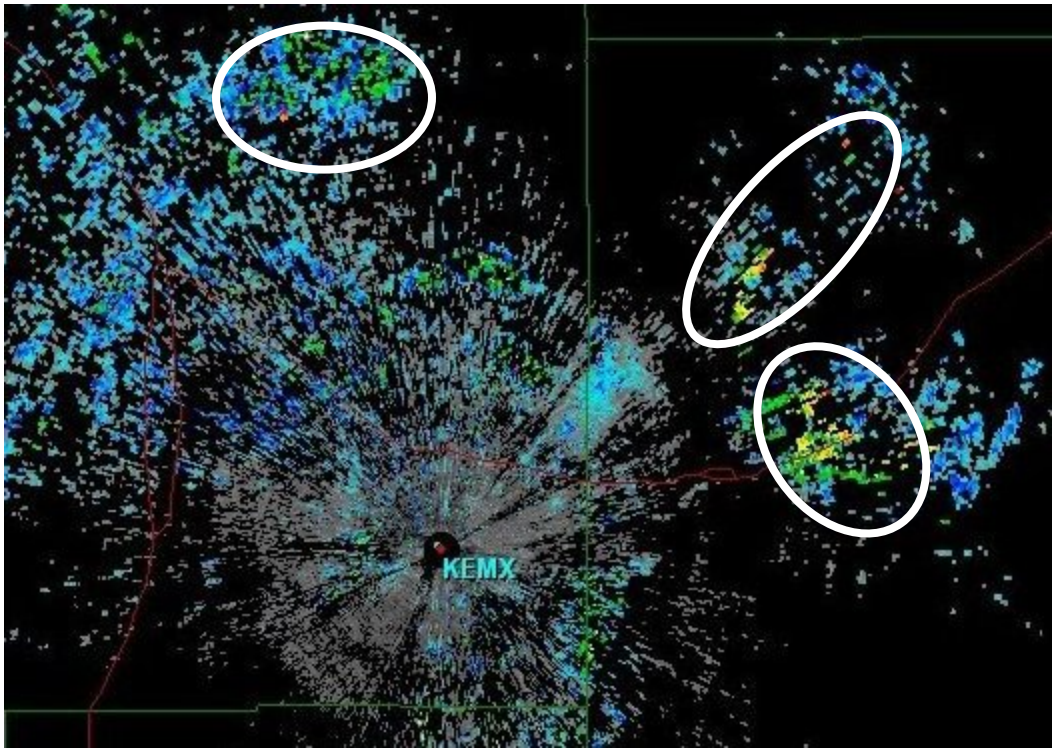
RDA Software Update 11.1
Operational Changes

There are two changes with RDA Software Update 11.1 that are of operational interest. Please complete the RDA/RPG Build 11.0 training before reading this document! It is written with the assumption that you are familiar with the RDA/RPG Build 11.0 changes!

1. Update to improve CMD performance in mountainous terrain

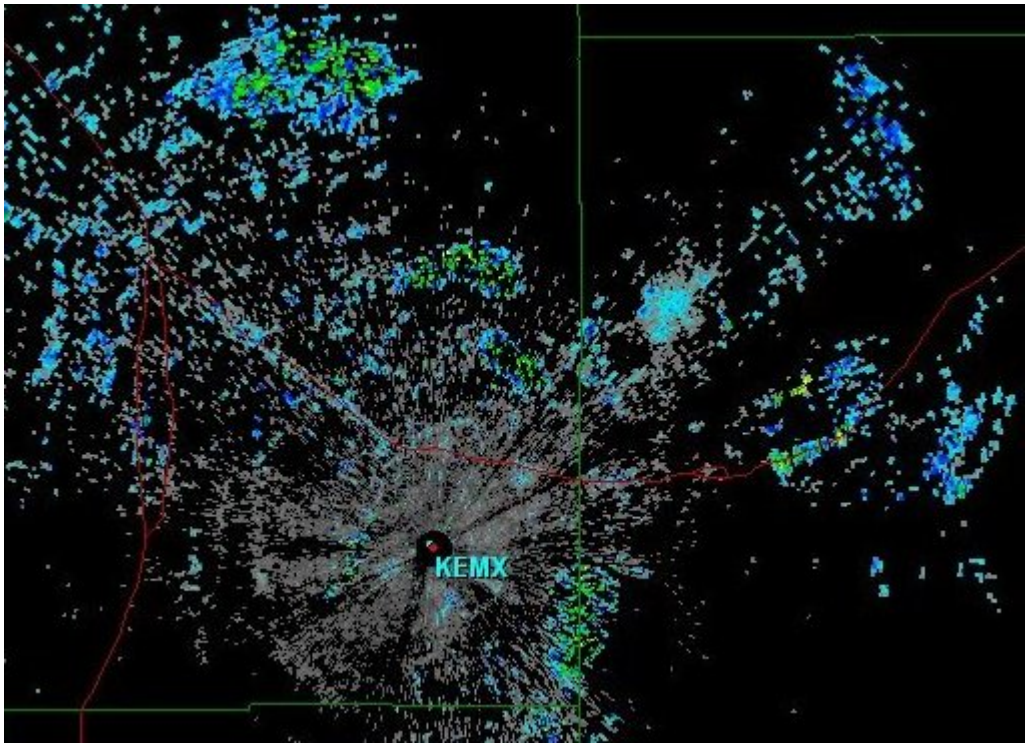
A number of the RDA/RPG Build 11.0 Beta Test sites were chosen because their nearby terrain presents a significant clutter suppression challenge. The RDA/RPG Build 11.0 Beta Test revealed that CMD sometimes did not identify isolated bins of clutter. These isolated bins were distributed within areas of rugged mountainous terrain. Here's an example from the Tucson, AZ office with RDA/RPG Build 11.0 installed:



Within the mountainous areas near Tucson (circled), on the 0.5° Surveillance (CS) rotation, CMD missed some isolated bins of ground clutter. The ROC analysis determined that CMD detection of clutter for the first Surveillance rotation for each clutter elevation segment was processed at Super Res (0.5° azimuth x .25 km range) resolution. However, the CMD generated Bypass Map applied to the remaining rotations was based on legacy resolution (1° azimuth x 1 km range), the resolution that CMD was designed to analyze. Therefore, in RDA Software Update 11.1 the CMD algorithm was modified to apply clutter filtering at

the legacy resolution for all antenna rotations. Though CMD may be adjusted in the future to identify clutter at super resolution, the RDA Software Update 11.1 version of CMD ensures legacy resolution clutter filtering is used for all base data.

Here's an example from Tucson, AZ once RDA Build 11.1 was installed:



RDA Build 11.1 significantly improved the problem of isolated missed detections within mountainous areas. This change ***only*** affects the areal coverage of ground clutter identified by CMD. It does ***not*** change the amount of suppression applied by GMAP. It also does not change CMD's relationship with moving clutter. For example, CMD will ***not*** detect traffic on roads or returns from wind turbines.

The problem with missed detections has also occurred with very strong AP events. Among the residual AP clutter have been isolated bins of high reflectivity. RDA Software Update 11.1 is expected to improve this situation as well.

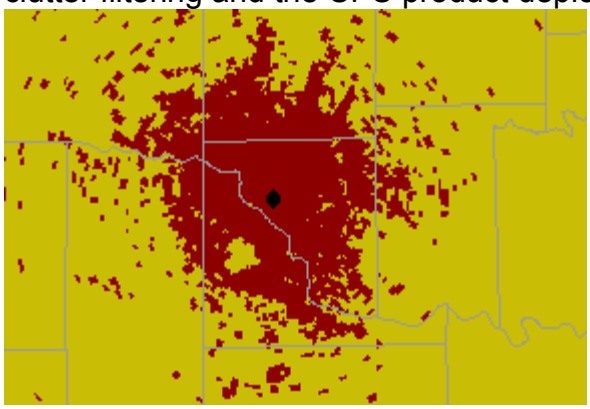
The RDA/RPG Build 11.0 training described the process of building a "CMD Local" clutter regions file as a strategy for dealing with these missed detections. Once RDA Build 11.1 is installed, if you are satisfied with the CMD performance, you can simply use the Default clutter regions file as described in the training. All Bins over very small areas can still be used as needed.

CMD and Stratiform Rain

Although CMD is superior to previous methods for identifying ground clutter, stratiform rain is still challenging. Range bins with low reflectivity, velocity, and spectrum width may still be identified by CMD as containing ground clutter. A widening of the zero isodop with widespread stratiform rain may occur, but even then, CMD is preferable to All Bins. If a wider zero isodop is of concern, turn CMD off, but do not download All Bins. The result will likely make you want to turn CMD right back on!

CFC Holes and Stratiform Rain

The RDA/RPG Build 11.0 training had an example of convection within the ground clutter very close to the radar, resulting in “holes” on the CFC product. The reflectivity in these convective cells was strong enough to dominate the returns from the ground. Thus CMD did not identify the associated range bins for clutter filtering and the CFC product depicted holes in the ground clutter pattern.



This will occur only with weather returns that are sufficiently strong to dominate the ground returns. For example, you will not see this effect with stratiform precipitation.

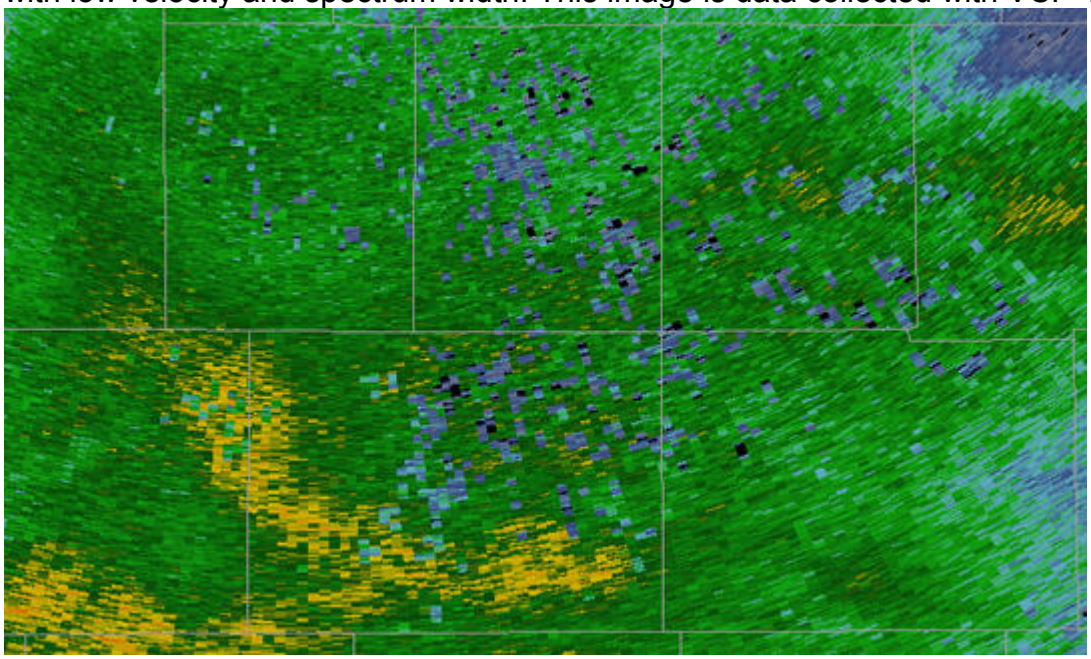
2. Adjustment to GMAP Seed Width

GMAP uses an initial interval around zero velocity, known as the seed width, to isolate the clutter portion of the signal before applying signal suppression. The default setting is supposed to be 0.4 m/s. Testing for RDA Build 11.1 revealed that under certain circumstances this value could be reset to 0.7 m/s (the previous default) without operator notification. A seed width of 0.7 m/s is more aggressive, resulting in more data loss along the zero isodop.

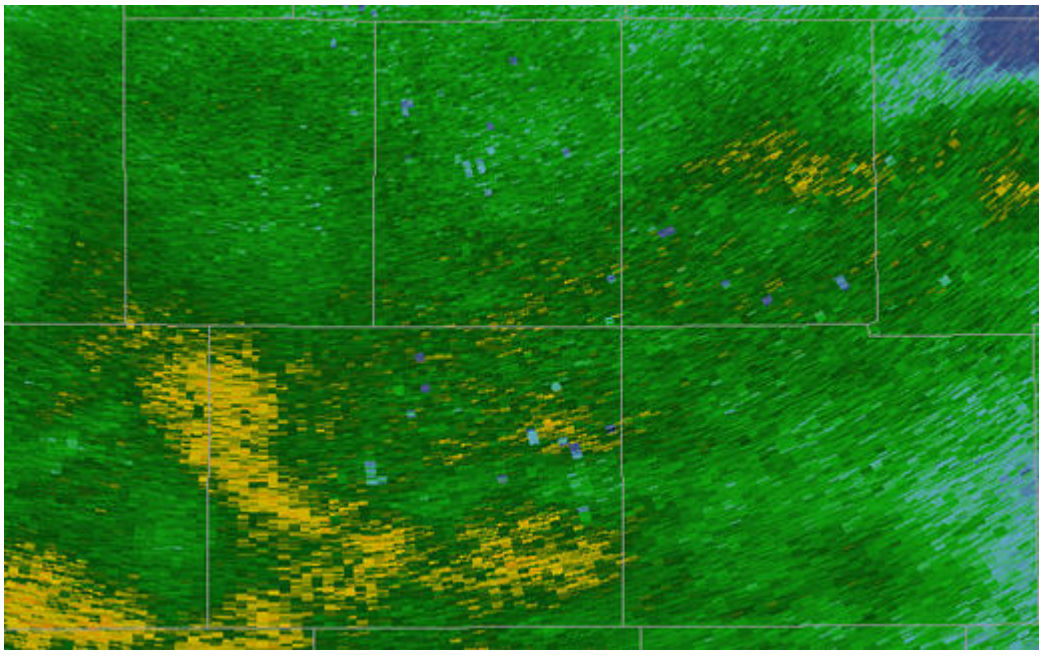
With widespread areas of stratiform rain, CMD may identify range bins with clutter (low velocity and spectrum width) in an erratically distributed pattern. If the GMAP seed width was set at 0.7 m/s, the CMD identified bins would likely result in a noticeable number of gates on base products with reduced reflectivity and some data dropouts. If a faster VCP is used (fewer pulses per radial), GMAP is

also less likely to rebuild the weather signal. The result of all of these factors is noisy base data with scattered data dropouts.

The following example is from Minneapolis, MN. This is a stratiform rain event with low velocity and spectrum width. This image is data collected with VCP 12.



Concerned about data quality, the staff switched to VCP 21. This image is from the next volume scan with VCP 21.



Why is there a significant difference? In order to have 4 minute product updates, VCP 12 uses fewer pulses per radial than VCP 21. The cumulative effects of

Super Res processing, CMD, and GMAP reduce the data quality of VCP 12, though it is still sufficient for base data interrogation. The advantages of VCP 12 are obvious! In this case, it is highly likely that the GMAP seed width was set at 0.7 m/s, resulting in more bins with reduced reflectivity and some data dropouts, which made the difference between 12 and 21 more apparent.

RDA Software Update 11.1 resets the GMAP seed width to the more appropriate value of 0.4 m/s and keeps it there!