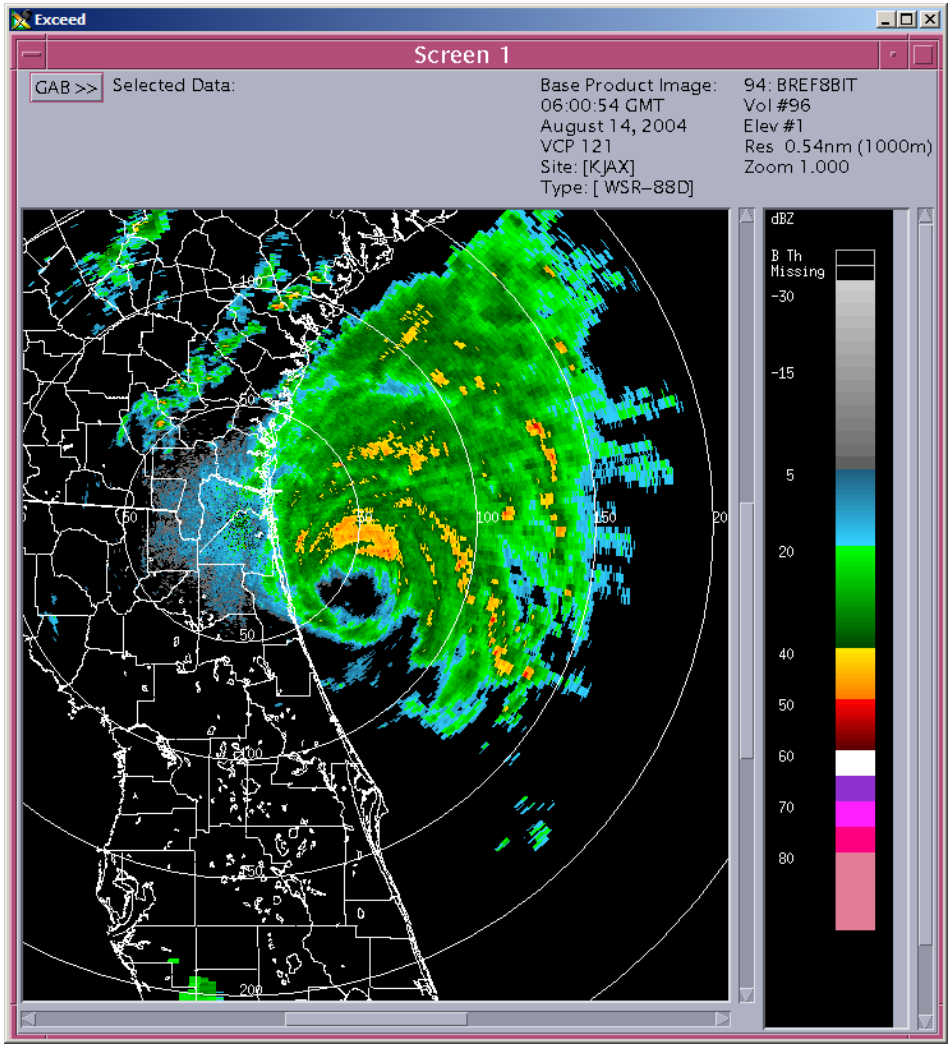
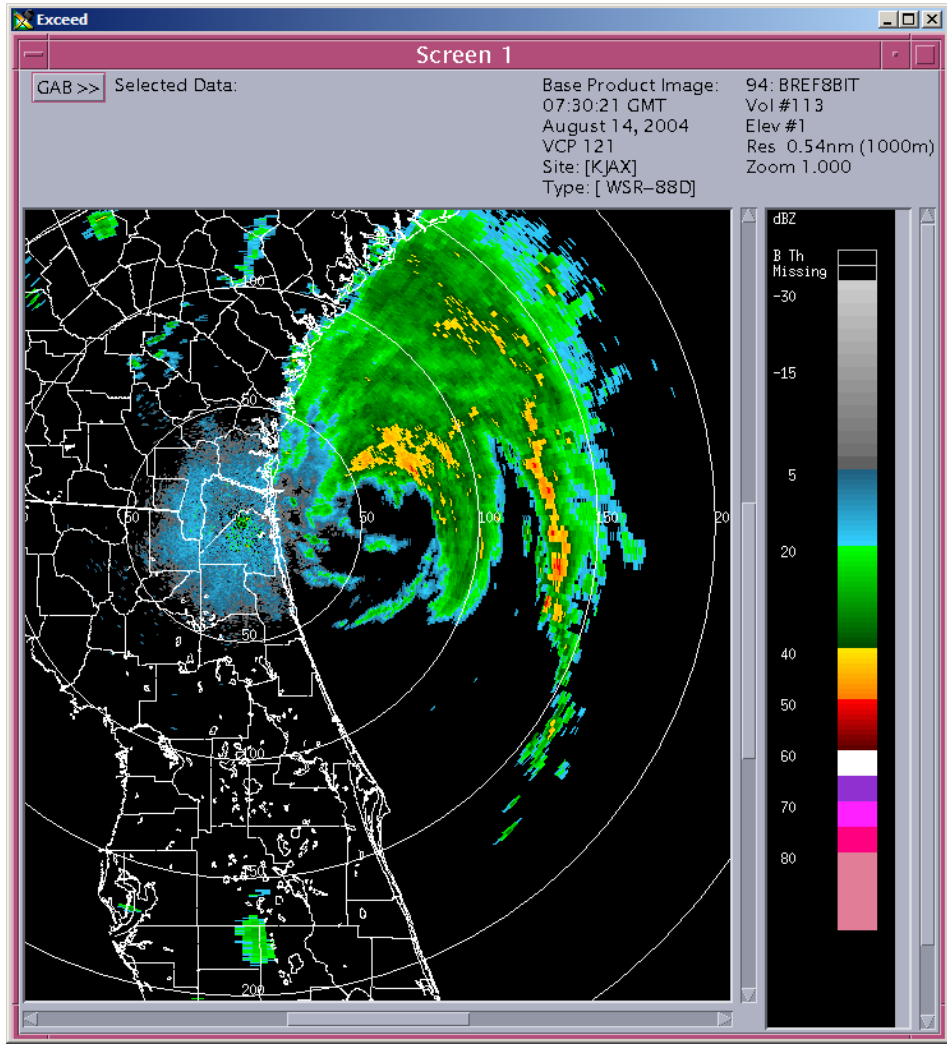


# Summary

- The new VCPs are gaining acceptance and are being incorporated into daily operations.
- In ORPG Builds 6 and 7 the ROC has corrected minor  deficiencies.

# Supplemental 8-bit Reflectivity products from Jacksonville, FL WSR-88D For Hurricane Charley at 03:01Z and 04:31Z 14 Aug 04.






Supplemental 8-bit Reflectivity products from Jacksonville, FL WSR-88D
For Hurricane Charley at 06:00Z and 07:30Z 14 Aug 04.