Automated Volume Scan Evaluation and Termination (AVSET)

Overview: The basic premise of the AVSET function is to terminate the current volume scan after the radar has scanned all the elevations with important return. In other words, once the data collection elevation overshoots the available radar return the volume scan is terminated (because there is no benefit realized by continuing the execution of the current volume scan) and a new volume scan is begun.

Proposal: Calculate the areal coverage of significant return present on each elevation angle above 5.0° and, if the amount of significant return fails to exceed the predefined thresholds, command an "end of volume scan". This commanded "end of volume scan" causes the system to enter its normal transition (RDA antenna retrace, RPG conclude algorithm processing and product generation) to prepare for the start of a new volume scan.

The net affect of AVSET is to shorten the elapse time between data collection on low elevation angles during periods when no significant data are available on the higher elevation tilts.

Additional Information:

To ensure adequate vertical coverage to support precipitation accumulation processing, the AVSET process will only run on elevations higher than 5.0°.

The following conditions must be met before the AVSET process will terminate a volume scan:

- The areal coverage of reflectivity above *30 dBZ* must be less than *30 km^2* and
- The areal coverage of reflectivity above *18 dBZ* must be less than *80 km^2* and
- The areal coverage of reflectivity above *38 dBZ* must be less than *8 km^2* and
- The change in areal coverage of *18 dBZ* and higher be less than *12 km^2*

The AVSET-commanded volume scan termination would emulate the normal "end of volume scan" processing as opposed to the restart volume scan process.

AVSET can be used with all precipitation mode volume coverage patterns.

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Pseudo Code

For each elevation above 5.0°,

Sum the areal coverage of all reflectivity gates whose reflectivity is above Sig_High_Ref. Assign this sum to High_R_Areal_Coverage;

Sum the areal coverage of all reflectivity gates whose reflectivity is above Sig_Min_Ref. Assign this sum to Min_R_Areal_Coverage;

Sig_R_Present = TRUE
  if, High_R_Areal_Coverage is less than or equal to Sig_High_R_Areal_Coverage
    and
   Min_R_Areal_Coverage is less than or equal to Sig_Min_R_Areal_Coverage;
 then, Set Sig_R_Present to FALSE

if, the Sig_R_Present flag is FALSE, then command the "End of Volume";

  else, process next elevation;

end;

Variables	Type	Default
Sig_High_Ref (dBZ)	integer	30
Sig_Min_Ref (dBZ)	integer	18
Sig_High_R_Areal_Coverage (km^2)	integer	30
Sig_Min_R_Areal_Coverage (km^2)	integer	80
High_R_Areal_Coverage (km^2)	integer	0
Min_R_Areal_Coverage (km^2)	integer	0
Sig_R_Present	TRUE/FALSE	TRUE

Note: The formula used to calculate the areal coverage for each 1km bin is as follows:
1/2(R_end_of_bin * R_end_of_bin - R_start_of_bin * R_start_of_bin)*(pi/180)

Backup Info

Background: Currently WSR-88D VCPs are designed to automatically and continuously scan predefined elevation angles regardless of the areal coverage or significance of the return present on those elevations.

WSR-88D volume coverage patterns are distinguished by the number of elevation angles sampled and the total time required to complete the elevation sequence (e.g., VCP 11 samples 14 elevations in 5 minutes). These predefined scanning sequences provide updates for each elevation angle once within the defined VCP scanning time interval.