Sterling Reporter

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Open House

September 22nd & 23rd

http://www.erh.noaa.gov/lwx/openhouse/

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MIC's Corner

By, James E. Lee
Meteorologist in Charge

I am pleased to announce that the Baltimore/Washington Weather Forecast Office will be hosting an Open House the weekend of September 22-23, 2012, here in Sterling, Virginia. This will be our first Open House since October 2008, and our staff is looking forward to having a great event for you. The theme of the Open House will be *"Creating a Weather-Ready Nation."* We'll be having a Weather-Ready Nation Ceremony at the Open House on Saturday morning. You can learn more about NOAA's Weather-Ready Nation initiative at the following website: http://www.nws.noaa.gov/com/weatherreadynation/. At the Open House, there will also be weather-balloon launches, weather seminars, tours of the operations area and partner exhibits. You'll be able to talk with our staff, and get answers to those weather-related questions you've been thinking about for years.

Since our last Sterling Reporter, our region has experienced several major severe weather events. We've had a tornado outbreak on June 1, severe microbursts on June 22 that resulted in considerable damage in Bladensburg, Maryland, and Frederick County Maryland, and, of course, the June 29 Derecho. Severe events such as these are unlike winter storms or tropical systems that we're able to provide, in most cases, at least a couple days of preparation. Severe Thunderstorm Watches or Tornado Watches provide anywhere from two to four hours of advanced notification of the potential of damage from

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MIC's Corner *(continued)*

thunderstorms, but the state of the science does not allow us to be able to pinpoint where damage will be this many hours in advance. Our goal for providing definitive warning of a Severe Thunderstorm or a tornado is about eighteen minutes.

You or someone you know was probably impacted by the Derecho which caused widespread damage from winds gusting to 75 mph. Wind gusts exceeding seventy miles per hour that produce widespread damage over a large area are very rare, occurring once every fifteen to twenty years. However, hundreds of locations across our area experience damage due to thunderstorms annually, and some of the storms produce injuries and even fatalities. This is why everyone should be prepared to know what to do if dangerous weather approaches and warnings are issued.

The most important thing in being prepared is becoming weather-aware. Get the latest weather forecast so that you can know what to expect. Great ways to obtain our forecasts are through our internet webpage at http://www.weather.gov/washington, or through NOAA Weather Radio (you can purchase a NOAA Weather Radio at your local electronics retailer). After you receive your forecast, monitor the weather and look for signs of a developing thunderstorm such as darkening skies, rumbles of thunder, lightning, or increasing gusty winds. At this point, you should get to a safe place immediately, such as a sturdy building. If you do receive a Severe Thunderstorm Warning or a Tornado Warning, the safest place to be is your basement. I've seen reports of a couple of fatalities in our area this year by trees falling on houses, killing people who are in an upstairs room. This is why you should move to a basement and ride the storm out. Stay inside until thirty minutes after the last rumble of thunder.

This is all part of our *"Weather-Ready Nation"* initiative. We want you, your family, and your business prepared before hazardous weather occurs. As evidenced by the June 29 Derecho, we can't stop Mother Nature, being *weather-ready* by planning ahead can lessen your risk of injury, and allow you and yours to be more comfortable in case of utility outages.

On another note, our office has just completed planning for the upcoming year. We look forward to providing the region great weather forecasts and warnings; providing our core customers in local, county, state and federal government great decision support services; and for our office to be a great place to work.

If you have any questions, feel free to call me at 703-996-2200, extension 222, or email me at James.E.Lee@noaa.gov.

Dual Polarization Technology Arrives in the Middle Atlantic

By, Gregory Schoor, General Forecaster

What is Dual-Pol?

A major upgrade is being installed in all National Weather Service (NWS) radars across the nation. Dual-Polarization technology takes each sweep of the radar from 2-D, to 3-D. Before Dual-Pol, a radar beam was transmitted only in the horizontal plane, so the beam could only receive data about falling precipitation in one direction. With February's upgrade to our local NWS radar, forecasters can now get information about precipitation not only in the horizontal but in the vertical as well, telling us much more about what we are looking at. Dual-Pol is a vital part of the Weather-Ready Nation effort by the NWS. Creating a Weather-Ready Nation requires providing the media, government and other key partners with the most accurate warnings and forecasts to protect lives and property.

What are the functions of Dual-Pol data compared to the conventional radar data?

Conventional radar products only allow forecasters to see the "brightness" of clouds and precipitation (raindrops, hail, snowflakes, etc.). The larger the raindrop or hailstone, the "shinier" it will appear to the radar. On a radar screen, the most reflective objects correspond to the more intense col-

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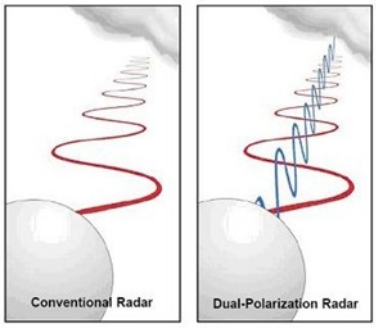
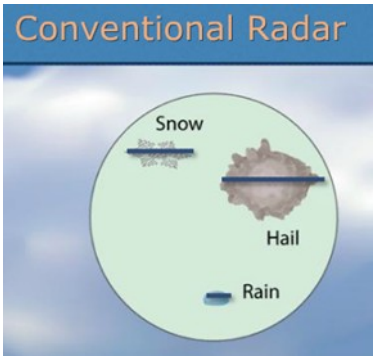
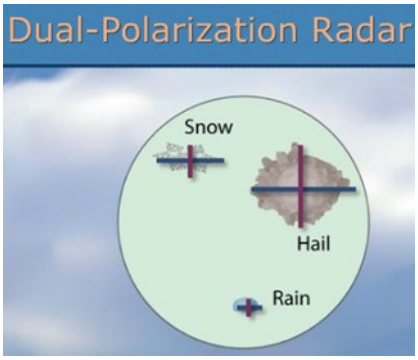
Dual Polarization *(continued)*

ors on the color wheel, red, pink, bright purple. Conversely, light precipitation will have the less alarming colors, light greens and blues, maybe even gray for the lightest drizzle or flurries.

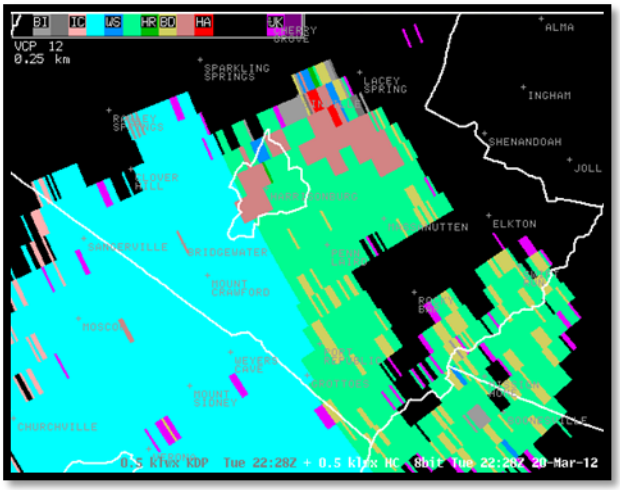
The image below shows the difference between a beam that a conventional radar would emit, compared to one that is equipped with Dual-Polarization technology. Conventional radar beams only emit a frequency in the horizontal plane, while a dual-polarized beam sends and receives information in both the horizontal and vertical planes - creating a 3-dimensional view. The two images on the right show this in terms of individual precipitation forms, a snowflake, hailstone, and raindrop. Dual-Pol offers the ability to dissect this "brightness" or "reflective" idea even further. Since the beam is now polarized, meaning that it sends out waves not only in the horizontal plane, but the vertical, we can now see the actual shapes of falling precipitation and how they change direction as they fall toward the surface. For the most part, raindrops fall straight without rotating or make too much random motion, while snowflakes are completely different. Snowflakes are flat and change direction constantly as they float toward the surface. Even hailstones, especially large hailstones, will "tumble" as they fall, rotating and changing direction because they are not perfectly round.

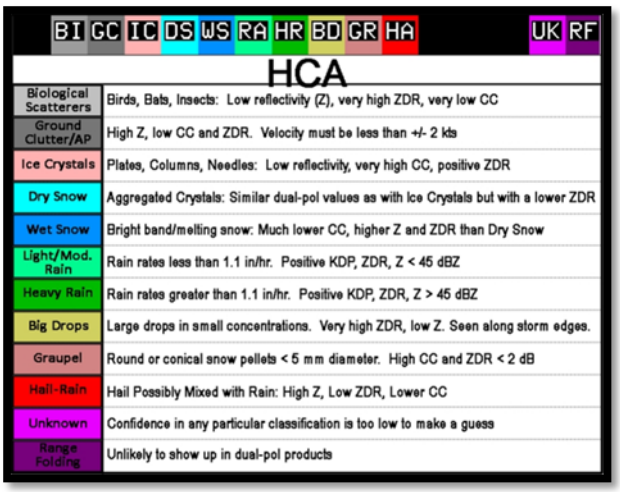






Dual-Pol products can show these characteristics in a number of ways to meteorologists. The radar can then take all of that information and make its best estimate of what type of precipitation is in the sky. In the lower right of the below Dual-Pol radar image is an example of summer thunderstorms over southern Pennsylvania and north central Maryland from the NWS Dual-Pol radar in Pittsburgh. Since the radar beam shoots out at an angle away from the ground, far away from the radar, the beam for the northern Maryland storms is high within the tops of the clouds. Up there, it is well below freezing and the radar can see the irregular shape of the ice crystals in the cloud - the blues. However, it can also tell the difference between those ice crystals and the red that signifies hail in the storm.





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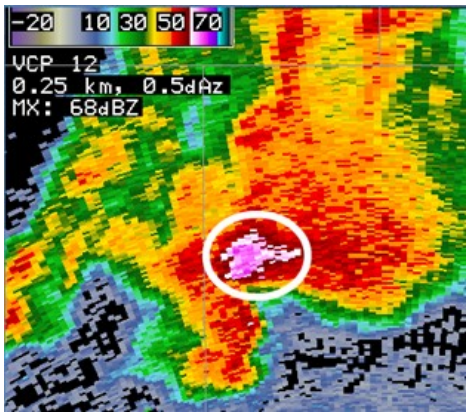
Dual Polarization *(continued)*

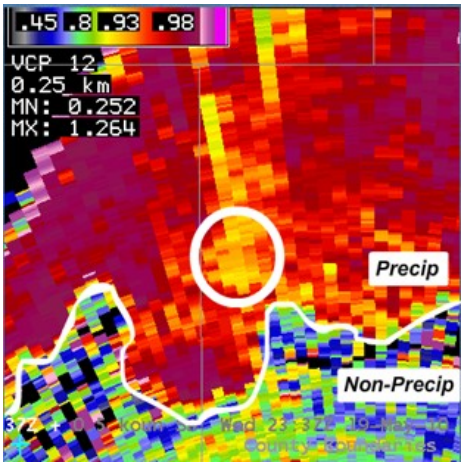
Why is Dual-Pol important for the Mid-Atlantic Region?

Finding Hail: In terms of severe storms, most of our typical summertime storms are pulse thunderstorms, lasting only 20-30 minutes on average. Unlike supercells (which we do see around here on occasion - i.e. La Plata, MD April 2002) which 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, NWS 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.



Winter Precipitation: Dual-Pol technology gives meteorologists a new set of highly sophisticated tools to better diagnose and determine precipitation types at all levels of the lower atmosphere. Winter precipitation can be especially challenging, as the heavily populated I-95 corridor is often the transition zone between rain and snow. The zone of mixed precipitation in-between can be a relatively short distance and change quickly, so having tools that give forecasters better clues as to where the in-cloud melting/freezing layers are and how they are changing will be crucial to providing better service for our region for years to come.

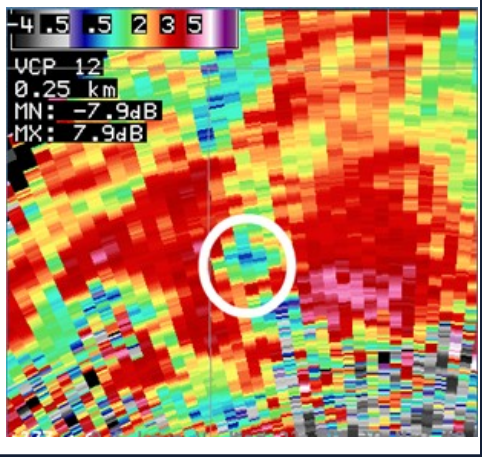
Better Rainfall Estimates: Conventional radar can only rely on assigning rainfall rates to how reflective the precipitation is. This is an issue if hail is present within an area of rain. Hail appears very bright like torrential rain, but causes no flooding. Dual-Pol radars automatically account for areas of rain that have hail mixed in and give a more realistic estimation for how much rain has fallen. This is crucial since flooding is the #1 weather killer. We need to have accurate rainfall estimation to provide the best possible flood warnings and help people get out of harm's way.



What are the new products available with Dual-Pol?

There are three base products, each of them combine to create the Hydrometeor Classification (HC) product, previously mentioned. One of the best ways examples to show each of the new Dual-Pol products and what purpose they can serve is to go through case with hail in a thunderstorm. Starting off with what we are more used to seeing, the lowest tilt Reflectivity product. A white oval surrounds the area just north of the storm's updraft where large hail is likely falling. Reflectivity, however, only shows how "reflective" the surfaces of raindrops, hail, ice and snowflakes, not giving much more information about the echo.

However, when hail is present and mixed in with rain, different characteristics can be seen with Dual-Pol products that cannot be detected by conventional radar. Looking at Correlation Coefficient (CC) product gives us a few key pieces of information:



1). Which echoes are precipitation and non-precipitation (ground clutter).
2). Where echoes are the same type of precipitation and where there is a mix of different precipitation types. 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.

3). The white circle denotes the same region in the Reflectivity image that is the core of hail.

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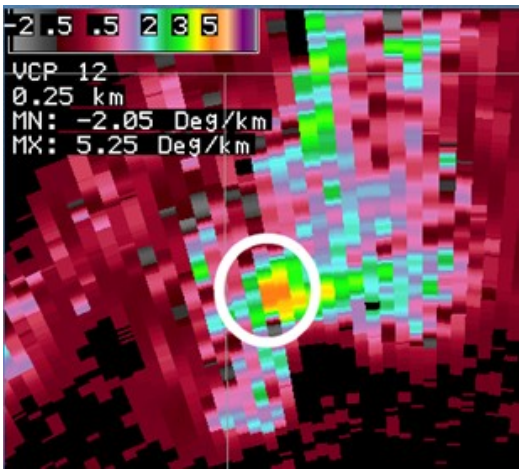
Dual Polarization *(continued)*



The other two products show the same hail core feature, in different ways. The Differential Reflectivity (ZDR) product shows the height vs. width difference for each echo. Rain drops are wider (as they are falling) than they are tall, so their ZDR will be a positive value. Conversely, ice crystals and some graupel appear taller than they are wide, so they will return negative values of ZDR. Hail, since it is mostly round will have values closer to zero, since the height vs. width difference is about zero. In the image to the right, the white circle shows the same hail core region, where the values are much closer to zero than the pixels surrounding it.

Lastly, for the hail example, is Specific Differential Phase Shift (KDP). Hail, raindrops, snowflakes and other precipitation types will fall all out of a cloud 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. The white circle showing the same hail core region shows high values of KDP, which reflects the highly random motion from the medium-to-large sized hail that is falling out of the thunderstorm.

(All images courtesy WDTB: http://www.wdtb.noaa.gov/courses/dualpol/trainingaid/index.htm)

Aviation Forecasting

By, Brandon Peloquin, Senior Forecaster

Tens of thousands of flights occur daily across the United States. Each day, the skies of the National Air Space (NAS) are filled with commercial airlines, corporate jets and smaller general aviation aircraft. As one might imagine, weather can have a significant impact on aviation, especially with take-offs (a.k.a. departures) and landings (a.k.a. arrivals) at an airport. In addition, weather-related delays at one major airport can lead to delays and congestion at other airports.

Considering both flight safety and flight planning needs, National Weather Service (NWS) Weather Forecast Offices (WFOs) issue TAFs, or Terminal Aerodrome Forecasts, for airports across the country. The TAF is a forecast of the expected meteorological conditions within 5 statute miles of the center of an airport's terminal. Meteorological conditions which are forecast in the TAF include: surface wind, visibility, obstructions to visibility, sky cover and cloud heights, precipitation and low level wind shear. A routine TAF is issued 4 times per day: at 00Z, 06Z, 12Z and 18Z (Z represents Zulu time). Forecasts extend out 24 hours, except for 30 hours for international airports. **(image: example TAF)**

At NWS Baltimore/Washington, our forecasters provide TAF service to 6 airports: DCA – Ronald Reagan Washington National Airport, IAD – Washington Dulles International Airport, BWI – Baltimore-Washington International Thurgood Marshall Airport, MTN – Glenn E. Martin State Airport, CHO – Charlottesville/Albemarle Airport and MRB – Eastern West Virginia

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FTUS41 KLWX 242300
TAFIAD
TAF
KIAD 242337Z 2500/2606 19015G25KT P6SM -RA OVC045
     FM250300 19010KT 4SM -RA BR OVC025 WS020/21030KT
     FM250700 18006KT 2SM -RA BR OVC015 WS020/21035KT
     FM251200 28007KT P6SM SCT020 BKN035 BKN060
     FM251400 29011G18KT P6SM SCT070 SCT150
     FM252000 28013G20KT P6SM BKN050 OVC100
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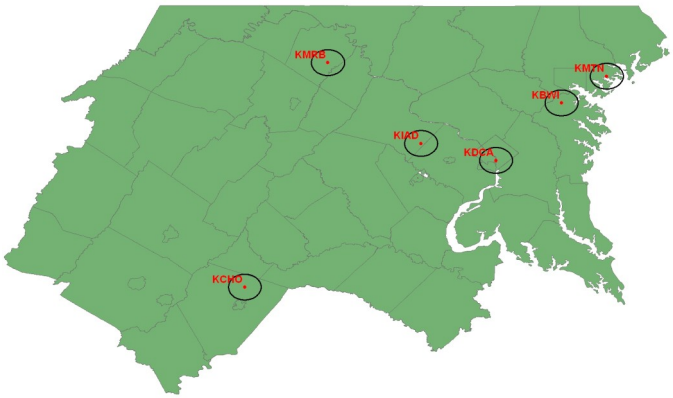
Aviation Forecasting *(continued)*

Regional Airport. **(image: 6 TAF sites—right)** TAFs for IAD and BWI extend out 30 hours, while TAFs for the remaining sites extend out 24 hours. In addition to the routine issuances mentioned above, our office also provides regular TAF amendments at 09Z, 15Z and 21Z for IAD, BWI and DCA, and of course non-routine amendments are issued at any TAF sites as necessary.



At the end of August, the way that our office composes TAFs for the above 6 airports changed. Similar to our public, marine and fire weather forecasts, much of the work for aviation forecasts is now completed in our Graphical Forecast Editor (GFE), which essentially is our office's gridded forecast database. This means that our forecasters create grids (which are blocks in time for different weather elements) for aviation-specific elements such as cloud height (ceiling) and visibility. Grids for all of the weather elements necessary for the TAFs are completed and then a formatter is run that produces TAFs in the format that users are accustomed to. So, while the way we compose a TAF has changed, the TAF looks the same as it always has and will continue to be a high end product for safety and flight planning for users. This change will help ensure that our aviation forecasts are consistent with forecasts from other products (like the public forecast) since everything will be derived from the same gridded database. In addition, elements such as ceiling and visibility will eventually be available on NDFD across our County Warning Area, so users can see aviation forecast information away from the 6 TAF sites.

Fire Weather Season

By, Brian Lasorsa, General Forecaster

Wildfires are a significant threat to life and property and they can occur at any time. Wildfires are quite common in the Mid-Atlantic and they are most likely during periods of dry and windy weather. There are two distinct periods during a calendar year when wildfires are most likely. The first period is from February 15th through May 15th and the second period is from October 15th through December 15th. You may have noticed that these two time periods are centered around the late winter into spring as well as the autumn. This is when the jet stream is most active due to a large temperature difference between colder air to our north and warm air across the southern portion of the United States. An active jet stream can lead to windy conditions, and if the jet stream is positioned in a certain way, then storm systems will have little precipitation associated with them.

Wolf Gap Fire: Picture from the NV Daily.com

An extended period of dry conditions persisted during the first half of April. An active jet stream led to windy conditions which combined with the dry ground to spark wild fires across the area. Two of the bigger wild fires were located in the Shenandoah Valley. One wildfire was located near the Virginia/West Virginia state line in northern Shenandoah County, called the Wolf Gap Fire. The Wolf Gap Fire burned over 750 acres. The other fire was located in southern Page County, called the Shipwreck Fire. The Shipwreck fire burned over 3,700 acres before being put out.

Assessing Flood Risk at Our Weather Gauges

By, Jason Elliott,
Senior Service Hydrologist

Last summer, our office began a major project to determine flood risk across the NWS Baltimore/Washington Hydrologic Service Area (HSA), and formed an in-office River Assessment Group to tackle this wide-ranging activity. The active weather in the summer and fall of 2011 led to a slow start to the project, but things have picked up significantly in 2012.

You may already know that our office is responsible for monitoring and warning at 34 river forecast points throughout the Potomac, Shenandoah, and Rappahannock basins. But did you know there are over 300 stream gauges, most of them monitoring streamflow on at least an hourly basis? The problem is that at most of these locations, no one knows what those values mean. Our project is intended to provide meaning to those values and determine the flood risk at each gauged location. Through August 1st, 2012, we have visited 127 gauged locations in the HSA, or around 40% of all the sites in our area of responsibility.

What are we doing at each location? We take pictures of the stream and the surrounding area. Then, utilizing metadata from the United States Geological Survey (USGS), we locate known elevations near the stream called benchmarks. If you enjoy geocaching, you're probably familiar with benchmarks. In some cases, we use the same benchmarks you find when geocaching!

Next we use the benchmark elevations to determine, as needed, the elevations of unknown areas of interest near the stream. For example, in this photo, you see General Forecaster Stephen Konarik using our laser detection equipment to help calculate the height of the creekside trail near historic Burnside Bridge at Antietam National Battlefield.


Burnside Bridge at Antietam National Battlefield

Sometimes the field survey is very involved, determining heights of many locations near the stream. Other times, the benchmarks tell us most, if not all, of the information we need at a given site. In general, urban streams require more work since there is more nearby that could be impacted. For example, we need to know the height of this roadside park and road along the South River in Waynesboro.

Using our equipment, we were able to determine that water begins to overflow into the park between 6 and 7 feet, but this does not impact much. By the time the flood stage of 9.5 feet is reached, water is nearing the road shown on the left of the photograph, and approaching nearby homes downstream on the right side (beyond this photo). So this assessment activity confirmed our existing flood stage.

After the field survey is complete, we return to the office with all the collected information. A comprehensive data analysis is performed to determine impacts of areas we may not have been able to reach, as well as to check bridge and culvert information for accuracy. Once we've finished the data analysis, we provide the impact information to county emergency management officials for review and comment, and then we implement the information into our operations.

We have updated information at many of our forecast points, in-

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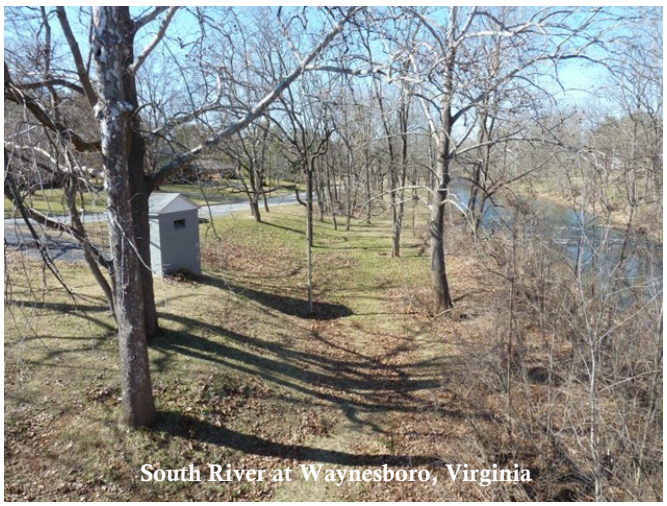
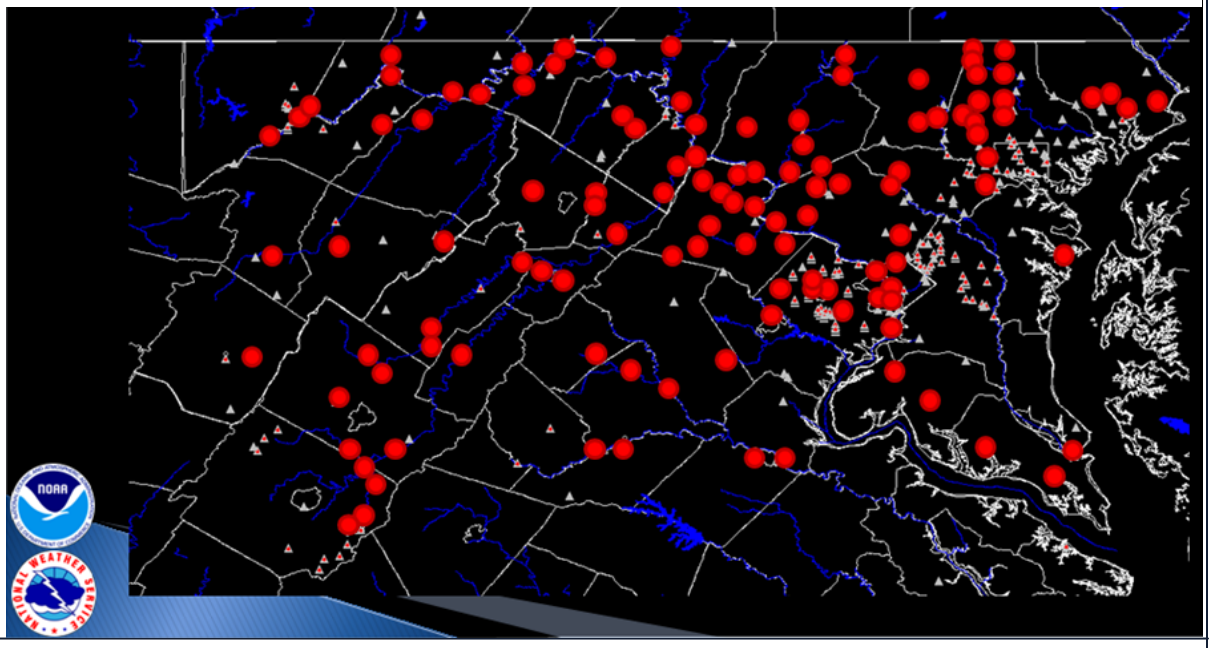

South River at Waynesboro, Virginia

Assessing Flood Risk at Our River Gauges *(continued)*

cluding changing flood stages and flood categories at many sites. At the other locations where we do not produce a forecast, we will still be able to monitor the stream levels for potential flooding – because now we will have a better understanding of the level at which it occurs. We also hope to undertake further study at some of these locations to determine what amount of rainfall could cause a stream to rise to our newly-defined flood stage.

The National Weather Service (NWS) is especially grateful to our partners at the United States Geological Survey (USGS), the Virginia Department of Emergency Management (VDEM), the Maryland Department of the Environment (MDE), and the Hydrologic Services Division of National Weather Service Headquarters for their assistance in collecting and/or analyzing data for this project.

Map of all the locations visited through August 1st, 2012. Red dots indicate visited locations. Gray triangles indicate locations yet to be visited.



Wireless Emergency Alerts — Warnings to Your Cell Phone!

By, Christopher Strong, Warning Coordination Meteorologist

Imagine a tornado warning popping up and alerting you on your cell phone, giving you enough time to find shelter. Now imagine this important information getting to you not only based on your home, but wherever you and your cell phone happen to be. On vacation? In the car? On a hike? It won't matter. If you have cellular coverage, you can get these alerts. They are called Wireless Emergency Alerts, and they plan to begin nationwide in 2012 – with the Washington & New York City areas being first up this spring. These alerts are a coordinated effort between the wireless industry, the Federal Communication Commission (FCC), and the Federal Emergency Management Agency (FEMA).

It is important to note that not all cell phones will be able to receive these. Initially, many of the newest smart phones will have the capability, but many phones will not. However, as people replace their older phones with newer ones that are compatible in the months and years ahead, the reach of these messages will extend. These very special text messages will have their own tone and vibration, and will be stored separately from your normal text

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Emergency Alerts *(continued)*

messages.

The system activates by cell tower, so any compatible phone that is receiving a signal from an affected cell tower will get the warning. If you travel into an affected area, that cell tower will pass the warning to your phone when you start receiving from that tower. It does not use your phone's GPS or track you.

The President, emergency management, and state and local governments can pass important warnings over the system that are high in urgency, severity, and certainty. In addition, the NWS expects to start utilizing this by pushing extreme weather warnings over the system in May 2012. They will go directly to people that are in the county affected by these warnings. The intent is not to provide all information – as the messages will be 90 characters or less – but to be an alert, and encourage people to get more information about the threat. In our region, the six types of extreme warnings that will utilize this system are:

Tornado Warnings
Flash Flood Warnings
Hurricane Warnings
Ice Storm Warning
Blizzard Warning
Tsunami Warnings (Atlantic Coast)

So if your phone passes you one of these warnings in the months and years ahead, don't be surprised. This is just another way that life-saving information can be passed to everyone quickly. Together with alerts from your local broadcast meteorologist, county, and/or NOAA Weather Radio, you will be that much surer that your family will get life-saving warnings when they are issued.

Much more information, and answers to commonly asked questions can be found here:

www.weather.gov/washington/WEA/WEA.php and here: www.ctia.org/wea

Reaching Out to Marine Users

By, Brandon Peloquin, Senior Forecaster

On March 31st, I had the privilege of attending the 2012 United States Coast Guard Auxiliary Sector Baltimore Spring Workshop. This year's workshop was held on a Saturday at Southern High School in Harwood, MD. This was the first year the workshop included an exhibitor section. NWS Sterling set up a booth, and over one hundred members stopped by to take some weather education and safety pamphlets and/or talk about marine weather. The NOAA Chesapeake Bay Office was also in attendance, demonstrating the usefulness of the Chesapeake Bay Interpretive Buoy System (CBIBS).

Marine Program Leader, Brandon Peloquin

I was also invited to speak at the monthly meeting of the Pentagon Sailing Club on April 16th in Arlington, VA. Around 30 club members attended the meeting. We talked about navigating through NOAA/NWS websites to find pertinent weather information to assist in the decision of whether or not to go sailing and also talked about ways to stay safe on the waters. After the meeting, one member commented: "Folks really got helpful and specific 'take-aways' that they will use on the water. It's great to know we have a friend at the NWS who is truly interested in how we use weather information and opportunities to fine tune the service."

Most recently, on May 2nd, the Northern Virginia Sail & Power Squadron visited our office in Sterling, VA. Each year, the Squadron Instructor brings a fresh group of Squadron Members, typically after they have completed their Squadron Marine Weather Course. In addition to a demonstration on where to find weather information and how marine forecasts are created, the visit included the launch of that evening's weather balloon.

As I always tell boaters at outreach events like the ones above, if you are out on the Tidal Potomac River or Maryland Chesapeake Bay, and would like to call in a marine observation, feel free to call our toll-free number at 1-800-253-7091. We are interested in winds, waves and any adverse weather such as thunderstorms and fog.

State Tornado Drills — A Success!

By, Christopher Strong,
Warning Coordination Meteorologist

On Tuesday, March 20th, kids in Virginia schools moved into hallways and assumed a brace position against the wall. On Wednesday, April 11th, kids in Maryland did the same. Both were examples of statewide tornado drills that help everyone practice what they would do if a tornado was bearing down.

For both drills, schools, businesses, organizations, and families were encouraged to participate when the alert message came at a preset time in the mid-morning. Alerts were passed across the airwaves of NOAA Weather Radio, as well as other broadcast systems. An initial toned alert message was followed 15 minutes later by an all-clear message to indicate the drill was over.

Tornado Drill from Saint Marys Department of Public Safety

The Virginia drill was organized between the National Weather Service (NWS) and the Virginia Department of Emergency Management (VDEM). The Maryland drill was run between the NWS and the Maryland Emergency Management Agency (MEMA).

Statewide tornado drills are done in many states across the nation in tornado prone areas like ours. The point of these drills is two-fold. First, is to get people to make plans for themselves, their families, businesses, and/or organizations. These plans should include things that can be done quickly, since tornado lead times are typically on the order of minutes – not hours. They should also include a few different ways to receive warnings that quickly activate these plans. This ensures that the warning still makes it to you if one way fails, and that you receive the warning quickly enough that you can activate your plan with enough time. The second goal of the drills is to get people to practice their plans. Practice allows a plan to be activated quickly and correctly when danger is near. It is in these dangerous times when a tornado is moving in when things tend to be chaotic. Without a well-practiced plan, disorganized chaos will keep people in harm's way, instead of in a safe area.

If you didn't get to participate, don't worry. Here's what you should do:

- Go to Ready.Gov and make a family emergency plan. It's quick and easy using this site.
- Make sure you have those multiple ways to get NWS warning information quickly and dependably – even when you are asleep.
- Pick a time to practice your plan and do it – just like you would in an actual emergency.

Don't forget to participate next spring! These are annual drills.

Summer 2012 Summer Volunteer

By, Heather Sheffield, Meteorologist Intern

The summer at Sterling is always an exciting season. Not only do we get geared up for severe and tropical weather but we also have local college students complete a research project in our office. This summer, Anna Schneider from Olney, MD volunteered her time to work with General Forecaster, Stephen Konarik and Service Hydrologist, Jason Elliott. Anna is a rising senior at Pennsylvania State University in State College, PA. She was the only one selected from the student volunteer interview team back in February 2012. Anna worked a few times a week on a project entitled "Analysis of Flash Flood Monitoring and Prediction-Advanced (FFMP-A) Performance on Flash Flood Events in the Baltimore/Washington Weather Forecast Office Area of Responsibility." Her analysis led her to conclude that the FFMP application does significantly better with tropical systems and/or major flooding events than with summer convection or winter precipitation flash floods. FFMP still missed tropical storm events and forecasters should not wait until a ratio between radar trends and flash flood guidance reaches 100%.

Stephen Konarik (left), Anna Schneider (center) & Jason Elliot (right)

For prospective students, the student volunteer process begins before the New Year when a call for applications is posted on the NWS Sterling website and sent to professors at regional colleges. College students will then fill out an application and attach their transcripts. Interviews are conducted in January and a selection is made in February. For more information, please visit http://www.erh.noaa.gov/lwx/outreach/Student_Volunteer_Webpage.htm

The Ohio Valley/Mid Atlantic Derecho of June 29, 2012

By, Steven Zubrick, Science and Operations Officer

During the afternoon and evening of Friday June 29, 2012, an intense, long-lived line of thunderstorms raced eastward from the Ohio Valley to the Mid-Atlantic coast. In its wake, this storm system that packed near hurricane-force wind gusts left behind an extensive swath of destruction that killed 22 people (7 in the WFO Sterling county warning area alone), caused millions of dollars in property damage, and led to massive power outages (an estimated five million people lost power from Chicago to the Mid-Atlantic Coast; with an estimated two million customers losing power in the Washington DC-Baltimore metro region). Meteorologists use the term "**derecho**" (pronounced "deh-REY-cho") to describe these special types of long-lived, violently-destructive windstorms.

What is a derecho? How frequent are they? Why are they so destructive? What do I need to know to keep safe in a derecho? To answer these and other questions is beyond the scope of this newsletter article. However, our office issued a summary article on the June 29th derecho that addresses these and other questions. It's available at: http://www.erh.noaa.gov/lwx/events/svrwx_20120629/.

Derecho ***(continued)***

This brief item summarizes some information found in this web article concerning the June 29th derecho. More information on derechos is available on the NWS Storm Prediction Center (SPC) web site "***About Derechos***": http://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm.
So, what is a "**derecho"**? Essentially, a derecho is a long-lived, rapidly-moving line of intense thunderstorms that produces widespread damaging winds in a nearly continuous swath. Derechos often occur in a very warm, moist and particularly unstable airmass. Such an airmass was in place here on the 29th. In fact, Washington DC's Reagan-National Airport hit 104F deg the day of the derecho, which broke the all-time daily high temperature for June in DC.

The term "derecho" was coined over a century ago in 1888 by a physics professor, Dr. Gustavus Hinrichs, at the University of Iowa. For a variety of reasons, Dr. Hinrich's term derecho, never caught on with meteorologists of his time or in the years afterward. However, a century later in 1987, two forecasters (Bob Johns and Bill Hirt) with the NWS National Severe Storms Forecast Center (predecessor to today's SPC), published a scientific paper that revived the term "derecho". Since publication of their paper, use of the term "derecho" has gained wide acceptance within the meteorological community. But because derechos are uncommon here in the Mid-Atlantic region, one rarely hears this term used.

Some of the more significant meteorological features of derechos (including the one on June 29th):

- Derechos are more common (though infrequent) in the central and southern plains of the U.S.
- They can travel immense distances; over 250 miles (400 km). The June 29th derecho travelled over 700 miles from its start in eastern Iowa to the East Coast; a derecho that occurred across the northern U.S. on July 4-5, 1999, travelled a distance of 1300 miles!
- Derechos move in roughly a linear fashion, although they can take sharp turns to the right or left,
- Surface wind gusts of 50 to 75 mph occur with derechos; with gusts to near 100 mph possible,
- Derechos characteristically produce widespread wind damage in a nearly continuous swath,
- A single derecho at any instant in time can cover large portions of a state or multiple states,
- Derechos can travel at speeds upwards of 65 to 70 mph,
- Derechos are often prolific lightning producers when they occur during the warm months.

The derecho moved through the DC and Baltimore region between roughly 1030 and 1115 PM EDT. At the three metro regional airports on the 29th, Dulles gusted to 71 mph at 1023 PM EDT, Reagan National had a peak wind gust of 70 mph at 1048 PM, and BWI had a peak gust of 66 mph at 1102 PM.

On the next page is a radar image (left) taken at 1038 PM EDT (0238 UTC) just as the derecho (denoted by the North-South line of red reflectivity echoes) is about to move into DC. The image on the right (next page) is an infra-red satellite image from nearly the same time as the radar image on the left, with individual lightning strikes (in yellow) at the time overlaid. The satellite shows very cold cloud tops. (the

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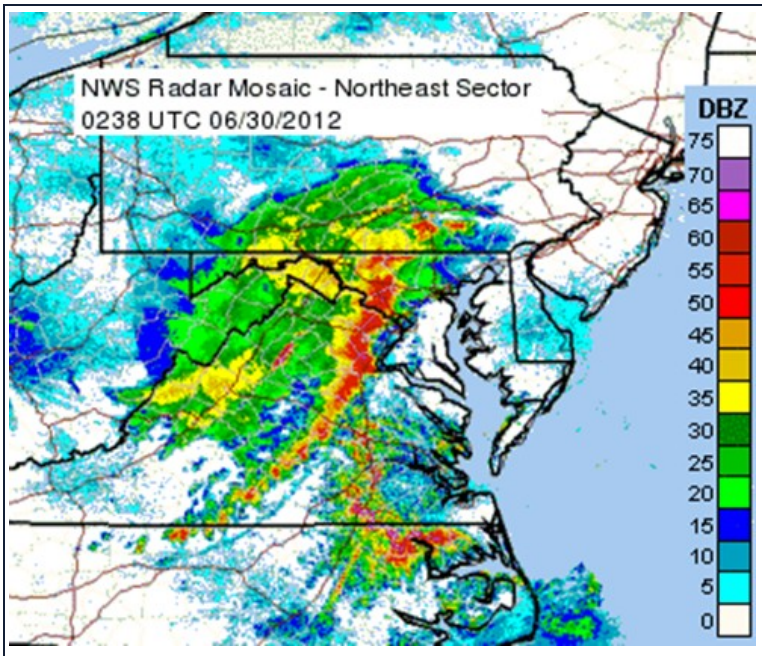
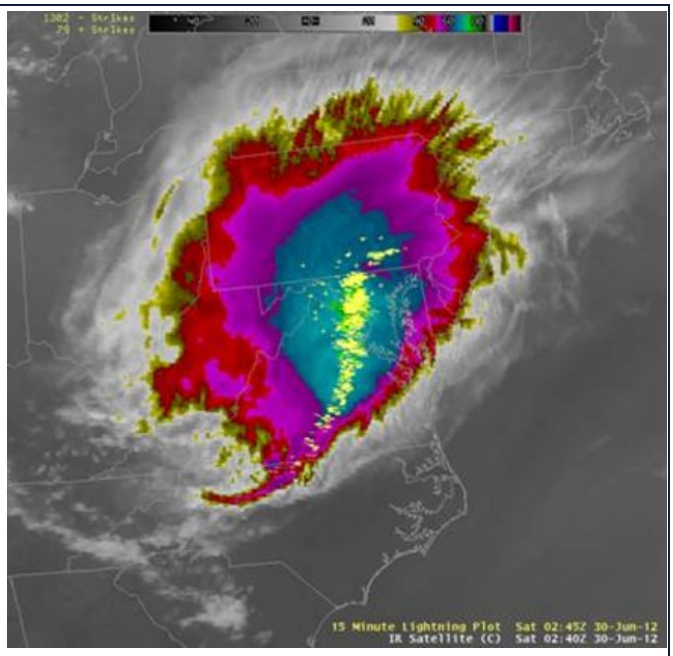
Derecho *(continued)*





bluish colors)

The June 29th derecho was uncommon here. Typically, our region averages a derecho once every 2 to 4 years. The last derecho to strike the Washington DC-Baltimore metro region was on June 4, 2008. That one did considerable damage, but nothing like what was seen on June 29th. Although no official rating system or scale exists to categorize derechos (such as those that exist for classifying tornadoes and hurricanes), most meteorologists would agree the June 29th derecho ranks as one of the most intense derechos ever seen here. The last derecho to strike this region that produced damage comparable to that from the June 29th derecho was associated with a derecho that occurred on July 4-5, 1980.
The impact from the June 29th derecho in our region was severe. The most significant impacts were those inflicted from the derecho's powerful winds. Countless trees were uprooted or snapped, causing damage not only to structures from falling trees, but creating massive power outages as downed trees took out power lines and other infrastructure. Complete restoration of power to the estimated 2 million customers affected took over a week. These outages occurred at a bad time, coinciding a multi-day heat wave. Power outages also caused significant traffic issues not only from downed trees and power lines blocking roadways immediately after the storm, but traffic signals were out at many intersections for days. In addition, many across the region also experienced loss of communications as cell phones service was unreliable. Portions of populous northern Virginia, including Arlington, Fairfax and Prince William counties lost access to reliable 911-emergency call service.

In terms of service, our office did an excellent job once forecasters recognized that a derecho was impacting portions of the Ohio Valley. In concert with the SPC, we issued a severe thunderstorm watch

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Derecho ***(continued)***

around 630 PM EDT giving residents in our region two to four hours of advanced notice.

We issued two "Special Weather Statements" that both used strong language to get the message out about the destructive potential of the impending derecho. Such language included advising residents *"…this line of storm has a history of producing major wind damage…with wind gusts over 75 mph…"*, "*…this a particularly dangerous situation…*" and "*…seek shelter in a sturdy building…*"

All 15 severe thunderstorm warnings we issued the evening of the 29th verified, with an average lead time of about 37 minutes. We recorded over 300 reports of storm damage (and that number is low and does not account for all damage that occurred). Even with excellent warning and watch lead times, 7 deaths occurred here with the derecho. Typically, most deaths from derechos occur from falling trees, especially to those outdoors. However, even if inside, one can be at risk. An elderly person asleep in the top floor bedroom of her house in Silver Spring, MD was killed when a large tree crashed down. Always seek shelter inside a sturdy building or structure at the lowest level possible, especially if large trees are nearby. And think twice about venturing outside after the storm, especially at night and if the power is out. Unfortunately, several deaths on the 29th occurred when individuals ventured outside to check damage and came unknowingly in contact with live downed wires in the darkness.

All severe thunderstorm warnings need to be taken seriously. Follow the recommendations included in the warnings. As described in our web article on derechos:

Anytime you have one of these warnings issued for where you are, you should seek shelter in a sturdy structure away from windows, in a low and central location (hopefully like an interior basement bathroom or closet). … A NOAA Weather Radio, which you can pick up at many big box stores or electronics stores, is a great way to receive life-threatening weather warnings that are affecting your county 24/7 (you program your county into it). While there are many ways to get warnings during the day, a weather radio is a great way to be alerted to these warnings when you aren't connected to the outside world - such as at night. You can also sign up for text alerts from many county governments, your local broadcast meteorologists, and/or private weather companies.

The derecho of June 29, 2012, was certainly one of the most intense storms systems to affect our region. Even though they cover immense distances and are of great size, it's difficult to forecast both their onset and movement precisely. The initial development of a derecho can occur in relatively subtle ways. The SPC's "***About Derechos***" nicely summarizes the issues of predicting derechos:

"*…Many meteorological factors, some acting synergistically and some seemingly at odds, may come together to yield an environment conducive to derechos. The variation of these factors over space and time also is important in fostering or hindering development. Two nearly identical meteorological settings might yield vastly different outcomes --- that is, a derecho or no derecho --- depending upon how the atmosphere evolved to that point in time. …*".
Better observational networks (including satellite, radar and surface observations), coupled with the running ensembles of high resolution numerical weather prediction models, offer hope that derechos will be forecast with more accuracy in the future.

WEATHER READY NATION CORNER

Decision Support Service for July 4th Festivities

By, Steve Goldstein,
Emergency Response Meteorologist

The National Park Service (NPS) has developed a program of emergency preparedness for the July 4th festivities at the National Mall. Thousands of people flock to the Mall every July 4th to attend various concerts, parades and the fireworks display. The NPS utilizes a multi-agency (incident) management team to help ensure the safety of visitors and employees. This incident management team (IMT) manages the logistical, fiscal, planning, operational and safety issues related to the all-day holiday event. The IMT helps protect resources and property to all extents possible.


Photo By: Washington Post

Weather has a huge impact on the July 4th festivities. The Baltimore / Washington Weather Forecast Office (WFO) has supported the NPS with supplemental forecasts and on-site support for years. This year was special in that the WFO had the opportunity to deploy two of its new Emergency Response Specialist (ERS) meteorologists. ERS meteorologists have special training. They are certified to provide impact based decision support forecasts directly to emergency managers, incident command center staff and event organizers.

The deployment of the ERS meteorologists to the July 4th event command center helped to improve the distribution of critical weather information. There were two potential weather hazards to monitor as the day began. The Washington DC metro area was under a heat advisory until 9 PM on July 4th. Heat indices were expected to exceed 105 degrees in the late afternoon and early evening. This meant preparations for heat exhaustion and dehydration would be necessary. It also meant event staff and emergency responders themselves would also be subject to potentially dangerous heat. The heat also elevated the threat of grass fires spreading rapidly, if one should happen to start.

The other issue was the threat of severe thunderstorms. A line of showers and thunderstorms was expected to move out of the Ohio valley and impact the DC area late in the evening. It appeared possible that storms would impact the fireworks show early in the evening. Cancelling or postponing a major event like the July 4th fireworks in Washington DC would require a tremendous amount of resources and planning. The coordination center would need the very latest weather information to help make safe decisions as the evening approached. There was also a lot of activity supporting the event on the waters of the tidal Potomac. Special marine warnings and forecasts might become necessary to protect these interests.

ERS mets were on-site for twelve hours (10 AM – 10 PM) for a morning and evening shift. Routine weather briefings were scheduled every two hours; but frequent impromptu briefings ended up being presented as new information became available. For example, there was a 1045 AM briefing to present updated WFO information about the chances of thunderstorms later that afternoon. Another special briefing was presented when the Storm Prediction Center (SPC) in Norman, OK included the DC metro area in a 'slight risk' of severe thunderstorms later in the day. Yet another was presented when the first severe thunderstorm warnings of the day were issued at 5:15 PM well north of the DC area. At this point, briefings were conducted every hour until the scheduled time of the fireworks. Forecast updates were also emailed to personnel at the DC office of Homeland Security (DCHSEMA) and FEMA's National Capital Corridor Region.

The fireworks were scheduled to begin at 9:10 PM. Lightning within 3 to 5 miles of the Washington Monument at show time, or wind gusts over 18 mph would mean the show would have to be delayed or rescheduled. As the evening progressed severe thunderstorms materialized over portions of western Maryland and eastern west Virginia. As showtime drew nearer it became apparent that the stronger storms would not impact the area until after after 10 PM. The fireworks show went off without a hitch.

WEATHER READY NATION CORNER

July 4th *(continued)*

NPS Incident Command was very happy with these enhanced forecast services. Event organizers appreciated receiving updated forecast information well in advance of, and during the development of thunderstorms. National Weather Service warning polygons and radar products were displayed continuously on designated situational awareness screens throughout the event. This allowed all of the agencies participating in July 4th support to view current thunderstorm activity.

ERS met on-site support has also been utilized for support of the G8 Summit and War of 1812 Commemoration "Sailabration" festivities. These deployments were at the Maryland Emergency Management Agency's (MEMA) Emergency Operations Center (EOC) in Reisterstown, MD. ERs mets were also deployed to the George Washington National Forest HQ in Edinburg, VA for a large wildfire outbreak last spring. Support will be provided for the upcoming 2013 Presidential Inauguration, an event that may be attended by more than one million people.

Emergency Response Meteorologists Provide Support for Spring Wildfires

By, Kyle Struckmann, Emergency Response Meteorologist

When multiple wildfires developed across western Virginia and eastern West Virginia in early April, the Baltimore/Washington National Weather Service (NWS) Weather Forecast Office (WFO) in Sterling, VA, deployed its new Emergency Response Specialist (ERS) team to provide on-site Impact-based Decision Support Services (IDSS) for several local, state and federal agencies.

On-site IDSS for the "Wolf Gap" and "Shipwreck" wildfires were provided by NWS ERS meteorologists Steve Goldstein and Kyle Struckmann from the United States Forest Service office in Edinburg, VA, on April 10 and 11, 2012. Both meteorologists provided updated weather fire weather forecasts for the United States Forest Service, the Virginia Department of Forestry, and other local organizations.

Specific services included morning and afternoon weather briefings with forecasts for precipitation, winds and relative humidity, and ongoing briefings for precipitation when light rain/snow flurries developed over the area. In addition, long-term forecasts were provided to let firefighters know how fire weather conditions would change through the upcoming weekend. All forecasts were collaborated with on-duty forecasters at the WFO to ensure consistency, and the WFO continued to provide spot forecasts and Nowcasts for the region. In addition, observations submitted by firefighters and members of the local community were forwarded to the WFO to verify forecasts and support enhanced short-term forecasting efforts.

As fires continued to spread across Virginia forests, a NWS IMET was assigned to take over late in the day on April 11 to handle multiple fires across several CWAs. When this occurred, the Emergency Response Meteorologists briefed the IMET about the status of IDSS forecasts, the progress of firefighting efforts and how they may be affected by the weather forecast for the next several days.

Through the Emergency Response Pilot Project, WFO Sterling was able to quickly deploy meteorologists to provide critical decision-support forecasts for multiple local, state and federal agencies that were participating in the firefighting effort. These efforts gave them accurate forecast information for two days until a NWS IMET was deployed to handle weather support for the many fires that had developed across the region. This event signifies that one important benefit of the Pilot Project is the ability of a WFO to deploy ERS meteorologists to a fire to provide support until an IMET can arrive.

Shipwreck Fire: Picture from the Luray Free Press

WEATHER READY NATION CORNER

Emergency Response Meteorologists Embed with Core Customers

By, Ken Widelski ,
Emergency Response Meteorologist

Since arriving on-station in mid January, the new team of Emergency Response Specialist (ERS) meteorologists have participated in various conferences and tabletop exercises with core emergency management customers across Virginia, Maryland and Washington D.C. During March, Ken Widelski represented NWS Sterling at a nuclear training exercise at the Maryland Emergency Management Agency (MEMA) in Reisterstown, Maryland. Shortly thereafter, Ken and Chris Strong (Warning Coordination Meteorologist) returned to MEMA in April to provide basic Hurricane and storm surge training to various emergency management agencies. The group was able to embed with customers for two additional days receiving basic and advanced Hurricane assessment training and participating in evacuation training exercises. The group used this time to promote the new ERS pilot project and provided leadership on how it could positively impact emergency managers. In addition to working with MEMA, the ERS group attended a three day Virginia Department of Emergency Management Symposium in Richmond, Virginia. During this time, the group received valuable training in emergency management and disaster preparedness while networking and building relationships with core customers, paving the way for future ERS deployments.

In addition to conferences and tabletop exercises, the ERS group has led numerous weather briefings to fire officials and emergency managers during high impact hazardous weather operations. Kyle Struckmann and Steve Goldstein led onsite briefing services during a recent fire complex in western Virginia on April 10 and 11. Ken and Kyle also led briefing services to MEMA leading up to the recent nor'easter that brought heavy rainfall, mountain snow and strong winds to much of the region. Additional weather briefings to the West Virginia State Emergency Operations Center and District Department of Homeland Security also proved successful. The office received very positive feedback from core customers for the excellent decision support services provided.

The ERS group has also worked diligently with other WFO staff to help develop an Impacts Catalogue for hazardous weather events. The purpose of this initiative is to help develop a probabilistic product and services suite to aid decision making during hazardous weather events.

Forward Resolve Tabletop Exercise Held at FEMA

By, Steve Goldstein ,
Emergency Response Meteorologist

In March Jim, Chris and I attended FEMA's "Forward Resolve" tabletop exercise downtown. The exercise was a two day, discussion based forum that focused on issues related to an early dismissal of the Federal workforce within the National Capital Region (NCR). Day one brought FEMA together with other Federal departments and agencies. The second day incorporated state, local and regional organizations into the exercise. We attended both days. The exercise simulated an unexpected severe weather event and the subsequent unplanned early dismissal of all Federal employees working within the NCR. Attendees were divided into roundtable discussion participants, observers and data collectors. Various stages of the event were presented to participants in individual segments. Utilizing their agency's expert knowledge, each group discussed appropriate response procedures, action plans and insight. Event facilitators then had all of the individual groups share their insight with everyone.

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WEATHER READY NATION CORNER

Tabletop Exercise *(continued)*

While much of the exercise dealt with planning and coordination beyond the scope of weather support, the whole process incorporates our forecasts. A need for one centralized source of weather information for the Capital Corridor Region was demonstrated. NWS Baltimore/Washington forecasts appear in daily FEMA situational reports. We also provide weather briefings for conference calls organized by the DC metro Council of Governments (COG). The exercise gave us an opportunity to assess how our new impact based decision support (IDSS) services project can be integrated into this process. Two of the goals of the IDSS project are to catalog local impacts from weather and to better explain the range of possibilities for oncoming weather. Our attendance at this multi-agency exercise gave us the opportunity to see how the entire process of an early dismissal of the Federal workforce unfolds.

How is the early release of the Federal workforce coordinated? OPM (the Office of Personnel Management) has developed rules and guidelines for the process. Each individual agency has the authority to send its employees home early. Within the Beltway the decision to do this is usually made for snow. Non weather events such as law enforcement incidents can also prompt an early dismissal. In any early dismissal, the primary objectives are to secure the safety of the workforce and to maintain continuity of the Government. Many agencies have teleworking procedures in place and this will help allow operations to continue in the event of an unexpected early dismissal.

The decision process begins with a 3 AM COG conference call initiated by the OPM situation room. If the weather service forecasts an inch or more of snow or ice to accumulate on area roadways, OPM's policy is to coordinate an early dismissal. A second call involving OPM senior staff members would follow at 330 AM. The decision is expected to be made by 4 AM.

NWS Sterling can suggest the need to conduct a COG conference call if a forecast changes to one where high impact conditions become likely. Once the decision is made, individual agencies are notified and told to execute their dismissal plans. The COG will coordinate this decision back out through the White House, MATOC (the Metropolitan Area Transportation Center), local and county law enforcement and the media. Social media such as Facebook and Twitter are also used in the dissemination process.

FEMA's NCR watch desk is co-located with the national FEMA operations center. They are both staffed by FEMA Watch Analysts and maintain an "all-hazards" situational awareness. NCR issues a situation report every day at 3 PM that includes our weather information. They summarize a "hazardous weather outlook" and provide a direct link to our 'point and click' forecast on the Internet. The NCR maintains awareness of large public gatherings, construction projects, planned demonstrations, sporting events and unusual activity for potential to turn into Regional incidents. Most of the time, the main concern is bad weather.

To alert Federal agencies about the threat of a Regional incident, the COG has developed a software application that sends emergency alerts to cell phones, pagers, BlackBerrys; PDA's and / or email accounts. It is called RICCS (Roam Secure Alert Network). In the event of an emergency such as a tornado warning, fire or September 11th type of attack Federal agencies can receive important mobile alerts and updates. These can notify key decision makers to the location of the nearest emergency shelters, available bed spaces, evacuation routes and community information. Precautionary warnings including severe weather warnings, a change in the Homeland Security Advisory level or voluntary evacuations can also be received.

The FCC has taken steps that will allow telecommunication companies like Verizon, AT&T and Sprint to deliver emergency alerts directly to the public. Known as CMAS (Commercial Mobile Services), this developing system will allow providers to transmit emergency alerts to their customers if they choose to receive them.

Skywarn Reporting Procedures

1. **Tornado or Funnel Cloud**
2. **Storm Rotation**
3. **Hail (any size and depth on ground)**
4. **Wind 50 MPH or greater (measured or estimated)**
5. **Wind Damage (downed trees and/or powerlines, structural)**
6. **Snow Accumulation (every two inches, storm total)**
7. **Ice Accumulation (any ice accumulation)**
8. **Heavy Rain (measured 1 inch, storm total)**
9. **Flooding (water out of banks and/or covering roadways)**
10. **Time of event & location**

How to report:

Telephone: 1.800.253.7091

Amateur Radio: WX4LWX

This is very time critical information that needs to be relayed to the forecaster **immediately**. Give the person on the phone/radio your name and spotter number.

If you absolutely cannot get to a telephone to relay a report or to email ***delayed*** reports and storm totals: **LWX-report@noaa.gov**

National Weather Service
Baltimore MD/Washington DC
43858 Weather Service Road
Sterling, VA 20166
703.996.2200
Spring/Summer 2012 Sterling Reporter
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Skywarn Classes

Class	Date	Location
Basics I	September 22	Sterling, VA
Basics I	September 23	Sterling, VA
Winter Storms	October 4	Westminster, MD

For more information on our Skywarn Classes, please visit our website:

weather.gov/washington OR weather.gov/baltimore

Photo: LWX

On April 17, the Space Shuttle Discovery (on a 747) flew over the office before landing at Dulles Airport. On April 27, the Space Shuttle Enterprise flew out of Dulles Airport to New York City.

Photo: Steven Zubrick, SOO