Supplemental Adaptive Intra-Volume Low-Level Scan (SAILS)

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Operational Need

- Operator survey results
  - Over 62% of respondents rate faster Volume Coverage Pattern (VCP) updates (more frequent low elevation updates) as the "Most Important VCP Improvement" the ROC could provide

AVSET

- The Automated Volume Scan Evaluation and Terminal (AVSET) function was a good first step in meeting this operational need
- AVSET Limitation
  - When storms are close to RDA, AVSET does not reduce VCP completion times (does not provide more frequent low-level updates)
  - Possible remedy for this limitation is Supplemental Adaptive Intra-Volume Low-Level Scan (SAILS)
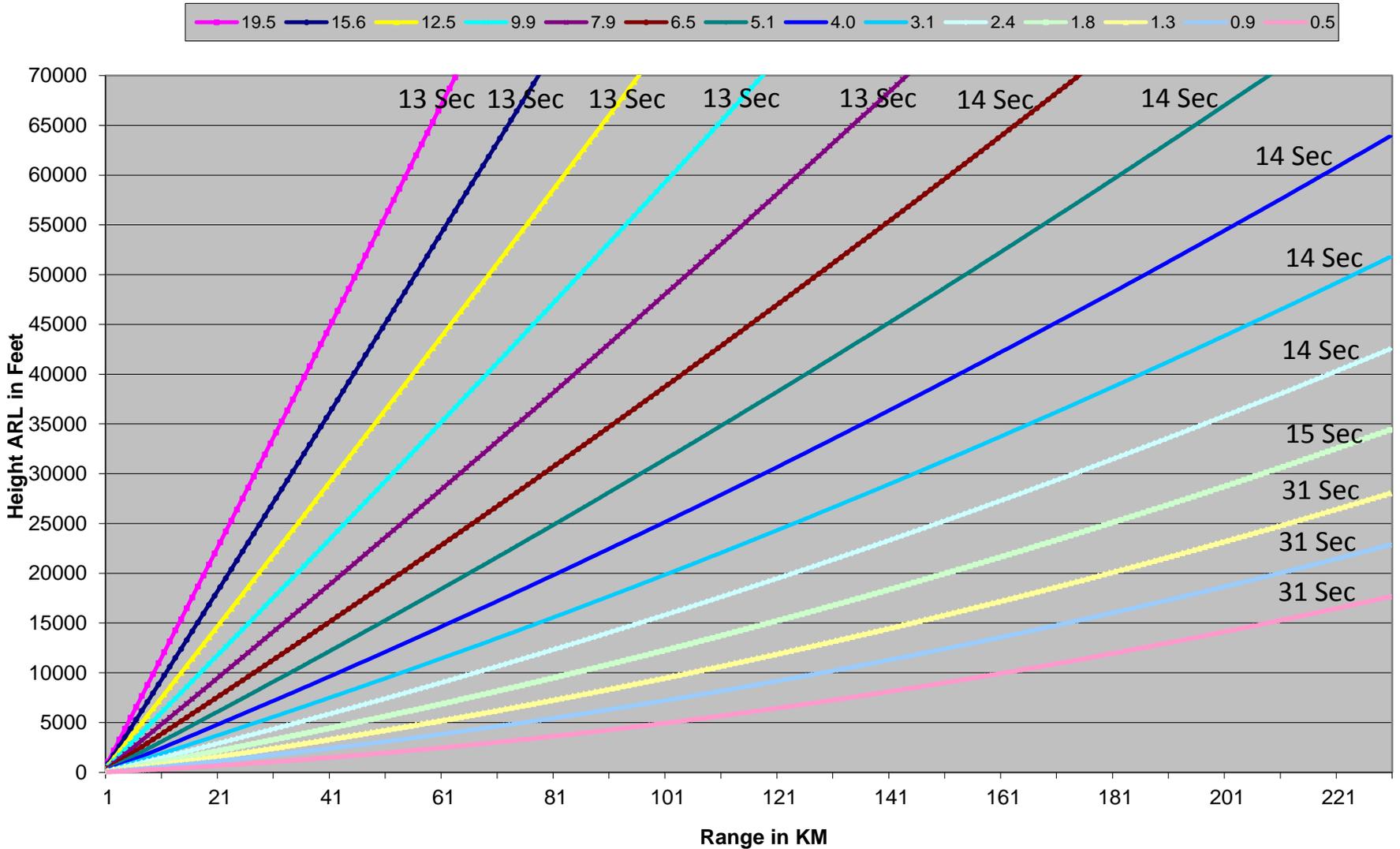
Supplemental Adaptive Intra-Volume Low-Level Scan (SAILS)

- Concept
  - Add a new 0.5° scan to existing severe weather VCPs 12 and 212
  - Insert this new low-level scan into the "middle" of the volume scan
    - The "middle" is adaptive because volume scan completion times vary due to AVSET

SAILS – 0.5° VCP Updates Rate: Every ~140 seconds (~105 seconds w/ AVSET)

SAILS VCP Completion Times ~285 seconds (~210 seconds w/ AVSET)

VCP 12
Completion Time ~ 180 to 250 Seconds

Legend: 19.5 | 15.6 | 12.5 | 9.9 | 7.9 | 6.5 | 5.1 | 4.0 | 3.1 | 2.4 | 1.8 | 1.3 | 0.9 | 0.5

Chart: Height ARL in Feet (y-axis, 0 to 70000) vs Range in KM (x-axis, 1 to 221)

Annotations: 13 Sec, 13 Sec, 13 Sec, 13 Sec, 13 Sec, 14 Sec, 14 Sec, 14 Sec, 14 Sec, 14 Sec, 15 Sec, 31 Sec, 31 Sec, 31 Sec

Elevation Angles (VCP 12)	VCP 12 Elevation Duration	Termination Angle = 19.5	AVSET Termination Angle = 15.6	AVSET Termination Angle = 12.5	AVSET Termination Angle = 10.0	AVSET Termination Angle = 8.0	AVSET Termination Angle = 6.4
0.5°	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec
0.9°	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec
1.3°	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec	31 Sec
1.8°	15 Sec	15 Sec	15 Sec	15 Sec	15 Sec	15 Sec	15 Sec
0.5°						31 Sec	31 Sec
2.4°	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec
0.5°				31 Sec	31 Sec		
3.1°	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec
0.5°		31 Sec	31 Sec				
4.0°	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec
5.1°	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec
6.4°	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec	14 Sec
8.0°	13 Sec	13 Sec	13 Sec	13 Sec	13 Sec	13 Sec	
10.0°	13 Sec	13 Sec	13 Sec	13 Sec	13 Sec		
12.5°	13 Sec	13 Sec	13 Sec	13 Sec			
15.6°	13 Sec	13 Sec	13 Sec				
19.5°	13 Sec	13 Sec					
Duration	243 Sec	274 Sec	261 Sec	248 Sec	235 Sec	222 Sec	209 Sec
0.5 Elevation Update Times	243 Sec *	136 Sec and 138Sec *	136 Sec and 125 Sec *	122 Sec and 126 Sec *	122 Sec and 113 Sec *	108 Sec and 114 Sec *	108 Sec and 101 Sec *

* Plus Retrace Time

Benefits of SAILS

- Significantly reduces low level scan update rate
- Provides more low level "looks" during severe weather operations
  - Current VCP 12 provides 14–20 0.5° scans per hour
  - SAILS VCP 12 will provide 25–33 0.5° scans per hour
- Only extends volume scan completion time by ~35 seconds
  - VCP 12 still executes in less than 5 mins (~280 sec)
- Easily implemented into WSR-88D
- No Anticipated Hard Costs

SAILS Implementation

- Insert a Split Cut into the "middle" of VCP 12 and 212
  - Split Cut Completion Time ~31 seconds
    - Surveillance scan = ~17 sec
    - Doppler scan = ~14 sec)
- Split Cut Supports
  - Best GMAP clutter filtering
  - Super Resolution data processing

SAILS Implementation (Cont)

- Initially new 0.5° data
  - Used to generate Z/V/W base products and Dual Pol variables (ZDR/KDP/CC)
  - Included in Level II data stream
  - NOT used by RPG algorithms
- Future
  - Algorithm developers can use the Level II data stream to enhance/correct/rewrite algorithms
  - Algorithm updates can be included in a future RPG build

Concerns

- Will increase bandwidth usage
  - Testing is required to quantify how much
  - If additional bandwidth required project will incur Hard Costs
- Impacts to external users systems unknown at this time
- Another VCP selection (option)

Questions
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BACKUP

Split Cut

- Completion time ~31 Sec
  - Surveillance = ~ 17 Sec
  - Doppler = ~14 Sec
- Supports GMAP Filtering
- Super Resolution
- Range unambiguous R data available
- Range unambiguous Dual Pol variables

Batch Cut

- Completion time ~30 Sec
  - Slow rotation to allow adequate Z samples to support GMAP filtering
- Azimuthal spacing does not support Super Res
- Range ambiguous R data
- Range ambiguous Dual Pol variables

BACKUP

Z only Cut

- Completion time ~17 Sec
- Supports GMAP Filtering
- Super Resolution Reflectivity only
- Dual Pol variables
- No Doppler data

V Only Cut

- Completion time ~14 Sec
- Supports GMAP Filtering
- Super Resolution Reflectivity and Doppler data
- Range unfolding relies on ~2 minutes old power data
- Range ambiguous R data
- No Dual Pol variables