Manual Clutter Suppression Management - Its Back Or, Oh! How I Miss CMD

Do to the particular timing of the development and testing of the Clutter Mitigation Decision (CMD) algorithm, and the realities of contracts, the CMD algorithm is not included in the initial Dual Polarization baseline software suite. The good news is that CMD will return in Build 13.0. The bad news is that when a radar is upgraded to Dual Polarization, CMD will not be available and manual clutter suppression management will be required until Build 13.0 is deployed (Summer 2012).

A quick look at the National Radar Mosaic reaffirms the concern that maybe some of the knowledge and ability required to effectively apply clutter suppression might be a little bit fuzzy after three years of not worrying about it. As a review, the following is a slightly modified reprint of an article that was first published in the Summer 2006 edition of *NEXRAD Now*.

Improved Capability:

Clutter filtering in the Radar Data Acquisition (RDA) is accomplished using a WSR-88D-tuned version of the SIGMET Gaussian Model Adaptive Processing (GMAP) clutter filtering technique. 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).

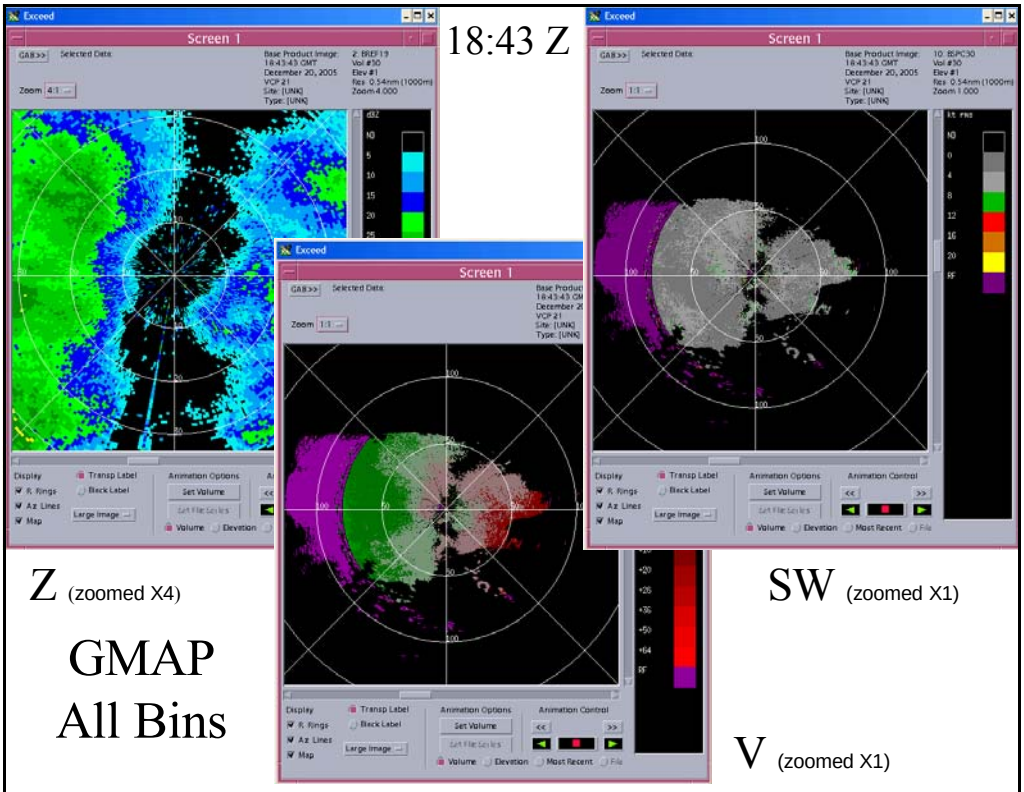

Figure 1: GMAP applied to All Bins

Even though GMAP can "rebuild" a portion of the power spectrum from meteorological return, improper application of GMAP can have a detrimental affect on the base data estimates.

Better Suppression Through Proper Application:

Generally speaking, use the Bypass Map to address the normal ground clutter pattern and only invoke All Bins clutter suppression when and where there is clutter return caused by Anomalous Propagation (AP).

Using clutter suppression regions in areas where there

Continued on Page 20

Manual Clutter Suppression

Continued from Page 19

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 for 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.

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

As one can see, GMAP filtering can be very aggressive under certain circumstances (Figure 1).

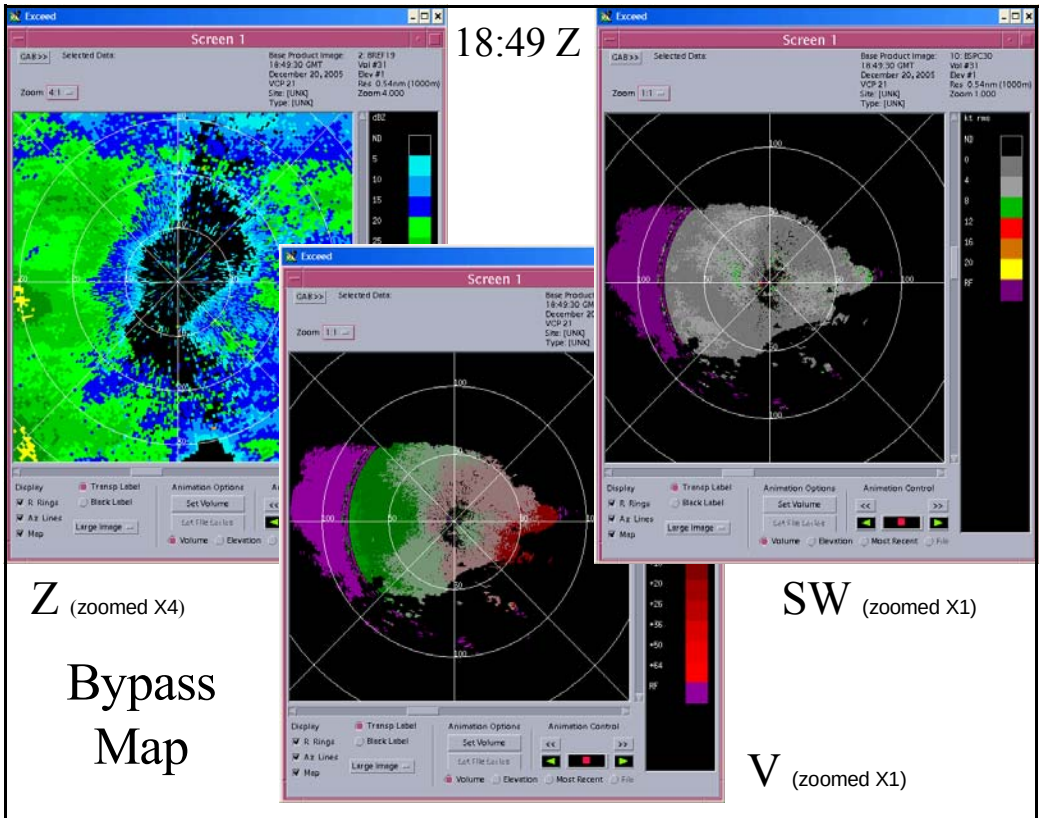

Figure 2: Bypass Map-Controlled GMAP clutter suppression applied

It is important to remember, however, that with the Bypass Map in control (Figure 2) the impact of GMAP filtering can also cause 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.

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 RDA 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. To discuss questions concerning the validity of the Bypass Map, contact the Radar Operations Center (ROC) 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 21

Manual Clutter Suppression

Continued from Page 20

- One file should invoke All Bins filtering for the low elevation segment and the Bypass Map for the high elevation segment.
  (*Note:* The Radar Operations Center 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 appropriate at your location, 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.

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Picture This...

In 2008 *NEXRAD Now* held a photo contest of scenic NEXRAD sites, and received some wonderful photos. The photos received such positive feedback that we have decided to expand upon the theme. We will now be featuring a scenic photo of an RDA in each edition of *NEXRAD Now.*

Keep your camera (or cell phone) handy and snap a few pictures of your site when your RDA is looking particularly scenic. Send the photos to Ruth.E.Jackson@noaa.gov and look for them in the next edition of *NEXRAD Now.*

Below is a lovely picture of the Glasgow, MT RDA site at dawn. However, the photo belies the temperature -- at the time it was -37º F. Thanks to Bill Martin, Glasgow WFO Science and Operations Officer, for braving the cold to capture the photo.

Ruth Jackson
Editor, *NEXRAD Now*

Glasgow, MT RDA at dawn.