# **RDA/RPG Build 16.0**

# Training

	SAILS		
	Algorithm	s	
6.4	Close Save Undo Baseline: Restore Update		<u>_</u>
	Adaptation Item Dual-Pol Precip	Descriptions	
LASI	Name	Value	Range
	Zdr/Z Coefficient for Z	0.0067	0.0067, 0.0142, (Tropical
	Zdr/Z Exponent for Z	0.927	0.927, 0.770, (Tropical,
	Zdr/Z Exponent for Zdr	-3.43	-3.43, -1.67, (Tropical,
	GR Multiplier	0.8	0.1 <= x <= 2.0
	HA Multiplier	0.8	0.1 <= x <= 2.0
	DS Multiplier	2.8	1.0 <= x <= 2.8
	DS Multiplier Below ML Top	1.0	0.8 <= x <= 1.2
	IC Multiplier	2.8	1.0 <= x <= 2.8
	WS Multiplier	0.6	0.1 <= x <= 2.0
	Reflectivity Threshold for use of R(Kdp) in Heavy Rain	45.0	40.0 <= x <= 50.0, dBZ
	Maximum Reflectivity	53.0	45.0 <= x <= 60.0, dBZ
	PAIF Area Threshold	80	0 <= x <= 82800, km^2
	PAIF Rate Threshold	0.5	0.0 <= x <= 50.0, mm/hr
	DP Max Precip Rate	200.0	50.0 <= x <= 500.0, mm/hr
	Number of Exclusion Zones	0	0 <= x <= 20
	Exclusion Zone Limits # 1 - Begin Azimuth #1	0.0	0.0 <= x <= 360.0, degree
	- End Azimuth #1	0.0	0.0 <= x <= 360.0, degree
	- Begin Range #1	0	0 <= x <= 124, nm

# Presented by the Warning Decision Training Division

Overview	Build 16.0 is an upgrade for both the RDA and the RPG. Though this build is primarily an RPG hard- ware upgrade, there are some RPG software changes that affect operations.
Unit Radar Committee	The Build 16.0 changes at the RPG may affect Unit Radar Committee (URC) decision making. Coordination among URC members with respect to how Build 16.0 impacts URC protocols is encouraged.
	The information presented in this document reflects the pre-deployment state of knowledge of the operational impacts of Build 16.0.
RDA/RPG Build 16.0 Operational	The following Build 16.0 operational changes are presented in this document:
Impacts	<ul> <li>Supplemental Adaptive Intra-Volume Low-Level Scan (SAILS) updates:</li> <li>RPG HCI main page SAILS cut indicator</li> <li>Dual-Pol products generated for SAILS cut</li> <li>Multiple Elevation Scan Option (MESO) SAILS Field Test</li> <li>Last elevation on RPG HCI main page</li> <li>For Dual-Pol Quantitative Precipitation Estimation (QPE):</li> <li>Editable multiplier for Dry Snow (DS) below the top of the melting layer</li> <li>Reflectivity threshold for use of R(Kdp) in Heavy Rain</li> <li>Maximum precipitation Array (DAA) generated at the top of each hour</li> <li>ZDR bias estimator based on Bragg scatter</li> <li>Automated Microburst Detection Algorithm</li> </ul>
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• RPG GUI changes for sites with wideband backup service

SAILS is a powerful tool for use with VCPs 12 or 212 to increase the update frequency of the lowest elevation (usually 0.5°) products.

When SAILS is active for VCPs 12 or 212, it is not apparent when the SAILS cut is executed within the volume scan. With both SAILS and Automated Volume Scan Evaluation and Termination (AVSET) active, the SAILS cut is executed between different elevation angles. Build 16.0 includes a change to the RPG HCI main page to identify the SAILS elevation within a volume scan. The first 0.5° scan will continue to have the 0.5° label on the radome. When the SAILS scan is executed, "SAILS" is displayed on the radome (Figure 1).





Figure 1. First 0.5 scan (left) and SAILS scan (right) indicators on the radome at the RPG HCI.

When SAILS was originally fielded, the products generated for the SAILS cut were limited to the legacy base data, the 8 bit Reflectivity (SDR), Velocity (SDV), and Spectrum Width (SDR), and the legacy data Array products, DR, and DV. At the time, resources were insufficient to perform the necessary testing to include the Dual-Pol products.

Build 16.0 provides default generation of the following Dual-Pol **base** products:

## Dual-Pol Products Generated for SAILS Cut

**SAILS Updates** 

**RPG HCI Main Page** 

SAILS Cut Indicator

Warning Decision Training Division				
	<ul> <li>DZD, 8 bit (256 data levels) Differential Reflec- tivity (ZDR)</li> </ul>			
	DCC, 8 bit (256 data levels) Correlation Coefficient (CC)			
	<ul> <li>DKD, 8 bit (256 data levels) Specific Differen- tial Phase (KDP)</li> </ul>			
	Build 16.0 provides default generation of the fol- lowing Dual-Pol <i>derived</i> products:			
	<ul> <li>DHC, 8 bit (256 data levels) Hydrometeor Classification (HC)</li> </ul>			
	<ul> <li>ML, Melting Layer overlay product</li> </ul>			
	In addition to these Dual-Pol products, the 8 bit legacy products from the SAILS cut will be available by request via the WAN OTR.			
	This increase in SAILS cut products is scheduled for inclusion to the national VCP 12 and 212 RPS lists. Check the status of the national lists before editing any local lists.			
MESO-SAILS Field Test	In order to build upon the success of the imple- mentation of SAILS, the next step in dynamic scanning is the Multiple Elevation Scan Option for SAILS, or MESO-SAILS. MESO-SAILS allows for the choice of 1, 2 or 3 SAILS cuts within a VCP 12 or 212 volume scan. When the 3 scan option is chosen, 0.5° products (legacy and Dual-Pol) will update about every 75 to 90 seconds, depending on the termination angle selected by AVSET.			
	Following the deployment of Build 16.0, a MESO- SAILS Field Test will be conducted for one year. The goal of the MESO-SAILS Field Test is to assess added value to the hazardous weather warning process. Radar data (level 2) and prod-			

ucts (level 3) generated by the Field Test sites will be available through the same distribution channels as all routine data/products. Thus the legacy and Dual-Pol products from multiple SAILS cuts will be distributed for the participating sites:

<ul> <li>Oklahoma City, OK (KTLX)</li> </ul>	
<ul> <li>Tulsa, OK (KINX)</li> </ul>	
<ul> <li>El Paso, TX (KEPZ)</li> </ul>	
<ul> <li>Dodge City, KS (KDDC)</li> </ul>	
<ul> <li>Wichita, KS (KICT)</li> </ul>	
<ul> <li>Goodland, KS (KGLD)</li> </ul>	
<ul> <li>Raleigh, NC (KRAX)</li> </ul>	
<ul> <li>Cleveland, OH (KCLE)</li> </ul>	
<ul> <li>Albany, NY (KENX)</li> </ul>	
<ul> <li>Charleston, WV (KRLX)</li> </ul>	
<ul> <li>Morehead City, NC (KMHX)</li> </ul>	
<ul> <li>Glasgow, MT (KGGW)</li> </ul>	
<ul> <li>Phoenix, AZ (KIWA)</li> </ul>	
In anticipation of the MESO-SAILS Field Test, the SAILS button on the RPG HCI main page has changed. In addition to indicating whether SAILS is ACTIVE or INACTIVE, the button indicates the number of SAILS cuts within the volume scan (Fig-	SAILS Control Window
ure 2). For the non-Field Test sites, the button will	

VCP:	R212/A
AVSET:	ENABLED
SAILS:	ACTIVE/1
PRF Mode:	MULTI-STORM



Clicking on the SAILS button reveals the SAILS Control window, which allows for the selection of the number of SAILS cuts within a volume scan.

show ACTIVE/1 while in VCP 12 or 212.

Selecting 0 cuts is the same as disabling SAILS. When MESO-SAILS is allowed, such as for the Field Test sites, this window will include selections for up to 3 SAILS cuts (0, 1, 2, or 3). This SAILS Control window was included with Build 16.0 to support the MESO-SAILS Field Test (Figure 3).



Figure 3. SAILS Control window, with the option of 0 or 1 SAILS cuts within a volume scan.

## Last Elevation on RPG HCI Main Page

The use of the Automated Volume Scan Evaluation and Termination (AVSET) feature motivated a need to determine when the current volume scan will end. With Build 16.0, the radome on the RPG HCI main page will display LAST when the final elevation angle for the current volume scan is being sampled, whether AVSET is active or not (Figure 4).



Figure 4. LAST on the radome used to indicate the final elevation.

# Dual-Pol QPE Updates

Editable Multiplier for DS Below Top of Melting Layer

Dry Snow (DS), as identified by the Hydrometeor
 Classification Algorithm (HCA), is one of the
 hydroclass values used by the QPE with differing

multipliers  $[x^*R(Z)]$ . The multiplier used is dependent on the hydroclass value and the location of the range bin with respect to the melting layer [as identified by the Melting Layer Detection Algorithm (MLDA)]. For the case where DS is identified below the top of the melting layer, R(Z) is used with a default multiplier of 1. Build 16.0 allows for editing of this multiplier, based on guidance from the ROC (Figure 5).

Algorithn	ns	
Close Save Undo Baseline: Restore Update		
Adaptation Item Dual-Pol Precip 👱	Descriptions	
Name	Value	Range
Zdr/Z Coefficient for Z	0.0067	0.0067, 0.0142, (Tropical
Zdr/Z Exponent for Z	0.927	0.927, 0.770, (Tropical,
Zdr/Z Exponent for Zdr	-3.43	-3.43, -1.67, (Tropical,
GR Multiplier	0.8	0.1 <= x <= 2.0
HA Multiplier	0.8	0.1 <= x <= 2.0
DS Multinlier	ר <u>ז</u> פ	10 <- x <- 28
DS Multiplier Below ML Top	1.0	0.8 <= x <= 1.2
ic nutcipiter	2.0	1.0 2.0
NS Multiplier	0.6	0.1 <= x <= 2.0
NS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain	0.6	0.1 <= x <= 2.0 $40.0 <= x <= 50.0, dBZ$
WS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain Maximum Reflectivity	0.6           45.0           53.0	$\begin{array}{c} 1.0 < - x < - 2.0 \\ \hline 0.1 < = x < = 2.0 \\ \hline 40.0 < = x < = 50.0, \ dBZ \\ \hline 45.0 < = x < = 60.0, \ dBZ \end{array}$
NS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain Maximum Reflectivity PAIF Area Threshold	0.6       45.0       53.0       80	$\begin{array}{c} 1.0 < -x < -2.0 \\ \hline 0.1 < = x < = 2.0 \\ \hline 40.0 < = x < = 50.0, \ dBZ \\ \hline 45.0 < = x < = 60.0, \ dBZ \\ \hline 0 < = x < = 82800, \ km^2 \end{array}$
NS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain Maximum Reflectivity PAIF Area Threshold PAIF Rate Threshold	2.0       0.6       45.0       53.0       80       0.5	1.0 <= x <= 2.0 0.1 <= x <= 2.0 40.0 <= x <= 50.0, dBZ 45.0 <= x <= 60.0, dBZ 0 <= x <= 82800, km <sup>2</sup> 0.0 <= x <= 50.0, mm/hr
NS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain Maximum Reflectivity PAIF Area Threshold PAIF Rate Threshold DP Max Precip Rate	2.0       0.6       45.0       53.0       80       0.5       200.0	1.0 <= x <= 2.0 0.1 <= x <= 2.0 40.0 <= x <= 50.0, dBZ 45.0 <= x <= 60.0, dBZ 0 <= x <= 82800, km <sup>2</sup> 0.0 <= x <= 50.0, mm/hr 50.0 <= x <= 500.0, mm/hr
NS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain Maximum Reflectivity PAIF Area Threshold PAIF Rate Threshold DP Max Precip Rate Number of Exclusion Zones	2.0       0.6       45.0       53.0       80       0.5       200.0       0	1.0 <= x <= 2.0 0.1 <= x <= 2.0 40.0 <= x <= 50.0, dBZ 45.0 <= x <= 60.0, dBZ 0 <= x <= 82800, km <sup>2</sup> 0.0 <= x <= 50.0, mm/hr 50.0 <= x <= 500.0, mm/hr 0 <= x <= 20
NS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain Maximum Reflectivity PAIF Area Threshold PAIF Rate Threshold DP Max Precip Rate Number of Exclusion Zones Exclusion Zone Limits # 1 - Begin Azimuth #1	2.0       0.6       45.0       53.0       80       0.5       200.0       0       0.0	1.0 <= x <= 2.0 0.1 <= x <= 2.0 40.0 <= x <= 50.0, dBZ 45.0 <= x <= 60.0, dBZ 0 <= x <= 82800, km^2 0.0 <= x <= 50.0, mm/hr 50.0 <= x <= 500.0, mm/hr 0 <= x <= 20 0.0 <= x <= 360.0, degree
NS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain Maximum Reflectivity PAIF Area Threshold PAIF Rate Threshold DP Max Precip Rate Number of Exclusion Zones Exclusion Zone Limits # 1 - Begin Azimuth #1 - End Azimuth #1	2.0       0.6       45.0       53.0       80       0.5       200.0       0       0.0       0.0	<pre>1.0 &lt;= x &lt;= 2.0 0.1 &lt;= x &lt;= 2.0 40.0 &lt;= x &lt;= 50.0, dBZ 45.0 &lt;= x &lt;= 60.0, dBZ 0 &lt;= x &lt;= 82800, km^2 0.0 &lt;= x &lt;= 50.0, mm/hr 50.0 &lt;= x &lt;= 500.0, mm/hr 0 &lt;= x &lt;= 20 0.0 &lt;= x &lt;= 360.0, degree 0.0 &lt;= x &lt;= 360.0, degree</pre>
NS Multiplier Reflectivity Threshold for use of R(Kdp) in Heavy Rain Maximum Reflectivity PAIF Area Threshold PAIF Rate Threshold DP Max Precip Rate Number of Exclusion Zones Exclusion Zone Limits # 1 - Begin Azimuth #1 - End Azimuth #1 - Begin Range #1	2.0       0.6       45.0       53.0       80       0.5       200.0       0       0.0       0.0       0.0	<pre>1.0 &lt;= x &lt;= 2.0 0.1 &lt;= x &lt;= 2.0 40.0 &lt;= x &lt;= 50.0, dBZ 45.0 &lt;= x &lt;= 60.0, dBZ 0 &lt;= x &lt;= 82800, km^2 0.0 &lt;= x &lt;= 500.0, mm/hr 50.0 &lt;= x &lt;= 500.0, mm/hr 0 &lt;= x &lt;= 20 0.0 &lt;= x &lt;= 360.0, degree 0.0 &lt;= x &lt;= 124, nm</pre>

Figure 5. Dual-Pol Precip Algorithms window with the "DS Multiplier Below ML Top" highlighted.

There are now several multipliers for R(Z) on the Dual-Pol Precip parameters window that are editable. The **only** ones from this group that should be edited based on local research are the 2.8\*R(Z) for:

- DS above the top of the melting layer, and
- Ice Crystals (IC).

The remaining multipliers are in place for research that is underway. ROC guidance with respect to

## Guidance for R(Z) Multipliers

editing these other multipliers will be provided in the future.

# **DS and IC Multipliers** Many offices have done the necessary local research to edit the 2.8 multiplier, since it results in an overestimation above the melting layer for cold season events. There is an option with the National Severe Storms Laboratory (NSSL) Multi-Radar Multi-Sensor System (MRMS) to observe the parameter settings for IC and other hydroclass values used by QPE. This particular MRMS page presents a snapshot of the progress that has been made thus far with adjusting the IC multiplier based on local research (Figure 6).



Figure 6. MRMS page with QPE and PPS metadata, specifically IC multiplier status.

The address for this MRMS page is: http://nmq.ou.edu/applications/qvs\_lev3\_metadata\_main.html

Research has shown that the R(Kdp) equation used by QPE for computing rain rates and thus accumulations performs well for heavy rain events. The pre-Build 16.0 version of QPE limits the use of R(Kdp) to the classification of Hail, mixed with Rain (HA) below the top of the melting layer. Build 16.0 allows for R(Kdp) to be used, instead of R(Z,ZDR), for Heavy Rain (HR), based on reflectivity. This is controlled by the parameter "Reflectivity Threshold for use of R(Kdp) in Heavy Rain". The default setting is 45 dBZ, with a selection range of 40 to 50 dBZ. As of this writing, the ROC guidance for this parameter is to use the default value (Figure 7).

## Reflectivity Threshold for Use of R(Kdp) in Heavy Rain

Algorithms		
Close Save Unio Baseline: Restore Update		
Adaptation Item Dual-Pol Precip	Descriptions	
Name	Value	Range
Zdr/Z Coefficient for Z	0.0067	0.0067, 0.0142, (Tropical
Zdr/Z Exponent for Z	0.927	0.927, 0.770, (Tropical,
Zdr/Z Exponent for Zdr	-3.43	-3.43, -1.67, (Tropical,
GR Multiplier	0.8	0.1 <= x <= 2.0
HA Multiplier	0.8	0.1 <= x <= 2.0
DS Multiplier	2.8	1.0 <= x <= 2.8
DS Multiplier Below ML Top	1.0	0.8 <= x <= 1.2
IC Multiplier	2.8	1.0 <= x <= 2.8
WS Multinlier	[n ត	0 1 <= x <= 2 0
Reflectivity Threshold for use of R(Kdp) in Heavy Rain	45.0	40.0 <= x <= 50.0, dBZ
PAIF Area Threshold	80	0 <= x <= 82800, km^2
DP Max Precip Rate	200.0	50.0 <= x <= 500.0, mm/hr
NUMBER OF EXCLUSION SOLES	l o	0 <= x <= 20
Exclusion Zone Limits # 1 - Begin Azimuth #1	0.0	0.0 <= x <= 360.0, degree
- End Azimuth #1	0.0	0.0 <= x <= 360.0, degree
- Begin Range #1	0	0 <= x <= 124, nm
4		

**Figure 7.** Dual-Pol Precip Algorithms window with Reflectivity Threshold for use of R(Kdp) and the editable Maximum Precipitation Rate.

Both the legacy Precipitation Processing System (PPS) and the Dual-Pol QPE have parameters that limit the maximum rainfall rate. For the PPS,

## QPE Maximum Precip Rate Editable

	the rate has been adjustable as it also serves as a hail cap for potential hail contamination. For the QPE, the maximum rainfall rate was intended to function as a climatological limit. Due to requests from field offices, this rainfall rate, "DP Max Precip Rate" is now editable with URC control. The default value is 200 mm/hr, or 7.9 in/hr (Figure 7). For contrast, the PPS maximum rainfall rate default is 103.8 mm/hr, or 4.0 in/hr.
DAA Generated at Top of Hour	A top of the hour version of the QPE's Digital Accumulation Array (DAA) product is automatically generated. This enables compatibility with hourly rain gage data input to the Multi-sensor Precipita- tion Estimator (MPE).
ZDR Bias Estimator Based on Bragg Scatter	Since the deployment of Dual-Polarization, the accuracy of the ZDR base data continues to be researched. The ZDR base products are sufficient for human interpretation, where relative values (maximums, minimums) matter more than specific thresholds. The RPG Dual-Pol algorithms are more stringent, designed with the assumption that ZDR base data are accurate within ±0.1 dB. Since the WSR-88D Dual-Pol hardware design is unique, verifying this accuracy remains challenging.
	Accurate ZDR base data require an understanding of the contribution from the hardware, and the ZDR bias is part of this understanding. By sam- pling known targets with a ZDR of 0 dB, hardware contributors can be identified. The ZDR base data calculation can then be adjusted to account for the ZDR bias. Two approaches that involve precipita- tion with ZDR near 0 dB (light rain and dry snow) have been implemented and continue to be used for evaluation. With Build 16.0, a new approach for estimating the ZDR bias is introduced, and it is

based on	returns	that a	are f	the	result	of B	ragg s	scat-
tering.								

In non precipitation areas, the vertical change in temperature and moisture associated with the top of the boundary layer is often sufficient to generate Bragg scatter returns. The differing index of refraction due to these vertical changes provides returns that should have a ZDR of 0 dB, provided the beam is sampling above any ground clutter and that there is no contamination from biological targets.

The Build 16.0 ZDR Bias estimator based on Bragg scattering is part of the RPG Dual-Pol Preprocessor and computed with VCPs 32 and 21. The results of this ZDR Bias estimator will be used along with the light rain/dry snow method to continue the process of researching the accuracy of ZDR base data.

The RPG Status window has periodic messages related to the Bragg scatter ZDR Bias process, depending on atmospheric conditions. When an estimate can be made, the "ZDR Stats (Bragg)" message appears every volume scan. These messages are not intended for operational use. The information is used for engineering analysis only (Figure 8).

If there are any questions or concerns about ZDR quality for your WSR-88D, the Hotline can provide assistance as needed.

Bragg Scatter Messages on RPG Status Window

RPG Status	
1000	
EPG State OPERATE PESCIPITATION (A)	
RPG Alarn Summary	
Product Storage Distribution Control Task Failure	
RDA Radial Data Base Failure Bode Connectivity	
RPG Radial Task Failure DDA Hidebard	
Regia railure	
Nessage Filter	
rev 🚽 > Next Hessage Filter Search:	
System Log Messages	
<pre>DCt 29.14 [01:08:47] &gt;&gt; ZDR Stat8:-99.07-99.00,-99.00,-99.00,-99.00,-99.00,-99.00,-99.00,00,-99.007070.0,0.0,0.0,0.</pre>	
Oct 29,14 [01:00:45] >> ZDR Stats (Bragg): 0.31/117061/-99.00/7228/0.94/-6.5/32	
Oct 29,14 [01:08:44] >> Vol: 29 (Seq: 29) RDA Clock:10/28/13 10:27:42 VCP: 32 L2: 6 DP SR	
Oct 29,14 [01:08:44] >> RDA CAL: T-759; N=-81.46; NT-190; dB20=-44.68; IO=-115.17; C=64; L=0.9938 Oct 29,14 [01:08:44] >> RDA CAL: (DD): TDDP=_0.7535 VM-81.28 UNV-181 VMDV0-44.64	
Oct 29,14 [01:08:44] >> RDA Adaptation Data is Available	
Oct 29,14 [01:08:44] >> RDA Clutter Filter Bypass Map is Available	
Oct 29,14 [01:08:44] >> RDA Clutter Hap is Available Det 29,14 [01:05:57] >> RDA ACKNOWLEDGHENT: Remote WCP Received at RDA	
Oct 29,14 [01:05:54] >> HSF STATUS: 60km^2 > 30.0dBZ, in VCP 32, recommended CLEAR AIR mode is	
Oct 29, 14 101:05:541 >> MSF SETUP: PRECIP:A/ 21/30.0dBZ/ 80km^2.CLEAR AIR:A/ 32/20min.INC:N/ 8hr	
<pre>Sect 29.14 [00:56:381 &gt;&gt; MSF STAT</pre>	US: 🔪 62km^2 > 30.0dBZ, in VCP 32, recommended CLEAR AIR mode is
pet 29.	
Oct 2	
bet 2	
Oct 29.14 [00:50:141 >> ZDR Stat	s (Bragg): 0.31/133076/0.25/8533/0.88/-6.5/32
Det 2	
lot 2	
oet 29, di	
22 Dot 29 14 [00.50.13] >> RDA CAL	$(DP) \cdot ZDRB = -0.7604 WN = -81.30 WNT = 164 WdBZO = -44.62$
Det 29	(br), bris- 0.1004, th- 01.00, th1-104, Vabav- 44.02
Oct 29,14 [00:50:13] >> RDA Adaptation Data is Available	
oct 29,14 [00:50:13] >> RDA Clutter Filter Bypass Hap is Available Oct 29.14 (00:50:13) >> RDA Clutter Hap is Available	
Oct 29,14 [00:50:12] >> Vol: 27 (Seq: 27) RDA Clock:10/28/13 10:08:52 WCP: 32 L2: 6 DP SR	

Figure 8. RPG Status window with ZDR Bias Bragg scatter message.

## Automated Microburst Detection Algorithm

The Automated Microburst Detection Algorithm (AMDA) is an FAA sponsored algorithm implemented in Build 16.0.

The product generated from the AMDA is an overlay, with the mnemonic MBA. Any detections are presented as "bandaid" shaped ovals. There are different types of detections, and the categories are

- Wind Shear: deltaV  $\leq$  12 m/s
- Microburst: deltaV > 12 m/s and small shape size ( $\leq 4 \ \text{km}^2)$
- Macroburst: deltaV > 12 m/s and shape size >  $4\ km^2$
- Speed Shear: deltaV > 12 m/s, but wind direction does not change through the outflow, i.e. high winds exist in only one direction. This category is intended to identify moving micro/macro bursts.

There are multiple attributes for each detection:

• Strength (deltaV): The maximum deltaV within the detection area.

- Maximum Velocity (maxV): The maximum radial velocity (absolute value) within the detection area.
- Maximum shear: The maximum shear within the detection area.

An example of the MBA overlay product in the AWIPS environment is provided in Figure 9. This product will be available with AWIPS2 build 14.4.1. There is a variety of detection areas, with the cursor readout for one that meets the microburst category.



Figure 9. Automated Microburst Detection Algorithm overlay product (MBA).

A phased implementation of wideband backup services using 4G or Very-small-aperture terminal (VSAT) satellite began with Build 15 (deployed Fall of 2014). This backup service will eventually be available for all sites that have commercial T1 wideband links (total of 57). Build 16.0 has a new RPG Alarm to indicate when the wideband is detected to be on backup. It is a Maintenance Required alarm, labeled as RDA Wideband on the RPG Status window (Figure 10).

## RPG GUI Changes for Wideband Backup

### Warning Decision Training Division

	RPG Status	1		
State: OPERATE	Close			
Oper: MAINT REQD	RPG State Rx Mode CLEAR AIR (D)			
RPG I	Load Shed Haintenance Required Haintenance Mandatory Product Storage Distribution Control Task Failure			
	RDA Radial         Data Base Failure         Node Connectivity           RFG Radial         Task Failure         RDA Wideband Failure			
	RDA Wideband Media Failure			
Control	Nessage Filter			
	Prev - Next Message Filter See ch:			
	Sys m Log Hessages			
Products	Jan 13,15 [20:17:19] >> Wideband Link> Ba tup Communications			
	Jan 13,15 [20:17:15] >> RDA ALARH ACTIVATED: ) 3 LINK - RED ALARH (NO RX)			
	Jan 13,15 [20:17:07] >> ZDR Stats: -99.00/-99.0099.0099.0099.0099.00/00.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0			
	Jan 13,15 [20:17:07] >> RDA Clutter Filter Bypas Hap is Available			
Status	Jan 13,15 [20:17:06] >> LDM Stats: Ver: 7, VCP: 2, Last Elev: 4.5 deg, Dur: 574 s, Bytes C: 395			
	Jan 13,15 [20:07:30] >> Vol: 50 (Seq: 610) RDA Clo ::01/13/15 20:07:29 VCP: 32 L2: 7 DP SR			
	Jan 13,15 [20:07:30] >> RDA CAL: T=701; N=-81.03; 1 =191; dBZ0=-44.73; I0=-114.39; C=55; L=1.0000			
	Jan 13,15 [20:07:30] >> RDA CAL (DP): ZDRB= 0.7. 0N=-81.38, VNT=228, VdBZ0=-44.11 Tan 13.15 [20:07:211 >> ZDR Stats: -99.00/-99.009.0099.0099.0099.0099.00/0/0.0.0.0.0.0.			
	Task Failure	ure		
	RDA Wideband Media Failure			
Message Filter				
Prev Next Message Filter Search: [Clear]				
	System Log Messages			
Jan 13,15 [20:17:19] >>	RPG ALARM ACTIVATED: RDA Wideband Alarm	A		
Jan 13,15 [20:17:19] >>	Iideband Link> Backup Communications			

**Figure 10.** RPG Wideband alarm when 4G or VSAT satellite backup is used (only for sites with commercial T1 wideband communications).

## Summary

This document presents the operational changes associated with RDA/RPG Build 16.0. These changes are related to SAILS, AVSET, the Dual-Pol QPE algorithm, the continued research regarding ZDR accuracy, and the implementation of the AMDA.