NEXRAD Now

Summer 2006
Issue 16

“X” Marks the Spot

What is that “X” in the reflectivity product? Does it mark the landing spot for alien spaceships? Is it the “You Are Here” marker on an NWS RDA Locations map? What is it?

For several hours on April 10, 2006, the reflectivity products from Twin Lakes, OK (KTLX) exhibited this curious “X” pattern (Figure 1), which sparked some curiosity and a little concern regarding the cause.

When this image was first seen, it was hoped that the ROC could report

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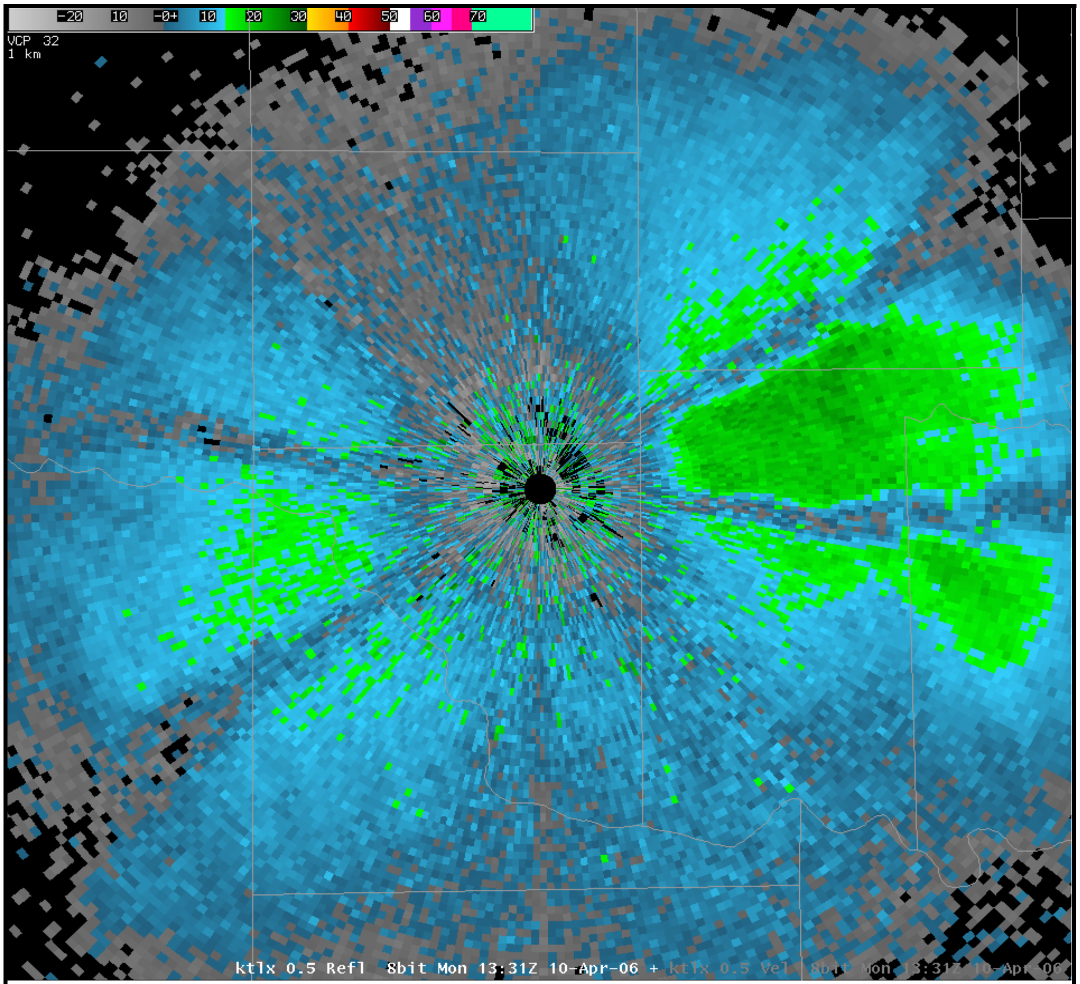

Figure 1: KTLX Reflectivity Product

What’s Inside?

“X” Marks the Spot *(Cont.)*

(Continued from Page 1)

something new and exciting causing the anomaly in the reflectivity data. Unfortunately, we cannot. This data anomaly is merely caused by the clutter filter removing power from the zero isodop (east-west), from the zero isodop (NE-SW), and again, although not nearly as distinctly, from the zero isodop (NW-SE).

This poses the following question, “How is it possible to have three zero isodops crossing at the RDA?” Since the corresponding velocity image (Figure 2) shows strong, almost uniform southerly winds, this does not make sense; or does it?

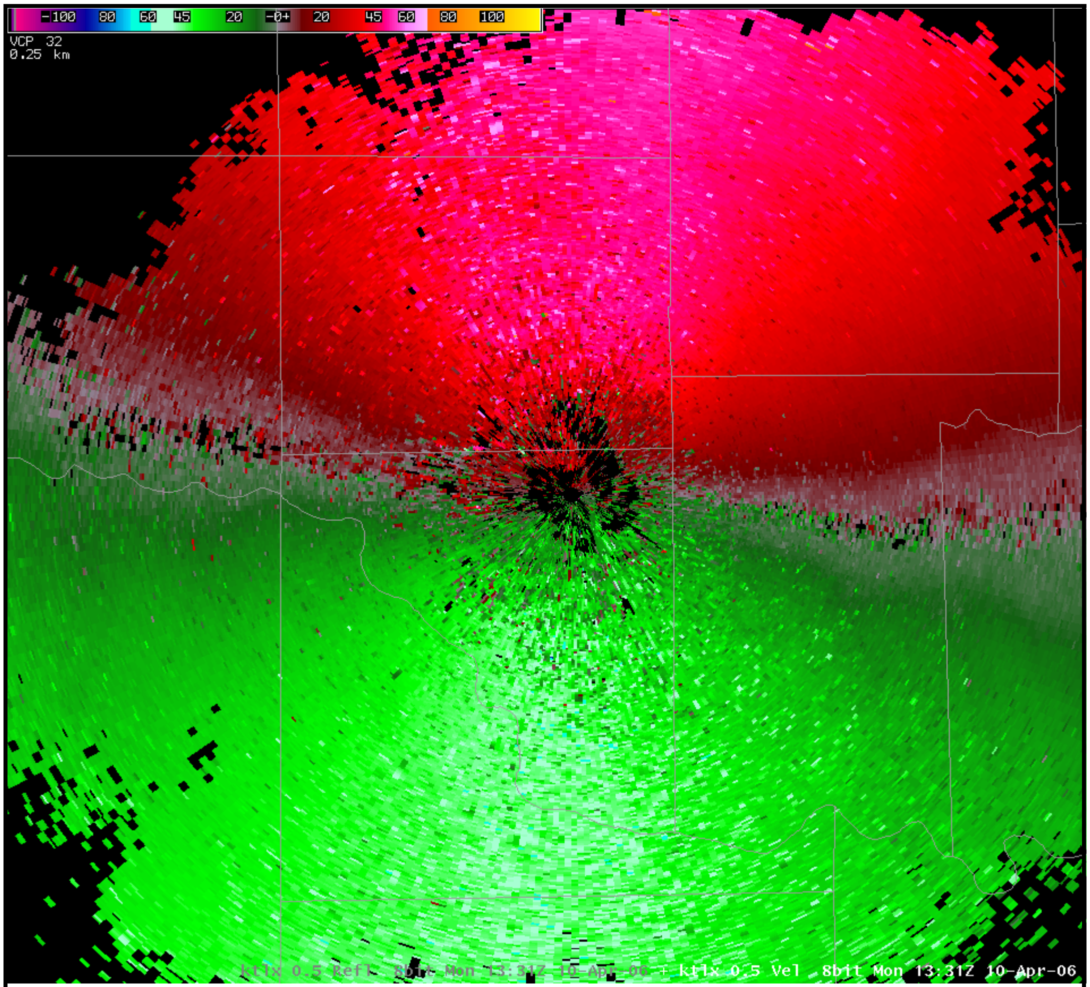

Figure 2: KTLX Velocity Product

Remember, Clutter Suppression is performed in the signal processor before the calculation of the base data estimates. Within the area defined for clutter suppression, power is removed from any signal with a near-zero velocity and a narrow spectrum width. The velocity is determined by the active PRF; in this case, PRF #1, which is used for the 0.5° surveillance cut. PRF #1 has a maximum unambiguous range (Rmax) of approximately 460 km and a Nyquist (Interval) Velocity (Vmax) of approximately 16 kts. Using PRF #1, the system can only unambiguously measure wind speeds up to ±16 kts. Therefore, all return velocities that exceed 16 kts will alias (wrap) around into the opposite direction and increment through that Nyquist Interval. Refer to Figure 3 for a visual illustration of this concept.

By looking at the example in Figure 3, it can easily be seen that a true wind speed of +18 kts (outbound) would be assigned a speed of -14 kts (inbound) and a true wind speed of +28 kts (outbound) would be assigned a speed of -4 kts (inbound). But, what happens if the true wind speed is twice the Nyquist Interval (2 * Vmax = 32 kts)? In the case where the wind speed is twice the Nyquist Interval, it is assigned a speed of 0 kts. (This is because the pulse-pair phase shift for 2 * Vmax is zero.)

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"X" Marks the Spot *(Cont.)*

(Continued from Page 2)

On April 10th, the winds were strong enough (>16 kts) to exceed the Vmax for PRF #1 which caused the velocity values to wrap around into the opposite Nyquist Interval. In fact, the wind speeds were well in excess of 32 kts.

-2	-34
0	-32
+2	-30
+4	-28
+6	-26
+8	-24
+10	-22
+12	-20
+14	-18
-16	-16
-14	-14
-12	-12
-10	-10
-8	-8
-6	-6
-4	-4
-2	-2
0	0
+2	+2
+4	+4
+6	+6
+8	+8
+10	+10
+12	+12
+14	+14
+16	+16
-14	+18
-12	+20
-10	+22
-8	+24
-6	+26
-4	+28
-2	+30
0	+32
+2	+34

NYQUIST INTERVAL 16KT

↑ TRUE WIND SPEEDS ↓

Figure 3: True wind speeds mapped into 16 kt Nyquist Interval

To help identify the location of the 32 kt wind bands, the base velocity product from Figure 2 was re-captured using a modified color pallet, see Figure 4. For this image, the gates with velocity values of ±32 kts are assigned the color white.

Now it is easy to see that the weaker data lines in the reflectivity image correspond to the velocity bands of ≈32 kts, which is 2 * Vmax for PRF #1. Remember, in the surveillance cut these returns are processed as if their velocity was zero. In other words, the velocity of the returns in the surveillance cut exceeded the PRF #1 Vmax and aliased (wrapped) back through the opposite Nyquist Interval to 0 kts, at which point those returns were processed by the clutter filter. The clutter filter removed the

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Alarms Following ORDA Installation

Several sites have expressed interest in knowing why their radar went into the ORDA INCO process with no alarms and emerged from the process with several alarms. The explanation is quite straightforward and reflects the fact that ORDA samples the signal path and monitors component performance in areas the legacy system could not.

The legacy RDA monitored signal path components at only a few selected signal levels. The limited scope of the legacy system's status monitoring capabilities results in the inability of the legacy system to identify varying performance parameters caused by aging components. These performance variations can result in degradation in data quality.

The fault isolation and monitoring improvements implemented by the ORDA monitor the test and shared signal paths through the entire linear portion of the RDA. Monitoring the signal path over the linear region makes the ORDA more sensitive to components that are operating on the outer boundaries of acceptable tolerances and to variations in performance of aging components. Therefore, the ORDA will identify more performance alarms than the legacy system. This has been noted at several sites where, immediately after installation, ORDA flagged alarms caused by weak or failing legacy components.

Even though it appears that the ORDA installation introduced new errors, the simple truth is that the cause of the alarms was already there and the new system identified it because ORDA detects deviations from the specified performance requirements. The advantage of this increased performance sensitivity is that the ORDA system will enhance the site technician's ability to more finely tune the system, which will provide site operators with the best data possible.

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“X” Marks the Spot *(Cont.)*

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clear-air return from these “zero isodop” returns, which resulted in the “X” shape.

These reflectivity anomalies are somewhat rare because three circumstances: strong low-level winds (at least twice the Nyquist Interval), abundant weak low-level return, and aggressive clutter filtering, must all come together to produce this effect.

Note: This situation is more likely when using ALL BINS Clutter Suppression instead of having the Bypass Map in control.

Joe N. Chrisman
ROC Engineering Branch

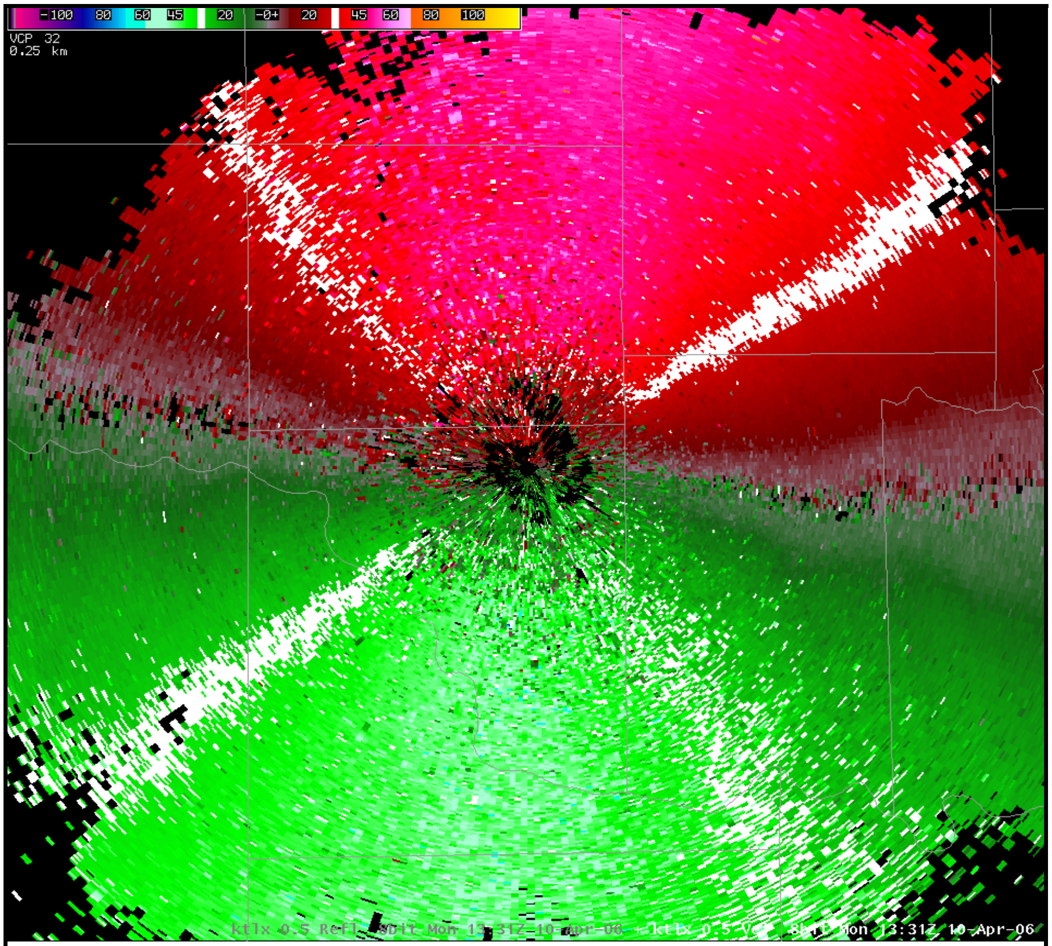

Figure 4: KTLX Velocity Product with a modified color pallet highlighting the 31-33 kt data fields

ROC Engineering and CM Join Forces

ROC Engineering and Configuration Management teams have joined forces in an effort to provide more timely and consistent documentation of changes to the WSR-88D system. This new method of doing business assigns a CM Analyst to each project team to act as a facilitator for completion and submission of engineering change proposals (ECPs).

In the past, ROC engineers have expressed frustration with the ever dynamic WSR-88D change process. As ROC engineers may submit only one or two ECPs a year, it is very likely the process and/or ECP documentation requirements changed during the time between these ECP submissions. On the other hand, ROC CM Analysts deal with ECPs and the change process on a daily basis. Thus, assigning a team member to oversee documentation of the ECP and provide the project lead with guidance on the change process was pro-

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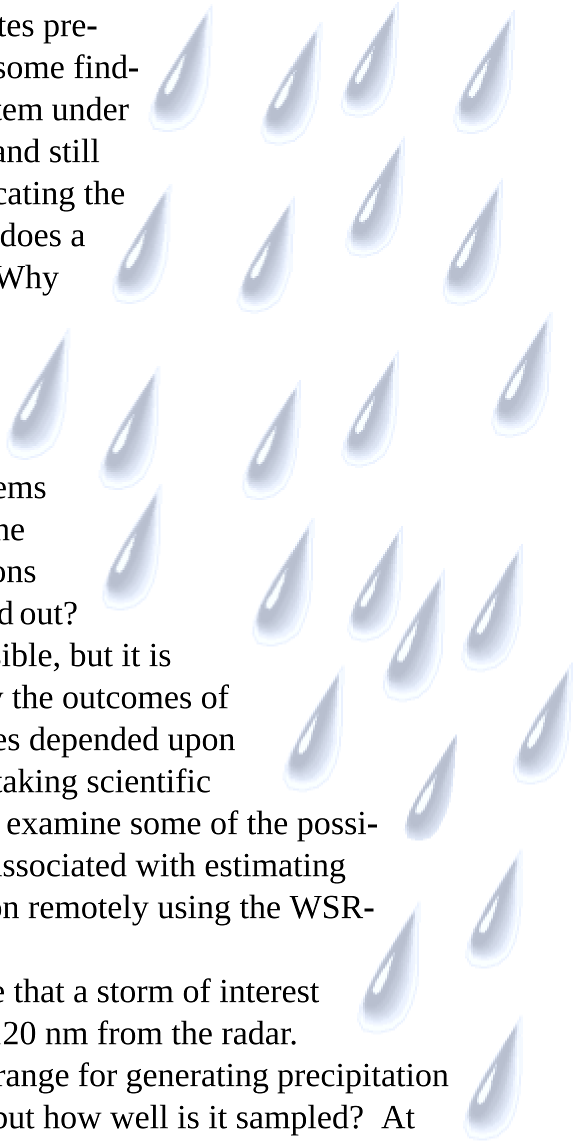
WSR-88D Precipitation Estimation - "A Conversation"

Precipitation estimation problems make up one of the largest classes of problems reported to the ROC Hotline. On the other hand, radar estimates of precipitation amounts are a great asset for hydrologists, forecasters, and other radar data users. Here we'll discuss a few issues related to precipitation estimation, with which most sites are undoubtedly familiar, but hopefully a slightly different way of thinking about the problem can be provided. For a moment, we'll step away from the world of algorithms, Z-R relationships, and rain bias estimates to take a common sense, higher level approach to viewing the problem.

As most are aware, radars overestimate or underestimate precipitation for various reasons: incorrect adaptable parameter settings, hardware performance, assumptions used in the precipitation processing system, etc. which can negatively impact estimates. Then, "Mother Nature" and "Murphy's Law" throw unexpected "kinks" into the situation. For our purposes here, we will focus on the issues related to sampling and "Mother Nature." These categories contain, by far, the largest number of variables which can impact WSR-88D precipitation estimates. And, unfortunately, some of the variables are intangible, poorly sampled, or simply unknown. But, we do know about many of them, and a few have been chosen for discussion. Let's assume the radar hardware is operating perfectly and all adaptable parameters are adjusted as recommended by the ROC's "Guidance on Adaptable Parameters."

With these ground rules identified, a valid lead in question is, "Why doesn't the radar do a better job of estimating precipitation?" Dozens of peer-reviewed articles related to WSR-88D precipitation estimation have been written by universities, private corporations, and governmental agencies. The results have varied, with some claiming the system overestimates precipitation, some finding the system under estimates, and still others indicating the WSR-88D does a good job. Why the differences? Could there have been problems with how the investigations were carried out? That's possible, but it is more likely the outcomes of these studies depended upon more than taking scientific care. Let's examine some of the possible issues associated with estimating precipitation remotely using the WSR-88D.



Assume that a storm of interest is located 120 nm from the radar. It's within range for generating precipitation estimates, but how well is it sampled? At 120 nm, the radar's lowest tilt samples the storm at about 18,000 feet (center of the beam), or about 3.5 miles above the ground - and that's the LOWEST tilt. Realistically, what can be expected in terms of radar precipitation estimates as compared to ground truth?

At 120 nm, the radar beam is likely overshooting the core of the storm thought to be currently filling the site's tipping bucket, so the WSR-88D will underestimate precipitation - right? That's a good, educated guess based on a sound under-

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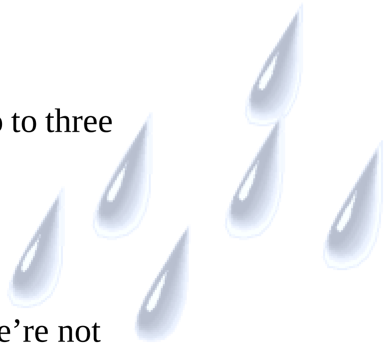
"A Conversation" *(Cont.)*



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standing of the storm and precipitation characteristics. So, we have one vote for underestimation.

Depending upon the season, the radar beam may actually be intersecting a melting layer - what will that do for us? If by chance the sampling is of the bright band, most of us would expect precipitation overestimates from the radar. So, now we have a vote for overestimation and the game is tied.

Now, let's throw a curve into the mix. In keeping with the policy of "no higher order mathematics," and borrowing some numbers from the old OSF Training Branch's training material, at 120 nm, the pulse volume is about 0.86 cubic miles. To keep things simple, we'll round that number to 1 cubic mile of atmosphere. That's a lot. Additionally, the beam diameter at that distance is about 2 miles across.

Let's look at the first number - the pulse volume. Converting 1 cubic mile to cubic inches, the result is something on the order of 2.5E14 cubic inches. Now, let's assume we have a rain gauge that is 12 inches tall with an 8 inch radius. Calculating the volume of this cylinder results in something on the order of 6.5E2 cubic inches.

When we compare a radar scatter volume (that's one pixel of high resolution reflectivity (Z)) with the rain gauge contents (R), which sits underneath it, we're equating the contents of those two volumes using a simple equation to convert Zs to Rs. Realistically, we're actually saying that a value that is 12 orders of magnitude (OOM) larger than a reference value is scientifically representative of that reference value. Surely, there are other scientific fields and circumstances wherein scientists agree that two numbers which differ by twelve OOM are representative of each other, but none come to mind right now. In fact, even in our own field, when we "solve" the equations of motion, what do we do with terms that are two to three OOM smaller? We "dump" them. Why? Because we believe their contributions are insignificant. Here, we're not talking about numbers that are 2 or 3 OOM smaller, but TWELVE OOM smaller. Many of us have conducted original research - what would our advisors say about these numbers? Do the estimates create a "warm, fuzzy feeling" that they're comparable and accurate?

Here's another curve - a lot of averaging is taking place - some at 3.5 miles above the earth's surface, and quite a bit of it in the RPG. To begin with, recall that the radar beam was two miles wide. That single storm will be "smeared" across the entire pulse volume. So, a storm that may be only ½ mile wide is averaged across the pulse volume. The tipping bucket is located below the center of the radar beam - right?

Since we're making this up as we go, in this scenario the rain gauge is located on the far left of the pulse volume and the storm is on the far right, which means they are nearly two miles apart. See where this is going...? The storm is spread across the pulse volume, which technically contains both the storm and the rain gauge, but is any rain actually getting into the gauge? That's questionable - but possible, for reasons that we'll discuss in a moment. But for now, what is the expected result?

Our first guess is that the radar will be overestimating, since the actual storm is nearly 2 miles from the rain gauge. And once we begin to understand this concept, we must keep in mind that this set of variables (storm location vs. rain gauge location) is completely INDEPENDENT of those discussed earlier. We must still consider where the beam intersects the storm and the large differences

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"A Conversation" *(Cont.)*

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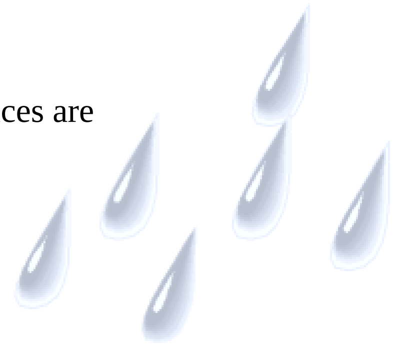
in scales. And we're not finished yet, sports fans.

"Mother Nature" will get her two cents in, too. In this case, at 3.5 miles up, the wind is blowing pretty hard. To simplify things, let's make a few very broad, admittedly unrealistic assumptions. Let's watch a single rain drop located 3.5 miles high in the atmosphere. Assume the wind is blowing 40 mph at that level and it's unchanging all the way down to the surface. There are no updrafts or downdrafts and no evaporation or coalescence. Our drop falls at a speed of 7 mph. It will take about 30 minutes for it to hit the ground, during which time it will be blown 20 miles horizontally. Now, there are many things wrong with this simplified example, but it makes a point. Where could that rain drop actually hit the ground? What happens when a realistic wind profile, updrafts and downdrafts, and realistic microphysics are inserted? Based on this information, could the radar be overestimating, underestimating, or even be correct?

And finally, we must consider what's going on with respect to beam propagation. In the AWIPS era, it's easy to fall into the trap of believing the height value displayed when a cursor height readout is provided. Therefore, this is an important aspect of the problem to consider.

In an effort to keep things simple, we originally assumed a standard atmosphere and standard propagation. Making that assumption is putting a great deal of faith in "Mother Nature." As before, not much detail is given here, but the issue, in context, is provided for consideration.

Most of us are aware that beam propagation depends on, and changes with, the refractive index. The atmospheric refractive index depends on pressure, temperature, and water vapor. And, it's been shown that these variables, and hence the refractive index, vary across very small distances. What are the chances our radar beam is exactly 3.5 nm above the ground? The chances are pretty small.



What if a frontal boundary, outflow boundary, dry line, or sea breeze, all of which have different kinematic and thermodynamic characteristics, is lying between the radar and the storm? Again, it's apparent that large distances, as well as microscale meteorological variables play havoc with our ability to truly know where the beam is intersecting the storm. So, should we expect overestimates or underestimates?

If after this discussion we think we have a handle on the variables discussed, let's step back into the real world. Keep in mind that we haven't introduced variables associated with radar calibration, antenna pointing angle, volume coverage scan being used, operator-related changes in adaptable parameters, incorrectly placed rain gauges (not accurately geo-located), improperly operating tipping buckets, and the list goes on and on.

When we try to compare precipitation estimates from one radar to another, we must apply what we have discussed to each system independently, and give a bit of thought as to how the combination of variables will interact to make the radar estimates match - or not. At this point, things can become overwhelming, and thankfully there are folks at the River Forecast Centers who work on these types of issues every day.

It is doubtful the radar was ever designed to measure the amount of water falling into a single tipping bucket. This author has had many discussions with several of the scientists and engineers who were around when the WSR-88D was still on the drawing board. These discussions revealed that when the radar was designed and the original hydrological functionality developed, it was envi-

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“A Conversation” *(Cont.)*

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sioned that the radar-provided precipitation estimates would be used to initialize river basin-based hydrological algorithms. At that time, the number of drops that hit in an eight inch diameter rain gauge was not being counted, but rather the amount of water that fell on either side of a ridge line separating two river basins. Given the averaging, and atmospheric parameters discussed above, it is suspected the radar is MUCH better at that scale of measurement.

Obviously, the worst case scenarios have been used in this discussion. The problem of estimation generally gets smaller as range decreases and as convective precipitation turns into stratiform precipitation, but the above discussion remains valid. The variables and problems don’t go away - they just become a bit more manageable. And considering the conversation we've just had, maybe the question shouldn’t be, “Why doesn't the radar do a better job of estimating precipitation?” but possibly, “Why are radar-based precipitation estimates as good as they are?”

The radar is, and will remain one of our most valuable tools for estimating the amount of precipitation hitting the ground. And, with input from the field, new hardware, and new algorithms, it continues to get better with each software build. The above discussion is simply meant to remind everyone that there are large numbers of variables associated with radar-derived products. The products that “magically” appear on the display screen aren’t really magic - well, maybe there's some smoke and mirrors stuff going on, but no true magic.

Tony Ray
ROC Operations Branch

Alarms *(Cont.)*

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Common Alarms:

Linearity Test Signal Degraded or Linearity Slope Degraded - These alarms indicate a failure in the signal path for the entire linear range of the RDA system. One cause of these alarms is system noise attributed to the legacy 4/104W104 (relabeled as 4/104W154 in an ORDA system) or 4/104W100 cables or their connections at the bulkhead. Typical symptoms are jaggedness in the top linear portion of the linear curve when running Linearity in STS.

Replacement of the 4/104W154 and 4/104W100 cables is being addressed through a cooperative program between the ORDA team and the ROC. This program will replace the 4/104W154 and 4/104W100 cables, fleet-wide. The ORDA installation teams have begun installing new 4/104W154 and 4/104W100 cables as part of the ORDA installation process. Sites that already have ORDA will be sent new 4/104W154 and 4/104W100 cables as part of a retrofit program. The target completion date for the retrofit program is August 30, 2006.

UPS Site Wiring Fault – This alarm can indicate a grounding problem with the RDA UPS.

ROC Engineering is conducting preliminary tests on additional causes of the UPS Site Wiring Fault alarm. Appropriate actions will be taken based on the findings of these tests.

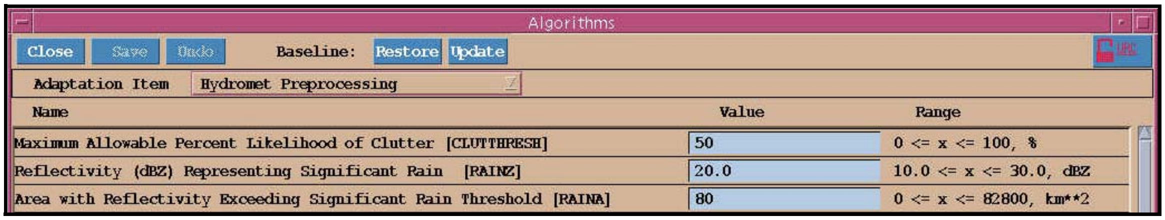
Joe N. Chrisman
ROC Engineering Branch

PPS Parameters & Their Impact on Rainfall Estimates

Underestimation and overestimation of rainfall accumulations can often be mitigated by local studies and careful adjustment of PPS adaptable parameters. Here we will explore some of these parameters and their potential impacts on rainfall estimates. All of the parameters in this article are subject to URC guidelines.

RAINZ and RAINA (Hydromet Preprocessing)

There are two parameters that control when accumulations start and stop. A common cause of underestimation is the setting of these parameters such that accumulations begin too late and end too early. The parameters of interest are RAINA and RAINZ, part of the Enhanced Precipitation Preprocessing (EPRE) Algorithm, introduced with Build 5.0 (Spring 2004).



Adaptation Item: Hydromet Preprocessing

Name	Value	Range
Maximum Allowable Percent Likelihood of Clutter [CLUTTHRESH]	50	0 <= x <= 100, %
Reflectivity (dBZ) Representing Significant Rain [RAINZ]	20.0	10.0 <= x <= 30.0, dBZ
Area with Reflectivity Exceeding Significant Rain Threshold [RAINA]	80	0 <= x <= 82800, km**2

RAINZ is the dBZ threshold that represents significant rain, i.e., desired rain accumulation. The default setting for RAINZ is 20 dBZ. RAINA is the minimum areal coverage of significant rain. The default setting is 80 km^2. When the areal coverage of returns at or above RAINZ meet or exceed RAINA, the PPS will accumulate rainfall. The accumulations reset to zero once the returns are below these thresholds for one hour.

RAINA should represent the areal coverage of residual clutter for any particular site. RAINA functions similarly to its predecessor, the Nominal Clutter Area (NCA), which was part of the Precipitation Detection Function (PDF). Prior to Build 8.0 (Spring 2006), when returns exceeded the NCA and Clear Air Mode was current, the PDF would command an automatic switch to Precipitation Mode. For many offices, this automatic switch was undesirable and the NCA was often set very high to prevent the switch.

When RAINA and RAINZ were implemented, mode switching became independent of rainfall accumulations. The PDF still controlled the automatic switch to Precipitation Mode, but no longer controlled rainfall accumulations. RAINA and RAINZ, part of EPRE, controlled whether or not rainfall was accumulated, regardless of the current VCP/Mode. However, RAINA and the NCA had a similar function, accounting for residual clutter and were often set to similar values. For offices that used a high setting for the NCA, a similar high setting for RAINA will delay the onset of accumulations and stop the accumulations too soon. This results in the underestimation of rainfall.

CLUTTHRESH (Hydromet Preprocessing)

CLUTTHRESH was also introduced as part of EPRE with Build 5.0. The culminating task of EPRE is to construct the Hybrid Scan. EPRE uses the Radar Echo Classifier (REC) algorithm to determine, on a bin by bin basis, the probability that a given bin contains ground clutter. CLUTTHRESH determines whether or not a bin is used in the Hybrid Scan and thus gets used for rainfall accumulation. The default setting for CLUT-

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PPS Parameters *(Cont.)*

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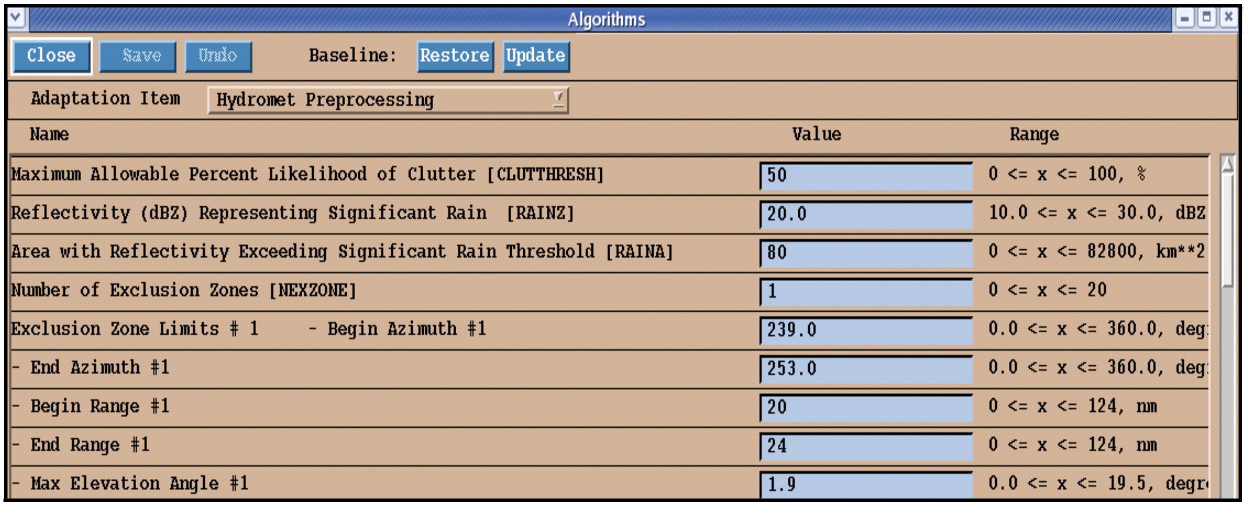
THRESH is 50%. This means that any bin with a 50% or greater clutter likelihood would be rejected as clutter and the corresponding bin from the next higher elevation would then be checked. An optimal setting for CLUTTHRESH will often vary seasonally or even from event to event. Adjustments to CLUTTHRESH can produce significant improvement but will require careful monitoring.

At least one NWS office noticed rainfall overestimates during convective events beginning with the fielding of EPRE. They have since changed the setting of CLUTTHRESH from 50% to 75% for convection and have thus far seen significant improvement. A higher setting for CLUTTHRESH requires a high clutter likelihood value for the bin to be rejected. This would increase the number of low elevation bins used in the Hybrid Scan and thus for rainfall accumulations. In convective storms with hail cores, the use of lower elevations reduces the risk of overestimation due to hail contamination.

With appropriate clutter filtering files and procedures in place, unfiltered AP should be a rare event. However, if there is unfiltered AP present, a lower setting for CLUTTHRESH would result in higher elevations being used, reducing clutter contamination of the rainfall estimates.

Exclusion Zones (Hydromet Preprocessing)

Another feature of EPRE is the ability to designate areas and elevations that are excluded from the Hybrid Scan and thus rainfall accumulations. There are some ground based targets with movement, such as wind farms, that clutter suppression cannot successfully remove from the base data. In order to prevent contamination of the rainfall estimates, exclusion zones can be used for these areas.



Adaptation Item: Hydromet Preprocessing

Name	Value	Range
Maximum Allowable Percent Likelihood of Clutter [CLUTTHRESH]	50	0 <= x <= 100, %
Reflectivity (dBZ) Representing Significant Rain [RAINZ]	20.0	10.0 <= x <= 30.0, dBZ
Area with Reflectivity Exceeding Significant Rain Threshold [RAINA]	80	0 <= x <= 82800, km**2
Number of Exclusion Zones [NEXZONE]	1	0 <= x <= 20
Exclusion Zone Limits # 1 - Begin Azimuth #1	239.0	0.0 <= x <= 360.0, deg
- End Azimuth #1	253.0	0.0 <= x <= 360.0, deg
- Begin Range #1	20	0 <= x <= 124, nm
- End Range #1	24	0 <= x <= 124, nm
- Max Elevation Angle #1	1.9	0.0 <= x <= 19.5, degr

In this example, an exclusion zone has been defined for an area associated with a wind farm to the southwest and for elevations at or below 1.9°. This area would then be excluded for the lowest three elevations in VCP 12 and the lowest two elevations for the remaining VCPs. For the azimuths and ranges that fall within an exclusion zone, the Hybrid Scan would use a bin from an elevation that is above the excluded angles.

Exclusion zones must be used carefully with the volume (area and elevation angles) defined as small as possible. For the volume within an exclusion zone, rainfall estimates will be based on the elevation angles above the designated zone, often resulting in an underestimation of rainfall. Therefore, it is important to avoid defining exclusion

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PPS Parameters *(Cont.)*

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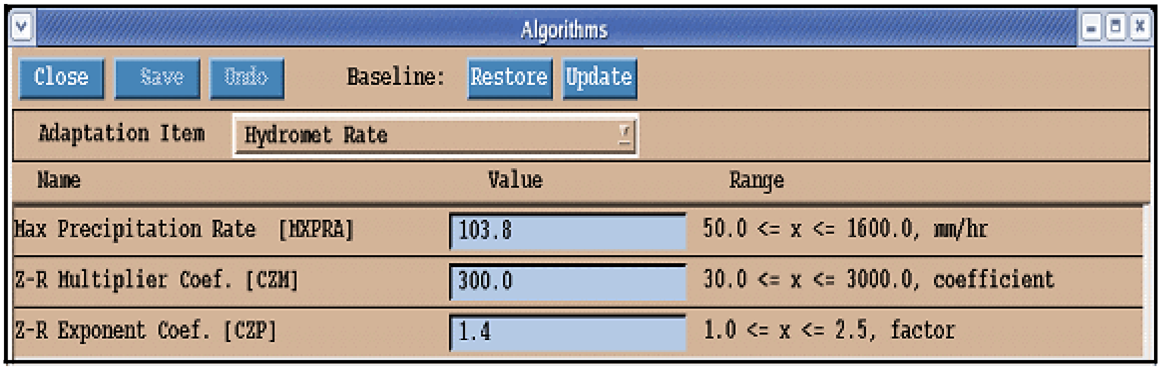
zones for unnecessarily large volumes.

It is important to remember that exclusion zones will not prevent ground targets such as wind farms from contaminating the base data. They can only be used to prevent contamination of the rainfall estimates.

Z-R relationships and MXPRA (Hydromet Rate)



Adaptation Item: Hydromet Rate

Name	Value	Range
Max Precipitation Rate [MXPRA]	103.8	50.0 <= x <= 1600.0, mm/hr
Z-R Multiplier Coef. [CZM]	300.0	30.0 <= x <= 3000.0, coefficient
Z-R Exponent Coef. [CZP]	1.4	1.0 <= x <= 2.5, factor

MXPRA defines the maximum rain rate used by the PPS for rainfall accumulations. This parameter serves to mitigate hail contamination and should represent the maximum expected rainfall rate for any given area, based on climatology. The units for MXPRA are in mm/hr. The following conversions are provided as guidance:

75 mm/hr is about 3 in/hr
100 mm/hr is about 4 in/hr
125 mm/hr is about 5 in/hr
150 mm/hr is about 6 in/hr
175 mm/hr is about 7 in/hr
200 mm/hr is about 8 in/hr

The ROC recommends that MXPRA never be set higher than 200 mm/hr.

There are 5 Z-R relationships available and they are implemented by editing the Z-R coefficients, CZM and CZP. An awareness of the setting of MXPRA is recommended when adjusting the Z-R relationship. For example, the default Z-R relationship is $Z=300R^{1.4}$ while the default setting of MXPRA is 103.8 mm/hr, just over 4 in/hr. If atmospheric conditions change such that warm rain processes will dominate, a switch to the tropical Z-R, $Z=250R^{1.2}$, may be made. In this case, adjusting the MXPRA to allow for the potentially higher rain rates would also be recommended.

A suggested reference for this article is the Guidance on Adaptable Parameters, Chapter 8.

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Warning Decision Training Branch

NEXRAD Now is an informational publication of the WSR-88D Radar Operations Center (ROC).

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ORDA and Clutter Suppression

Improved Capability

Clutter filtering in the ORDA is accomplished using a WSR-88D-tuned version of the SIGMET Gaussian Model Adaptive Processing (GMAP) clutter filtering technique. Compared to the legacy clutter filter, GMAP is able to achieve approximately 5dB more suppression. Additionally, GMAP provides the capability to “rebuild” the power spectrum of any removed meteorological return, thereby significantly reducing clutter filter-induced bias in the base data estimates. (For additional information, refer to “A First Look at the Operational (Data Quality) Improvements Provided by the Open Radar Data Acquisition (ORDA) System,” Chrisman and Ray, 2005 at http://www.wdtb.noaa.gov/buildTraining/ORDA/PDFs/Final_Chrisman_Ray.pdf).

Even though ORDA and GMAP provide improved clutter suppression capability, this improved capability does not necessarily equate to “better” suppression. Like the legacy clutter filter, improper application of GMAP can also have a detrimental affect on the base data estimates.

Better Suppression Through Proper Application

Generally speaking, the guidance for operations of the ORDA with GMAP is the same as the Legacy RDA with the Infinite Impulse Response (IIR) filter. In other words, use the Bypass Map to address the normal ground clutter pattern and only invoke All Bins clutter suppression when and where there is AP return.

Using clutter suppression regions in areas where there is no clutter return can still result in significant degradation of meteorological return. Even though GMAP attempts to “rebuild” the power spectrum of any removed meteorological return, it can only do this when some power from the meteorological return survives the initial filter process. In weakly forced laminar flow, GMAP suppresses (removes) all power with near zero-velocity. In this environment there may not be any power left to initiate the “rebuilding” process. Figure 1 clearly illustrates this situation.

(Continued on Page 13)

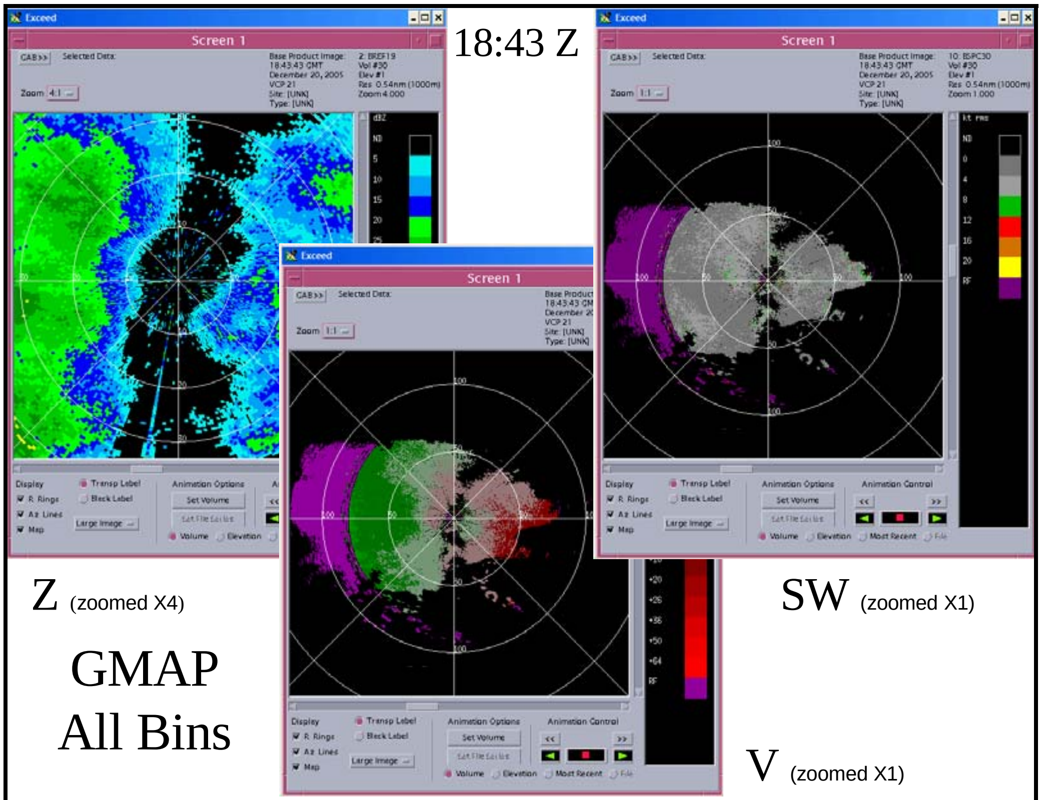


Figure 1: GMAP applied to All Bins

ORDA and Clutter Suppression *(Cont.)*

(Continued from Page 12)

Compare the data coverage area in Figure 1 with that of Figure 2. It's easy to see the reduction in meteorological data coverage caused by clutter suppression.

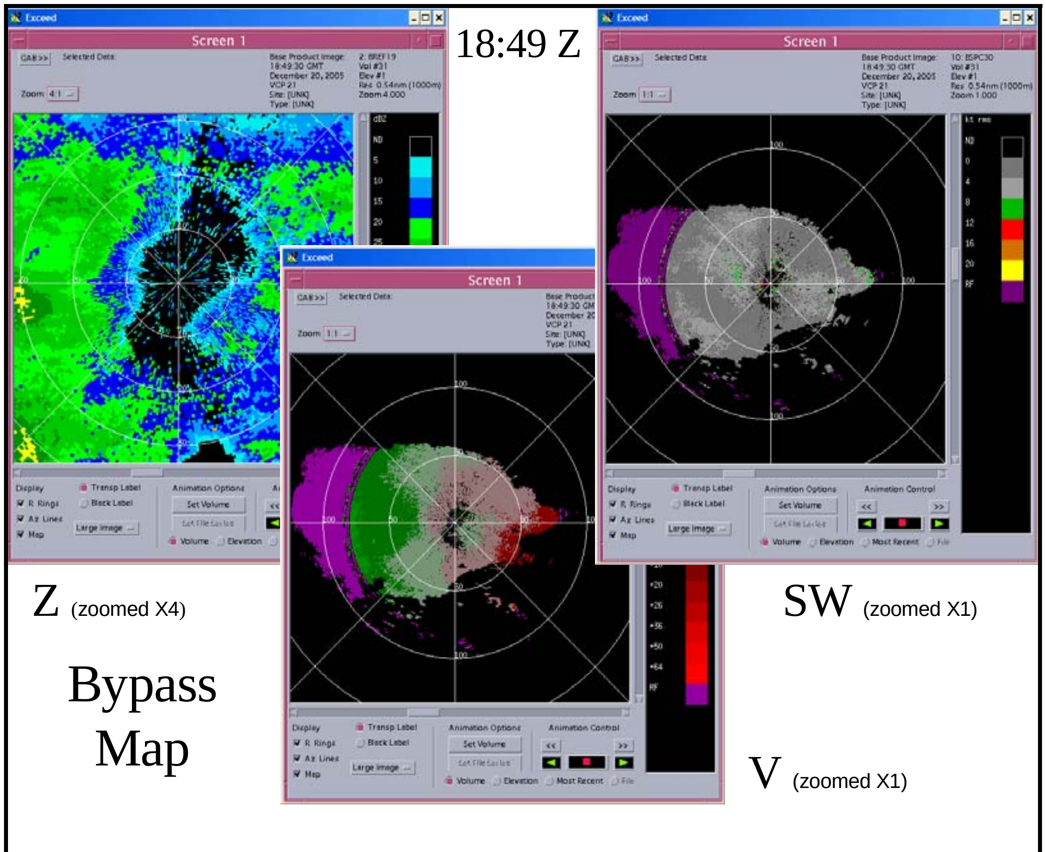


Figure 2: Bypass Map-Controlled GMAP clutter suppression applied

As can be seen in Figure 1, GMAP filtering can be very aggressive under certain circumstances. It is important to remember, however, that when the Bypass Map is in control (Fig 2) the impact of GMAP filtering is comparable to that of legacy suppression. In other words, the legacy filter also caused data loss along the zero isodop in areas where it was invoked.

Suggested Clutter Suppression Management Items

The following items are provided as general guidance to assist in local Clutter Suppression management.

1. Use the Bypass Map to address routine, non-transient clutter. (There was a 1km error in the Build 7 Bypass Map generation software. This error was corrected in Build 8 and therefore it is recommended that all sites generate a new Bypass Map once Build 8 is installed. The performance of Bypass Map controlled clutter suppression should be noticeably better with Build 8.)

2. Generate a new Bypass Map when seasonal conditions change (when the current Bypass Map no longer addresses the routine clutter). Bypass Map generation can be accomplished at the MSCF via the ORDA HCI. A technician working with a meteorologist can generate a new Bypass Map in about 10 minutes. Refer to the document "Bypass Map Generation Guidance" at http://www.wdtb.noaa.gov/buildTraining/ORDA/PDFs/Bypass.pdf for additional information. For questions concerning the validity of the Bypass Map, call the WSR-88D Hotline.

3. Define at least two Clutter Suppression Regions files and name them accordingly.

- One of these files should invoke the Bypass Map for both elevation segments.

(Continued on Page 14)

"Hints & Kinks" from South Shore, HI

Most electronics and/or mechanical systems can afford at least some improvement, especially in the area of maintenance methods, procedures and techniques. The WSR-88D, NEXRAD is no exception. NEXRAD technicians across the country sport "a bag of tricks" designed to facilitate improved maintenance safety, efficiency, as well as reduced cost. Here are a few items in our "bag of tricks" we like to use at South Shore NEXRAD, Hawaii.

Slip Ring Contact Assembly, UD2A1A2

As any NEXRAD technician appreciates, cleaning the antenna slip rings can be a daunting task. Slips rings are generally cleaned by carefully inserting swabs between the web of tie-wrapped cable almost completely covering the front of the assembly. It would've been a delight to have a second portal free of interfering cabling to allow easy access to clean each slip ring disk and associated contacts. Unfortunately, this is not the case. Instead, our solution was to simply remove the existing cable tie-wraps, re-route the cable, and secure the cable with new tie-wraps to allow greater access to the slip ring/contacts assembly. Photo 1 shows an example of the re-routed cable.

(Continued on Page 15)

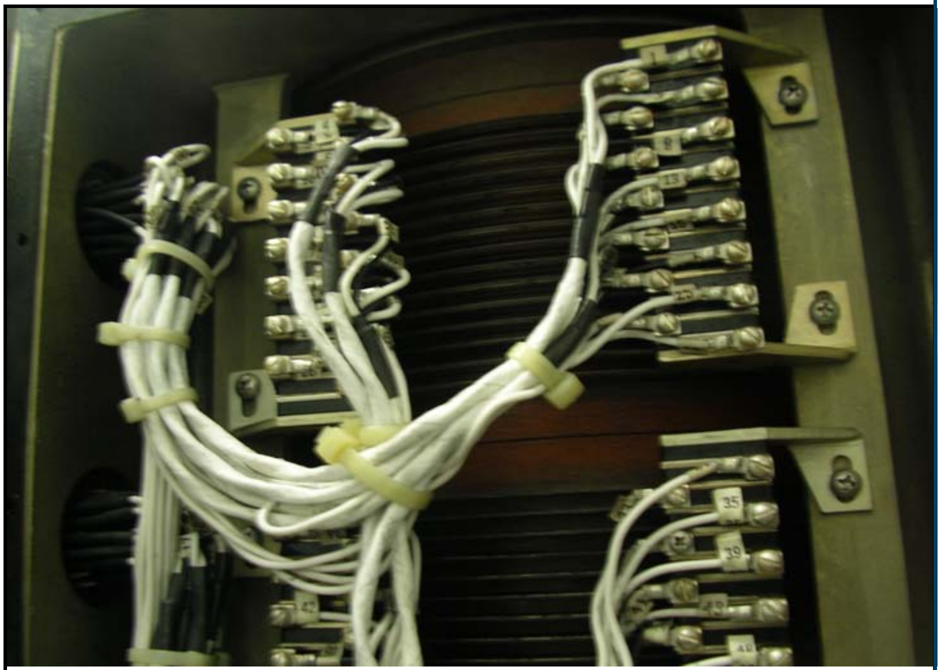


Photo 1: Re-routed Cable

ORDA Clutter *(Cont.)*

(Continued from Page 13)

- One file should invoke All Bins filtering for the low elevation segment and the Bypass Map for the high elevation segment.

  (**NOTE:** The ROC does not recommend using forced suppression on the high elevation segment except under extreme AP conditions when the 2.4 degree elevation cut is intersecting the ground. These extreme conditions are rare for most sites. At sites where these conditions do occur, create another file that invokes All Bins filtering for both elevation segments.)
- If location appropriate, define a file (or files) to address predictable transient clutter caused by local geography (e.g., small scale AP return caused by a large body of water, etc.).

4. Under AP conditions, invoke the appropriate clutter suppression regions file to address transient clutter return caused by AP. When the conditions causing the AP event subside, download the predefined file that invokes the Bypass Map.

Joe N. Chrisman
ROC Engineering Branch

“Hints & Kinks” *(Cont.)*

(Continued from Page 14)

Gain Control 4A9R1

The R1 gain control port on the UD4A9 IF Amplifier-Limiter is located at the bottom of the module, making it very difficult and awkward to adjust the gain during various receiver calibration and noise alignment procedures. Our solution was to horizontally rotate the UD4A9 module180 degrees so that the R1 gain control port faces up rather than down. This was accomplished by (a) removing appropriate tie wraps on the cables attached to the module, (b) removing the four (4) mounting screws, (c) rotating the module so that the rear now faces the front, (d) replacing the FOUR (4) mounting screws, and finally, (e) reattaching the tie wraps to the cables, as required. Photo 2 shows an example of the remounting of the IF Amplifier-Limiter assembly. (This tip will be removed from our “bag of tricks” following ORDA installation, which will eliminte 4A9R1 from the WSR-88D system.)

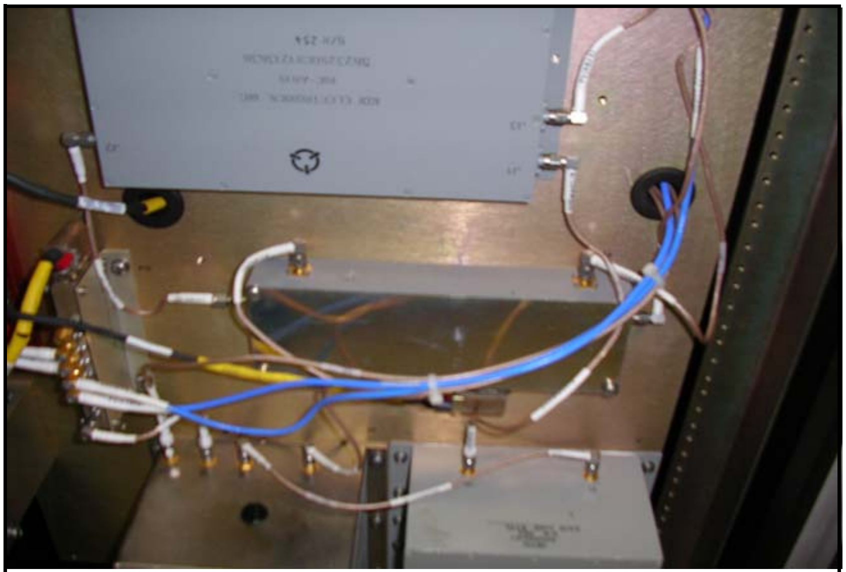


Photo 2: Remounting IF Amplifier-Limiter assembly

Dry Air Outlet, Waveguide Pressurization Unit, UD6

Replacing the Waveguide Pressurization Unit, UD6, requires removing the dry air outlet hose, which ultimately reduces the waveguide pressure to approximately zero. As a result, it is necessary to shut the transmitter down to prevent possible damage until suitable air pressure (approximately 3 psi) is revived in the waveguide. Recharging could take several hours to reach peak pressure. We have replaced the existing fixed hose connector within a quick disconnect type connector. This allows pressure to be maintained in the waveguide while the Waveguide Pressurization Unit is being replaced. The obvious benefit for dual channel systems is that the redundant channel can be brought on-line simultaneously while repairs are being made to the other channel. For single channel systems, the main advantage is not having to wait several hours for the waveguide

Photo 3: Quick disconnect replacement

(Continued on Page 16)

"Hints & Kinks" *(Cont.)*

(Continued from Page 15)

to recharge to nominal pressure. Photo 3 shows an example of a quick disconnect replacement for the dry air outlet hose connector.

Cabinet Lights, Control Panel, UD3A1

Several indicators on the transmitter control panel consist of incandescent type bulbs, which have a relatively short lifetime. Replacing the bulbs is time consuming. Normally, closing the transmitter panel door depresses a bracket onto the cabinet light switch UD3A1S10 that disconnects power to the lights on the control panel. On occasion, the cabinet light switch UD3A1S10 fails, thus causing the lights to remain on continuously. Other times, the panel door bracket is misaligned or even missing, which has the same effect. Our solution is to simply turn off the cabinet lights circuit breaker UD3A13CB3 when not in use. Photo 4 shows the cabinet lights circuit breaker UD3A13CB3 located on the far right of the switch panel.

Photo 4: Cabinet lights in "Off" position

The ROC Operations Branch found these "tricks" to be useful. Therefore, ROC Configuration Management is working with the FAA POC to submit change requests to add these "tricks" to the WSR-88D baseline.

Francis Benevides, Jr.
Allan Largo
David Inouye
FAA, South Shore, HI

ROC ENG and CM Join Forces *(Cont.)*

(Continued from Page 4)

posed and the ECP Facilitator pilot program was born.

The ECP Facilitator gathers data from the project lead and team members to populate the ECP form and its attachments. This ensures that all required drawing and documentation changes are identified; site effectivity, kit components and costs are listed; an implementation schedule is provided; and impacts to other projects or any project dependencies are noted. Certain attachments were made mandatory, with standardized formats, to provide ECP reviewers with thorough documentation presented in a consistent manner.

The results of the pilot program were so successful that the ECP Facilitator function was implemented in early 2006. The duties of the project lead remain as they have always been, but now they are free of the burden and frustration of dealing with forms and processes with which they are unfamiliar.

Ruth Jackson
METI/ROC Program Branch

Guidance for Bypass Map Generation

The Bypass Map identifies the geographic location of ground clutter targets within the normal radar viewing horizon. To generate a Bypass Map, the RDA operates off-line and collects data using a slow rotation rate. This data collection scheme is designed to provide enough samples from each target to ensure detection and classification of non-moving (radial velocity), hard targets. Two adaptable parameters, signal-to-noise ratio (SNR) and unfiltered-to-filtered (return) ratio (CLUT), are used to differentiate actual, hard target clutter return from well-behaved (zero velocity and narrow spectrum width) returns from non-ground clutter targets.

Signal-to-Noise Ratio (SNR)

- The SNR is a measure of signal strength relative to the measured background noise.
- The SNR threshold is used to discount weak targets, focusing on higher power returns.

Unfiltered-to-Filtered (Return) Ratio (CLUT)

- This ratio is a measure of signal strength prior clutter suppression relative to the resultant signal strength after clutter suppression.
- The CLUT threshold is used to differentiate weak meteorological/biological targets from high-power clutter targets.

Radar returns, both meteorological and non-meteorological, that exceed the SNR and CLUT thresholds are considered clutter targets and the range gates from which those targets originated are identified (as clutter contaminated) on the Bypass Map. The default setting for these two parameters are SNR=9 and CLUT=9. Our experience indicates that these default settings result in “noisy” maps (Figure 1) that do not adequately identify weaker

(Continued on Page 18)

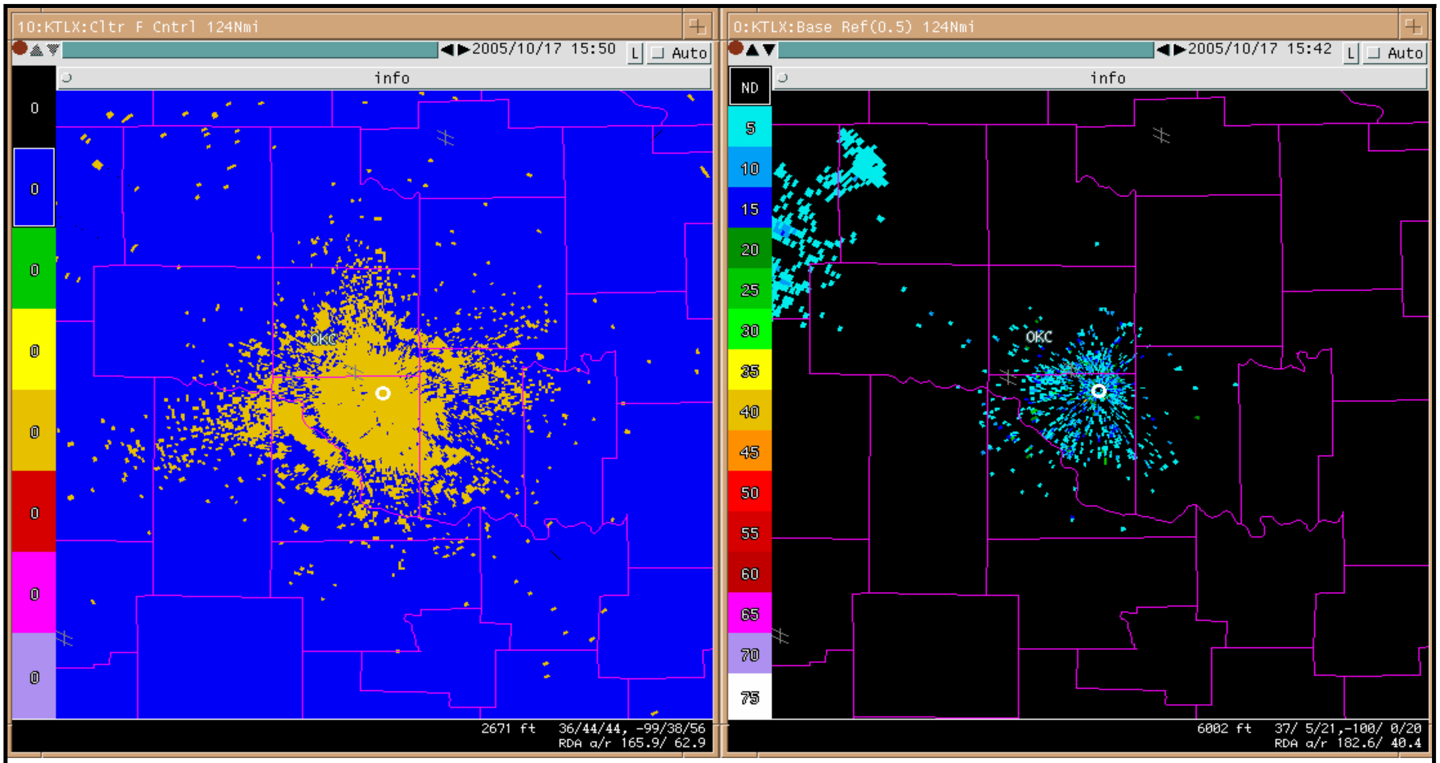


Figure 1: Example of KTLX Bypass Map (Left) with SNR = 9 and CLUT = 9 and resultant reflectivity data field (Right)

Bypass Map *(Cont.)*

(Continued from Page 17)

ground-based targets. These maps cause suppression over too large an area (due to the SNR=9 threshold) which may result in the loss of some meteorological data. Additionally, the CLUT threshold of 9 may prevent the identification of the entire clutter target resulting in "fringing" around the edges of identified ground returns.

For most sites, the settings of SNR = 24 and CLUT = 3 should optimize the bypass map (Figure 2). The ROC recommends a new map be generated using these settings as soon as possible after INCO.

The following sections touch on the most important aspects to consider when generating a new Bypass Map.

Why?

- The current Bypass Map *does not* adequately identify the hard target areas of the normal ground pattern.

OR

- Since the last Bypass Map was generated, the radar clutter horizon has changed. This may be due to seasonal changes or local, man-made construction projects.

No matter the cause, the need for a new Bypass Map can be easily seen when, under normal beam propagation conditions for the season and with the Bypass Map in control, ground clutter return is apparent in the base products.

When?

Select a day when the atmospheric conditions are representative of the "average" conditions expected for the upcoming season. For example, if

(Continued on Page 19)

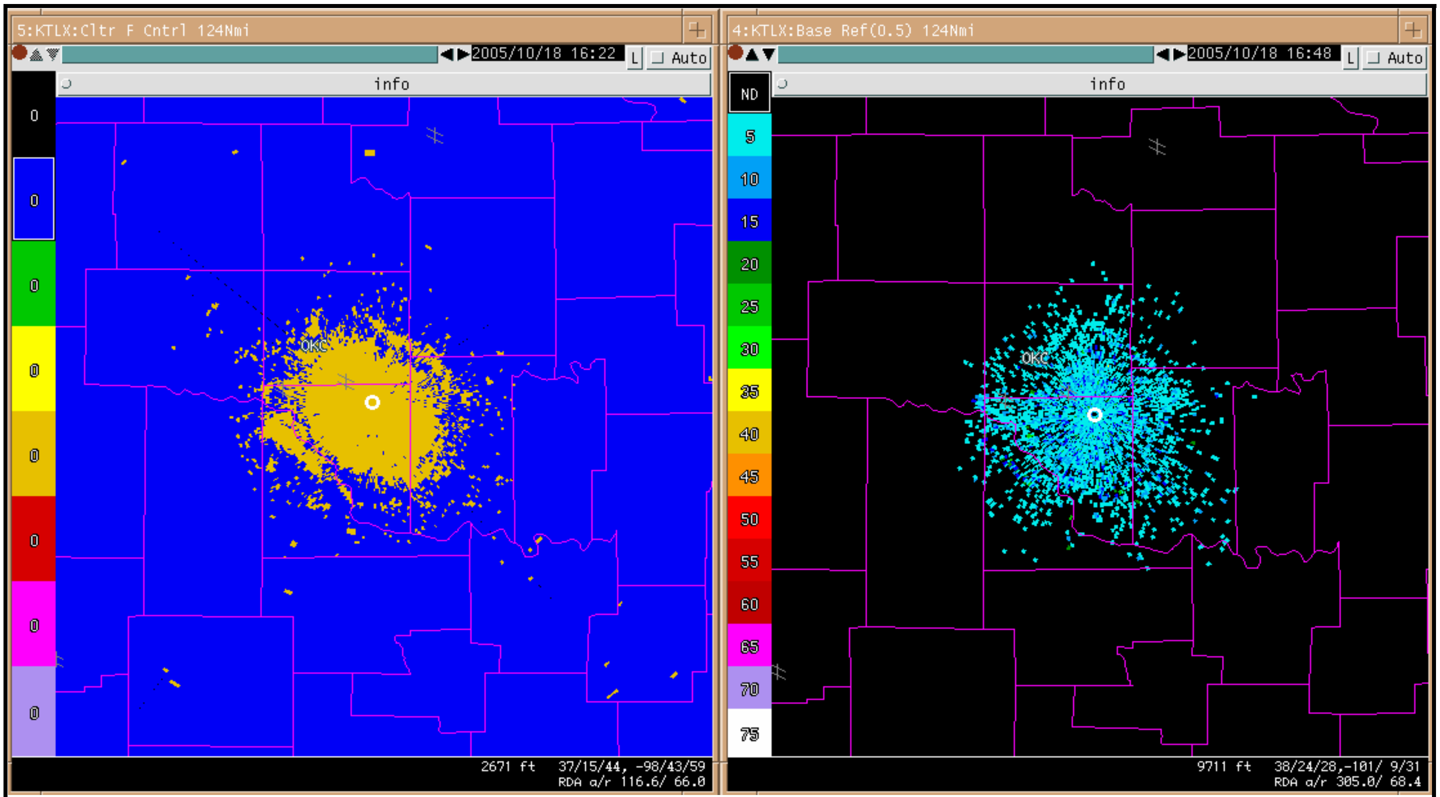


Figure 2: Example of KTLX Bypass Map (Left) with SNR = 24 and CLUT = 3 and resultant reflectivity data field (Right)

Bypass Map *(Cont.)*

(Continued from Page 18)

during the upcoming season the atmosphere will not be dominated by a surface-based inversion – *do not* generate a Bypass Map. However, when a strong surface-based inversion is present – *do* generate a Bypass Map on a day when the atmosphere is well mixed and near-normal beam propagation conditions exist.

How?

This section deals with the adjustment of the SNR and CLUT parameters to tailor the identification of clutter targets based on the character of the ambient return.

NOTE: For the mechanical, step-by-step, Bypass Map generation procedure follow the instructions provided in the ORDA technical manual, EHB 6-515 *Maintenance Instructions Open Radar Data Acquisition (ORDA) Group*.

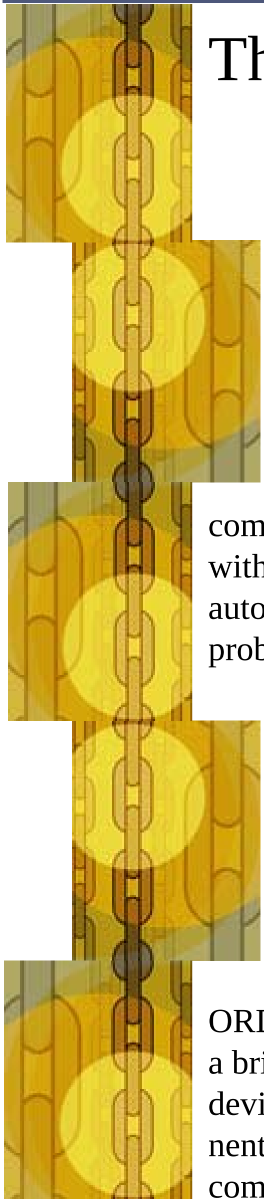
Together, the SNR and CLUT thresholds are used to customize the identification of ground clutter targets. That being said, these thresholds should be used in concert to optimize clutter target identification. For best results, modify the SNR and CLUT thresholds using the guidance provided in the following table.

Once completed, view the new map. Make sure it is representative of the local terrain and that it does not appear too “noisy.” If it looks good (reflects the normal ground clutter patter for the site), invoke it and compare it to the 0.5° base products to ensure the ground clutter targets are being adequately addressed. Depending on how the map appears, and how well it addresses (filters) ground targets, use the table below to identify the problem (State*) and generate another map using the recommended parameter settings. For questions, concerns, or a second opinion on the validity of a newly generated Bypass Map, contact the WSR-88D Hotline for additional guidance.

Joe N Chrisman
ROC Engineering Branch

Bypass Map Generation Guidance

State*	Change SNR (dB)	Change CLUT (dB)
Default setting of SNR = 9 and CLUT = 9	24	3
Too much areal coverage identified as ground return in the near field	24	6
Not enough areal coverage of ground return or distant ground targets not identified	15	3
Too much “noise” outside area of known ground targets	21	3



The RDA Chain

The WSR-88D Radar Data Acquisition (RDA) has undergone major changes this year with the installation of Open RDA (ORDA). However, one important point is now often overlooked when RDA problems occur - the RDA is comprised of both open *and* legacy components. Therefore, in dealing with RDA problems, it should not automatically be assumed that the problem lies with ORDA components only.

The ORDA architecture includes four SIGMET devices: the IFD (4A38), the IO Panel (90A20), the RCP8 (90A11), and the RVP8 (90A12). While the legacy components may be familiar, ORDA devices may not. Therefore, a brief description of each of these devices, their functionality, component failure modes and signs of component failure may be helpful.

The IFD is a high speed A/D Converter that digitizes three IF signals – radar returns, the burst pulse, and COHO. The IFD transmits the digital data to the RVP8 Receiver card via an RJ45 cable.

When troubleshooting the IFD, check the red Link light and green Ready light. If they are lit, the IFD is communicating properly to the RVP8. If the capped noise level is consistent and stable, the IFD is most likely functional. Injecting a CW input at the IF-1 input and monitoring measured levels through STS can confirm proper operation. Since IFD problems are rare, it is recommended that other receiver components be verified first.

The IO Panel is primarily used for signal routing between the SIGMET RCP8/RVP8 cables and legacy cables. The panel consists mostly of RS-422 drivers and TranzOrbs for lightning protection. The panel supplies 5V for the Receiver Protector and has lights for communication and power verification.

The easiest way to check the IO Panel functionality is to look at actual signals with an oscilloscope on the proper output pins. The IO Panel schematic is EHB 6-515 FO5-9. The IO panel has two BNC connectors to monitor individual trigger lines (generated by the RVP8). Note that IO Panel failures are rare.

The RCP8 and RVP8 are fast computers (PCs), which are interconnected with a serial cable and an RJ45 cable. The serial cable is not used. The RJ45 cable is the status and control communication link between the two machines. The RCP8 and RVP8 components can be tested via software with Linux commands and will fail similarly to any other PC.

The RCP8 contains two PCI cards: an 8-Port serial card and a SIGMET IO62 card. The serial card provides one port for the DAU communications link. The remaining serial ports provide console access for hardware configuration only (these ports are not used during normal operation). Failure of the 8-Port serial card would affect only DAU communications in normal operations. Other serial port failures would be noticed in STS Hardware Configuration when configuring a hardware device. The DCU serial communication cable is connected to an RCP8 motherboard serial port.

The RCP8 IO62 card sends commands to the receiver test hardware (4A22, 4A23, 4A24, 4A25, and 4A27) and commands short/long pulse in the transmitter. For proper IO62 operation, verify suspect signals with an oscilloscope at the IO panel.

The RVP8 contains 2 PCI cards: an IO62 card and a Digital Receiver card. The IO62 card sends

(Continued on Page 23)

WSR-88D Hotline - *Hot Topics*

Topic 1: High Voltage Cables

One recurring issue in troubleshooting modulator problems involves "smashed" high voltage cables behind the modulator. Remember to always remove the back panel when pulling the modulator out and position the cables so they don't get pinched between the plenum and the modulator when pushing the modulator back into place.

Topic 2: Soldering C1 & C2 Capacitors in the Transmitter Modulator Pulse Assembly

Improper soldering techniques can cause the terminals of the capacitors to spin. The terminals will spin if the end of the terminal, inside the capacitor, becomes overheated and no longer makes a good connection. Bad 3A12C1 capacitors can cause premature failures of Trigger Amplifiers. The proper way to avoid this is to use a heat-sink, but the small size of the terminal along with the large gauge of the HV lead make it almost impossible to implement the use of a heat-sink. This can be overcome with just a little bit of ingenuity. First, wrap a paper clip around the terminal and hold it in place with some locking pliers (Vise-grips). Then, using as little heat as possible, yet still maintaining good solder flow, clip off the excess paper clip from around the soldered terminal.

Topic 3: ORDA Release Notes

Historically, release notes were mainly of interest to operators, but ORDA release notes contain information geared specifically toward radar technicians. Radar technicians are reminded to read through the release notes thoroughly when they come out.

Topic 4: Pre-ORDA Deployment Assistance Team

The Hotline has assembled a pre-ORDA team to assist sites with ORDA installation preparations. They are contacting sites via e-mail 5-6 weeks out to gather system performance and adaptation data. ROC technicians will use this data for a system analysis and provide recommendations to the site technicians for optimizing their system prior to the ORDA installation.

Topic 5: New Tropical Cyclone Operations Plan (TCOP)

A new TCOP, containing information pertaining to Build 8.0, has been completed. It can be downloaded at the web site of the Office of the Federal Coordinator for Meteorology:

http://www.ofcm.noaa.gov/nhop/wsr-88d/nat_trop_cyc_wsr-88d_ops_plan.pdf.

Upon request, the Hotline can provide a single-page document for those sites interested in having a simple checklist which references specific sections of the TCOP.

Topic 6: Filtering Clutter Using GMAP

There has been some confusion regarding exactly what GMAP is. GMAP stands for "Gaussian Model Adaptive Processing," and actually has absolutely nothing to do with the bypass map. It's simply a different technique (algorithm) used to filter clutter. The bypass map is one way of directing GMAP to the specific sites where suppression should be applied. An alternative to using the bypass map to direct suppression, is to use "all bins" everywhere, or operator-created zones, or "wedges."

(Continued on Page 22)

Hot Topics (Cont.)

(Continued from Page 21)

Topic 7: Filtering Clutter Using GMAP 2

Many field sites have reported instances of significant data reduction in reflectivity products, associated with the Doppler zero isodop. Those operators who have been doing this a while have undoubtedly seen this occur with the legacy system, but it does appear to be more significant with the GMAP clutter suppression solution. Fortunately, this occurs under fairly limited circumstances which include near zero velocity and low/narrow spectrum width situations. It is most readily seen when suppressing clutter using ALL BIN suppression in the lower and upper segments during stratiform precipitation events. The problem is easily mitigated by simply invoking the bypass map for both segments. Some evidence of the problem may still be seen, but it will be limited to that ground clutter area immediately around the radar, which meets the velocity and spectrum width requirements.

Topic 8: Missing Burst Pulse Alarms

Site technicians continue to see the subject alarms. Most instances are nuisance alarms, having no impact on system operation or on the data. The false alarms occur due to a sampling mismatch (on the order of a few microseconds) between the software and the burst input power to the Intermediate Frequency Digitizer (IFD). These nuisance alarms typically clear within a second or two. When the alarm persists for greater than 1 minute, there is a likely failure in the burst pulse path. The site technician should troubleshoot the MISSING BURST PULSE alarm, EHB 6-515 Table 6-4. The burst pulse is a sample of the Klystron output off of 4A20, the 4-way splitter.

Topic 9: Generating a Good Bypass Map

Operators and technicians alike are happy with the capability to generate new bypass maps in less than 10 minutes. Since ORDA installation, it's been noticed that some sites were suppressing clutter using the default notch width map, which essentially means there's no legitimate bypass map. How can that happen? Actually, it's pretty easy to NOT save the map. Once map generation begins, it'll take about 10 minutes. When completed, a window pops up and asks to save the map. Select "Yes" and that's it... right? Wrong! What has been saved is simply an image file and not the bypass map that was just created. The operator must go to the GUI behind the popup window and select "Save" on the same screen where the map generation process was initiated. That will actually save the 1s & 0s representing the bypass map.

Topic 10: Clutter Map Generation Parameters

When generating a bypass map using ORDA, the operator will be asked to provide values for two variables/parameters: SNR & CLUT. The ROC has done quite a bit of testing and determined that for most sites, the optimum settings will likely be 24 and 3, respectively. However, some sites may benefit from tweaking these a bit. Since it takes very little time and the process can be completed from the office, it is recommended that each site find the settings that are optimum for their WSR-88D, and then record them somewhere prominent. If techs or mets call the ROC regarding bypass map issues, one of the first questions that will be asked is "What values were used for SNR and CLUT?" That information will be used to make recommendations for changing the parameters. A white paper which discusses the parameters, and describes expected changes on the map when the parameters are changed, can be found at:

(Continued on Page 23)

Hot Topics (Cont.)

(Continued from Page 22)

http://www.wdtb.noaa.gov/buildTraining/ORDA/PDFs/Bypass.pdf.

Topic 11: URC Meetings

All sites are reminded that, when requested, the ROC will provide a Met and/or a Tech to participate in local URC meetings. This is a good way for the field to find out what's going on in the world of NEXRAD, and also for the ROC to hear from the field regarding radar hardware, software, and products. ROC attendees routinely accept radar-related action items from the group and provide findings/results at the next meeting. To request attendance, send an e-mail to nexrad.hotline@noaa.gov or call the WSR-88D Hotline. Provide as much lead time as possible, as well as any requested topics or issues for the ROC to address with the committee.

Topic 12: ORDA Antenna Gain Values

Many sites have noticed a dramatic change in their A1 (antenna gain) values after ORDA installation. Typical Legacy values were 45-46dB and typical ORDA antenna gain values are 44-45dB. During ORDA development, engineers conducted antenna gain measurement studies and algorithm analysis. Engineers discovered that the legacy Suncheck routine habitually over-estimated system antenna gain. Therefore, many sites will typically see a delta of 1 to 1.5 dB in the antenna gain. The antenna gain with ORDA will be lower than the legacy value.

Many factors affect the system antenna gain measurements. The antenna gain measurement is affected by the Noise Source path calibration and Front End critical path calibration. Calibration path errors must be corrected before changing the system antenna gain value. Antenna gain also varies by site frequency. Lower antenna gain values should be expected for sites operating at lower frequencies. For example, sites operating at 2700MHz will have antenna gains closer to 44dB while sites operating closer to 2900MHz will have gains closer to 45dB.

Mike Shattuck
Monte Keel
Dan Frashier
James Bollinger
Dan Berkowitz
Tony Ray
ROC Operations Branch

Nita Patel
RSIS/ORDA Team

RDA Chain *(Cont.)*

(Continued from Page 20)

triggers to the transmitter and receiver. It also sends and receives the Rx Protector signals. For proper IO62 operation, verify suspect signals with an oscilloscope at the IO panel. The Digital Receiver card processes data from the IFD. STS signal processor diagnostics will reveal problems with this component.

Many times RCP8/RVP8 problems can be solved by restarting/rebooting. Problems with Build 8.0 software can typically be resolved through a software reload, but installation of Build 8.0.1 software will mitigate the need for such reloads.

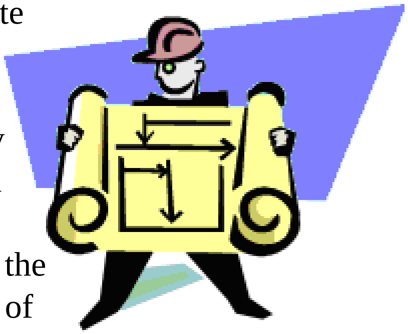
The ORDA brings many new capabilities to the WSR-88D system. However, ORDA did not replace all legacy parts. So, it is important to remember to evaluate the entire chain of RDA components - both the old and the new - when investigating RDA problems.

Nita Patel
RSIS/ORDA Team

FAA CM Notice for WSR-88D's

The WSR-88D radar system was developed as a tri-agency system with a Configuration Management (CM) process developed to promote configuration standardization by the implementation of tri-agency approved modifications. In September 2005, the FAA distributed Notice N 6345.5, Configuration Management Baseline Control of WSR-88D. This notice reiterates the need for proper CM and explains how FAA WSR-88D sites are to request and perform modifications within the WSR-88D process, which is outside the regular FAA CM process.

Notice N 6345.5 states that WSR-88D baseline configuration and documentation are to be managed by the Radar Operations Center (ROC) and no other FAA entity has the authority to make WSR-88D baseline changes. Baseline control is a vital function that ensures site modifications are implemented efficiently and consistently throughout the national tri-agency network.



The notice explains the process for submission of modification requests by FAA sites. To begin the process, an FAA National Change Proposal (NCP) is prepared - fully documenting the "site-proposed" change. The NCP will then be reviewed to evaluate technical solutions, system impacts, budget requirements and other pertinent issues. Once the NCP is approved locally, it is forwarded to the National Airway Systems Engineering office in Oklahoma City where it is reviewed for budgeting purposes and impacts to other FAA systems. (WSR-88D NCP's are not to be submitted to the FAA National CM process in Washington, DC.) Following this review, the NCP is forwarded to the ROC where it is converted into a Configuration Change Request (CCR). The CCR, which is the tri-agency approved document for review of proposed changes to the WSR-88D system, is then routed for formal tri-agency review and approval. Once approved, the CCR becomes a valid requirement, which is implemented as funding and personnel resources become available.

Notice N 6345.5 further stresses baseline deviations invalidate established operations and maintenance procedures, thus making ROC Hotline telephone assistance and on-site depot support more difficult and time consuming. It further states that rigorous CM is vital to planning and implementing WSR-88D modifications, sustaining an accurate system baseline, maintaining information technology, security, and ensuring the safety of site personnel, as well as the imperative that appropriate configuration control be maintained.

WSR-88D stakeholders, operators, site technicians, and regional managers are encouraged to propose changes that they believe will result in improvements to system performance, reliability, maintainability, and safety. As the WSR-88D configuration management authority, the ROC will assist as necessary in the development and submission of formal change proposals. The FAA Weather Products Branch is available and willing to assist the field to facilitate change requests through the CM process. Please forward/direct questions to the FAA/ROC Liaison, Dennis Roofe.

The ROC applauds the FAA's efforts to inform field sites of the importance of baseline configuration management and request all three agencies (DOC, DOD, DOT) strive to adhere to the CM process and avoid implementation of unauthorized site modifications.

Ruth Jackson
METI/ROC Program Branch