Tropical Winds

The Official Newsletter of WFO Miami

Sunset in Doral - Dan Gregoria - July 2011

Issue 8 – Spring 2012

Welcome to the Spring 2012 issue of *Tropical Winds.* In this issue, we will look back at the weather conditions that South Florida experienced late Winter and early Spring. With rainfall totals slightly below normal and temperatures above normal, South Florida certainly had a peculiar end of 2011 and beginning of 2012. Most of the cold fronts that moved across the peninsula were weak, with only a few showers and a slightly cooler airmass behind them.

In This Issue…

Also in this issue, we will explain in detail the latest upgrade that our Doppler radar WSR-88D experienced in February: its transition to Dual Pol! This upgrade will greatly enhance the National Weather Service radar network by providing the ability to collect data on the horizontal and vertical properties of weather (e.g. rain, hail) and non-weather (e.g. insects, ground clutter) targets.

Enjoy!!!!

Weather Summary

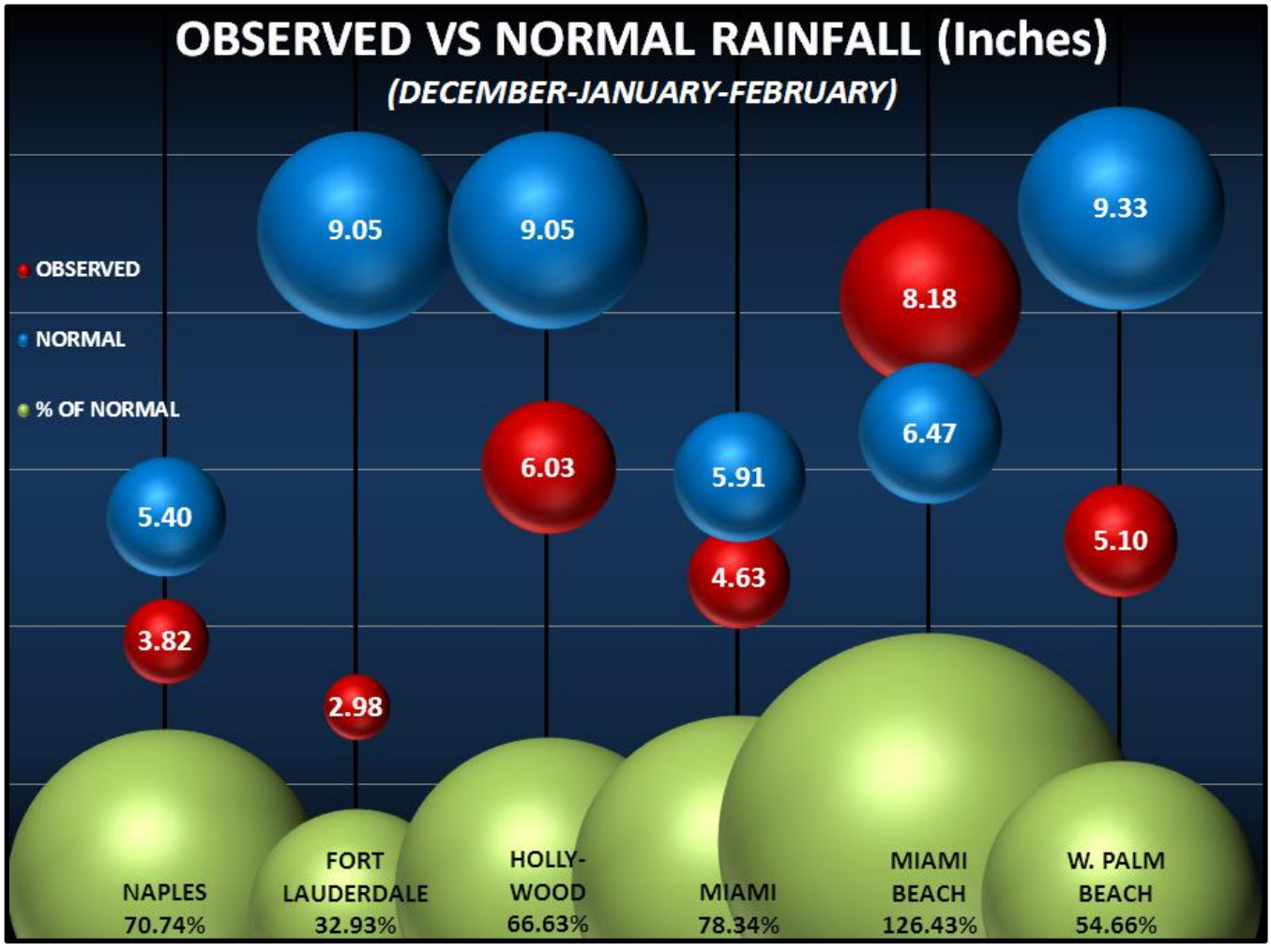
Dan Gregoria - October 2009

By: David Ross

Looking Back at December, January & February

Heading into December, all four climate sites across South Florida carried below normal rainfall totals for 2011. This trend continued into early 2012, with all four sites remaining in the negative for the 3-month period ending in February. Co-operative observations from Hollywood reported a similar pattern. Miami Beach was one of the few sites to report a rainfall surplus, ending more than one and a half inches above normal for December-January-February.

The graphic below depicts the observed and normal 3-month rainfall totals, in addition to the percentage of normal, at Naples Municipal Airport, Fort Lauderdale/Hollywood International Airport, Hollywood, Miami International Airport, Miami Beach, and Palm Beach International Airport.



For the most part, temperatures averaged above normal over the past three months at all four of South Florida's main climate sites. The 3-month average for these locations ranged from 1.3 to 2.4 degrees above normal, at Fort Lauderdale and West Palm Beach respectively. January was the coolest of the past three months, with temperatures generally averaging four to five degrees cooler than December and February.

The table below breaks down the average monthly temperature and departure from normal at Naples Municipal Airport, Fort Lauderdale/Hollywood International Airport, Miami International Airport, and Palm Beach International Airport.

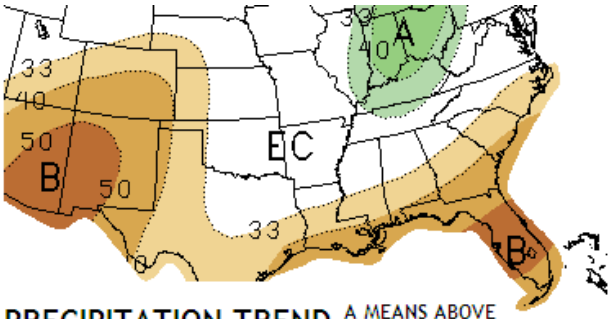
Average Temperature (degrees Fahrenheit) & Departure from Normal

(December 1, 2011 – February 29, 2012)

	Naples		Fort Lauderdale		Miami		West Palm Beach	
	Avg.	**Dep.**	**Avg.**	**Dep.**	**Avg.**	**Dep.**	**Avg.**	**Dep.**
Dec.	69.4	+2.6	73.5	+2.5	73.2	+2.7	72.0	+3.9
Jan.	65.2	+0.7	68.5	-0.5	68.5	+0.3	65.7	0.0
Feb.	70.5	+3.6	72.8	+1.9	72.8	+2.6	71.2	+3.4
3-Month	***68.4***	***+2.3***	***71.6***	***+1.3***	***71.5***	***+1.9***	***69.6***	***+2.4***

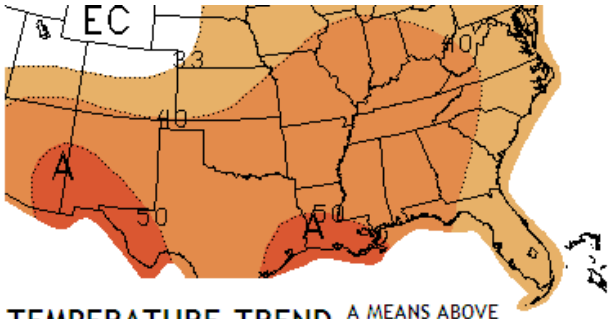
March through May Outlook

The Climate Prediction Center's (CPC) 3-month forecast continues to indicate a below normal trend in South Florida rainfall through late-spring. Temperature forecasts for the southern Florida peninsula are trending toward the warmer side of normal.



PRECIPITATION TREND
MAR-APR-MAY 2012
MADE 16 FEB 2012

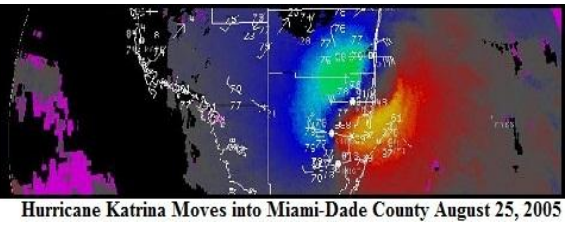
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
EC MEANS NO CLEAR SIGNAL



TEMPERATURE TREND
MAR-APR-MAY 2012
MADE 16 FEB 2012

A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
EC MEANS NO CLEAR SIGNAL

Radar Operations



Hurricane Katrina Moves into Miami-Dade County August 25, 2005

By: Mike Bettwy

The Future is Now: Dual-Polarization Radar Arrives in South Florida

In early February, the National Weather Service (NWS) in Miami was able to view the first local images of Dual-Polarization (Dual-Pol) radar. The Miami Doppler Radar (KAMX) was out of service January 30th through February 6th for the upgrade. During this period, forecasters used data from the surrounding Weather Service radars and Terminal Doppler Weather Radars (TDWRs) to monitor precipitation in the area. The upgrade to Dual-Polarization technology will ultimately be completed at approximately 150 sites in the National Weather Service radar network.

Conventional radar products only allow forecasters to see the "brightness" of clouds and precipitation. The larger the raindrop or hailstone, the more "shiny" it appears to the radar. On a radar screen, the most reflective objects correspond to the more intense colors on the color wheel, red, pink, bright purple. Conversely, light precipitation carries less alarming colors, light greens and blues, maybe even gray for drizzle.

Image 1 shows the difference between a beam that a conventional radar would emit, compared to one that is equipped with Dual-Polarization technology. Conventional radar beams only emit a frequency in the horizontal plane, while a dual-polarized beam sends and receives information in both the horizontal and vertical planes – creating a 3-dimensional view. Image 2 shows this concept in terms of individual precipitation forms, a snowflake, hailstone, and raindrop. This provides information on the size, shape, and ice density of cloud precipitation particles that were not previously available to forecasters. The new data will help meteorologists better discern radar-based signatures, including new ways to detect hail, updrafts, tornadic debris signatures, and non-meteorological phenomena.

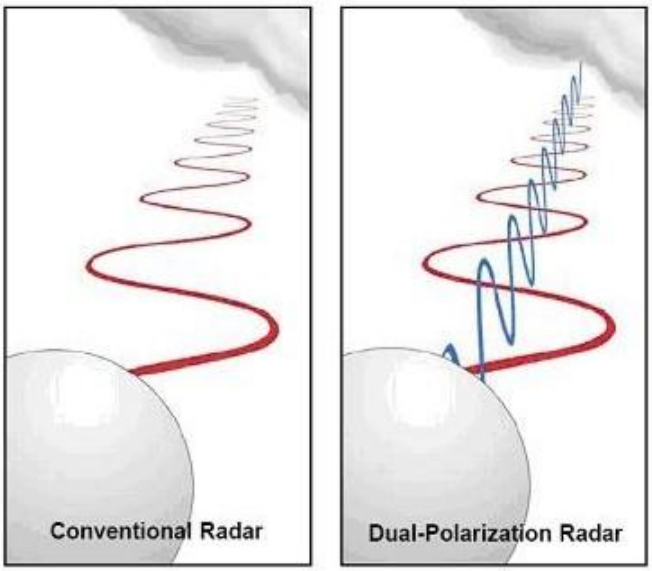


Image 1. The difference between a beam that a conventional radar would emit, compared to one that is equipped with Dual-Polarization technology. Credit: NOAA/NWS.

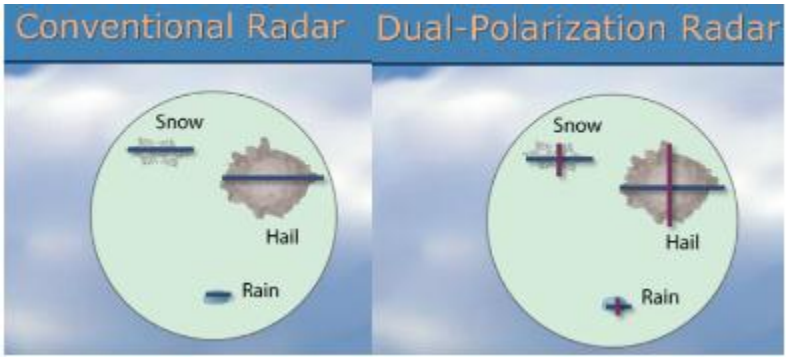


Image 2. A dual-polarized beam sends and receives information in both the horizontal and vertical planes - creating a 3-dimensional view of different precipitation types. Credit: NOAA/NWS/WDTB.

Dual-polarization will add 14 new products to aid in forecaster interrogation, including three new base products that meteorologists can use to further estimate precipitation. They are the Differential Reflectivity (ZDR), Correlation Coefficient (CC), and Specific Differential Phase (KDP).

The Correlation Coefficient (CC) product tells us which echoes are precipitation and non-precipitation (ground clutter), where echoes are the same type of precipitation, and where there is a mix of different precipitation types (see images 3 & 4). The ZDR product (image 5) shows the height vs. width difference for each echo. Rain drops tend to flatten and become wider as they are falling, so their ZDR will be a positive value. Conversely, ice crystals and some graupel appear taller rather than wider, so they will return negative values of ZDR. Hail, oddly shaped, will have values closer to zero because the height vs. width difference is about zero. Hail, raindrops, snowflakes and other precipitation types fall out of clouds in different ways. Most raindrops will normally fall straight down, with

not much randomness involved. Snowflakes, however, have completely random motions as they fall toward the surface. Even hail will "tumble" as it falls. The more random the falling motion, the higher the value for KDP (image 6).

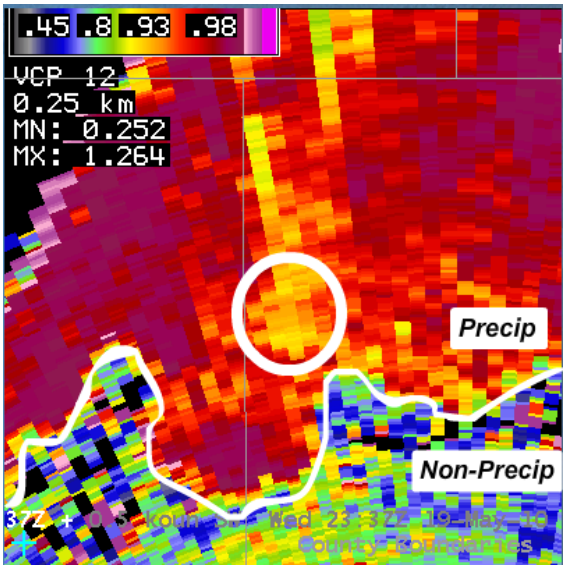


Image 3. An example of the Correlation Coefficient product. The magenta and dark reds are where precipitation types are the same, in this case, all rain. Once you see a mix of lighter oranges and yellows, there is a mix of other precipitation types, in this case, hail. The white circle denotes the core of the hail. Credit: NOAA/NWS/WDTB.

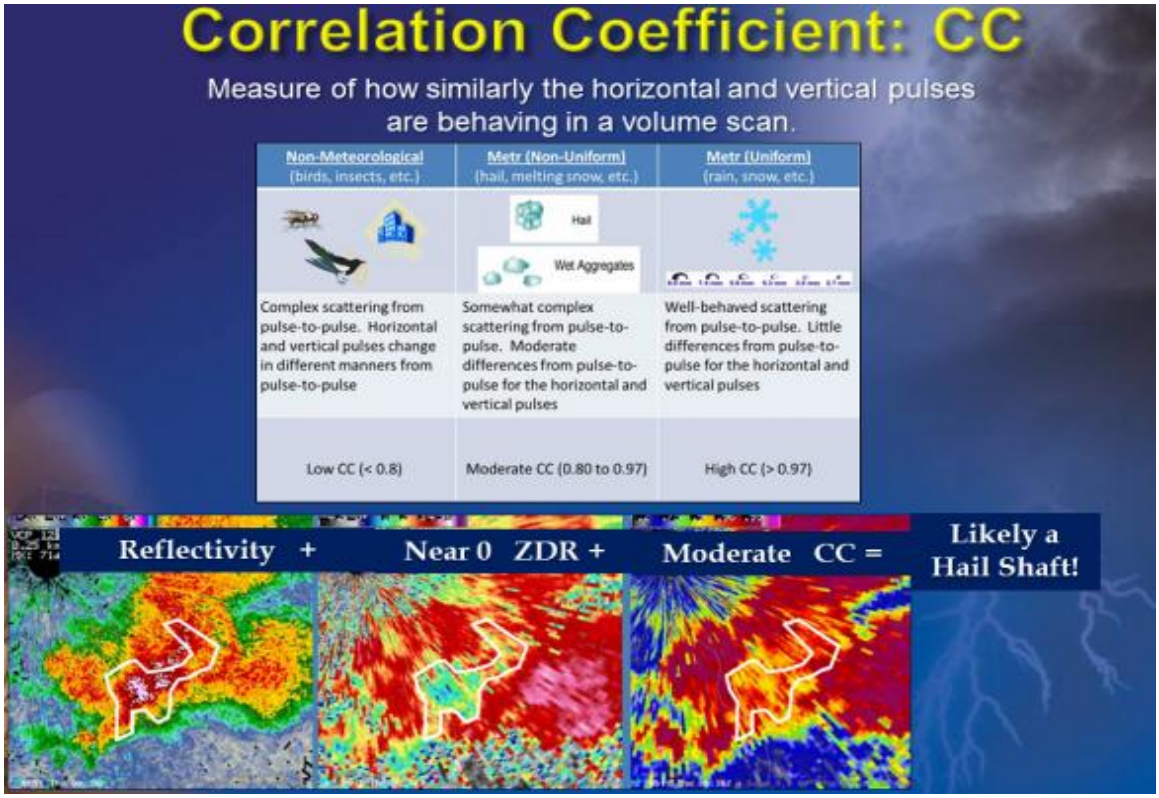


Image 4. The CC product measures the degree of similarity between the horizontal & vertical pulses in a particular volume scan. Credit: NOAA/NWS/WDTB.

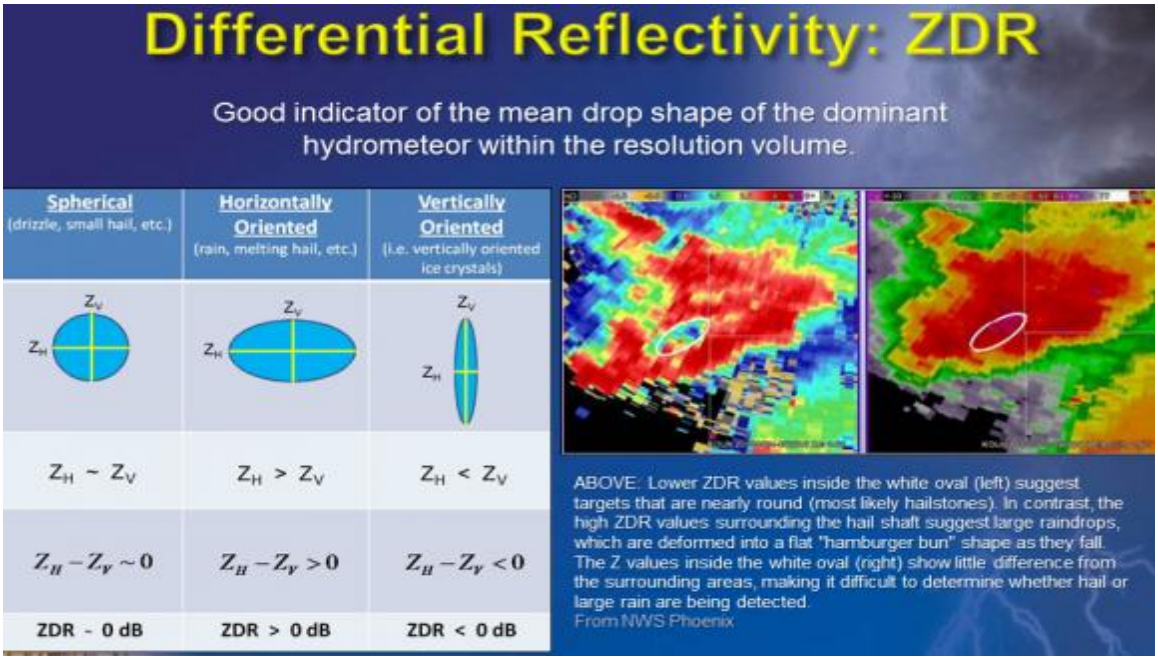


Image 5. The ZDR will show the difference between the horizontal & vertical reflectivity factors (units dBZ). Credit: NOAA/NWS/WDTB.

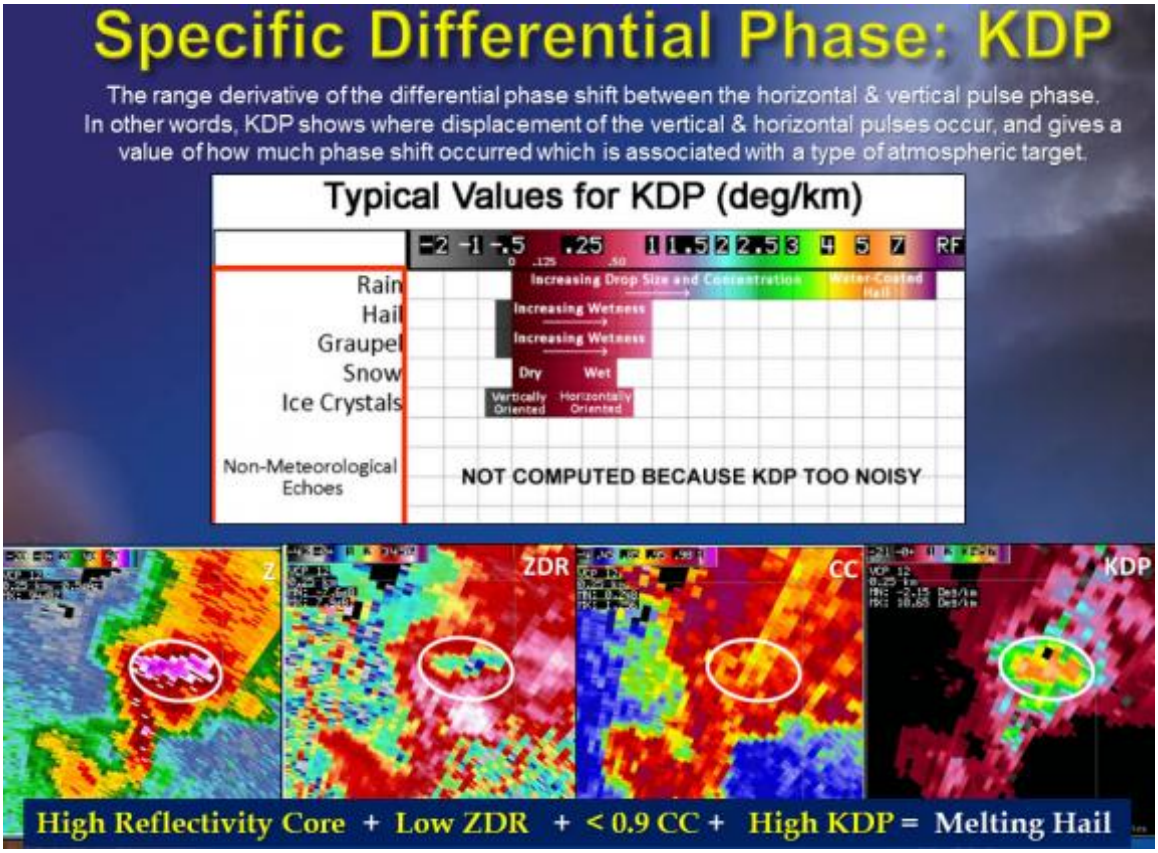


Image 6. The KDP is the range derivative of the differential phase shift between the horizontal and vertical pulse phases. Credit: NOAA/NWS/WDTB.

As we move into the wet season, forecasters will be able to use Dual-Pol radar precipitation estimates to filter out hail contamination. In the past, the highly reflective nature of hail in thunderstorms would cause overestimation in precipitation products. Dual-Pol has the ability to automatically detect hail and give more accurate precipitation estimates for hail producing storms. In addition, the new precipitation products provide forecasters another source for estimation of rainfall amounts. Meteorologists now can compare Dual-Pol estimates with legacy precipitation, TDWR data, and local gauges to help make more informed decisions on flood products. This is crucial since flooding is the # 1 weather killer and forecasters need to have accurate rainfall estimation to provide the best possible flood warnings to help people get out of harm's way.

In terms of severe storms, most of our typical summertime storms are pulse thunderstorms, lasting only 30 to 45 minutes on average. Unlike supercells (which we do see on occasion – i.e., Sunrise/Plantation EF-2 tornado of October 18, 2011) that can last anywhere from an hour to several hours, pulse thunderstorms form within a few minutes, develop their core of hail and wind, and dissipate shortly thereafter. When these storms contain hail and damaging winds, forecasters need to be able to quickly see it to help get the warning out before any of that hail or damaging wind reaches the ground.

The output of the dual-pol radar will also allow meteorologists to see more debris (objects thrown about from strong winds) within the storm, which indicates a possible tornado. In the past, we could only detect debris within a severe thunderstorm when the tornado was hitting a populated area and was at a fairly significant strength. These images were called debris balls that showed a higher dBZ (decibels of z) or higher reflectivity (brighter colors).

Advantages of dual-pol technology have already been realized this Spring. The rather noisy portion on the right side of image 7 is a dual-polarization radar product (correlation coefficient). Boxed in yellow is a tornado debris signature (TDS) over northern Haralson County, GA. This shows up as blue-like pixels embedded in a sea of dark purple and red pixels (image 7).

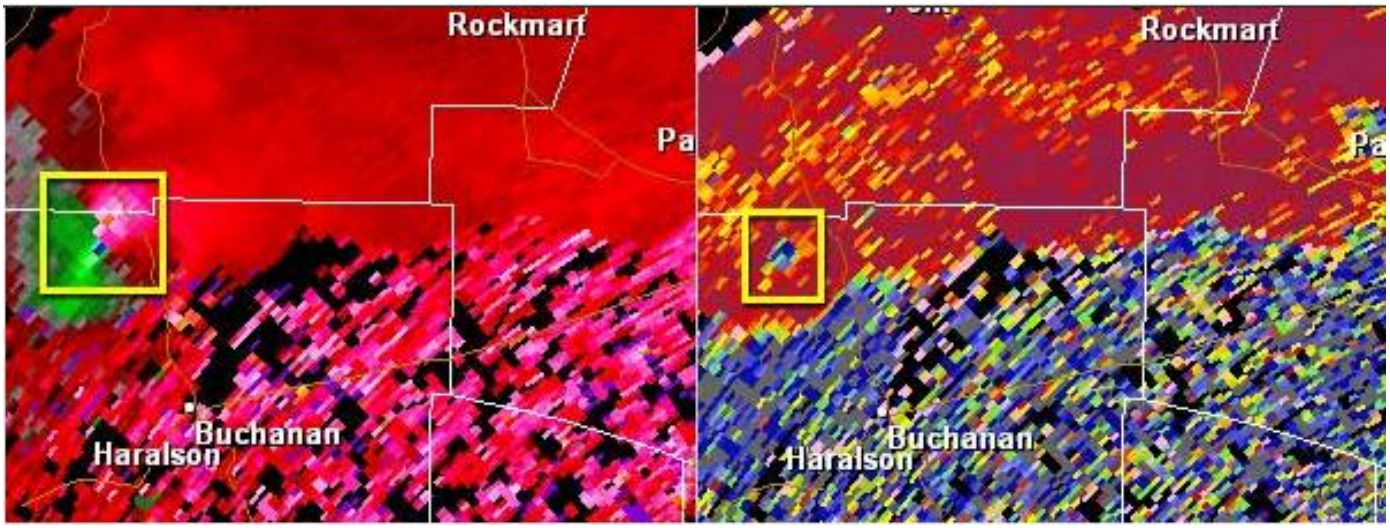


Image 7. Storm-relative velocity (left) and dual-polarization "correlation coefficient" (right) in northern Haralson County, Georgia, at 8:14 pm ET, March 2, 2012. Credit: NOAA/NWS/Peachtree City, GA.

Yet another benefit of the dual-pol technology is the ability to differentiate between meteorological and non-meteorological targets. Proper identification of meteorological targets (rain droplets) from non-meteorological targets such as chaff and ground clutter is important for accurate rainfall forecasts and warnings. During the dry season, it is not uncommon for chaff -- very light strips of metallic foil often dropped from military aircraft -- to have a similar radar appearance to rainfall, especially in the base reflectivity product. Several of the new dual-pol products can accurately and easily identify chaff from actual precipitation.

There are a number of web sites that offer information on the new suite of Dual-Pol products and what each of these products provides. There are also different levels of training available for the Dual-Pol products and applications for meteorologists and non-meteorologists:

http://www.wdtb.noaa.gov/courses/dualpol/outreach/

Also provided are helpful aides to better understand each of the individual Dual-Pol products and short instructor-led web modules with full explanations, accompanying graphics and real world examples:

http://www.wdtb.noaa.gov/courses/dualpol/trainingaid/index.htm

At the moment, NWS public radar pages do not include Dual-Pol products. Many of the WSR-88Ds around the country have yet to be upgraded, so there will be some time before it is readily available to the public. However, radar data is available for download and can be viewed from online and downloadable java viewers provided by the National Climatic Data Center (NCDC), here:

http://www.ncdc.noaa.gov/oa/radar/radardata.html

There are also a number of commercial vendors that offer specialized viewing software applications for conventional and Dual-Pol radar data that our local media can utilize.

For more information on how Dual-Polarization works, please see the following website:
http://www.roc.noaa.gov/WSR88D/dualpol/

Employee Spotlight

Sunrise over Doral - August 2010 - Andrew Tingler

By: Evelyn A. Rivera-Acevedo

In this issue, *Kim Brabander* was selected to be interviewed.

How did you become interested in weather?

It was in my 6th grade science class that the teacher noticed I was taking a real interest in the weather portion which most of the other students thought was boring. She later asked if I would be interested in giving a daily weather report to the class each morning and then later that same year my parents' gave me a weather kit for Christmas which included a rain gauge and a daily weather log for recording rainfall and temperature. Growing up in Phoenix, it did not rain that much and after having the rain gauge and log book, a rare significant flooding event occurred the following summer and I was hooked! By the time I entered high school, I was reading basic meteorology text books also discovering that mathematics was a very important element in learning about the atmosphere. Fortunately, math also came very easy to me.

Where did you take your studies?

After graduating high school in Phoenix, I attended Northern Arizona University in Flagstaff for three years taking some basic meteorology courses along with some math and geography classes. But, being sometimes typical of a young college student, I began to question meteorology as a profession because I also had a real interest in geography and of all things the railroading industry. But after a few years, I went back to school at Arizona State University in Tempe receiving a Bachelors' Degree in Geography specializing

in Climatology and then University of Nebraska-Lincoln getting my Masters' Degree in Meteorology. That in particular was a very special time for me since my parents' were both originally from Grand Island which was a little more than an hour's drive from Lincoln and spent several weekends with my Grandmother and other relatives.

What did you do after graduation?

Unfortunately, when graduating in 1985 from Nebraska the NWS had a hiring freeze and were only filling absolutely mandatory positions. So I moved back to Phoenix working mostly temporary jobs until I finally got in with the NWS two years later. In between my somewhat sporadic education endeavors, I also did some domestic travelling and stayed in Olympia, Washington for almost four months exploring the Pacific Northwest by car. During my breaks, I also drove through the upper Midwest along the shore of Lake Superior and saw the source of the Mississippi River.

Where did you work before the NWS?

I had many short term positions probably too many to list or for that matter to remember. But my longest stints include the Arizona State Law Library where I worked for a little more than two years as a Library Clerk before going back to school at ASU. It was also here that some of the best advice was given to me by one of the librarians when I happened to mention to her about going back to school part time. She told me my life was passing me by unless I was able to afford to go back full time getting my degree in roughly a third of the time it would take attending part time classes. I took that advice and never have regretted it. I also worked part time while attending classes at ASU at the Hydrology Section of the Arizona State Land Department. It was here that I put my geography to use and mapped state owned land on to Topography Maps using legal descriptions. Just prior to getting hired with the NWS, I worked at the Rocky Mountain Research Station co-located with the ASU campus and helped a Scientist collect meteorological data at three different field sites for a study he was doing on soil erosion.

What aspirations to you have today?

Most of my coursework was done prior to the technological computer advances of the past couple of decades, so my number one goal is to keep up with those skills and forward leaps. Sometimes it might take me awhile to comprehend these changes, but the NWS provides plenty of training to reach those objectives. It is also very rewarding when you come up with your best forecast possible and it plays out so another main ambition is learning new techniques that might help issue better forecasts.

What's the best/worst part of your job?

Well, it may not be surprising that the worst part of the job is the required rotating shifts. As a meteorologist however you realize that weather does not stop at midnight. The best part of the job is my focal point duties at the office which is Aviation Program Leader. In my career with the NWS, I have directly and indirectly worked with the FAA for the past 23 years by providing training to them on basic meteorology as a Meteorology Instructor at the FAA Academy in Oklahoma City, providing forecasts for Air Traffic Controllers at the Miami Air Traffic Control Center, and issuing forecasts for several airports across south Florida. From these experiences, I am able to convey my understanding to other forecasters in my current position and that is very enjoyable.

When you are not working here, what do you like to do?

One hobby I used to have that I am not able to do as much in south Florida is just getting in my car and taking a road trip to other states. It takes too long just to get out of the state of Florida! But my favorite activity began when I was a child, I would help my Mom in the kitchen helping her cook and bake. It was a great opportunity to spend quality time with her and she taught me many techniques I still use today in the kitchen. All of my close friends would probably agree though that my passion lies with baking and I sometimes share those products with my coworkers. I also enjoy bowling and have participated in a couple of leagues in the past although that is also difficult to do working a different shift each week and another hobby I have enjoyed since I was very young is railroading. One of my first memories as a child happened when I was about two or three years old. We visited my Aunt and Uncle in Kansas where my uncle was a conductor for the Union Pacific Railroad and he took me for a short ride on a switch engine. He was forever my hero!

Changes at the WFO

Sunset in Doral - Spring 2011 - Dan Gregoria

By: Dr. Pablo Santos and Evelyn A. Rivera-Acevedo

<u>Christopher Duke</u> - Chris has been selected as the new WFO Miami General Forecaster to replace Andy Tingler. He comes from WFO Memphis, where he has been an intern for the past 4 years or so. During his four years as a meteorologist intern in Memphis, Chris worked numerous severe weather events, including the Super Tuesday 2008 outbreak and the historic Mississippi River flooding of 2011. He earned a bachelor's degree with honors from the University of Memphis and later completed a master's degree at Mississippi State University.

Welcome to Miami, Chris!

Thanks for Reading!

Butterfly World in Coconut Creek - 2008 - Andrew Tingler

Editor-in-Chief… *Evelyn A. Rivera-Acevedo, Assistant Forecaster*

Editors and Contributors… *Dr. Pablo Santos JR. MIC*

Mike Bettwy, Lead Forecaster

Dan Gregoria, Lead Forecaster *David Ross, Meteorologist*

Questions or Comments? Please e-mail us at
sr-mfl.webmaster@noaa.gov