

WSR-88D Data Status And Plans

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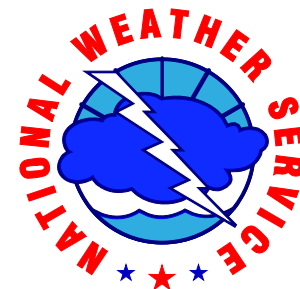
National Weather Service

Family Of Services/Partners Meeting

Silver Spring, MD



6/21/2012 FOS Meeting





Outline



- Recent Major WSR-88D Milestones
- WSR-88D Program Plans
 - Dual Polarization
 - Builds 13 and 14
 - Level II Data Collection Changes and Impacts
 - Product user support and additional information
- User Feedback and Q&A



Recent Major WSR-88D Milestones



- Dual Polarization
 - Operational deployment started, Sep 11
 - Since last FOS meeting, deployment completed at 48 operational sites (73 total)
- KLGX, Langley Hill, WSR-88D
 - Operational, Sep 11
 - Lower lowest scan angle test in progress; no impact on Level III since lowest elevation is not yet included in any volume product



Dual Polarization Plans



- Deployments and ~12-day installations on schedule
 - Modify remaining 87 operational sites through late summer 2013
 - ROC web page has additional information, deployment schedule and status
 - <http://www.roc.noaa.gov/WSR88D/DualPol/Default.aspx>
- Data availability after System Acceptance
 - Dual Pol and legacy Level II data distribution begins
 - Dual Pol legacy Level III product distribution begins
 - Dual Pol Level III product distribution added the following week
- RDA Build 12 provided by Dual Pol contractor
 - Dual Pol sites lose AVSET & CMD algorithm capability until RDA Build 13



Build 13 Software Release Plans



- RDA
 - Deployment begins July 30, 2012, beta test started June 11th
 - Deploys to Dual Pol RDA sites within 30 days of upgrade
 - Merges RDA software baselines (Dual Pol with Build 11.x)
 - Re-enables
 - CMD, introduces standard deviation of two Dual Pol fields: PHI and ZDR
 - AVSET, includes new threshold to account for small convective cells
 - Hybrid Spectrum Width estimate
- RPG
 - Deployment begins July 2, 2012, beta test started in May
 - Volume-based products to report AVSET top elevation angle
 - CR/35-38, CRE/98, ET/41, VIL/57, APR/67, LRM/65-66&90
 - Enhanced Vertical Wind Profile (EVWP)
 - Performs VADs at each height for multiple elevation/range pairs
 - Improves availability and accuracy of VWP wind estimates
 - For more information, see ROC web page “New Radar Technology”
 - Dual pol software corrections



Build 13.1 Software Release Plans



- Release plan
 - RDA/RPG beta test to begin October, deployment starts December 2012
 - Pre dual pol sites will run RPG Build 13.1 with RDA 11.x
- RDA
 - Miscellaneous software corrections
- RPG
 - 2D Velocity Dealiasing Algorithm
 - Will be used for all VCPs except VCP 121 or when the velocity increment is 1 m/s
 - Affects Level III products, but no change to Level II data
 - Expect better performance, but failure cases will look different than now
 - For more information, see ROC web page “New Radar Technology”
 - Dual pol software corrections



RDA Build 14 Release Plans

* - depends on data quality team review

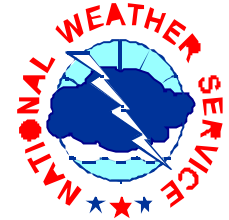


- Beta test scheduled for October 2013, deployment in December
- Content
 - Supplemental adaptive intra-volume low-level scans (SAILS)
 - Adds 0.5 deg elevation scan mid-way through the volume scan of VCP 12 and 212
 - When active with AVSET, shortens low level scan update to ~2 minutes
 - Storm-based auto PRF selection*
 - Minimizes range folding for operator selected or top 3 (cell-based VIL) storms
 - Manual & automatic PRF selection for SZ-2 VCPs (211, 212, 221)*
 - Adjusts range where poor data quality occurs in relatively weak second trip echos
 - Staggered PRF Phase III with Clean-AP for clutter detection and filtering*
 - Increases Nyquist velocity to reduce velocity dealiasing failures
 - Radial-by-radial noise estimation
 - Should improve Dual Pol and Spectrum Width estimates
 - Coherency based thresholding (CBT)*
 - Recovers some sensitivity loss from dual pol modification
 - Dual pol software corrections



Level II Plans

(Dependent on Budget)



- Add sites to Level II network
 - Remaining 8 CONUS DoD sites (Sept-Oct 2012)
 - Bandwidth will support transmitting full resolution and Dual Pol data, except Edwards AFB will provide version 4
 - Alaska sites (May-June 2013)
 - Bandwidth will support transmitting version 4 data
- Envisioned (hoped for) Level II state at the end of Dual Pol
 - 155 WSR-88Ds: 143 sending version 6, and 12 sending version 4
 - Single site throughput 45 to 436 kilo bits/second (hourly avg)
 - AVSET may increase worst case by 5%, SAILS by another 5%
 - Network throughput 2.0 to 20.4 mega bits/second (hourly avg)
 - AVSET may increase peak loading by 9%, SAILS by another 5%
 - Throughput spread depends on weather coverage, VCP, season, and number of sites simultaneously in a VCP and/or with AVSET/SAILS enabled



Other Program Plans

- Retirement of 3 base products from NOAAport and RPCCCDS moved back to Dec 12, 2012
 - Lowest elevation 4-bit base reflectivity (19/R, 20/R) and velocity (27/V)
 - Reference NWS TIN 10-41 (Amended), Modified Turn Off Date for WSR-88D Low- Resolution Products.
- TDWR – SPG
 - FAA installing new signal processor in TDWRs
 - Users may notice better data quality and increased sensitivity
 - 13 installed
 - Retrofit about one site per month and complete by fall 2013
 - No SPG Level II distribution changes planned
 - NOAAport and RPCCCDS distribution of VCP80 rapid scan update products
 - TIN 12-13 notified of evaluation that started April 12th with 11 radars
 - 1 minute surface elevation base products
 - 3 minute storm products and 3rd elevation base products
 - Increases since single site max throughput by 2.5X to around 42 kbps
 - Evaluating impacts on affected systems, will announce next steps in late July



WSR-88D Data and Product User Support



- Many changes in Level II Data, Level III products, Dual Pol, more sites on network, higher-resolution data, etc. underway:
 - Please keep checking for NWS TINs and PNSs
 - ROC web site contains TINs, PNSs, additional information
 - <http://www.roc.noaa.gov/WSR88D/>
- Level II and Level III products and Interface Control Documents
 - http://www.roc.noaa.gov/WSR88D/Level_III/Level3Info.aspx



Dual Pol Information



- Training
 - Initial Dual-Polarization Training for NWS Partners
<http://www.wdtb.noaa.gov/courses/dualpol/Outreach/index.html>
 - Courses for meteorologists and non-meteorologists
 - Follow-on Dual Polarization Radar Training
<http://www.wdtb.noaa.gov/courses/dualpol/SOTM/index.html>
 - WDTB Storm of the Month webinars and live webinar Q&A interchange recorded and “post processed” into “Dual Pol Best Practices” modules
- Additional information
 - Project status and schedules, Dual Pol sample data/products, and Interface Control Document
 - <http://www.roc.noaa.gov/WSR88D/DualPol/Default.aspx>



Additional Information



- Project updates and other Level II information:
 - http://www.roc.noaa.gov/WSR88D/Level_II/Level2Info.aspx
- NWS Real-Time Level II Data Monitoring Site:
 - <http://weather.noaa.gov/monitor/radar2/>
- NWS Real-Time Level III Product Site Status:
 - <http://weather.noaa.gov/monitor/radar/>
- NWS RPCCDS Information for product users:
 - <http://www.nws.noaa.gov/tg/rpccds.html>
- Build specific training materials:
 - <http://www.wdtb.noaa.gov/>



Additional Information

- NCDC Radar Resources: Order Level II and Level III Archive Data Via FTP, Use NCDC Java Viewer to View Level II and Level III Archive Data, etc.
 - <http://www.ncdc.noaa.gov/oa/radar/radarresources.html>
- Run RPG Software, LINUX Platform: The Common Operations and Development Environment (CODE)
 - <http://www.weather.gov/CODE88D>
- Federal Meteorological Handbook No. 11 (FMH-11) Part A Updated for Build 12.1 available electronically at:
 - <http://www.roc.noaa.gov/WSR88D/> under “WSR-88D Program”
- Follow-up questions to: Michael.Istok@noaa.gov or Tim.D.Crum@noaa.gov

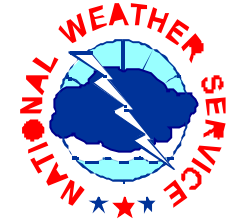
Backup Slides



WSR-88D Level II Information



- Dual Polarization Level II Data
 - New data versions 5, 6, 7 to indicate variations of Dual Pol data
 - Transmit version 6 (full resolution) from all NWS WSR-88Ds, CONUS DoD, and 1 FAA radar (Puerto Rico)
 - Single site and network throughput will increase 130% (factor of 2.3)
 - Remove Dual Pol data and recombine base moments from sites where bandwidth is constrained (e.g., version 4 from Hawaii)
 - Version 5 used if $\frac{1}{2}$ degree azimuth sampling is disabled which is identical in format, resolution, and size to version 7
 - Expect rare use (e.g., emergency satellite backup RDA/RPG link)
 - Level II collection radar site communication limitations
 - Increase single site throughput up to 70% (factor of 1.7)
 - Software to process Dual Pol Level II data available at
 - www.weather.gov/code88D



Versions of Level II Data

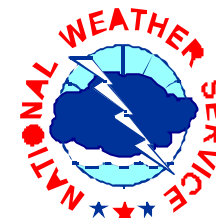
- Starting in RPG Build 12.1, RDA will always provide
 - Reflectivity data at 250 meter range resolution
 - Velocity and Spectrum Width to 300 km max range (< 70 kft altitude)
- Version numbers indicate type of data
 - Version 3 changes with RPG Build 12.1
- Plan for Dual Pol
 - NWS and CONUS DoD WSR-88Ds to provide version 6
 - FAA WSR-88Ds to provide version 4 (TJUA to send version 6)
 - Other Versions in special cases
- Degraded data characteristics driven by NWS comms funding availability

Pre-Dual Pol Super-Res	Recombined and delete Dual Pol	Dual Pol w/ Super-Res Disabled	Dual Pol w/ Super-Res Enabled	Recombined Dual Pol
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#	Data Characteristic	RDA Super Res Control		Level II Version Number				
		Disabled	Enabled	3	4	5	6	7
1	Azimuthal resolution on split cuts (deg)	1	0.5	0.5	1	1	0.5	1
2	Azimuthal resolution on batch and above cuts (deg)	1	1	1	1	1	1	1
3	Reflectivity range resolution on split cuts (m)	250	250	250	1000	250	250	250
4	Reflectivity range resolution of batch and above cuts (m)	250	250	1000*	1000	250	250	250
5	Reflectivity data included on Doppler split cuts	No	Yes	Yes	No	No	Yes	No
6	Doppler data to 300 km	Yes	Yes	Yes	No	Yes	Yes	Yes
9	Dual pol data included	Yes	Yes	No	No	Yes	Yes	Yes
7	Dual pol data at 250m range resolution	Yes	Yes	na	na	Yes	Yes	Yes
8	Dual pol data to 300km range	Yes	Yes	na	na	Yes	Yes	Yes
		RDA/RPG Link		LDM Level II				
Volume Average Worst Case Throughput (kbps)		3:1 Compression		4.1:1 Compression				
VCP 12		358	502	158	80	231	329	231
VCP121		250	389	174	80	156	249	156
Allocation		512	768	384	128	384	512	384



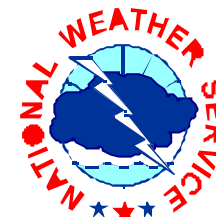
WSR-88D Dual Pol Level III



#	PRODUCT	PRODUCT HEADERS		ELEVATION ANGLES (DEGREES)	NWSTG RPCDDS FTP Dir Name	Average Size (Kbytes) *estimate
		RPG HEADER	WMO HEADER			
1	Differential Reflectivity - 0.13 nmi resolution, 162 nmi max range, 256 data levels (0.0625 dB)	159/DZD	SDUS8i cccc N0X xxx	0.5	DS.159x0	58*
2		159/DZD	SDUS8i cccc NAX xxx	0.9	DS.159xa	50*
3		159/DZD	SDUS8i cccc N1X xxx	1.3, 1.5	DS.159x1	45*
4		159/DZD	SDUS8i cccc NBX xxx	1.8	DS.159xb	40*
5		159/DZD	SDUS8i cccc N2X xxx	2.4, 2.5	DS.159x2	36*
6		159/DZD	SDUS8i cccc N3X xxx	3.1, 3.4, 3.5	DS.159x3	30*
7	Correlation Coefficient - 0.13 nmi resolution, 162 nmi max range, 256 data levels (0.00333)	161/DCC	SDUS8i cccc N0C xxx	0.5	DS.161c0	59*
8		161/DCC	SDUS8i cccc NAC xxx	0.9	DS.161ca	55*
9		161/DCC	SDUS8i cccc N1C xxx	1.3, 1.5	DS.161c1	50*
10		161/DCC	SDUS8i cccc NBC xxx	1.8	DS.161cb	45*
11		161/DCC	SDUS8i cccc N2C xxx	2.4, 2.5	DS.161c2	37*
12		161/DCC	SDUS8i cccc N3C xxx	3.1, 3.4, 3.5	DS.161c3	33*
13	Specific Differential Phase - 0.13 nmi resolution, 162 nmi max range, 256 data levels (0.05 deg/km)	163/DKD	SDUS8i cccc N0K xxx	0.5	DS.163k0	7*
14		163/DKD	SDUS8i cccc NAK xxx	0.9	DS.163ka	7*
15		163/DKD	SDUS8i cccc N1K xxx	1.3, 1.5	DS.163k1	7*
16		163/DKD	SDUS8i cccc NBK xxx	1.8	DS.163kb	6*
17		163/DKD	SDUS8i cccc N2K xxx	2.4, 2.5	DS.163k2	6*
18		163/DKD	SDUS8i cccc N3K xxx	3.1, 3.4, 3.5	DS.163k3	5*



WSR-88D Dual Pol Level III



#	PRODUCT	PRODUCT HEADERS		ELEVATION ANGLES (DEGREES)	NWSTG RPCCDS FTP Dir Name	Average Size (Kbytes) *estimate
		RPG HEADER	WMO HEADER			
19	<u>Hydrometeor Classification</u> - 0.13 nmi resolution, 162 nmi max range, 8bit but only 12 categories	165/DHC	SDUS8i cccc N0H xxx	0.5	DS.165h0	14*
20		165/DHC	SDUS8i cccc NAH xxx	0.9	DS.165ha	13*
21		165/DHC	SDUS8i cccc N1H xxx	1.3, 1.5	DS.165h1	12*
22		165/DHC	SDUS8i cccc NBH xxx	1.8	DS.165hb	11*
23		165/DHC	SDUS8i cccc N2H xxx	2.4, 2.5	DS.165h2	10*
24		165/DHC	SDUS8i cccc N3H xxx	3.1, 3.4, 3.5	DS.165h3	9*
25	<u>Melting Layer</u> - 162 nmi max range, 4 levels (contours)	166/ML	SDUS8i cccc N0M xxx	0.5	DS.166m0	5*
26		166/ML	SDUS8i cccc NAM xxx	0.9	DS.166ma	5*
27		166/ML	SDUS8i cccc N1M xxx	1.3, 1.5	DS.166m1	5*
28		166/ML	SDUS8i cccc NBM xxx	1.8	DS.166mb	5*
29		166/ML	SDUS8i cccc N2M xxx	2.4, 2.5	DS.166m2	5*
30		166/ML	SDUS8i cccc N3M xxx	3.1, 3.4, 3.5	DS.166m3	5*
31	Digital Inst. Precip. Rate(in/hr)	176/DPR	SDUS8i cccc DPR xxx	Elev Angle Not Applicable	DS.176pr	15*
32	Hybrid Scan Hydrometeor Classificati	177/HHC	SDUS8i cccc HHC xxx	Elev Angle Not Applicable	DS.177hh	4*
33	One hour Accum	169/OHA	SDUS8i cccc OHA xxx	Elev Angle Not Applicable	DS.169oh	5*
34	Dig. Accum Array (unbiased)	170/DAA	SDUS8i cccc DAA xxx	Elev Angle Not Applicable	DS.170aa	15*
35	Storm Total Accum	171/STA	SDUS3i cccc PTA xxx	Elev Angle Not Applicable	DS.171st	5*
36	Dig. Storm Total Accum	172/DSA	SDUS8i cccc DTA xxx	Elev Angle Not Applicable	DS.172dt	12*
37	Dig. User-Selectable Accum:3hr/hrly	173/DUA	SDUS8i cccc DU3 xxx	Elev Angle Not Applicable	DS.173u1	12*
38	Dig. User-Selectable Accum:24hr/12Z	173/DUA	SDUS8i cccc DU6 xxx	Elev Angle Not Applicable	DS.173u3	12*
39	Dig. One Hour Difference Accum	174/DOD	SDUS8i cccc DOD xxx	Elev Angle Not Applicable	DS.174od	10*
40	Dig. Storm Total Difference Accum	175/DSD	SDUS8i cccc DSD xxx	Elev Angle Not Applicable	DS.175sd	10*