Storm-Based Auto PRF

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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 which takes affect the NEXT Volume Scan
  - 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 from 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/m² (From 22:22)
- Not considered by SBAP Auto PRF-Elevation (Legacy) Algorithm used to determine PRF for this volume scan.
2236Z – Left
2241Z - Below
Let's look at 22:36

The PRF for this volume scan was determined from 22:32
- All 3 Cells < 20kg/m² (From 22:28)
- Not considered by SBAP

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