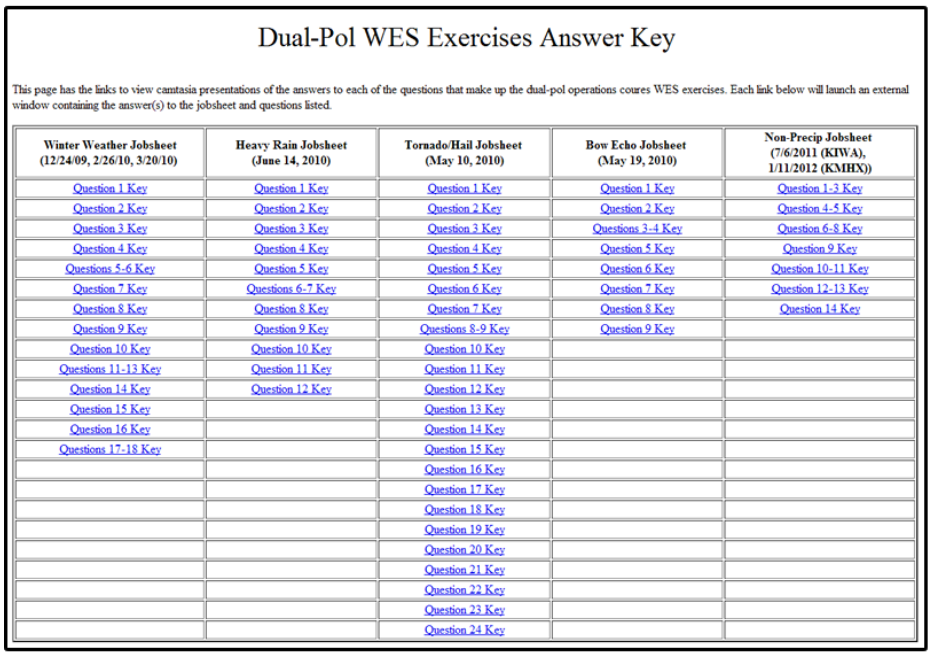
2011 Dual-Pol WES Exercises Overview

This document contains an added job sheet that supplements the 4 WES exercise job sheets that were supplied with the original release of the Dual-Polarization Radar Operations Course. This new job sheet (released early 2012) focuses on recognizing non-precipitation echoes using dual-pol data. The events used are from the Phoenix, AZ (KIWA) and Morehead City, NC (KMHX) Dual-Pol WSR-88Ds. While the completion time for this jobsheet will vary from person to person, expect this exercise to roughly take 1 hour to complete.

Answer Key

Answer keys are provided on a question by question basis, and are loaded directly off the WES! They each consist of a narrated video screen capture, demonstrating how the instructor from WDTB would have answered each question on the WES. It's up to you *when* you want to view the answer key for each question, either immediately after you fill out the answer or at the end of the job sheet. In any case, please load the answer key launch page right off the tools menu (right graphic below). A firefox window will open containing links to each of the jobsheet answer keys (left graphic below). These videos contain narration, so make sure your WES machine has a working sound card to hear the audio from each video screen capture answer key.



Dual-Pol WES Exercises Answer Key

This page has the links to view camtasia presentations of the answers to each of the questions that make up the dual-pol operations coures WES exercises. Each link below will launch an external window containing the answer(s) to the jobsheet and questions listed.

Winter Weather Jobsheet (12/24/09, 2/26/10, 3/20/10)	Heavy Rain Jobsheet (June 14, 2010)	Tornado/Hail Jobsheet (May 10, 2010)	Bow Echo Jobsheet (May 19, 2010)	Non-Precip Jobsheet (7/6/2011 (KIWA), 1/11/2012 (KMHX))
Question 1 Key	Question 1 Key	Question 1 Key	Question 1 Key	Question 1-3 Key
Question 2 Key	Question 2 Key	Question 2 Key	Question 2 Key	Question 4-5 Key
Question 3 Key	Question 3 Key	Question 3 Key	Questions 3-4 Key	Question 6-8 Key
Question 4 Key	Question 4 Key	Question 4 Key	Question 5 Key	Question 9 Key
Questions 5-6 Key	Question 5 Key	Question 5 Key	Question 6 Key	Question 10-11 Key
Question 7 Key	Questions 6-7 Key	Question 6 Key	Question 7 Key	Question 12-13 Key
Question 8 Key	Question 8 Key	Question 7 Key	Question 8 Key	Question 14 Key
Question 9 Key	Question 9 Key	Questions 8-9 Key	Question 9 Key	
Question 10 Key	Question 10 Key	Question 10 Key		
Questions 11-13 Key	Question 11 Key	Question 11 Key		
Question 14 Key	Question 12 Key	Question 12 Key		
Question 15 Key		Question 13 Key		
Question 16 Key		Question 14 Key		
Questions 17-18 Key		Question 15 Key		
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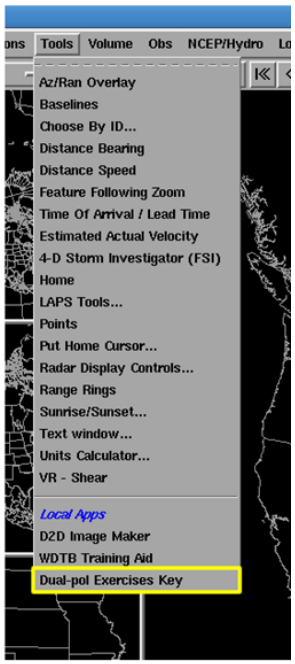

Jobsheet #5: Non-Precipitation Echoes

Objective:

- Integrate your knowledge gained from the training modules along with the WDTB training aids into an analysis of dual-pol radar base products for 2 cases described below. The focus will be primarily on discriminating precipitation and non-precipitation echoes that are very near each other and are difficult to discern in Z,V and SW.

Case Data: 06 July 2011 in Phoenix, AZ and 11-12 January 2012 in Morehead City, NC

Available Data: KIWA radar data (all-tilts), KMHX radar data (all-tilts)

Analysis Duration: 60 min
Answer Keys Duration: 30 min

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EVENT #1: Dust Storm (Phoenix, AZ) – July 5, 2011

This event was a high impact event for the Phoenix WFO. As evening approached, the monsoonal thunderstorms triggered several dust storms. Some dust storms were weak, not causing much impact, while one became a haboob causing delays at the Phoenix airport and knocking out power to thousands in the Phoenix metro area. Since dust storms are not common over much of the United States, the emphasis will be placed on the characteristics of the boundaries associated with the dust storms themselves.

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Instructions:

1. If you have your 2011DPexercises D-2D session running from before, close it.
2. Run ***start_awips*** from a terminal on your WES machine
3. Choose ***2011DPexercises*** for the *FXA_DATA (i.e. case location)*
4. Choose ***PSR*** for *FXA_LOCAL_SITE*
5. Click "OK" to start the D-2D session localized for Phoenix, AZ CWA
6. Using the WES workstation, left click on the D2D clock in the lower right part of D2D
7. Using the "Set Time" window, set the D2D clock to **2011 July 6 03:00 UTC** (don't bother changing the seconds) and check the "Freeze Time at This Position" box.
8. Set Map Scale to "WFO"
9. Click on the kiwa menu and load "0.5 Base Data"
10. Set frames to 25
11. Modify map backgrounds and data magnification as you see fit in both panes
12. *Get a feel for the big picture:* Loop through the 25 frames at 4 panels and/or Panel Combo/Rotate, getting a broad scale view of the base products Z, ZDR, CC, and KDP, the character and movement of the boundaries and precipitation, and to become familiar with controls if you are not already.

13. When ready, go to the time at **01:07 UTC**. Zoom into the area near the radar to the east (see Figure 1)

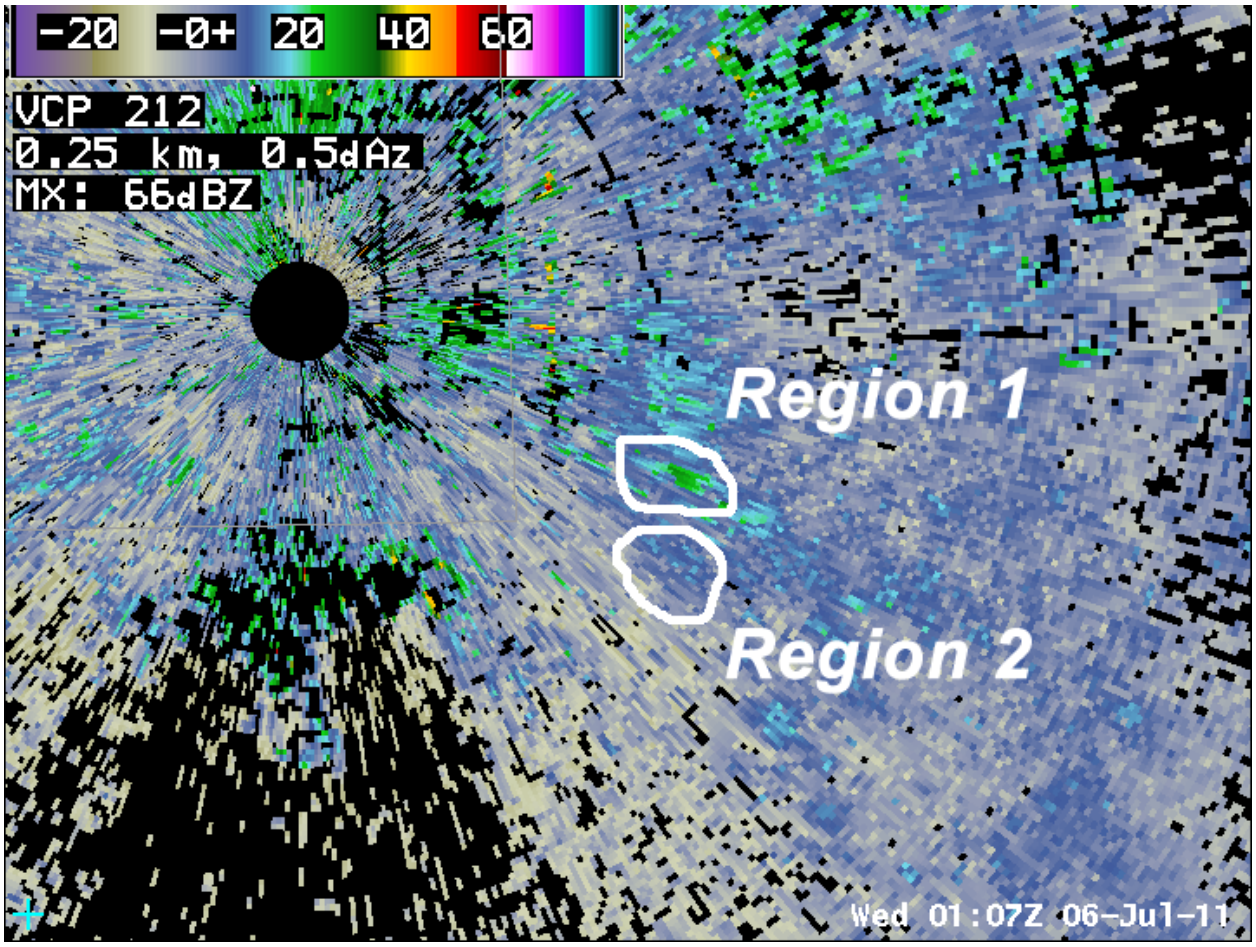

Figure 1

Question 1: One of the primary advantages of dual-pol radar is being able to discriminate more easily between non-meteorological and meteorological echo. Look at the area just east of the radar from roughly 9 to 11 nm range and between the azimuths of 113 and 126 degrees. Fill in the following table of values for the areas specified (See Fig. 1).

	Region 1: 9nm @ 113-114^{o}	Region 2: 10nm @ 122-126^{o}
Z (dBZ)		
ZDR (dB)		
CC		

Question 2: Based on Reflectivity alone, were you able to confidently identify regions of precipitation versus regions of ground clutter near the radar?

Yes / No

Question 3: Based on the values in the table from Question 1, label whether each region is experiencing precipitation or is within the ground clutter of the radar. Put "Precip" for precipitation and "GC" for ground clutter. Please give an explanation for your answers in the space provided below.

Region 1 (9nm @ 113-114^{o})	
Region 2 (10nm @ 122-126^{o})	

1. Navigate to **01:54 UTC**
2. Load up the “Cities” if you have not already done so
3. Zoom in until roughly the Phoenix metro area takes up the D-2D main pane
4. Note the two boundaries approaching the Phoenix metro area. One from the NW and one from the SE (See Fig. 2).

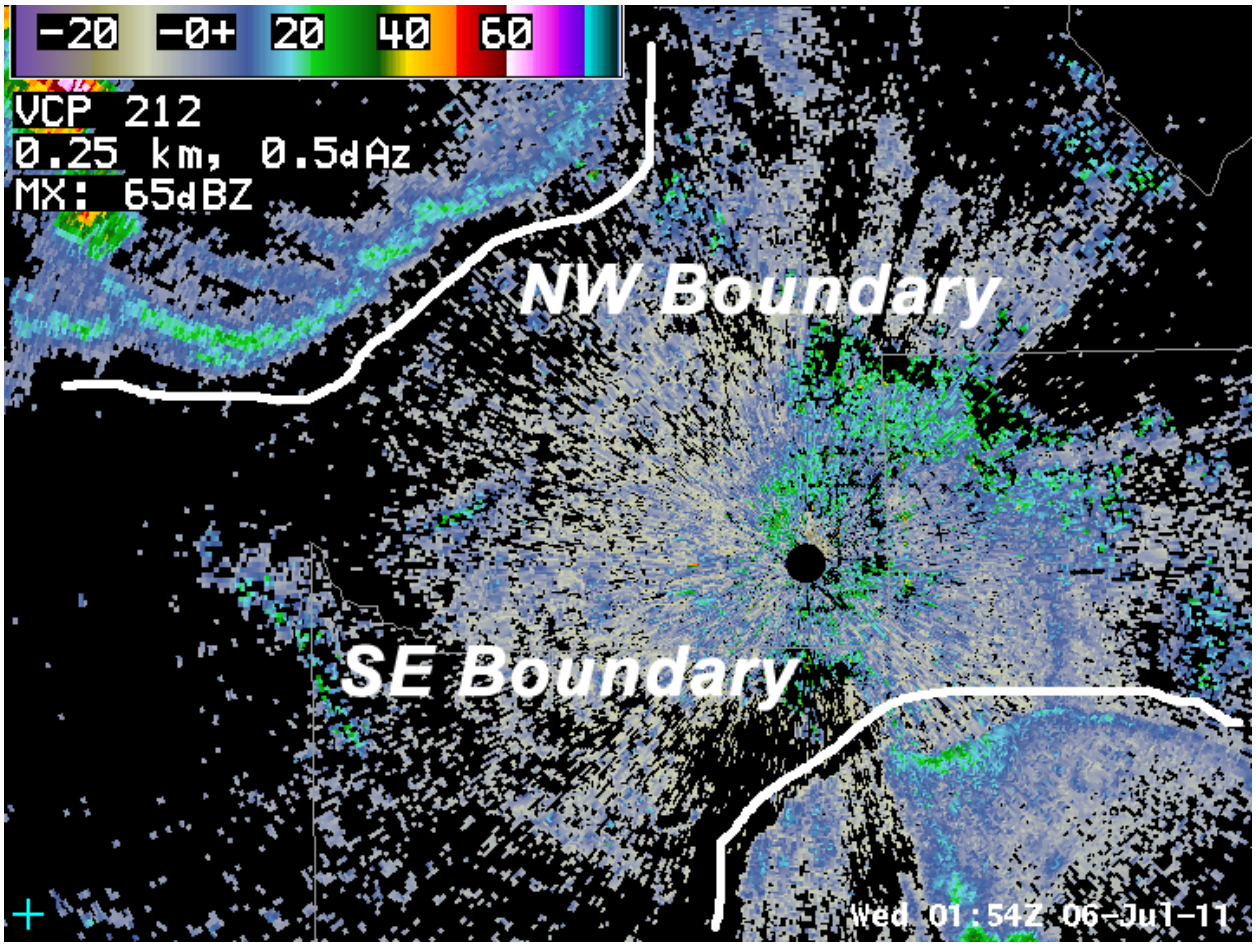

Figure 2

Question 4: Fill in the table of values for Z, ZDR, CC, and V characterizing the two boundaries, one to the NW and one to the SE (see Figure 2).

	NW Boundary	***SE Boundary***
Z (dBZ)		
ZDR (dB)		
CC		
V (kts)		

Question 5: Based on your answers in Question 4, which boundary do you think consists of typical boundary-type material (i.e. fine dust/dirt particles, insects, etc.) and which boundary do think is lofting a greater variety of dust and debris? Please explain.

NW Boundary / SE Boundary

5. Navigate to **02:59 UTC** *(The two boundaries from earlier have now collided and storms are developing in that area)*
6. Zoom into the area just west of the radar from 10 to 30 nm and between the azimuths of 273 and 324 degrees.
7. Some of the returns in this region are precipitation and the rest are residual dust from the haboob (see Figure 3). You will identify which areas are precip and dust in the following questions

Question 6: Based on the base moments (Z, V, and SW) can you confidently identify which areas in the defined area are precip and which are residual dust?

Yes / No

Question 7: Fill in the values for Z, V, ZDR and CC for the following regions (see Fig. 3)

	Region 1 **22-28nm @ 283-293°**	***Region 2*** **17-19nm @ 287-291°**
Z (dBZ)		
V (kts)		
ZDR (dB)		
CC		

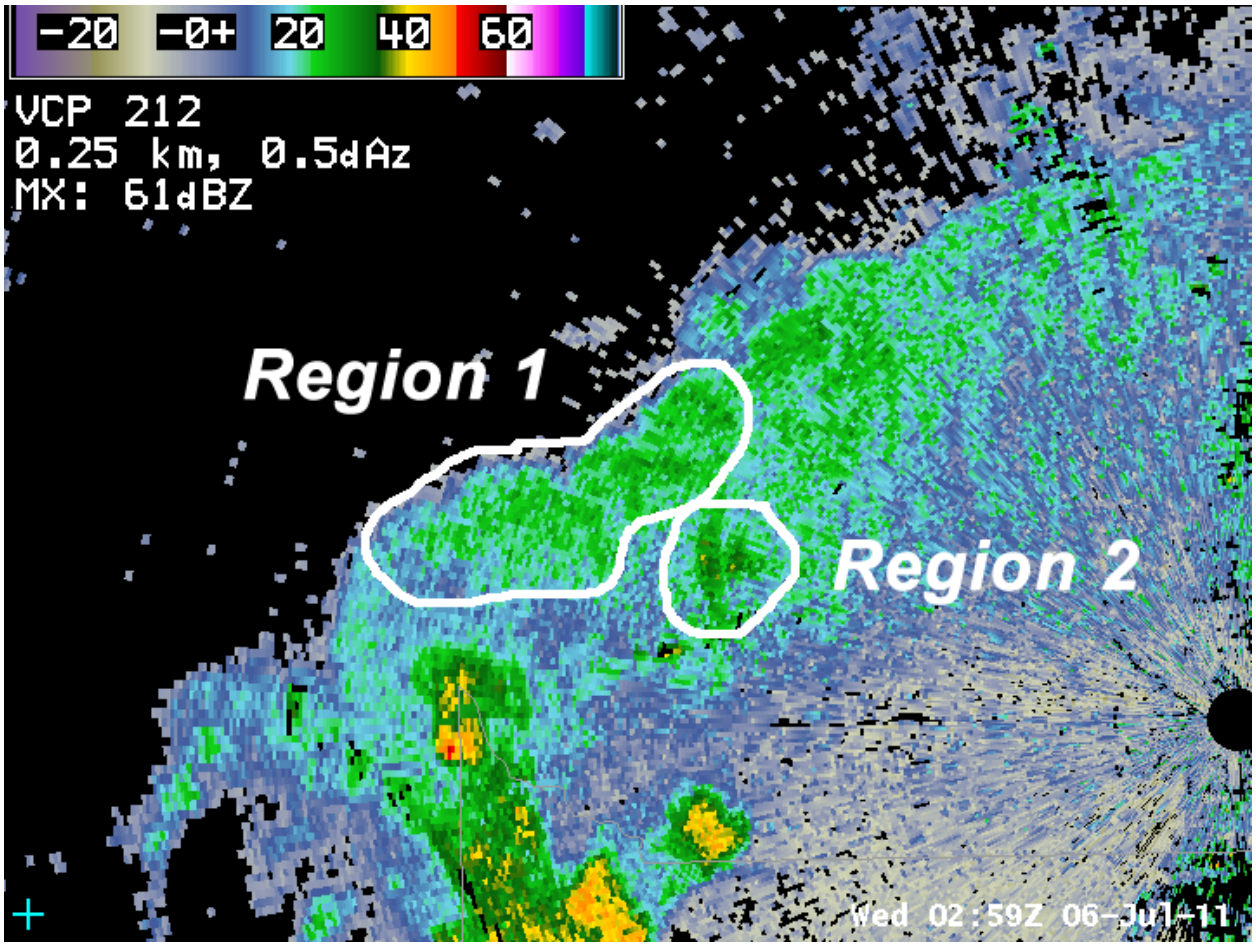

Figure 3

Question 8: Which region do you think is developing precipitation and which is residual dust? Explain your reasoning in the space provided below.

Region 1 –

Region 2 –

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EVENT #2: Morehead City, NC – January 11, 2012

In the late afternoon, early evening of January 11, 2012 a broad band of precipitation was moving through the Morehead City CWA. The event was low-impact but a few interesting non-meteorological features appeared during the event. While there is no explanation for these signatures, they are non-meteorological as will be seen in the dual-pol data. Let's get started!

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Instructions

1. Close your current D-2D session
2. Run ***start_awips*** from a terminal on your WES machine
3. Choose ***2011DPexercises*** for the *FXA_DATA (i.e. case location)*
4. Choose ***MHX*** for *FXA_LOCAL_SITE*
5. Click "OK" to start the D-2D session localized for Morehead City, NC
6. Using the WES workstation, left click on the D2D clock in the lower right part of D2D
7. Using the "Set Time" window, set the D2D clock to **2012 January 12 03 UTC** (don't bother changing the seconds) and check the "Freeze Time at This Position" box.
8. Set the "Frames" to 25
9. Set the scale to "WFO"
10. Load the "0.5 deg base data" from the kmhx menu.
11. *Get a feel for the big picture*: Zoomed out, loop the data and get a feel for the data. Notice the motion of the data and the general patterns in the Z, ZDR, CC and V. Note there is missing data between 00 and 02 UTC.

12. Navigate to **23:13 UTC** and look at Z and V.

Question 9: From the conventional base data (Z and V) do you see any evidence of non-meteorological echo within the precipitation? Please explain your reasoning in the space provided below.

Yes / No

Question 10: Zooming into the area just west of the radar, fill in the table of values for Z, V, ZDR, and CC for the 3 regions of interest noted in Figure 4.

	Region 1 42-45nm @ 240°-245°	***Region 2 46-48nm @ 260°-263°***	***Region 3 37-39nm @ 275°-279°***
Z (dBZ)			
V (kts)			
ZDR (dB)			
CC			

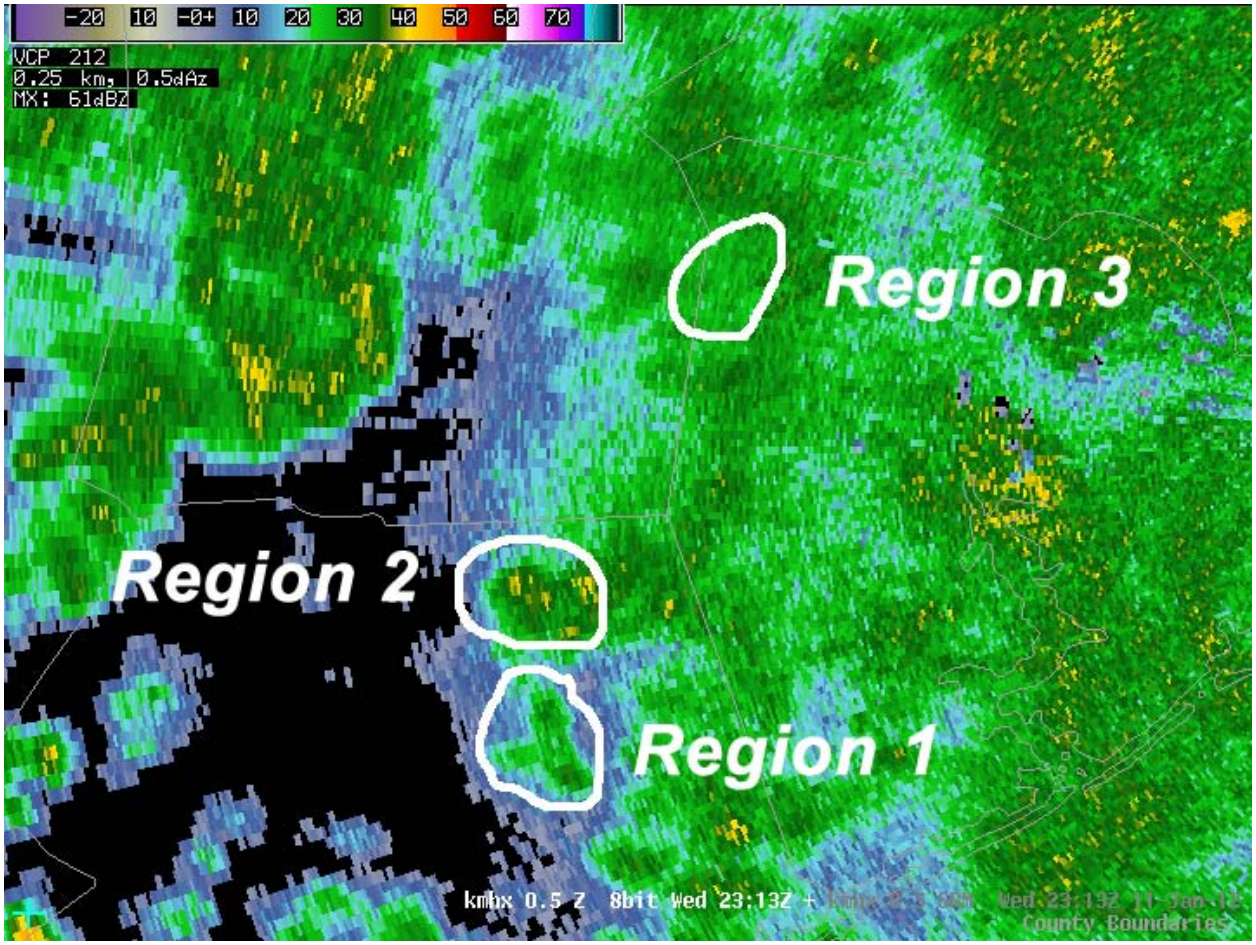

Figure 4

Question 11: Which region(s) are most likely to be precipitation and which region(s) are most likely to be non-meteorological?

Region 1 _____

Region 2 _____

Region 3 _____

13. Navigate to **02:58 UTC** and look at Z and V.

Question 12: Zoom into the area far south of the radar (roughly 80nm @ 180 deg). Fill in the table for the Z, ZDR, and CC values for the two regions noted in Figure 5.

	Region 1 77-87nm @ 173°-178°	Region 2 73-77nm @ 179°-182°
Z (dBZ)		
ZDR (dB)		
CC		

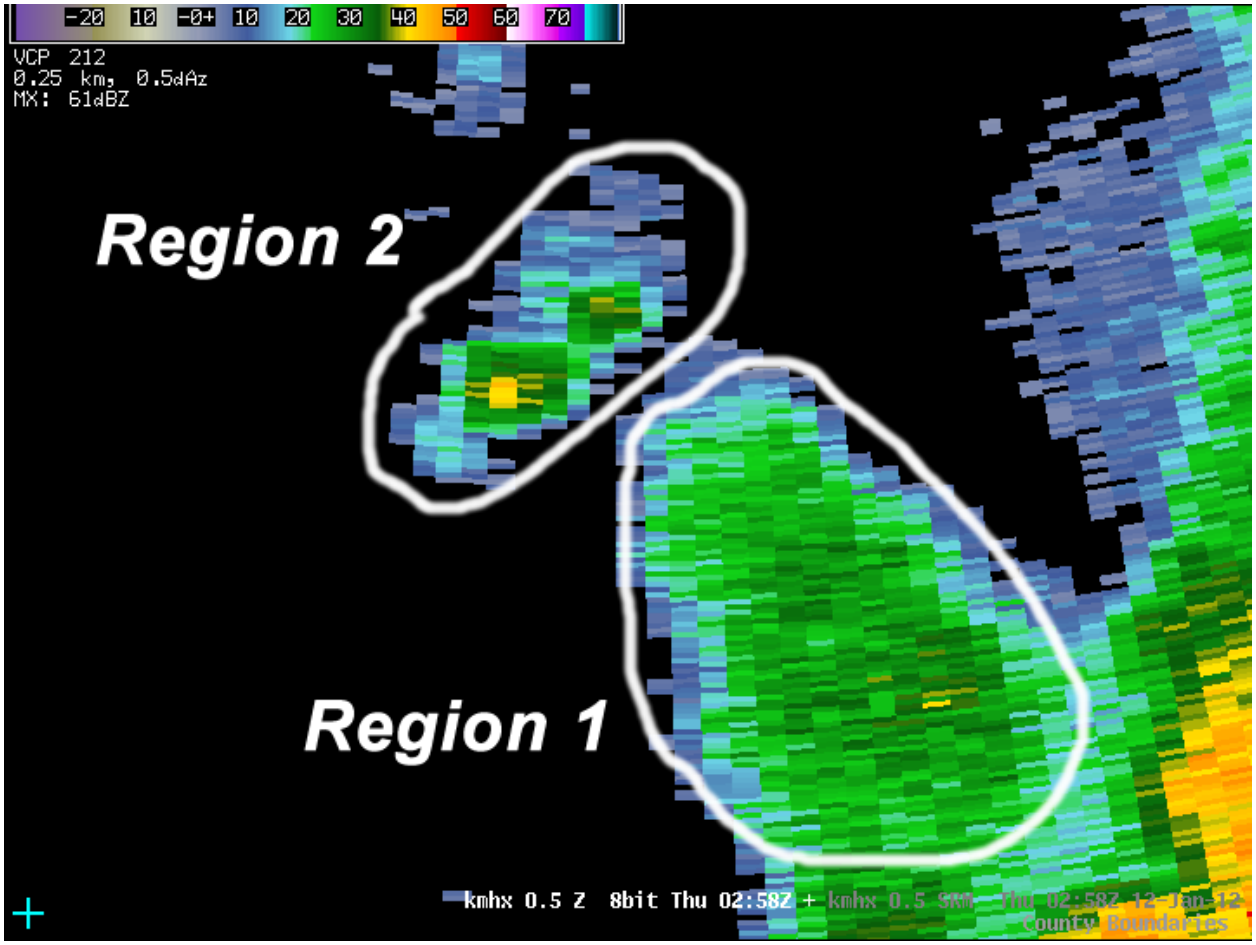

Figure 5

Question 13: Did the dual-pol variables help you to easily identify which region was non-meteorological and which one was precipitation?

Yes / No

Question 14 (BONUS): Throughout this exercise, in general, were the dual-pol variables noisier or smoother in non-meteorological echoes compared to meteorological echoes? Why?