Storm-Based Auto PRF

April 2014

Joe Chrisman

Joe.n.chrisman@noa.gov

Storm-Based Auto PRF Functional Overview

- The PRF Selection Function selects the 3^1 most significant storms based on the highest storm-based VIL **(Storms must have a VIL > 20 kg/m^2)**
- The "forecast positions" from SCIT are used to project where these storms will be next volume scan
- The Auto PRF algorithm:
  - Calculates a "storm circle" for each storm. The "storm circle" is defined as the boundary of a 20km radius circle around the projected storm location
  - Calculates the area of "obscured" data within each "storm circle" for each Doppler PRF
  - Selects the PRF that results in the smallest obscured area within the "storm circles"
  - Downloads the modified VCP to the RDA <u>which takes affect the NEXT Volume Scan</u>
  - Each subsequent volume scan, selects the top 3 storms
  - Recalculates the "storm circles" based on the new projected location for each storm
  - Repeats these steps until the one of the following conditions are satisfied:
    - there are no storms identified by the SCIT algorithm[2], or
    - the operator selects a different PRF option
- Note*[1]: The function will track and process up to 3 storms. If there are fewer than 3 storms then use the number of storms available.
- Note*[2]: If no storms meet the VIL threshold, Auto PRF Elevation is used.

Overview – How it Works

- Storm-Based Auto PRF

  USES

  – Reflectivity data form the **CURRENT** volume scan

  AND

 – Storm Cell location and VIL information from the **PREVIOUS** volume scan

  TO

 – Determine the BEST PRF for the **NEXT** volume scan

KICT Concern Case

- KICT was concerned that during the developing convective event during the evening of Apr 2, Storm-Based Auto PRF was not behaving as expected.

- I replayed the Level II data to determined what happened.

- The following few slides (four provided with the original question from KICT) explain the behavior of Storm-Based Auto PRF for this event.
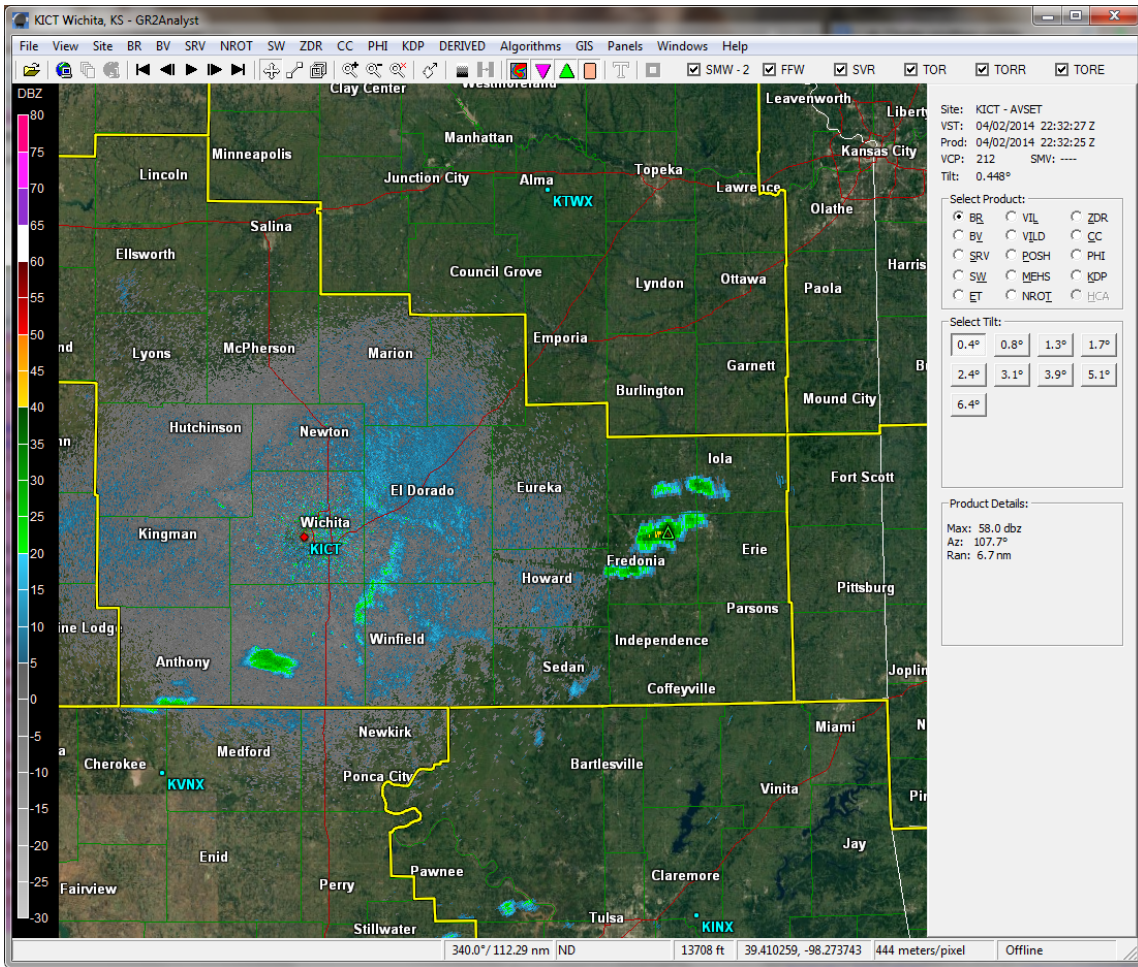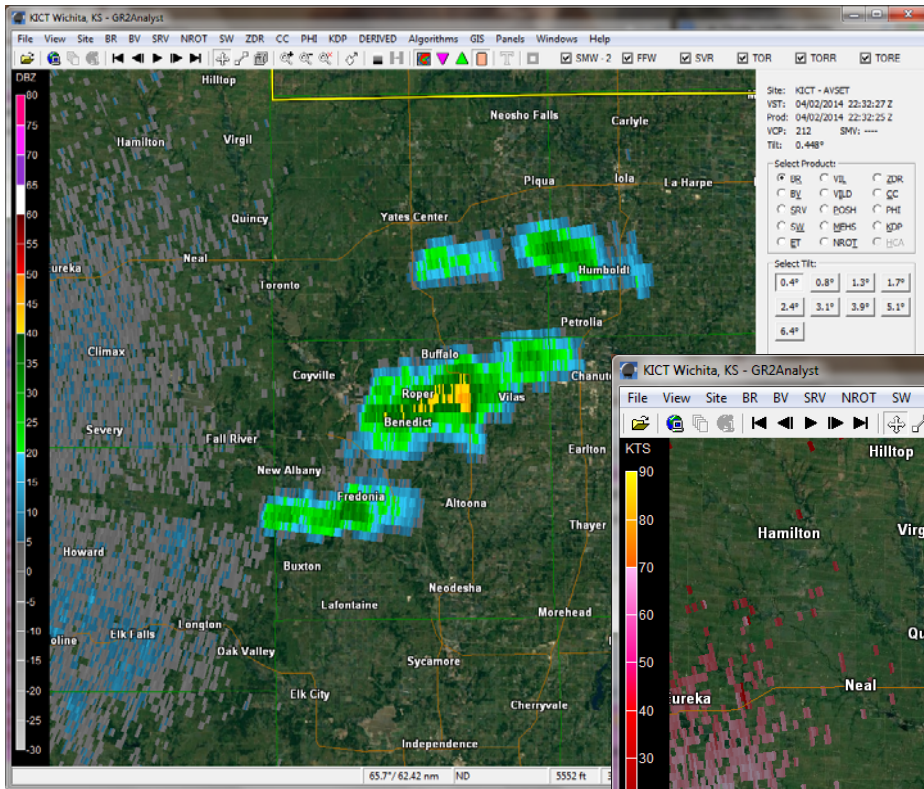
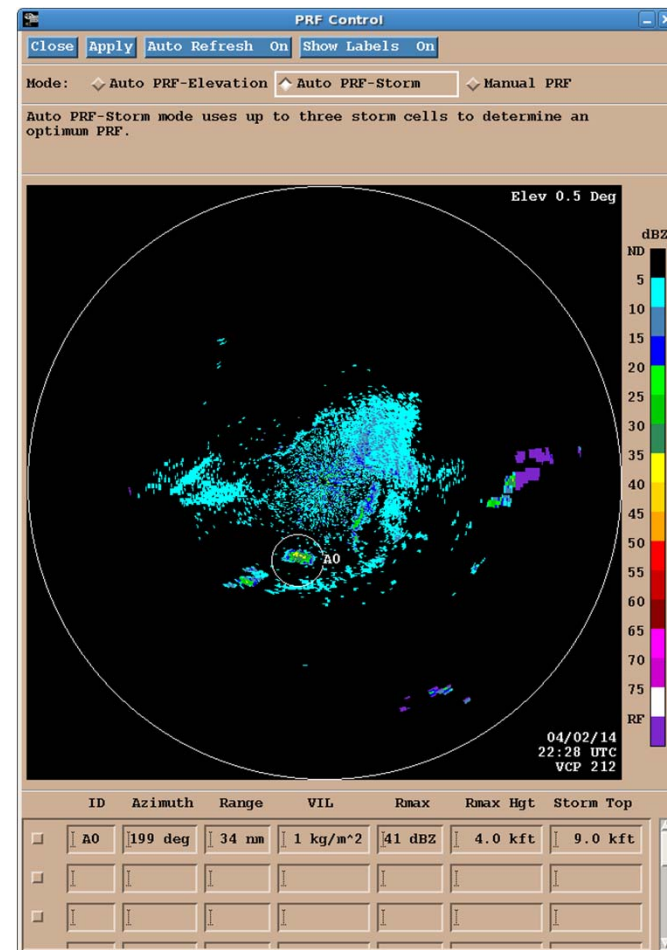2232Z – Wide Image of what was going on in the area.
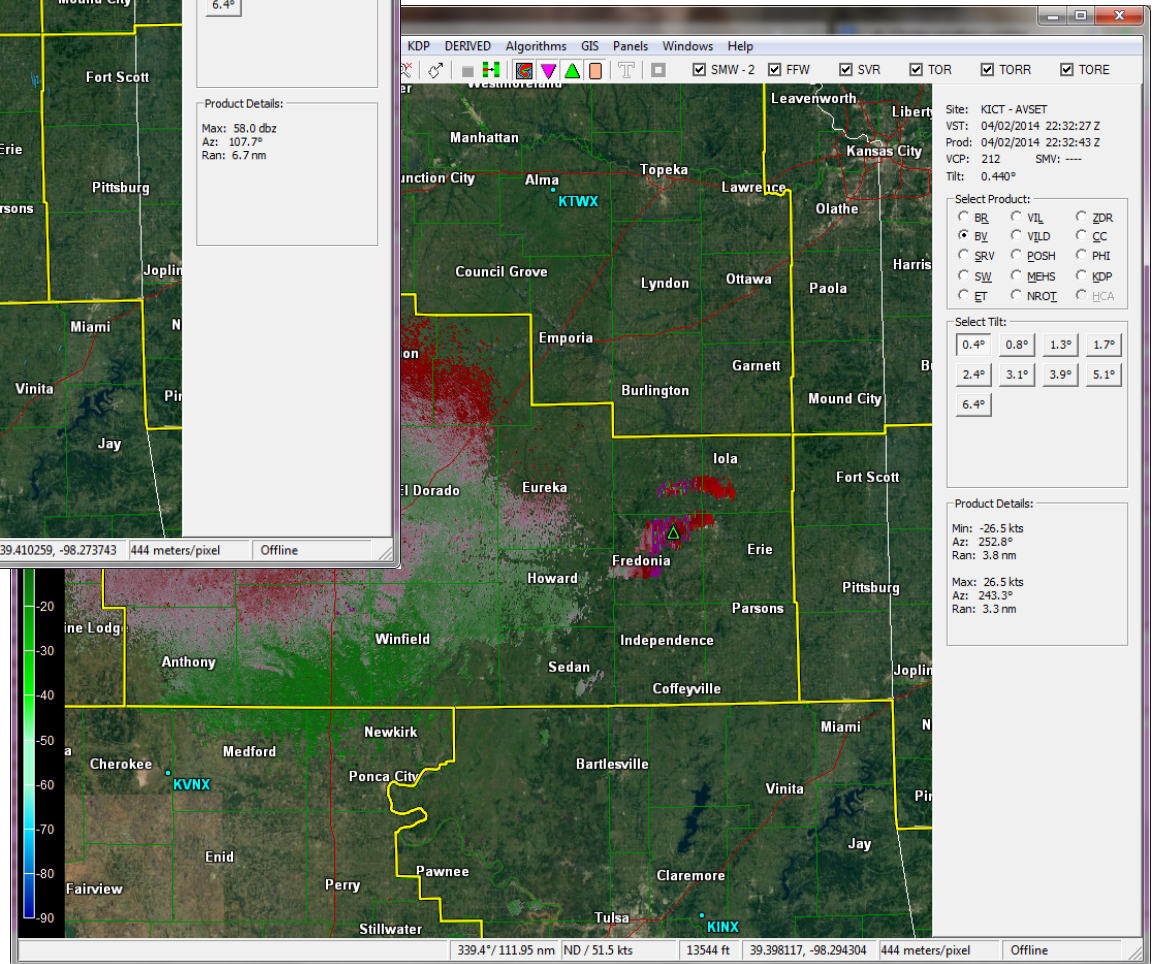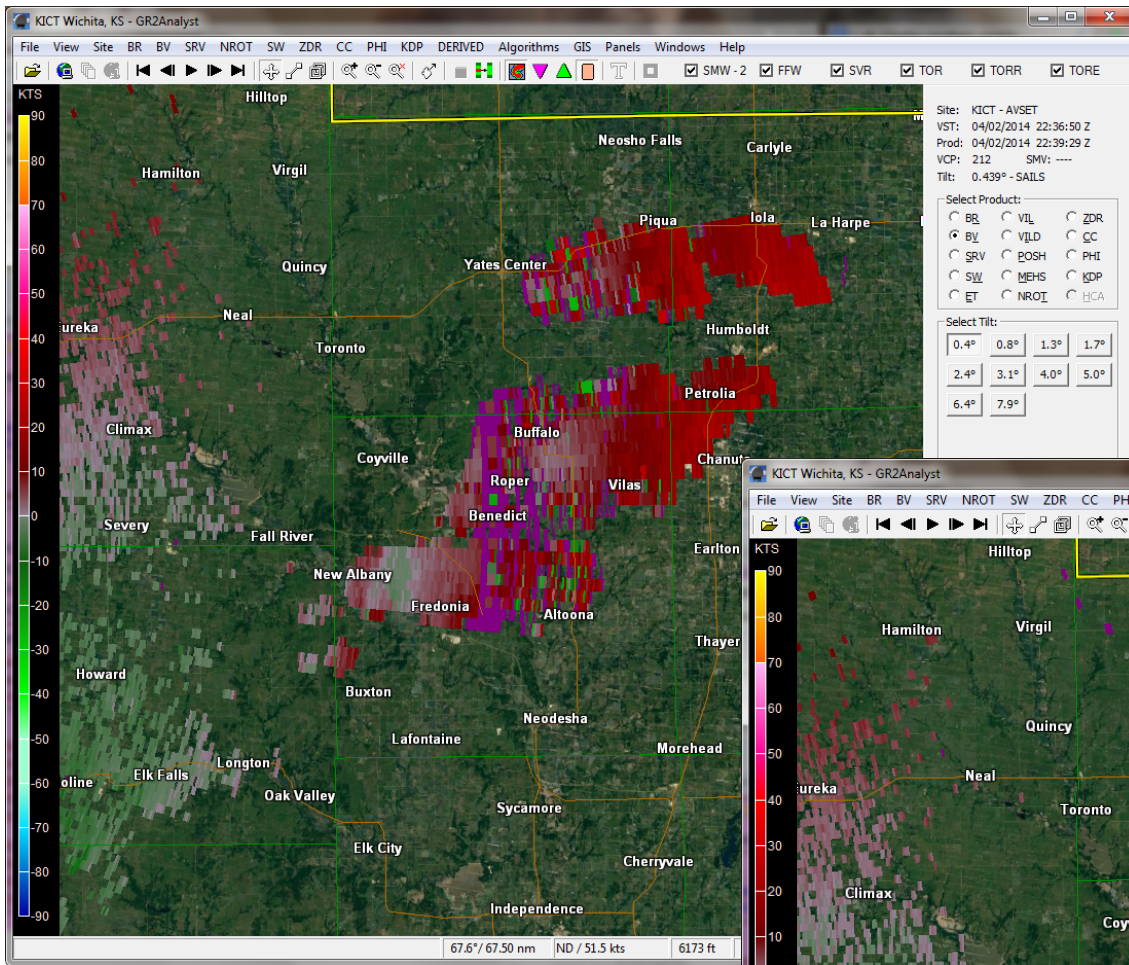
2232Z Image zoomed in
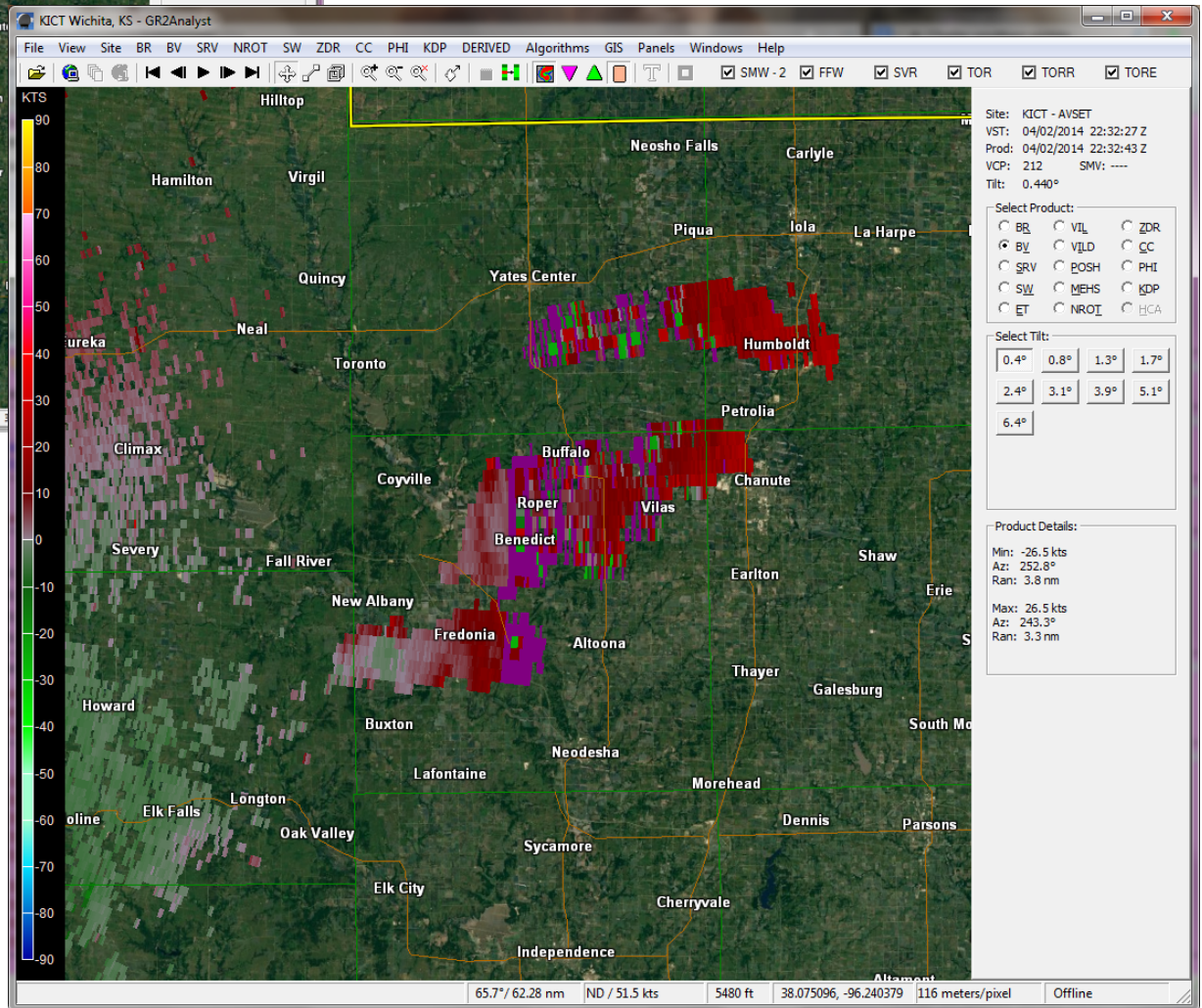
Obvious Question: Why is the ONLY cell on the display range folded?

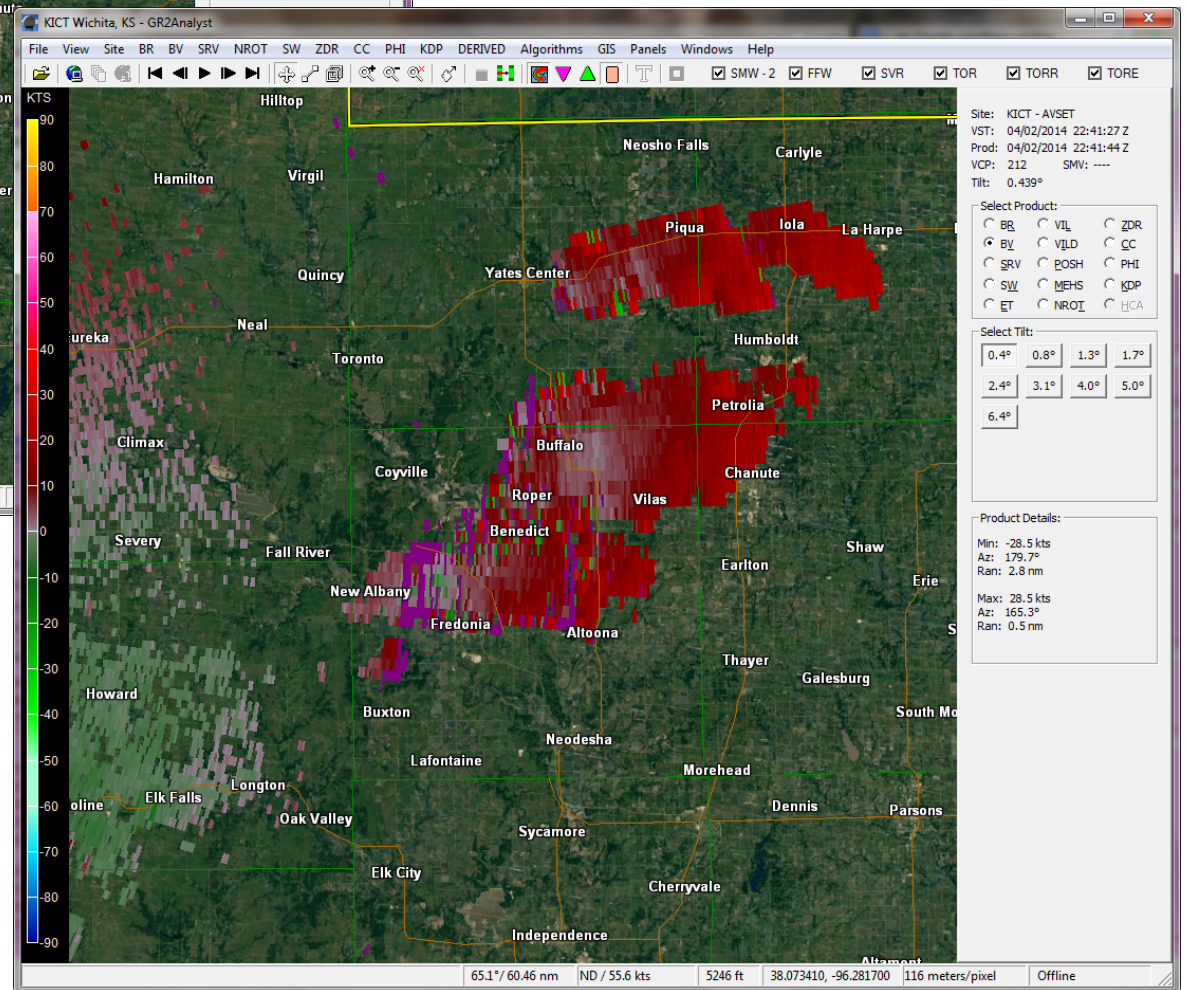The PRF for this volume scan was determined LAST volume scan (22:28)

- Only Cell was 1 kg/m^2

    (From 22:22)

- Not considered by SBAP

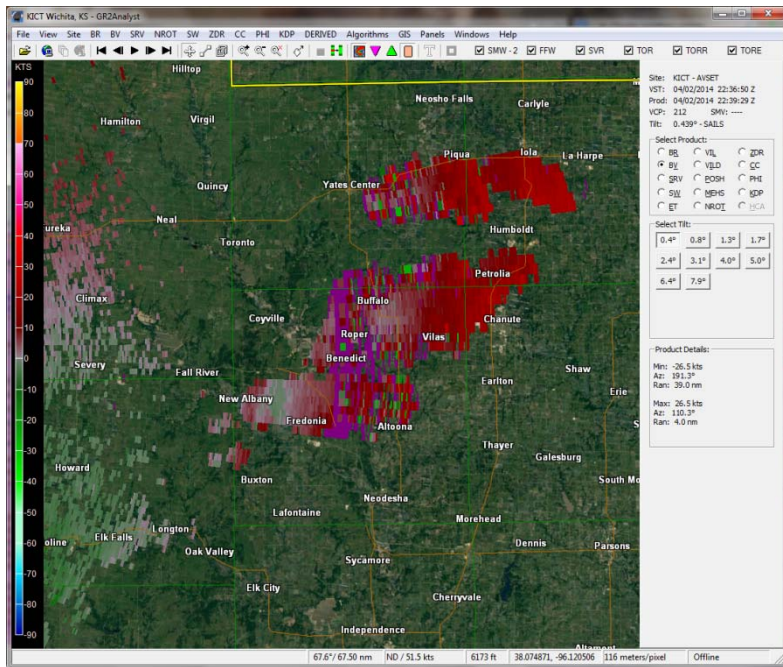Auto PRF-Elevation (Legacy) Algorithm used to determine PRF for this volume scan.
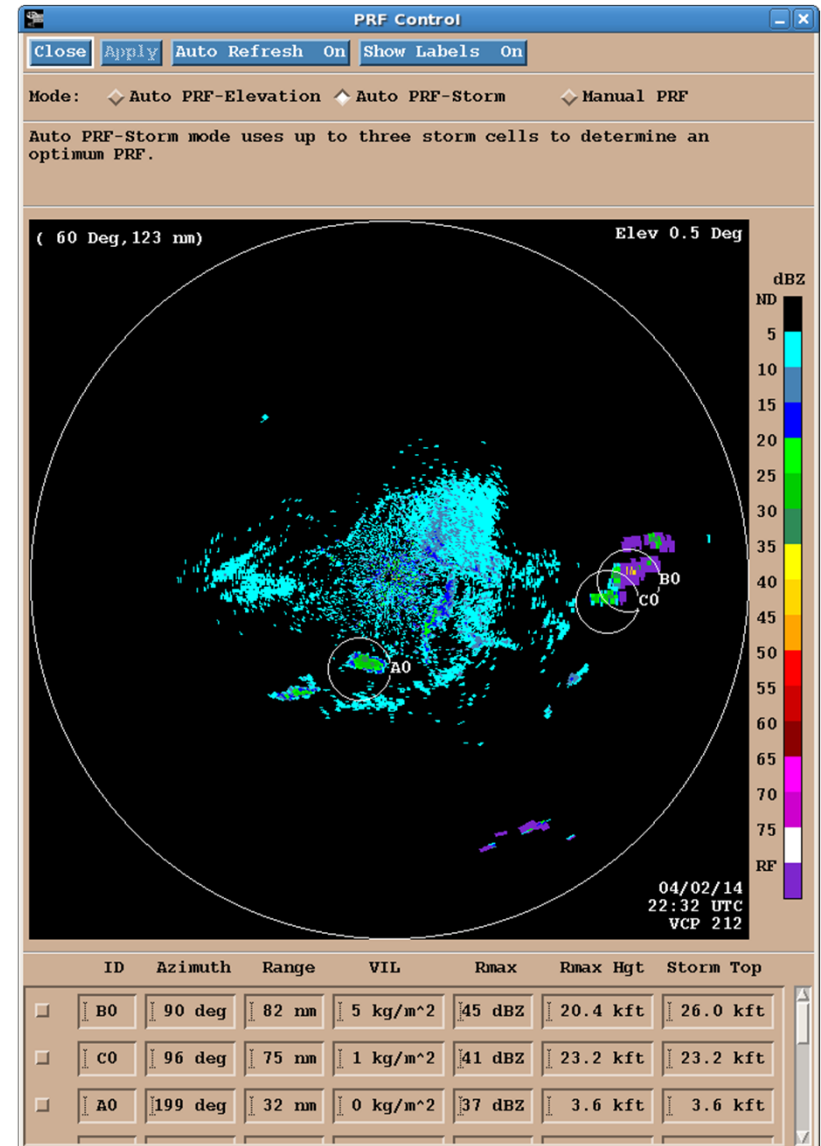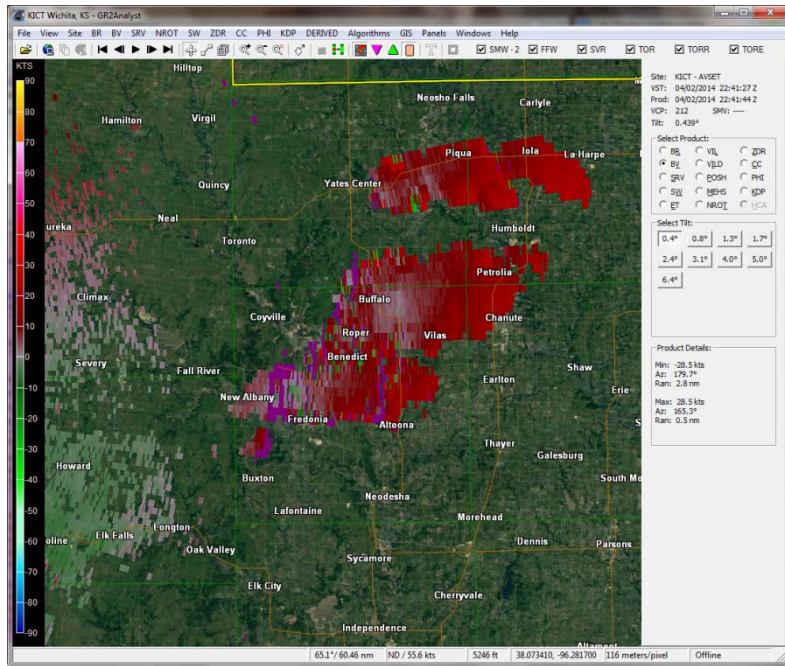
2236Z – Left
2241Z - Below

Lets Look at 22:36

The PRF for this volume scan was determined from 22:32

- All 3 Cells < 20kg/m^2
  (From 22:28)
- Not considered by SBAP

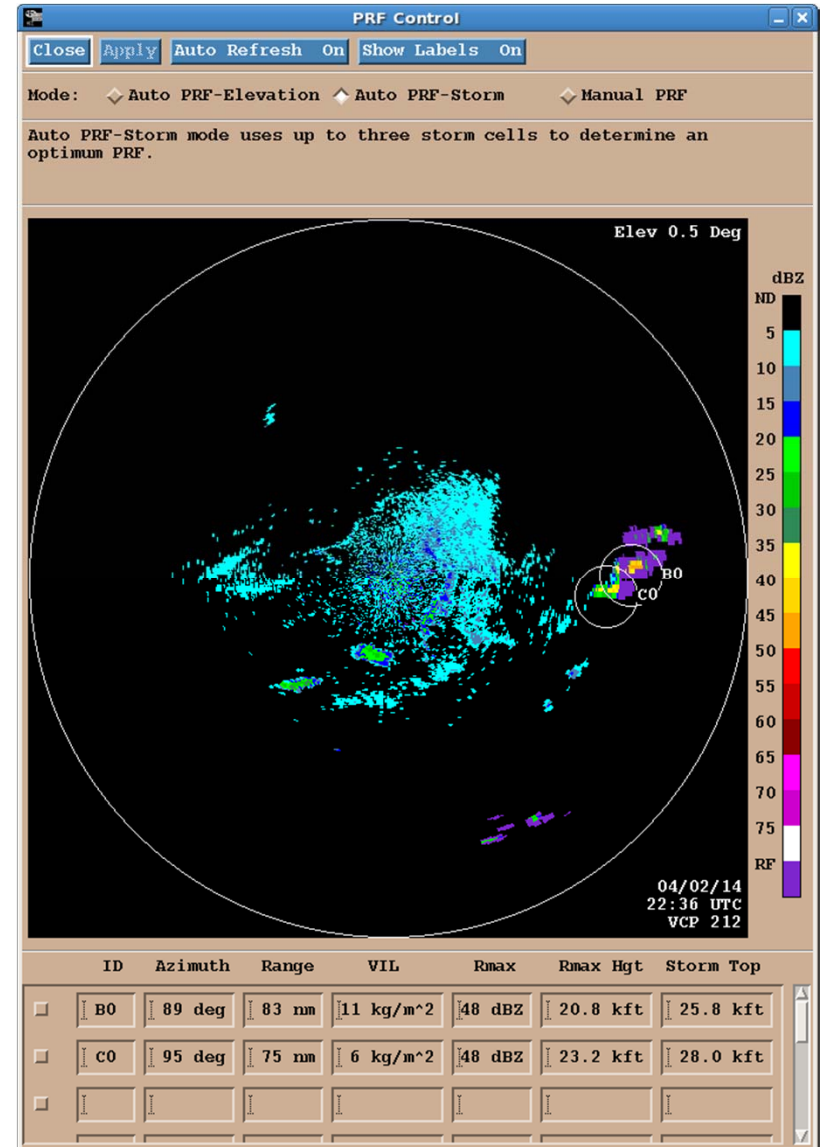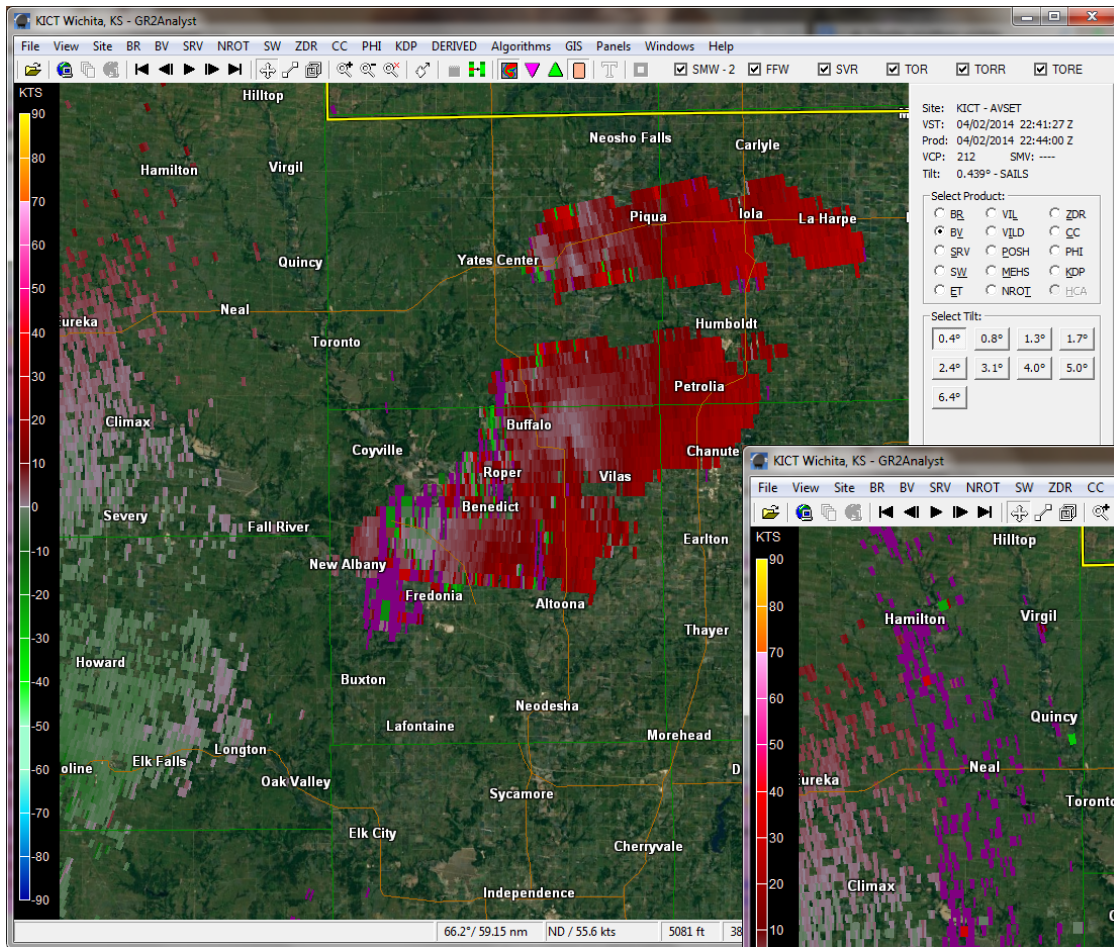Auto PRF-Elevation (Legacy) Algorithm used to determine PRF
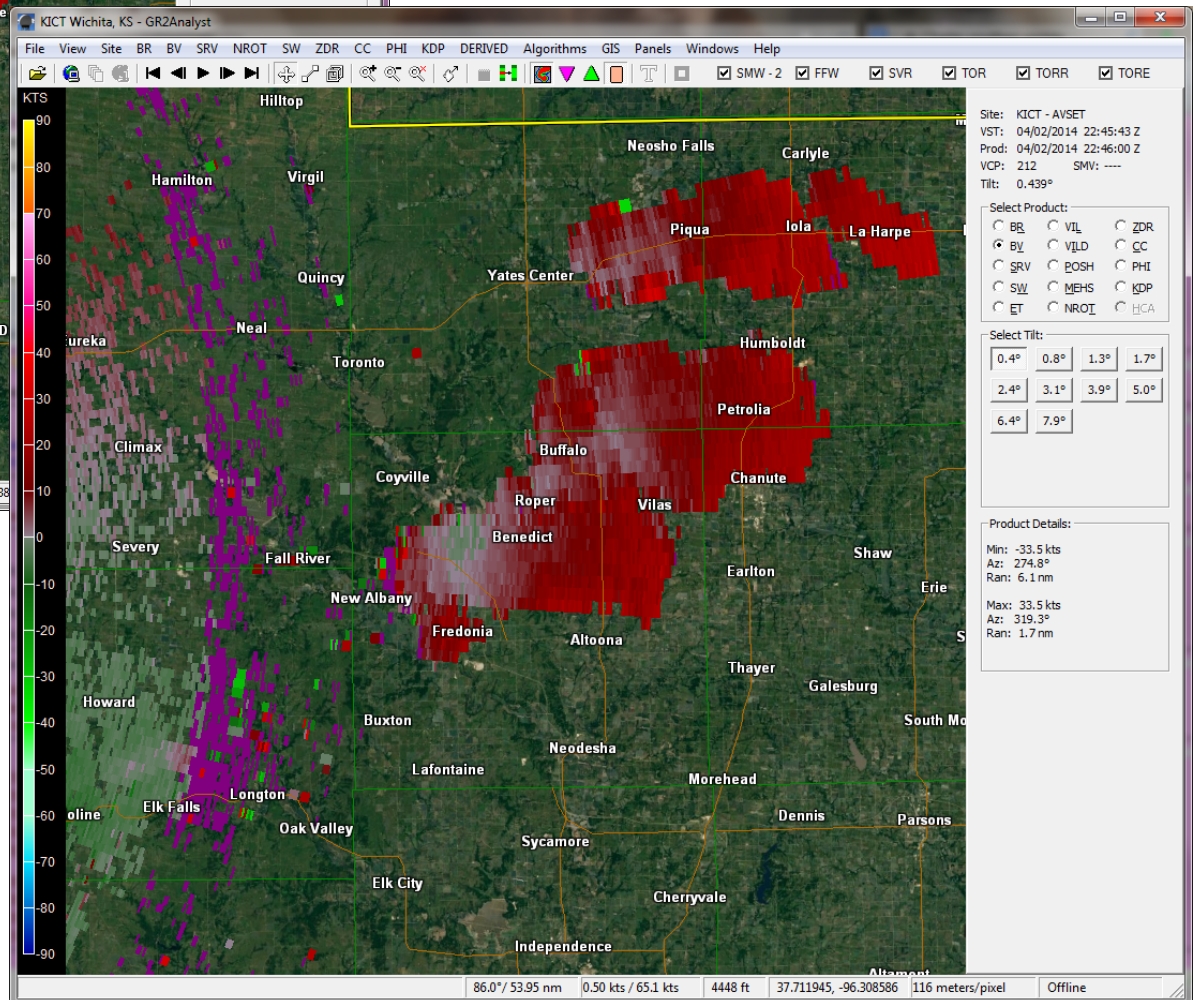
Lets Look at 22:41

The PRF for this volume scan was determined from 22:36

- Both Cells < 20kg/m² (From 22:32)
- Not considered by SBAP

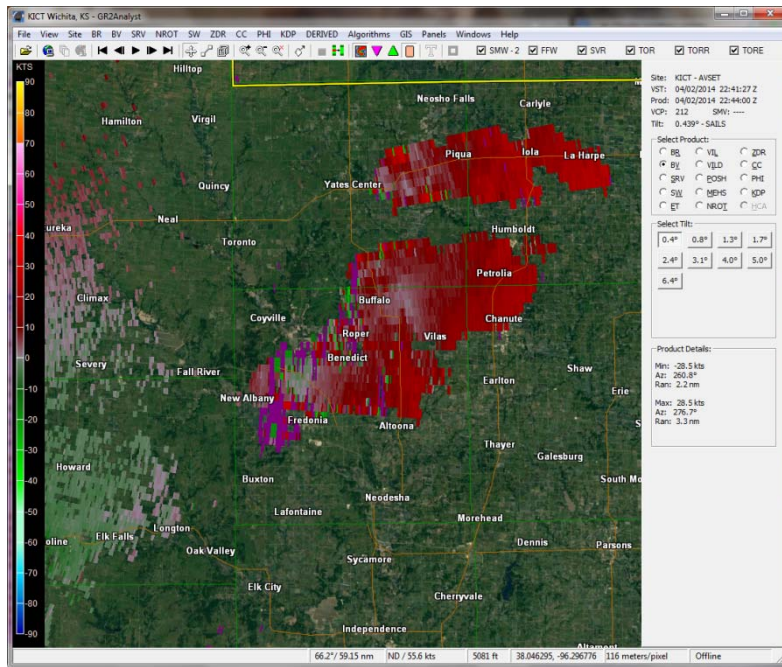Auto PRF-Elevation (Legacy) Algorithm used to determine PRF

2244Z – Left (Multi-Storm)
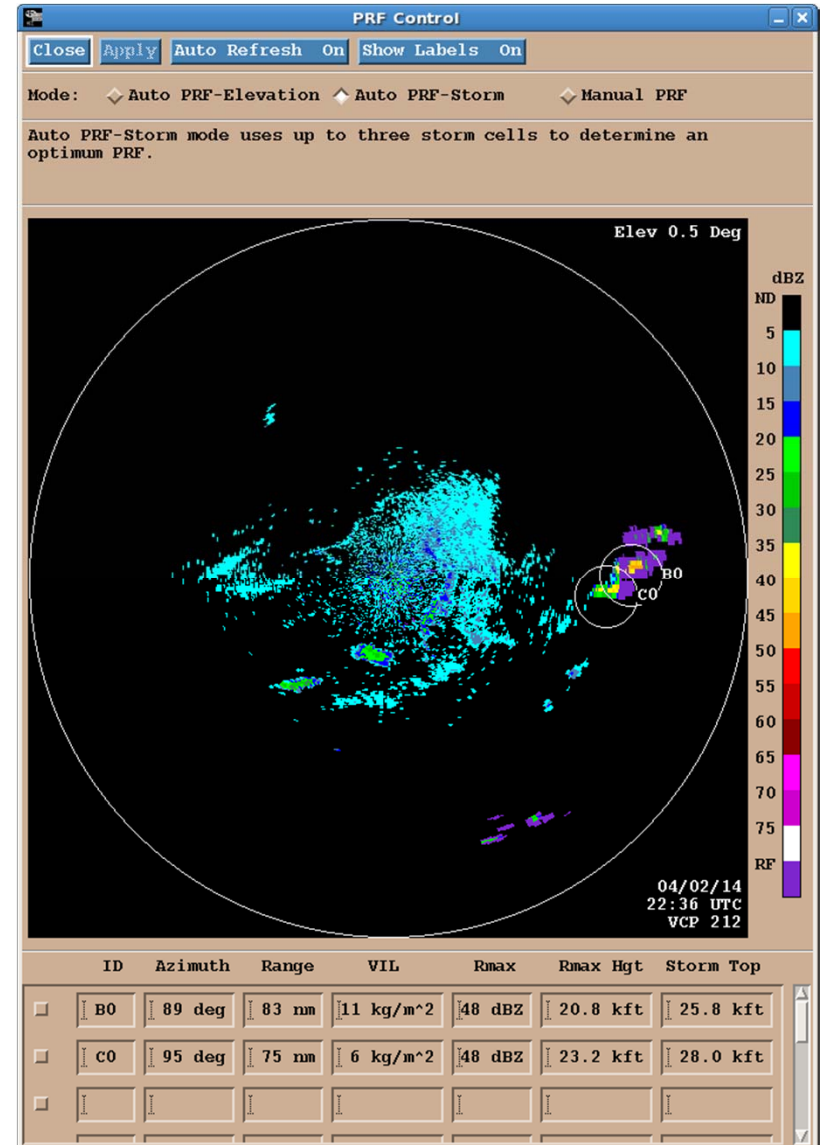2246Z – Below (Multi-elevation)

I can't be 100% sure this is when we changed the PRF, but it looks like what I recall it doing when we did.
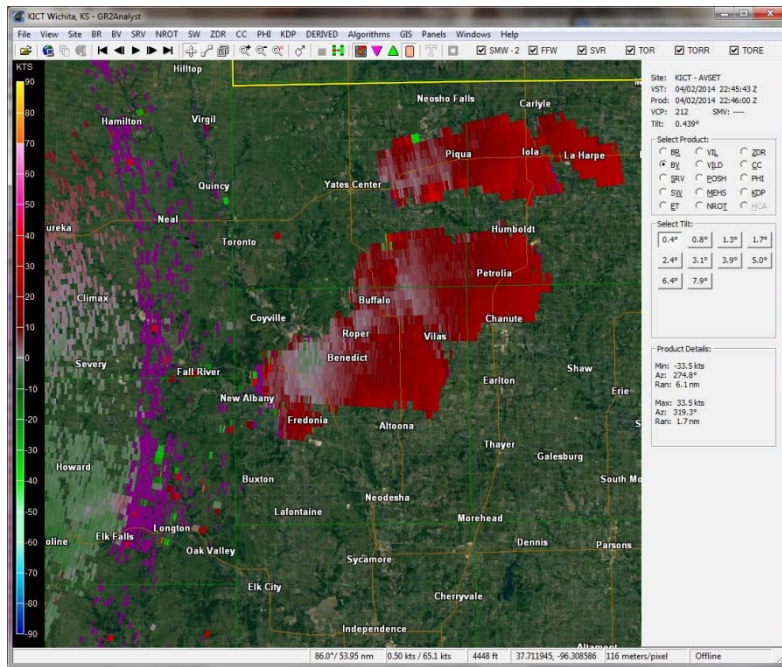
22:44

This product appears to be the SAILS cut from the 22:41 Volume Scan

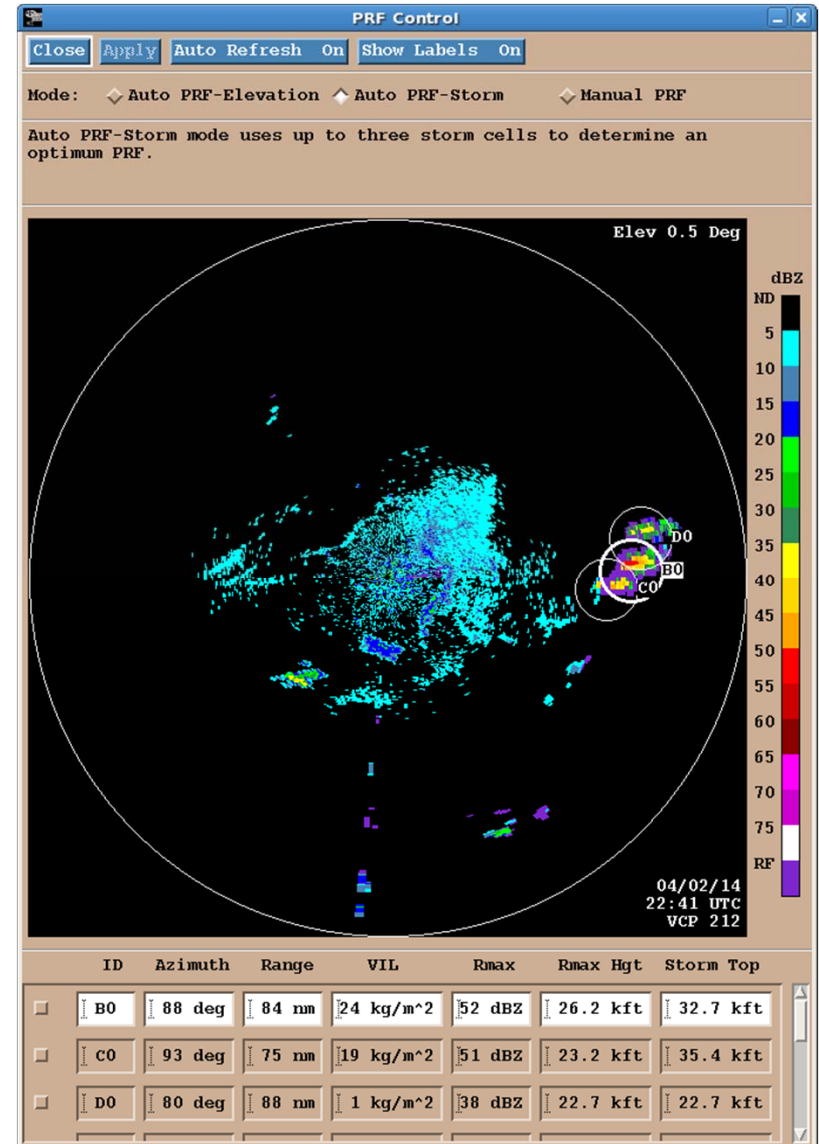By design, the SAILS Doppler cut uses the same PRF as the base Doppler cut

Lets Look at 22:46

The PRF for this volume scan was determined from 22:41
- 1 Cell > 20kg/m² (From 22:36)
- SBAP chose PRF 8 (63nm)

(Auto PRF-Elevation would have Selected PRF 7 for this data)

Summary

- Storm-Based Auto PRF behaved as designed for this period
- The only volume scan during this period when Storm-Based Auto PRF actually executed was 22:41
  - PRF 8 (63nm) was applied to 22:45
  - All other volume scans used Auto PRF-Elevation for PRF
- During the 22:45 volume scan Auto PRF-Elevation was selected by the operator. This resulted in PRF 6 (73nm) for 22:49. NOTE: Storm-Based Auto PRF would have selected PRF 8 (63nm)