

WSR-88D and TDWR-SPG Data Status And Plans

TDWR – SPG Only in This File

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and

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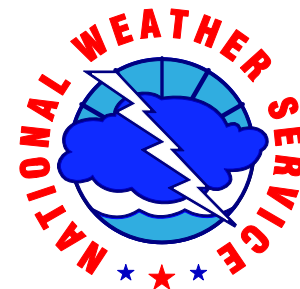
WSR-88D Radar Operations Center

15 January 2009

National Weather Service

Family Of Services/Partners Meeting

Phoenix, AZ





TDWR-SPG Status and Plans



- Beta test of FAA TDWR product collection and distribution from Supplemental Product Generator (SPG) started 18 Nov 08
 - SPG emulates RPG function to generate products
 - Details in TIN 08-85, 16 Oct 08
 - 6 TDWR-SPGs connected as of end of December
- Full-scale deployment dependent on installation of new AWIPS software (OB9); targeted “ramp up”:
 - January 2009: up to 8 sites
 - March 2009: up to 30 sites
 - June 2009: full implementation (45 sites)
 - Schedule will be posted at:
ftp://ftp.roc.noaa.gov/Pub/TDWR_SPG_INFO/



TDWR-SPG Status and Plans

(Continued)



- NWS plans to display TDWR-SPG products with RIDGE version 2 beta test in February 2008
 - Announcement of data availability and location will be made in advance
- NWS will combine TDWR-SPG product availability status and Free Text Messages to a new Radar Site Status page
 - Announcement of data availability will be made in advance; planning to use URL currently used
- TDWR Level II data collection and distribution uncertain due to funding; NWS exploring options on how to provide the additional data

New RPCCDS Status Page

NWS Level III Radar Site Status as of Mon Jan 5 17:44:59 UTC 2009

Radar Sites - Last receipt of data

RPG:	KABR	KABX	KAKQ	KAMA	KAMX	KAPX	KARX	KATX	KBBX	KBGM	KBHX	KBIS	KBLX	KBMX	KBOX
	17:39:53	17:42:43	17:40:53	17:36:43	17:39:14	17:42:33	17:40:23	17:41:13	17:43:03	15:44:28	17:39:33	17:40:53	17:34:23	17:42:24	17:44:13
	KBRO	KBUF	KBYX	KCAE	KCBW	KCBX	KCCX	KCLE	KCLX	KCRP	KCXX	KCYS	KDAX	KDDC	KDFX
	17:42:24	17:40:43	17:35:14	17:41:34	17:42:24	17:42:53	17:36:53	17:35:53	17:37:54	17:43:53	17:39:43	16:23:40	17:42:43	17:38:24	17:42:33
	KDGX	KDIX	KDLH	KDMX	KDOX	KDTX	KDVN	KDYX	KEAX	KEMX	KENX	KEOX	KEPZ	KE SX	KEVX
	17:39:53	17:36:43	17:42:03	16:18:00	17:42:33	16:22:10	17:36:13	14:59:36	17:44:13	17:43:53	17:36:43	17:42:33	17:43:44	17:42:33	17:39:33
	KEWX	KEYX	KFCX	KFDR	KFDX	KFFC	KFSD	KFSX	KFTG	KFWS	KGGW	KGJX	KGLD	KGRB	KGRK
	17:40:13	17:37:24	17:41:54	17:40:34	17:35:53	17:44:13	17:36:53	17:44:24	17:37:24	17:41:43	17:40:34	17:41:43	17:36:33	17:44:33	17:39:53
	KGRR	KGSP	KGWX	KG YX	KHDX	KHG X	KHN X	KHP X	KHT X	KICT	KIC X	KILN	KIL X	KIND	KIN X
	17:36:43	17:40:13	17:43:44	17:38:44	17:36:43	17:40:03	17:39:43	17:40:34	17:40:34	17:42:13	17:42:53	17:43:14	17:39:43	17:40:53	17:44:04
	KIWA	KIWX	KJAX	KJGX	KJKL	KLBB	KLCH	KLIX	KLNX	KLOT	KLRX	KLSX	KLTX	KLVX	KLWX
	17:40:43	17:40:53	17:41:43	17:44:13	17:41:13	17:44:24	17:41:34	17:43:14	17:40:03	17:39:23	17:42:33	17:40:13	17:36:13	17:39:23	17:39:43
	KLZK	KMAF	KMAX	KMBX	KMHX	KMKX	KMLB	KMOB	KMPX	KMQT	KMRX	KMSX	KMTX	KMUX	KMVX
	17:41:13	17:41:43	17:43:34	17:24:44	14:05:34	17:37:24	17:35:23	17:40:43	17:41:04	17:43:23	17:42:33	17:39:33	17:40:03	17:39:53	17:04:12
	KMXX	KNKX	KNQA	KOAX	KOHX	KOKX	KOTX	KPAH	KPBZ	KPDT	KPOE	KPUX	KRAX	KRGX	KRIW
	17:43:23	17:35:33	17:40:03	17:36:33	17:43:34	17:42:13	17:36:03	17:44:33	17:39:14	17:40:53	17:43:14	15:02:37	17:40:43	10:32:20	17:36:13
	KRLX	KRTX	KSFX	KSGF	KSHV	KSJT	KSOX	KSRX	KTBW	KTFX	KTLH	KTLX	KTWX	KTYX	KUDX
	17:40:13	17:44:13	17:39:53	17:42:13	17:44:04	17:40:53	17:36:13	17:43:14	17:41:24	17:35:23	17:40:03	17:41:04	17:35:14	17:41:13	17:41:24
KUEX	KVAX	KVBX	KVNX	KVTX	KVWX	KYUX	PABC	PACG	PAEC	PAHG	PAIH	PAKC	PAPD	PGUA	
17:40:03	17:44:43	17:42:43	17:37:24	17:44:04	17:37:33	17:43:34	17:40:34	17:42:43	17:42:53	17:41:24	17:39:14	17:39:33	17:41:54	17:42:24	
PHKI	PHKM	PHMO	PHWA	TJUA											
17:42:03	17:39:33	17:44:43	17:41:43	17:35:33											
SPG:	TADW	TATL	TBNA	TBOS	TBWI	TCLT	TCMH	TCVG	TDAL	TDAY	TDCA	TDEN	TDFW	TDTW	TEWR
	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	17:43:44	17:43:23
	TFLL	THOU	TIAD	TIAH	TICH	TIDS	TJFK	TLAS	TLVE	TMCI	TMCO	TMDW	TMEM	TMIA	TMKE
17:44:13	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	17:40:34	:No Data:	:No Data:	:No Data:	:No Data:	17:43:34	:No Data:	
TMSP	TMSY	TOKC	TORD	TPBI	TPHL	TPHX	TPIT	TRDU	TSDF	TSJU	TSLC	TSTL	TTPA	TTUL	
:No Data:	:No Data:	:No Data:	:No Data:	17:43:44	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	:No Data:	

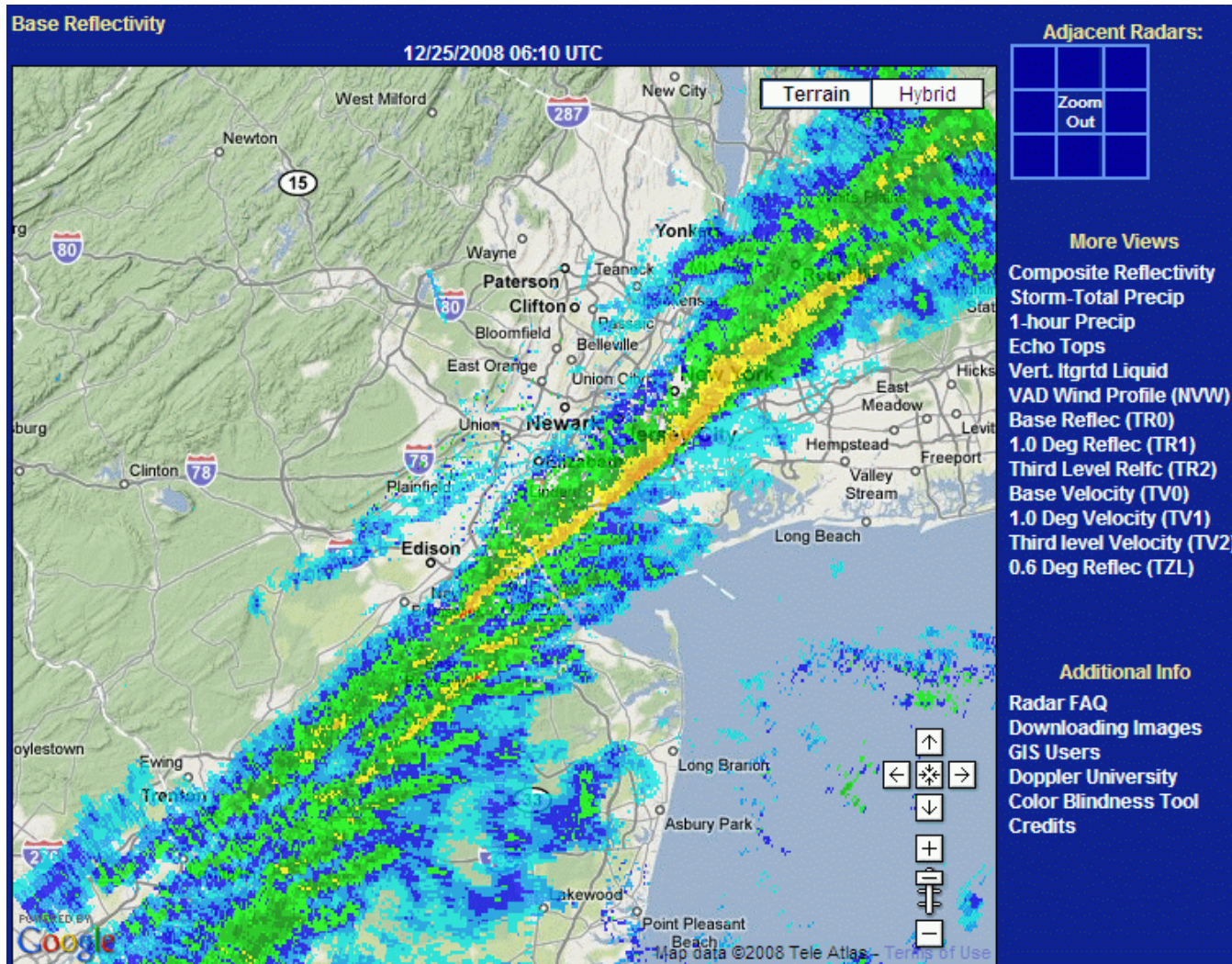
151 sites up (75.5%) of 200 radar sites monitored

Site Free Text Messages

Free Text Messages received within the previous 24 hours.

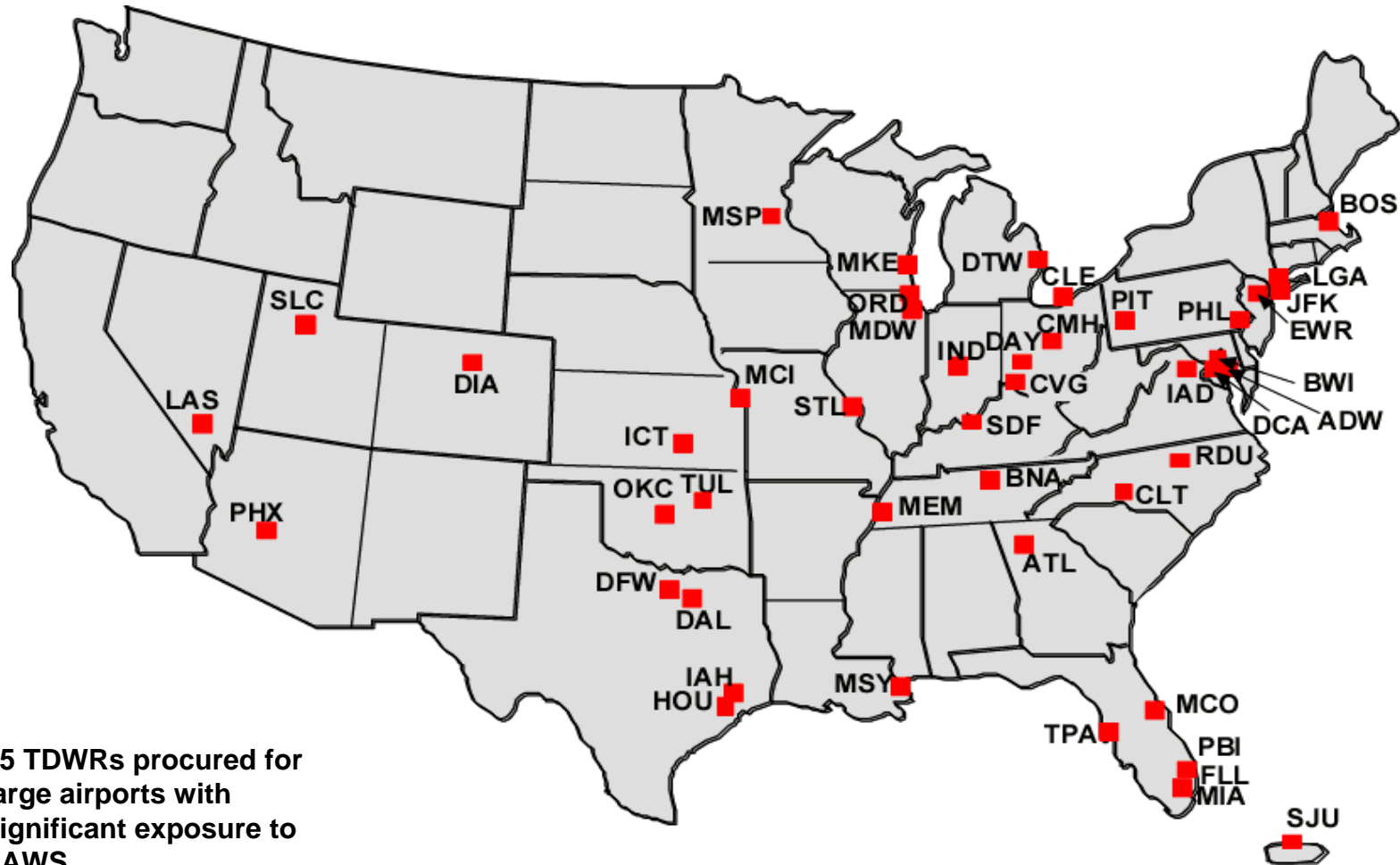
1/15/09 FOS Meeting

RIDGE2 display of TDWR SPG

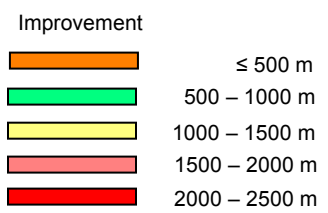
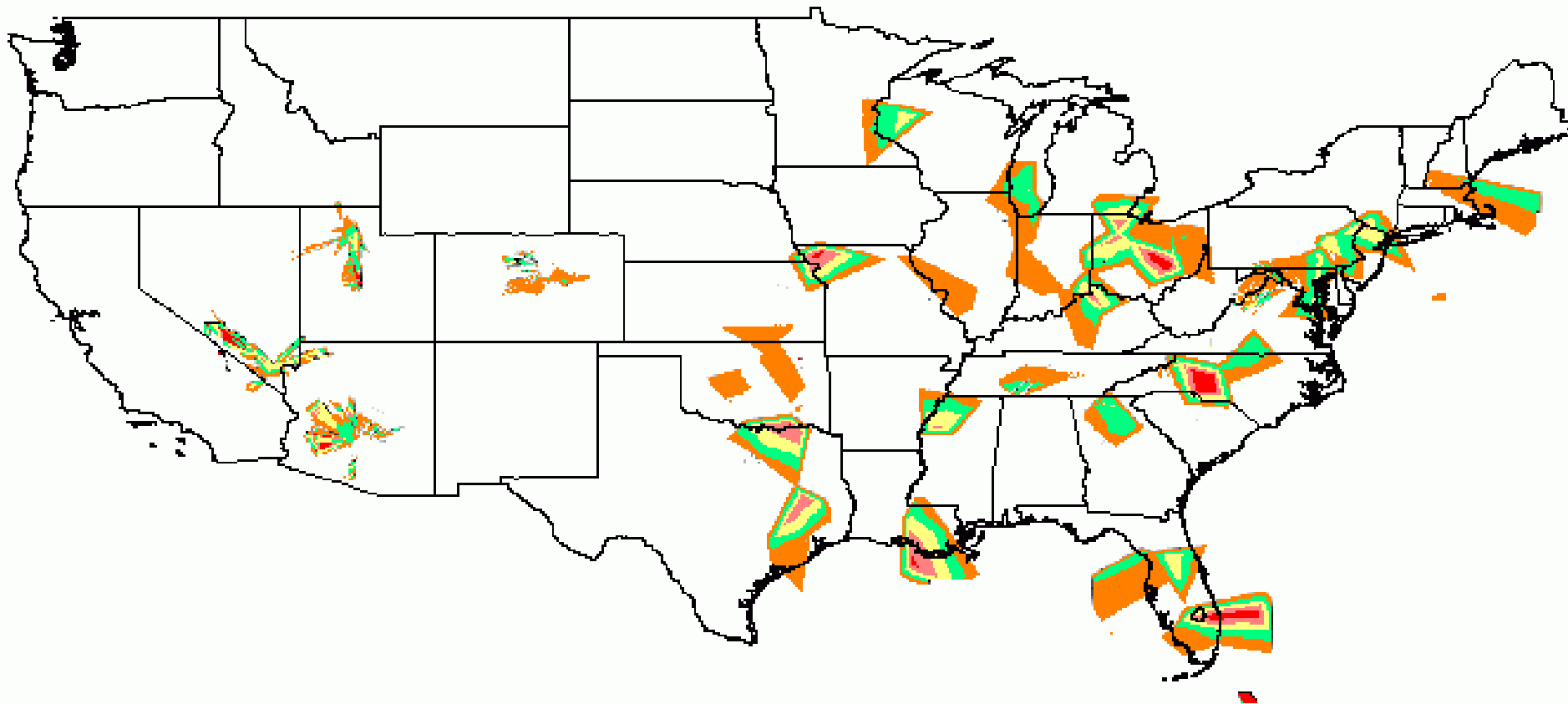


1/15/09 FOS Meeting

TDWR Sites



45 TDWRs procured for large airports with significant exposure to LAWS



Improvement in Minimum Height Above Ground of Radar Coverage: TDWR Added To WSR-88D

1/15/09 FOS Meeting



TDWR Level III Plans

TDWR SPG Product Collection



#	NNN	WMO	Radar Prod Code	Radar Product Name	Kbytes	Frequency	NWSTG Distribution	NWSTG RPCCDS FTP Dir Name
1	GSM	NXUS6i	2	General Status Message(GSM)	0.1	~ 5/day	RPCCDS & SBN	DS.p2gsm
2	FTM	NOUS6i	75	Free Text Message(FTM)	0.3	< 1/day	RPCCDS & SBN	DS.75ftm
3	RSL	SDUS4i	152	Archive Status Product(ASP)	3	3/day	RPCCDS & SBN	DS.152rs
4	TZL	SDUS5i	186	Reflectivity (Z) - 0.6 deg Long Range - 8bit	80	10/hr	RPCCDS & SBN	DS.186zl
5	TR0	SDUS5i	181	Reflectivity (Z) - Lowest elev - 4bit	25	10/hr	RPCCDS & SBN	DS.181r0
6	TR1	SDUS2i	181	Reflectivity (Z) - 1.0 deg - 4bit	14	10/hr	RPCCDS & SBN	DS.181r1
7	TR2	SDUS2i	181	Reflectivity (Z) - 3rd elev- 4bit	12	10/hr	RPCCDS & SBN	DS.181r2
8	TV0	SDUS5i	182	Velocity (V) - Lowest elev - 8bit	90	10/hr	RPCCDS & SBN	DS.182v0
9	TV1	SDUS7i	182	Velocity (V) - 1.0 deg - 8bit	70	10/hr	RPCCDS & SBN	DS.182v1
10	TV2	SDUS7i	182	Velocity (V) - 3rd elev - 8bit	45	10/hr	RPCCDS & SBN	DS.182v2
11	NCR	SDUS5i	37	Composite Ref (CZ)	20	10/hr	RPCCDS & SBN	DS.p37cr
12	NET	SDUS7i	41	Echo Tops (ET)	1.5	10/hr	RPCCDS & SBN	DS.p41et
13	NVW	SDUS3i	48	VAD Wind Profile (VWP)	7.5	10/hr	RPCCDS & SBN	DS.48vwp
14	NVL	SDUS5i	57	Vert Integ Liq (VIL)	1.3	10/hr	RPCCDS & SBN	DS.57vil
15	NST	SDUS6i	58	Storm Tracking Information (STI)	3.5	10/hr	RPCCDS	DS.58sti
16	NHI	SDUS6i	59	Hail Index (HI)	3.2	10/hr	RPCCDS	DS.p59hi
17	NTV	SDUS6i	61	Tornadic Vortex Signature (TVS)	2.1	10/hr	RPCCDS	DS.61tvs
18	N1P	SDUS3i	78	One Hour Precip (OHP)	10	10/hr	RPCCDS & SBN	DS.78ohp
19	NTP	SDUS5i	80	Storm Total Precip (STP)	11	10/hr	RPCCDS & SBN	DS.80stp
20	DPA	SDUS8i	81	Digital Precip Array (DPA)	7	10/hr	RPCCDS & SBN	DS.81dpr
21	SPD	SDUS6i	82	Supplemental Precipitation Data (SPD)	2.8	10/hr	RPCCDS	DS.82spd
22	DHR	SDUS5i	32	Digital Hybrid Scan Refl (DHR)	32	10/hr	RPCCDS & SBN	DS.32dhr
23	DSP	SDUS5i	138	Digital Storm Total Precip (STP)	15	10/hr	RPCCDS & SBN	DS.138dp
24	NMD	SDUS3i	141	Mesocyclone (MD)	2	10/hr	RPCCDS & SBN	DS.141md



TDWR Level III Plans

TDWR SPG IDs, Sending WFOs, FTP dir names

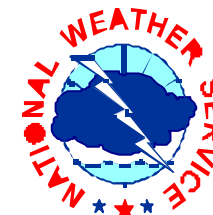


WFO #	SPGs @ wfo	Sending WFO ID CCCC	TDWR SPG ID xxx	TDWR SPG ID	Radar FTP Site directory	SPG #	WFO #	SPGs @ wfo	Sending WFO ID CCCC	TDWR SPG ID xxx	TDWR SPG ID	Radar FTP Site directory	SPG #
1	1	KBOU	DEN	3013	Sl.tden	1	17	4	KLWX	ADW	3001	Sl.tadw	22
2	1	KBOX	BOS	3004	Sl.tbos	2			KLWX	BWI	3005	Sl.tbwi	23
3	1	KCLE	LVE	3006	Sl.tlve	3			KLWX	DCA	3012	Sl.tdca	24
4	1	KDTX	DTW	3015	Sl.tdtw	4			KLWX	IAD	3019	Sl.tiad	25
5	1	KEAX	MCI	3025	Sl.tmci	5	18	1	KMEG	MEM	3028	Sl.tmem	26
6	1	KFFC	ATL	3002	Sl.tatl	6	19	3	KMFL	FLL	3017	Sl.tfll	27
7	2	KFWD	DAL	3010	Sl.tdal	7			KMFL	MIA	3029	Sl.tmia	28
		KFWD	DFW	3014	Sl.tdfw	8			KMFL	PBI	3035	Sl.tpbi	29
8	1	KGSP	CLT	3007	Sl.tclt	9	20	1	KMKX	MKE	3030	Sl.tmke	30
9	2	KHGX	HOU	3018	Sl.thou	10	21	1	KMLB	MCO	3026	Sl.tmco	31
		KHGX	IAH	3020	Sl.tiah	11	22	1	KMPX	MSP	3031	Sl.tmsp	32
10	1	KICT	ICH	3021	Sl.tich	12	23	1	KOHX	BNA	3003	Sl.tbna	33
11	3	KILN	CMH	3008	Sl.tcmh	13	24	2	KOKX	EWR	3016	Sl.tewr	34
		KILN	CVG	3009	Sl.tcvg	14			KOKX	JFK	3023	Sl.tjfk	35
		KILN	DAY	3011	Sl.tday	15	25	1	KOUN	OKC	3033	Sl.tokc	36
12	1	KIND	IDS	3022	Sl.tids	16	26	1	KPBZ	PIT	3038	Sl.tpit	37
13	1	KLIX	MSY	3032	Sl.tmsy	17	27	1	KPHI	PHL	3036	Sl.tphi	38
14	1	KLMK	SDF	3040	Sl.tsdf	18	28	1	KPSR	PHX	3037	Sl.tphx	39
15	2	KLOT	MDW	3027	Sl.tmdw	19	29	1	KRAH	RDU	3039	Sl.trdu	40
		KLOT	ORD	3034	Sl.tord	20	30	1	KSLC	SLC	3042	Sl.tslc	41
16	1	KLSX	STL	3043	Sl.tstl	21	31	1	KTBW	TPA	3044	Sl.ttpa	42
							32	1	KTSA	TUL	3045	Sl.ttul	43
							33	1	KVEF	LAS	3024	Sl.tlas	44
							34	1	TJSJ	SJU	3041	Sl.tsju	45

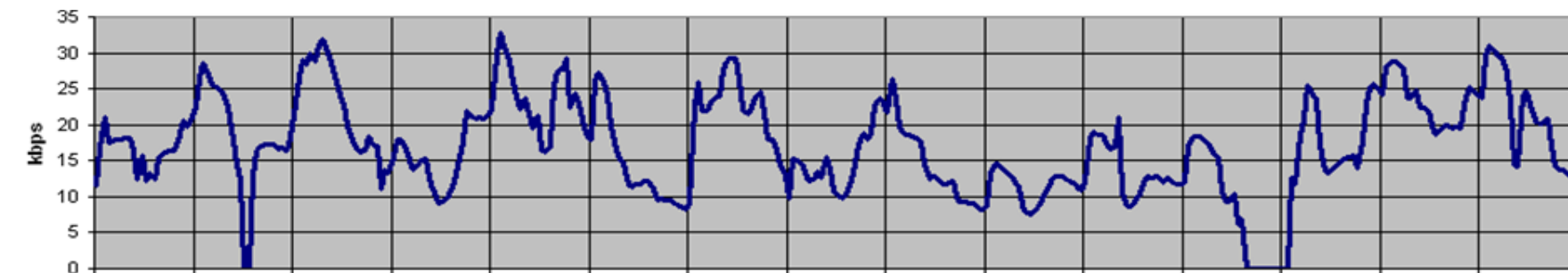


TDWR Level III Plans

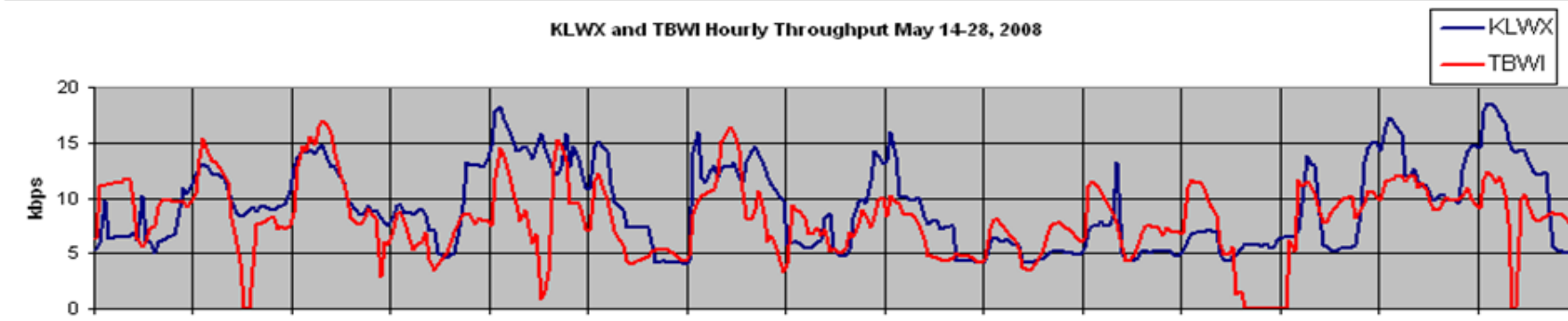
Product Throughput per Radar



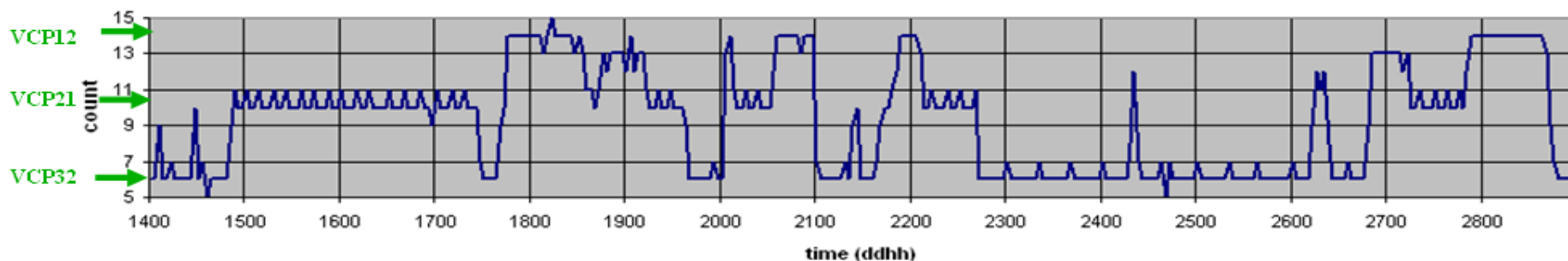
Total Hourly Throughput from KLWX and TBWI May 14-28, 2008



KLWX and TBWI Hourly Throughput May 14-28, 2008



LWX OHP/78 (IHP) Product Count per Hour May 14-28, 2008





Radar Product Collection

Content and Throughput

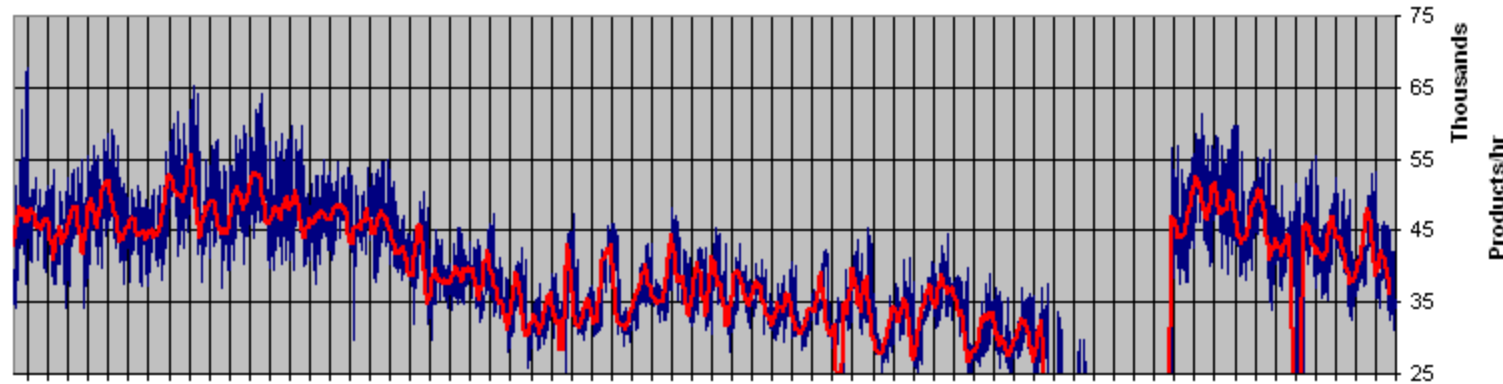


- Current Level III RPCCCDS
 - Varies from 3 to 21 kbps per radar hourly average throughput
 - Network hourly average 0.5 to 1.6 mbps (Seasonal Maxima in August)
 - 25,000 to 65,000 products per hour
- RPCCCDS content with TDWR SPG Products
 - 24 new products per radar added to the 10 second product bundles
 - Base Products (up to 3 elevations), Precipitation, Storm Analysis, Derived
 - Adds 252 products per hour at a throughput of 5 to 15 kbps per radar
 - 45 TDWRs will add 9,500 products per hour at throughput of 256 to 512 kbps
 - Archived at NCDC and most on NOAAPORT
 - Total RPCCCDS may reach 74,500 products/hour at a throughput of 2 mbps
- Dual Polarization will at least Double Level III Product Throughput
 - Will depend on which products, elevations, resolutions are selected
 - Requirements formulation in progress

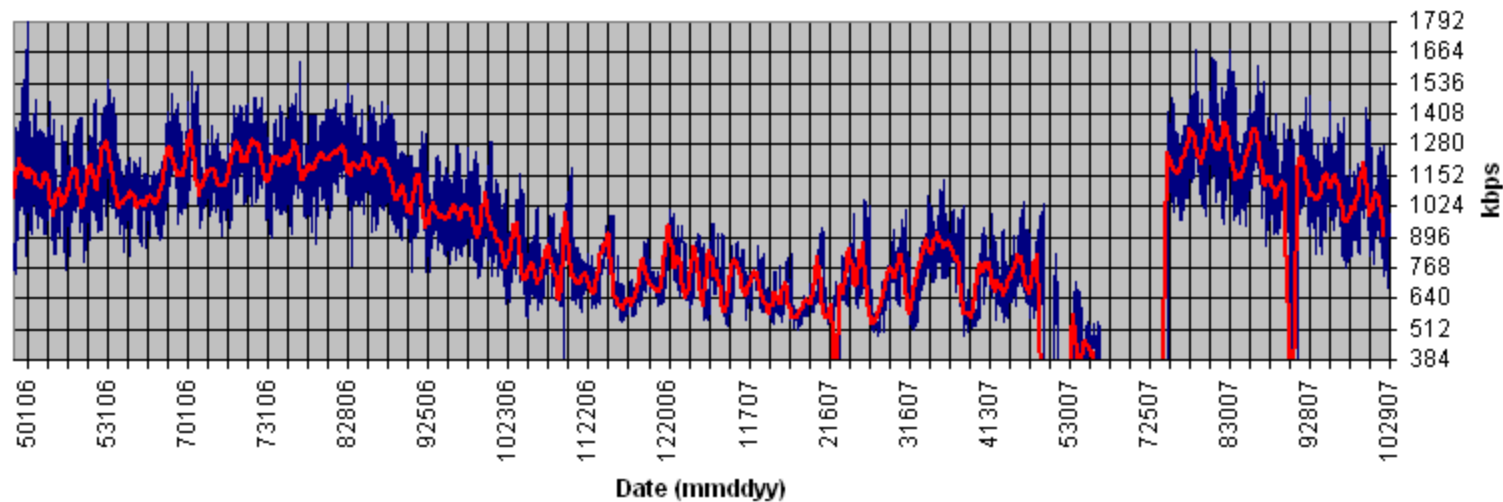


RPCCDS

All WSR-88D Level III sites 4/27/06 - 10/29/07
Hourly Average Product Count (moving average indicated by red line)

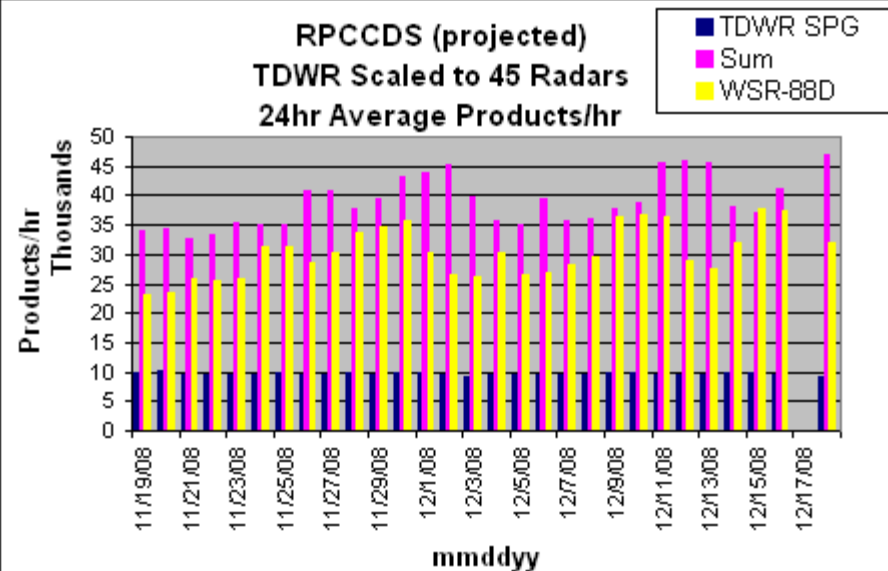
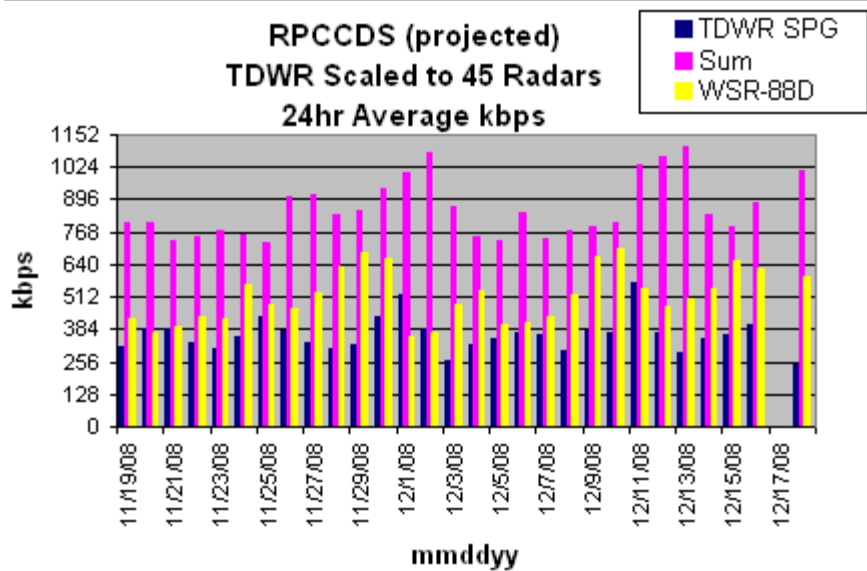
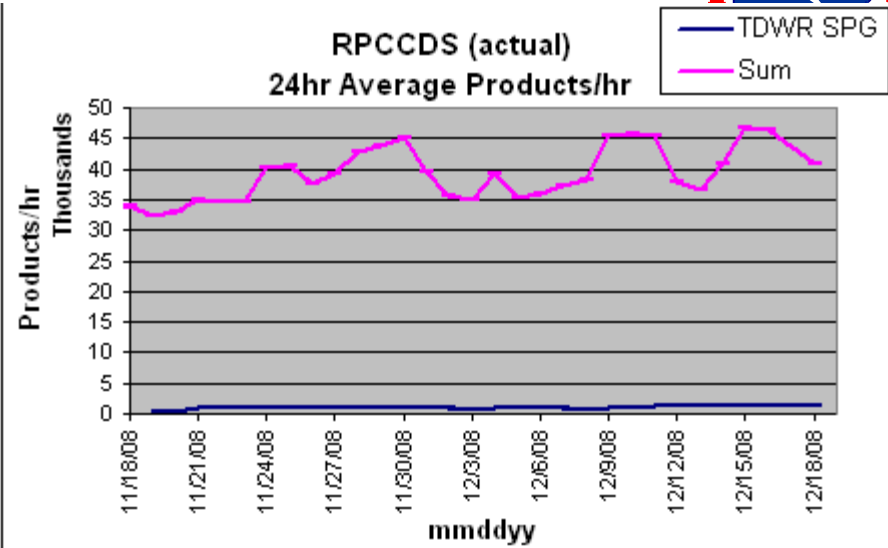
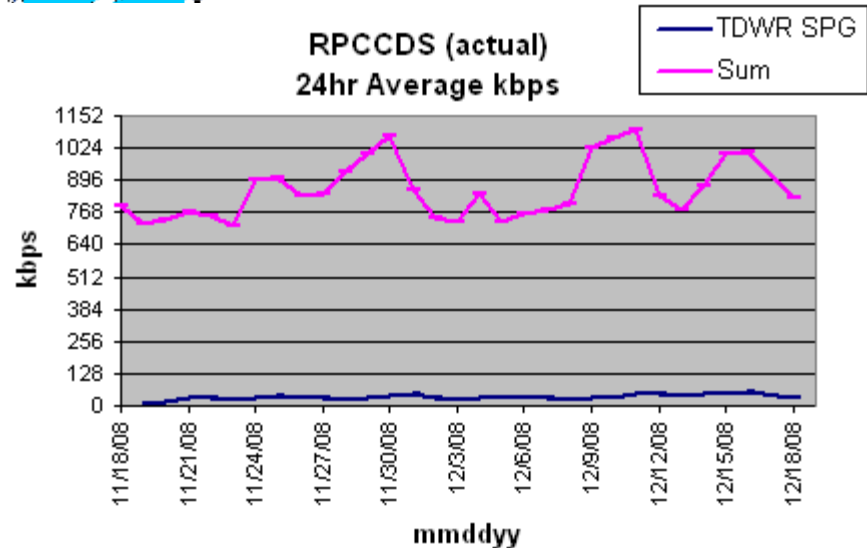


All WSR-88D Level III Sites 4/27/06 - 10/29/07
Hourly Average kbps (moving average indicated by red line)





RPCCCDS w/ TDWR





Additional Information



- Project updates and other Level II information:
 - http://www.roc.noaa.gov/NWS_Level_2
- NWS Real-Time WSR-88D Transmit/Receive Status:
 - <http://weather.noaa.gov/monitor/radar/>
 - Soon to include TDWR data flow status and FTMs
- NWS Real-Time Level II Data Monitoring Site:
 - <http://weather.noaa.gov/monitor/radar2/>
- WSR-88D Software/Program updates for product users:
 - <http://www.nws.noaa.gov/tg/rpccds.html>
- Build specific training materials:
 - <http://www.wdtb.noaa.gov/>



Additional Information

(Continued)

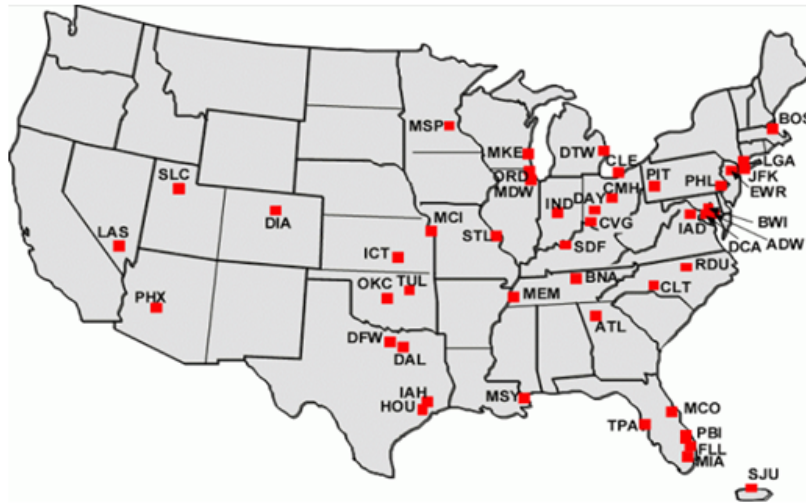
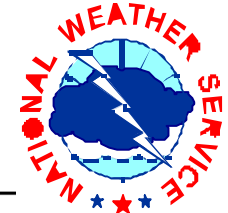


- NCDC Radar Resources: Order Level II and Level III (including TDWR) Archive Data Via FTP, Use NCDC Java Viewer to View Level II and Level III Archive Data, etc.
 - <http://www.ncdc.noaa.gov/oa/radar/radarresources.html>
- Run RPG Software, LINUX Platform: The Common Operations and Development Environment (CODE)
 - <http://www.weather.gov/CODE88D>
- Federal Meteorological Handbook No. 11 (FMH-11) Part A Updated for Build 11 will be available electronically in May
 - <http://www.ofcm.gov/homepage/text/pubs.htm>
- Follow-up questions to: Michael.Istok@noaa.gov or Tim.D.Crum@noaa.gov



TDWR Level III Plans – Backup Slide

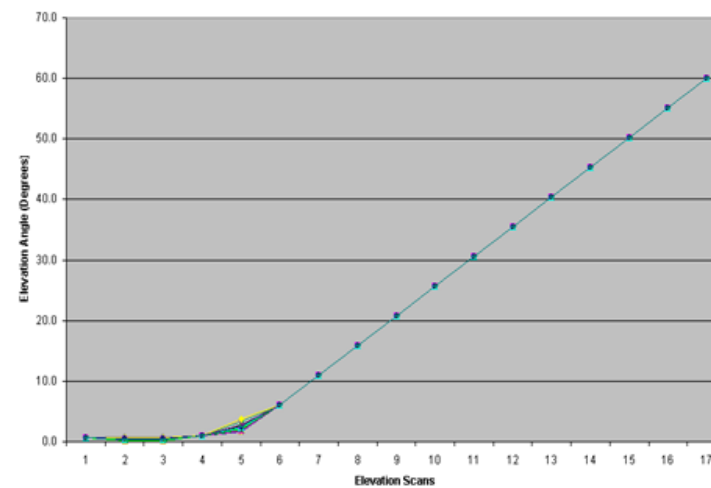
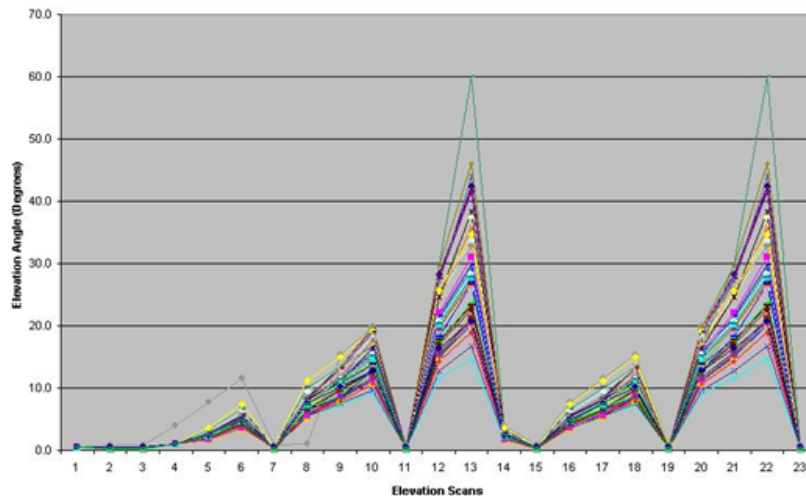
TDWR System Overview



Comparison of 45 TDWR Scan Strategies - Hazardous Mode

Antenna	
Peak Power	250 KW
Beam Width	0.55 Degrees
Power Gain	50 dB
Minimum Elevation	0 Degrees
Maximum Elevation	60 Degrees
Maximum Rotation Rate	5 RPM
Transmitter	
Frequency	C Band
Wavelength	5.3 cm
Pulse Width	1.1 msec
Polarization	Linear Horizontal
Max. Reflectivity Range	460 km
Min Unambiguous Doppler Range	90 km
Maximum Doppler Range	90 km
Range Resolution	150 m (out to 135 km)
(Reflectivity)	300 m (135 km - 460)
Doppler Range Resolution	150 m

Comparison of 45 TDWR Scan Strategies - Monitor Mode





TDWR Level III Plans – Backup Slide Differences from WSR-88D



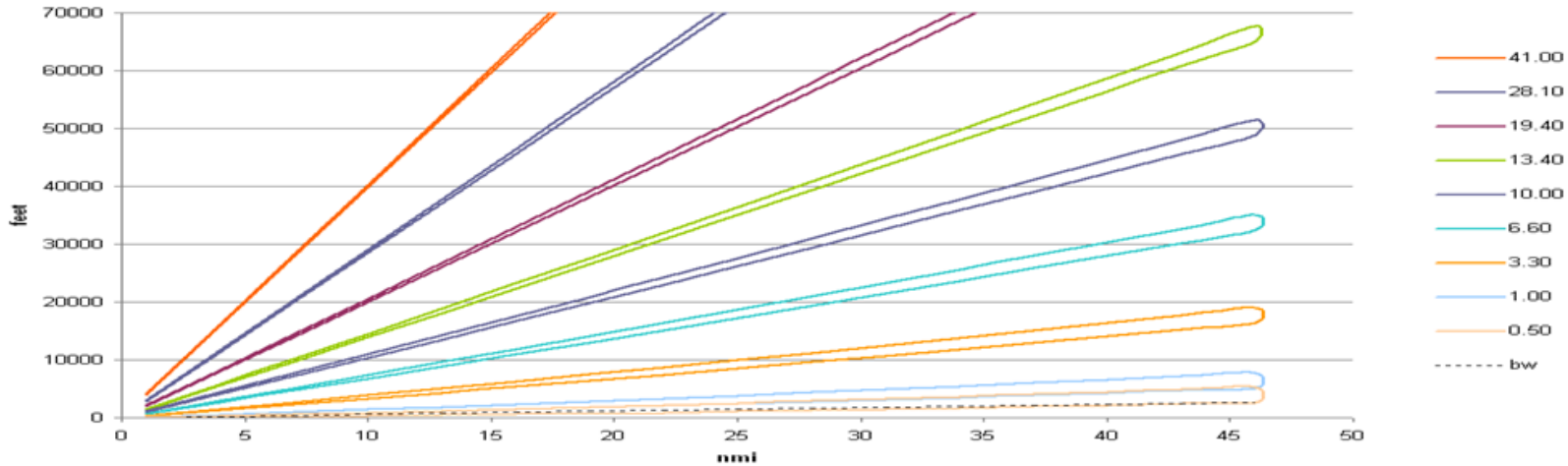
- TDWR is C-band
 - Significant Attenuation at times
 - More range and velocity folding
- Aggressive clutter filtering
- WSR-88D beamwidth is 1 degree, whereas TDWR is ½ degree
 - TDWR computes radial data at 1 degree azimuths, but still vertically narrow
- Scan Strategies / Volume Coverage Patterns (VCP)
 - TDWR scan strategy elevation angles are site specific
 - Higher elevation angles and larger intervals between elevations
 - SPG translates TDWR Hazardous and Monitor modes to VCP 80 and 90, respectively. Both are 6 minutes in duration.
 - Some elevations angles in VCP 80 repeat during the volume scan
- TDWR Spatial resolution and coverage area provided by SPG
 - Long range surveillance scan is at 300m resolution to 225 nmi range
 - All other elevations are at 150m resolution and extend to 45 nmi
 - Product range is 45nmi, except for rainfall products, and long range base Refl
 - SPG product VS time varies within a volume to distinguish product repeats



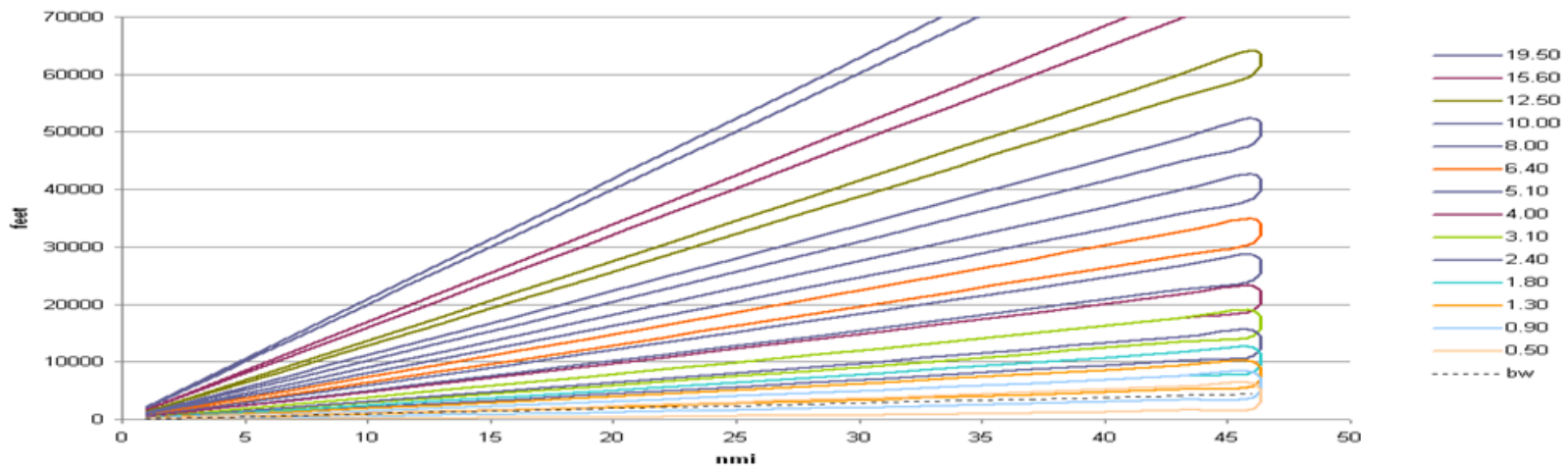
TDWR Level III Plans – Backup Slide VCP Elevation Scan Coverage Comparison



VCP80 (tbw) Range-Height Beam Coverage



VCP12 (WSR-88D) Range-Height Beam Coverage





TDWR Level III Plans – Backup Slide

TDWR SPG Algorithm/Product Processing

Bin		Angle		VCP		TDWR SPG (Product Time)								
#	Angle	Min	Max	90	80	2200	2200	2206	2207	2208	2209	2210	2211	2212
25	60.0	57.6	62.5	60.0			16							
24	55.0	52.6	57.5	55.1			15							
23	50.0	47.6	52.5	50.2			14							
22	45.0	42.6	47.5	45.3			13							
21	40.0	37.6	42.5	40.4	42.0		12			12			21	
20	35.0	32.6	37.5	35.5			11			11			20	
19	30.0	27.6	32.5	30.6	28.1		10			9			19	
18	25.0	22.1	27.5	25.7			9			8			17	
17	19.5	18.0	22.0	20.8	19.4		8			7			16	
16	16.7	15.7	17.9	15.9			7			6			15	
15	14.0	13.1	15.6		13.4		6			5			14	
13	10.0	9.6	11.0	11.0	10.0		5		5	4			13	
10	6.0	5.7	6.6	6.1	6.6		4		4	3			12	
7	3.4	2.7	3.6	3.3	3.3		3		3	2			11	
3	0.9	0.8	1.1	1.0	1.0		2		2	1			10	
2	0.5	0.4	0.8	0.6	0.6	1		1					9	
2	0.5	0.4	0.8	0.5	0.5		2		2	6	10		14	18
AWIPS Binning Scheme				bwi		90				80				
tbwi example				VNUM		1				2				

Algorithms/Products run on scans as indicated by cell side boarder (1 per 6 minute PPS, ULR, VWP), top (derived mini-vol), and patterns (storm analysis mini-volume).

- PPS: Long Range Cut
- VWP: Last Cut of Each Short Range Angle
- ULR: Every Cut
- 2 STI, HI, MD, TVS, cat: Cut #'s as noted & reuse
- 1 1.0 deg cut
- 2 CR, VIL, ET: Cut #'s as noted & reuse 1.0 deg and Long Range cut
- 1 and Long Range cut

Product Times (top) of Base Product Elevation Cuts indicated by cell color