SKYWARNEWS

National Weather Service State College, PA - Spring 2007

"Working Together To Save Lives"

Did You Know…?

By Scott Kroczynski, NWS MARFC Hydrologist

Hello SKYWARNEWS readers! Did you know that there are actually two unique National Weather Service offices located on the same floor of the same building in State College, PA? That's right, in addition to the NWS State College, PA, Weather Forecast Office (WFO CTP) that you know and love, there is also the NWS Middle Atlantic River Forecast Center (MARFC).

MARFC is one of only 12 regional hydrologic centers located across the U.S., plus one in Alaska. This compares to 122 weather forecast offices nationally. With a staff of 16 people, MARFC is smaller but still similar in size to our sister office, WFO CTP. Both offices share the same NWS mission of protecting life and property, as well as aiding in the economic and environmental well being of the Nation. To accomplish this mission, MARFC provides timely and accurate hydrologic forecasts and information to a variety of customers and partners, using

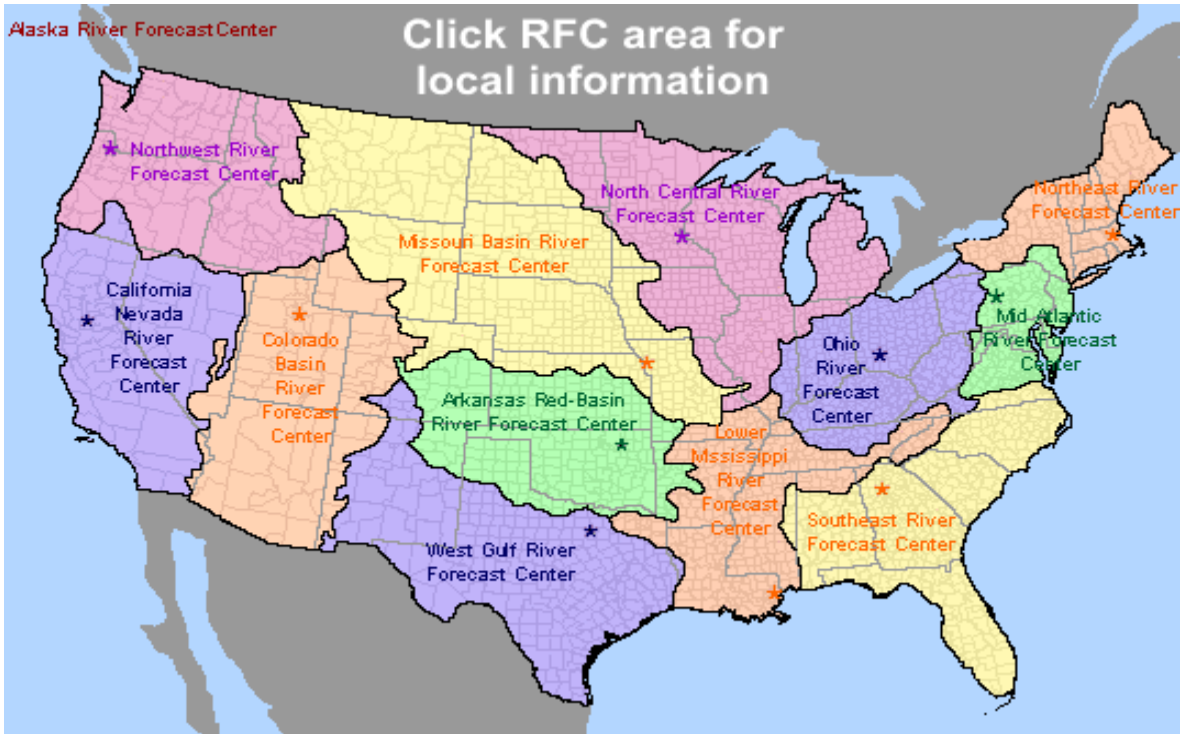

Figure 1. NOAA/NWS River Forecast Centers

the best available scientific principles and technology.

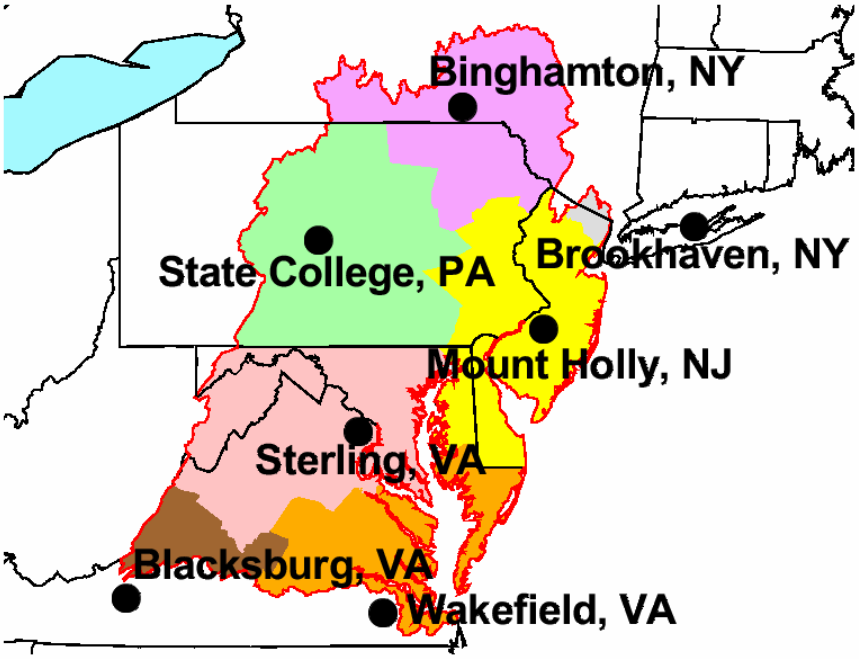

Figure 2. MARFC Hydroloic Service Area

MARFC's hydrologic service area encompasses some 87,000 square miles and includes all, or portions of the states of New York, Pennsylvania, New Jersey, West Virginia, Maryland, Delaware and Virginia, as well as the District of Columbia (Figure 2). Although our area of responsibility is the smallest of all of the 12 RFCs, it is one of the most flood prone areas. Our rivers are also some of the fastest rising rivers in the country, thanks in part to the Appalachian Mountains. It is not uncommon for most of our rivers to go from low flow conditions to serious flooding in just 12-72 hours!

In Pennsylvania, many SKYWARNEWS readers are most familiar with the Susquehanna River basin. MARFC provides forecasts and hydrologic information for all of this large river basin, from its origin near Cooperstown, NY to its mouth at the north end of the Chesapeake Bay!

In central Pennsylvania, one of the most important functions of MARFC is to prepare and provide flood forecasts for the Susquehanna River basin during times of flooding. For example, if you've ever heard something like this on the NOAA Weather Radio or TV: "…the Susquehanna River is expected to crest near 21 feet at Harrisburg overnight Saturday night, where flood stage is 17 feet…" - this type of information originates from MARFC. While nobody wants flooding, it is often unpreventable. So our job is to provide people with as much advance notice as possible, so that they can move themselves and their critical belongings out of harm's way.

While you're reading this issue of SKYWARNEWS, take a moment to visit our webpage at www.weather.gov/marfc. A good place to get an overview of MARFC would be to view our on-line brochure. This can be found by looking at the bottom of our homepage, and under the words "Additional News" (red in color), click on "Our Brochure." Welcome to MARFC! We hope you enjoy this and many other future visits. Please feel free to email our webmasters with your comments and suggestions.

Storm Chasing Tips - For Pennsylvania and Beyond

By Barry Lambert, Senior Forecaster

Storm chasing has blossomed quickly over the past several decades, both recreationally and throughout the research community. Considering the vast array of "portable" devices that can receive forecast model information, observational, and remote sensing data (via GPS/satellite systems), it's no wonder that many "trained" chasers can better forecast severe weather (right from their vehicles), compared with the requirement to perform the same analysis and forecasting from NWS Forecast Offices or TV Stations just 10 years ago.

One of the earliest, dedicated storm chasers was David Hoadley, who began his storm chasing career over one half century ago (in 1956). I had the pleasure of meeting David while attending Graduate School at Texas Tech in the late 1980s. His ambition to learn about severe convective storms through "the chasing experience" was almost unparalleled at that time. Just to show you how much storm chasing has changed in some respects, it amazed me that David would only use surface observations in text format to "hand plot" pertinent information on a blank map. He did this because he found that plotted surface observations often contained a mixture of observation times, which would throw significant error into the fields he was plotting. If any of you have ever been storm chasing, you realize that even apparently very small errors can lead you to be well "out of position" on the storm you are chasing (often cutoff by inadequate or non-existent roads or terrain). Obviously, timing and location (or perspective to the storm's updraft) is everything with respect to tornado chasing.

Storm chasing begins the day before (or even days in advance) of the event. Knowing and understanding the animal (supercell storm in this case) you'll be chasing is of utmost importance. A day or two ahead of time, focus on the type of storms expected and the timing of such events. If they're expected to be moving quickly to the northeast, and you plan to chase them after leaving work in the mid afternoon (but their formation is 30 to 60 miles to your east), your efforts and money invested to gas up the vehicle may be in vain. So, again, positioning (in time and space) is key. Will the storms be isolated or in long "squall lines"? Will the cells be slow movers? Right movers?

In additional to the initial forecasting of storm development and storm type, this is also the time to be preparing your vehicle and equipment for peak performance. There's nothing worse than an overheated car, dead camera or video battery, or the absence of a detailed road map to 'dampen' your experience (no pun intended). So, cameras (both digital and video with several rolls of film and batteries), a well-tuned vehicle, and detailed maps (preferably topographic) are a must. Oh yeah, let's not forget food and drinks. Chase days are long, travel and time-wise. If you're in remote area of the plains states and filming multiple tornadoes from a cyclical supercell, the last thing you need is to pass out from hunger in the middle of filming that EF4 tornado! High energy, non-perishable foods and drinks are best.

Now we come to the morning of the severe weather. Get up early enough to have adequate time to check out the location

(and forecast positions) of key weather forcing features such as a dry line, cold front, and quadrant of the upper level jet you'll be under. I can attest that you can have the best low level ingredients in the world, and compensating subsidence from a nearby cluster of earlier thunderstorms (or similarly falling under the subsiding branch of the upper jet) can completely squash any updraft that gets going at low levels.

As the event nears (within 2 to 4 hours of convective initiation) frequently examine/analyze surface to 850 mb fields such as temperature, moisture (dewpoint), wind and convergence, pressure and pressure change. Note things such as where breaks in the high cloud cover will be, where moisture is pooling along a leftover convective boundary (or perhaps just east of the highest east-facing slopes experiencing a strong orographic "upslope" wind component). Noting subtle, but key features such as these will mean the difference between being located just to the southeast of, and having a perfect viewing perspective on a large tornado (with award-winning film footage), or fighting sheets of wind-whipped rain and large hail with zero visibility on the northern or western edge of the updraft. It's also at this stage of the game (and the days leading up to the event) that you want to ensure the optimal number of "chase team members" is in your vehicle. Two is adequate, 3 to 4 people is optimal. Aside from a calm and experienced driver (with his/her feet comprised of something less than a heavy metal), you'll require a person fairly familiar with shooting video and still pictures. Lastly, an individual well versed in map reading, and estimating distances to the storm (quickly being able to relate the time needed to get to the best viewing location based on the available roads) is a must.

If you follow each of these planning steps, you will greatly improve your chances for having an enjoyable and perhaps unforgettable chase experience.

Whether you're ambitious enough to become a professional meteorologist and expert chaser or just to casually observe some of nature's magnificence, there is a wide range of material and training available to accomplish your goals. The National Weather Service is always looking for trained, severe weather spotters to exchange real time information during severe weather outbreaks which serve to "verify" what may be observed on the Doppler radar. There are numerous Spotter Training Sessions done in your area each year to accomplish this goal. You can find information on storm spotting, and a schedule of training sessions on our Website at:

http://www.erh.noaa.gov/ctp/safety/skywarn/CurrentTalks.php

Your knowledge and findings during a storm chase will also help with the process of readily exchanging information from the field with the National Weather Service and county/local Emergency Management Agencies, leading to improved warnings and storm verification.

Below is a link that describes a recent storm chase (March 2007), along with the successes and some pitfalls that this group encountered on the Texas High Plains.

http://weather.weatherbug.com/weather-reports.html?zcode=z5602&region=0&story=6294

A comprehensive guide to severe weather spotting and storm structure is available here –

http://www.srh.noaa.gov/oun/stormspotting

Happy and safe storm chasing!

Winter of 2006-07 a Seasonal Review

By John La Corte, Senior Forecaster

Once upon a time there was a thing called "Winter". It was long, cold and cruel. The winters of yesteryear seemed perennially stormy with biting cold and tales of travel woes and huge blizzards. Lately it seems that if you desire deep snows and bone chilling cold, you have to live in some nostalgic wonderland that is the product of your imagination since for the third winter in a row the region enjoyed milder than normal conditions along with less than average snowfall.

For ease of record keeping and comparison, the meteorological winter runs from December through February. This year marked the third winter in a row where most of the region ended up warmer than normal.

	Dec	Jan	Feb	AVG	Dep
State College	38.9	31.8	20.5	30.4	2.4
Harrisburg	40.2	35.2	25.7	33.7	1.1
Altoona	37.8	31.2	20.2	29.7	-0.1
Bradford	32.9	25.7	14.3	24.3	0.8
Williamsport	37.8	32.0	22.6	30.8	2.6
Pittsburgh	38.8	32.5	20.8	30.7	0.5

Table 1. Winter 2006-07 Temperature Summary

The season started off extremely warm with December and January averaging well above normal. In Williamsport, the first day of December set the standard rising to 70 degrees. With records that date back to the 1880's, it had never before been that warm on any day in the month. This contributed to it ending up being the 3rd warmest December on record in the city.

The warm weather marched almost unhindered into January. Those attending the Farm Show in Harrisburg may recall temperatures reaching well up into the 50s and 60s. It took until the last week of the month for readings to return to those we more closely associate with winter.

The cold actually intensified in February. While the late starting winter made a mighty effort to shake the region back to reality with a return to more traditional chilly and stormy conditions, the season still ended up above average for most of the area. Table 1 summarizes the average temperatures at several reporting sites across the state. With the exception of Altoona where the season managed average out just a smidge below normal, all other sites were a half degree or more warmer than the long term averages.

Another noteworthy aspect to the season was the extremely late start to the snow season in most locations. In Harrisburg the record for the latest first measurable snowfall came within one day of being tied when a tenth of an inch of snow finally fell on January 22nd. The venerable old record of January 23rd remains, it was set way back in 1890.

Overall it took until nearly Valentine's Day for the region's first widespread heavy snow storm to hit. While it brought a foot or more of snow to many locations, it would prove to be not enough to erase the season's snow deficit. Table 2 shows

that all observing locations ended up below normal for snow during the December through the February timeframe. Some parts of eastern Pennsylvania were nearly a foot and a half below normal.

	Dec	Jan	Feb	AVG	Dep
State College	0.4	4.8	12.3	17.5	-12.2
Harrisburg	T	0.6	9.2	9.8	-16.2
Altoona	0.8	4.3	11.0	16.1	-9.7
Bradford	4.6	26.3	25.4	56.3	-3.6
Williamsport	T	3.5	14.8	18.3	-10.0
Pittsburgh	0.7	11.3	14.0	26.0	-1.7

Table 2. Winter 2006-07 Snowfall Summary

While the "traditional" winter is over, March continued in February's footsteps with temperatures on the chilly side and above normal snowfall. As we ease into the lengthening days of spring, hopefully the pattern will take a turn for the better and we can enjoy the return of some warm weather. After any kind of winter, mild or otherwise, it's always nice to get out and grill a few burgers, plant the garden and relax in the sun after mowing the lawn.

Climate Change as a Result of Global Warming…Fact or Fiction?

By Matt Steinbugl, General Forecaster

One of the most debated topics on earth is the issue of climate change and how it relates to global warming. By the same token, many people question the validity of global warming by greenhouse gas emissions and the resulting impacts on weather, water and climate. Recently, the Intergovernmental Panel on Climate Change (IPCC) met to discuss these scientific questions and to find answers to this sensitive issue. The IPCC was created in 1988 by the World Meteorological Organization and the United Nations Environment Program. They were tasked with assessing the risk of human-induced climate change as well as potential impacts and options for adaptation and mitigation.

In short, the IPCC report states that the long-term (decade-to-decade) global climate is changing, mostly as a result of human causes.

Warming of the climate system is very likely underway, as it is becoming more and more evident from observations of increases in global average air and ocean temperatures, widespread melting of polar snow and ice, and rising global average sea level. At continental, regional, and ocean basin scales, numerous long-term changes in climate have been observed. These

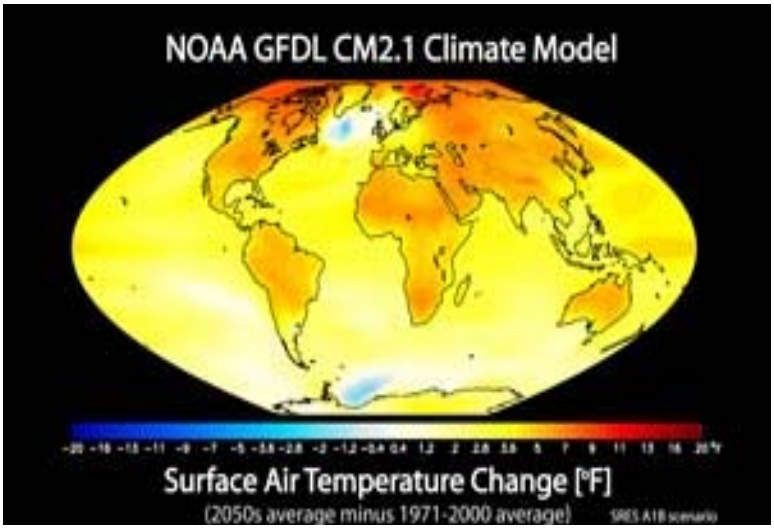

Figure 1. According to the NOAA GFDL Climate Model, a 4-7 °F increase in the mean surface temperature is projected by the mid 21st century. This increase is based on an average estimate of greenhouse gas emissions.

include changes in Arctic temperatures and ice thickness, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones. The NOAA climate program is working to build knowledge about the forces that affect the planet, including greenhouse gas emissions. The more we know about the planet, the more we will understand how its component systems interrelate with the ever-changing state of the atmosphere.

Without a specific study, which usually takes several months, we cannot determine the extent to which any specific extreme weather or climate event is a result of greenhouse warming. However, NOAA has recorded increases in the probability of very heavy and extreme rains and snows across large portions of the globe, including parts of the United States. Extremes are part of our natural climate, but with greenhouse warming some extremes are becoming more intense (hot nights), while others less so (cold waves). These trends are expected to continue into the 21st Century, including more severe droughts, more intense hurricanes, increased storm surge erosion and coastal inundation mostly as a result of sea level rise.

For more information, check out:

http://www.gfdl.noaa.gov/research/climate/highlights/

http://www.cmdl.noaa.gov/

More Climate News

By Matt Steinbugl, General Forecaster

NOAA REPORTS 2006 WARMEST YEAR ON RECORD FOR U.S.
U.S.GLOBAL AVERAGE TEMPERATURE FOR JANUARY 2007 HIGHEST ON RECORD

The 2006 average annual temperature for the contiguous U.S. was the warmest on record and nearly identical to the record set in 1998. Based on preliminary data, the 2006 annual average temperature was 55°F or 2.2°F above the 20th Century mean. Seven months in 2006 were much warmer than average, including December, which ended as the fourth warmest December since records began in 1895.

The combined global land and ocean surface temperatures were the highest for any January on record with temperatures 1.5°F warmer than the 20th century average of 53.6°F. This record was greatly influenced by a record high land-surface temperature, which was 3.4°F warmer than average. Separately, the global ocean-surface temperature was the fourth warmest in the 128-year period of record, only 0.1°F cooler than the record established during the very strong El Nino episode in 1998. The presence of El Nino along with the continuing global warming trend contributed to the record warm temperatures in both 2006 and early 2007. However, recent sea surface temperature trends (cooling across the central and eastern equatorial Pacific) would indicate that El Nino is rapidly weakening – possible giving way to a developing La Nina.

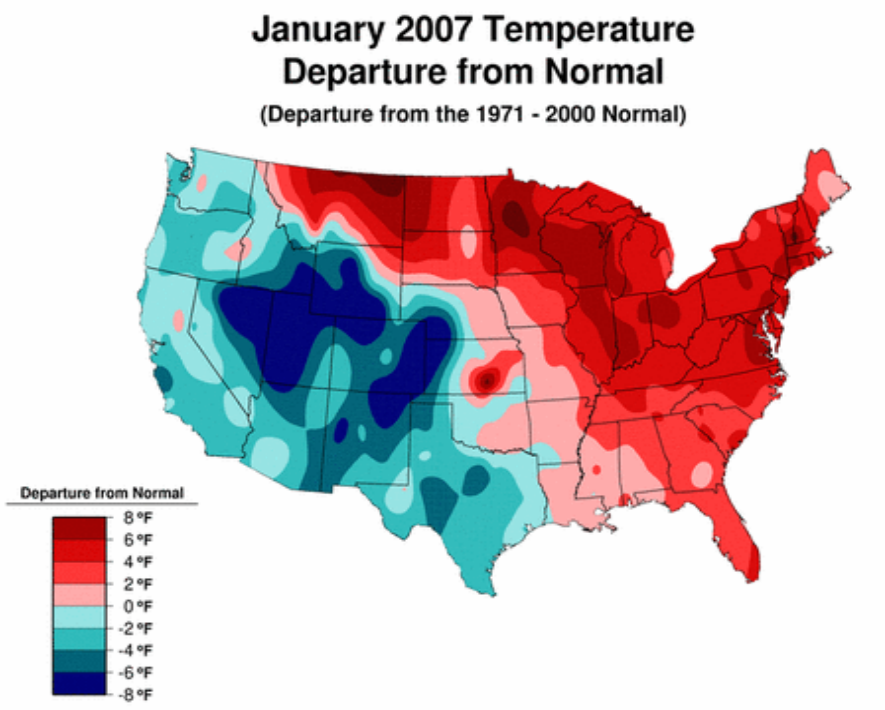

Figure 1. January 2007 temperature departures ranged from 4 to 6 degrees above normal over PA

For more information check out:

http://www.cpc.ncep.noaa.gov/

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

Flooding and Flood Products Issued by the NWS in State College

By Peter Jung, Service Hydrologist

What's the Number 1 weather related killer in Pennsylvania? Is it lightning? What about tornadoes? The answer may surprise you…it's flooding!

Flooding accounts for more deaths not only in Pennsylvania, but nationwide, as compared to any other weather hazard. The National Weather Service, in order to protect life and property, issues a variety of flood related watch, warning and advisory products to relay important flood information. Below is a summary of some of the *water*-related products you may see, and what each of them mean:

Flash Flood Warning – Flooding is Occurring or Imminent! Issued on a county-wide basis for a rapid life-threatening rise of water. Typically, this type of warning is reserved for small, quick responding creeks and streams, however may be issued for larger main-stem rivers in the event of a dam break or rapid ice-jam flood.

Areal Flood Warning – Flooding is Occurring or Imminent! Issued on a county-wide basis for significant flooding, but for cases where streams and creeks respond more slowly than a flash flood. Although the flooding may be as severe as a flash flood, the slower evolving nature of the flooding usually allows for more time to take preventative action. A good example of this is prolonged heavy rain from a tropical storm could cause devastating flooding, but may take a day or two to materialize.

Flood Warning – Flooding is Occurring or Imminent! Issued for larger rivers and main tributaries. These warnings are for gauged river points that have a pre-established flood stage. The River Forecast Centers provide guidance on these

locations. These warnings are site-specific, issued for a particular point on a river. (Web link – Do you know where the gauged river points are in central Pennsylvania? To find out, go to the following web site and explore!

http://newweb.erh.noaa.gov/ahps2/index.php?wfo=ctp)

Flood Advisory – Issued when flooding is not expected to be life threatening or have a significant impact on property. These warnings are also issued on a countywide basis. Examples of this would include urban flooding, where some intersections may be closed for a brief time due to heavy thunderstorm rains, or cause a few basements in typically low-lying areas to take on water. Usually, no stream or creek flooding is involved.

Flood Watches – Issued as a "heads-up" that flooding is possible, not imminent. A flood watch can be issued in advance of either Flash Flooding, Areal Flooding, or river flooding. A common use of Flood Watches is at times when *projected* rainfall may cause river flooding in a day or two. Confidence is still low, but if anticipated rain does fall, rivers will crest above flood stage.

Flood Statements and **Flash Flood Statements** – Updates for Flood and Flash Flood Warnings. Issued when flooding is ongoing, these products provide updates on extent of flooding, timing of flooding, or updated river stage height and crest information.

Whatever the warning type or flood situation, remember to play it safe. Only a small amount of water, 18 inches, can carry away most vehicles…even SUVs! When you come upon a flooded roadway…play it safe: ***Turn Around Don't Drown!***

Why the Floods of June 2006 were so unusual

By Mike Dangelo, Senior Forecaster

The widespread river flooding that occurred last summer was unusual for one reason: It was not directly associated with a land-falling Tropical Cyclone.

Most summertime river flooding in the Commonwealth is due to excessive rainfall from a Tropical Depression, Tropical Storm or Hurricane that has moved inland. When a Tropical Cyclone moves inland over PA, the system hits mountains and this creates additional uplift, resulting in heavier rainfall. Tropical Cyclones can also slow down a bit over land and become entangled with continental weather features like warm and cold fronts, prolonging and enhancing the heavy rain.

Most of the memorable/historic summertime river flood events have a name – Agnes (1972), Eloise (1975), Ivan (2004), and the list goes on. The flooding that occurred in late June of 2006 does not have a name to pin to it.

In fact, 2006 was the least active Atlantic-basin Tropical Cyclone season since 1997. Also, it seemed extra quiet since most of the Tropical Cyclones that managed to formed stayed out to sea. See the 2006 Atlantic seasonal track map from the National Hurricane Center at: http://www.nhc.noaa.gov/tracks/2006atl.gif

Alberto, which was the first Atlantic-basin storm of the season, formed in mid-June over the Gulf of Mexico, and affected the Deep South, but was out to sea (again) by

the time it got this far north. No other Tropical Storms even formed until mid-July. Ernesto was the only 2006 Atlantic Tropical Storm to directly affect PA. See a summary of what he did to Central PA at: http://www.erh.noaa.gov/ctp/features/2006/ernesto/

While the late-June flooding had no name to blame, there was plenty of tropical moisture available to the State. There was a frontal boundary that stalled out near or directly over PA for many days. Weak waves of low pressure rolled along the boundary almost every day for a week, as copious moisture flowed northward from the Gulf of Mexico and eastward from the Atlantic Ocean. Thunderstorms created Flash Flooding (rapid rises on smaller creeks and streams) on quite a few of those days, and the repeated heavy rain drained into the rivers, eventually pushing them over their banks.

Rainfall totals between the 22nd and 28th of June were as much as 13 inches in the Poconos, and also just to the south of Harrisburg. Most of Eastern PA had over 6 inches of rain that week (which is as much rain as we normally get during all of June - and half of July!), while lesser amounts fell over Western PA.

The crest of the Swatara Creek at Hershey was the highest ever recorded. However, the river gage at Hershey was installed after Agnes, but was in place before Eloise. Local residents remembered the flooding during Agnes as going higher than it did in late June 2006.

To stay safe from floodwaters, we urge you to stay aware of the forecasts and heed any local road closures that are in effect. Never drive through a flooded roadway. ***Turn Around, Don't Drown!***

More than half of all Tropical Cyclone deaths occur due to inland flooding, and most of those deaths occur in automobiles.

Read more about the effects of the late-June flooding of 2006 on our web page, at: http://www.erh.noaa.gov/ctp/features/2006/JuneFloods/

Winter & Spring River Flood Potential Outlooks

By Scott Kroczynski, NWS MARFC Hydrologist

Each winter and spring, the NWS Middle Atlantic River Forecast Center (MARFC) in State College, PA, issues a series of river flood potential outlooks usually beginning a few days after the New Year's holiday. These outlooks are prepared about every two weeks through about the end of March, or until the threat of spring flooding across the mid-Atlantic region has eased. The outlooks "predict" the potential for river flooding during the two-week period following their issuance dates and are based on an analysis of many hydrometeorological conditions and factors. Some of these factors include how much precipitation has recently fallen, how deep the snow is on the ground, how much water is actually contained in the snow (snow water equivalent), how much water is in the streams (streamflow) compared to normal, and perhaps most important - what kind of weather conditions are expected for the next week or two. After all, it should be no surprise that widespread heavy rainfall is the number one cause of river flooding in Pennsylvania and elsewhere!

The river flood potential outlooks prepared by MARFC are then used as guidance products by all of the NWS Weather

Forecast Offices located within MARFC's service area. For example, the NWS State College, PA, Weather Forecast Office (WFO CTP) will take the MARFC outlook issued on Thursday, modify it as necessary to fit local conditions in Pennsylvania and add local expertise, and then release the "official" Winter/Spring Flood Potential Outlook product to the public on Friday. WFO CTP's outlooks can be found on their web site (www.erh.noaa.gov/ctp) by clicking on "Hydrology" located under "Current Conditions" on the left-hand side of their homepage. This takes you to the "River Forecasts and Info" page. On the right-hand side, under "Text Forecasts and Statements," look for the section titled "Outlooks" and click on "Seasonal Flood Outlook." This will give you WFO CTP's most recently issued river flood outlook product. These text-based products provider readers with a good summary of where central Pennsylvania stands with respect to current hydrologic conditions, and how those conditions are combining to create a river flood potential that is below normal, normal, or above normal. Keep in mind that these "broad" outlooks do not attempt to predict how widespread or severe any future flooding will be, nor do they attempt to pinpoint exactly where river flooding will develop. Additionally, flash flooding is not addressed in these outlooks. Of course, WFO CTP will issue Flood/Flash Flood Warnings if ***any*** flooding is actually anticipated or reported, so keep an ear tuned to NOAA Weather Radio or television, or check the WFO CTP web pages for warnings. Remember, stay safe when flooding threatens, and ***"Turn Around Don't Drown!"***

Incidentally, although the flood outlooks prepared by MARFC are typically considered to be "guidance" products (rather than "public" products like the outlooks issued by the weather forecast offices), they are still posted on the internet. So, if you prefer to see what the flood potential is for the entire mid-Atlantic region, go to www.weather.gov/marfc.

Once there, on the left-hand side under "Forecasts" click on "Winter/Spring Flood Outlook." Under "Spring Flood Potential Statement" click on the date of the statement that you wish to view, noting that the most recent statement is on the bottom of the list.

A Look at the Upcoming 2007 Hurricane Season

By Barry Lambert, Senior Forecaster

While the Hurricane season of 2006 was the quietest in 10 years, it was still considered near normal, but with an absence of hurricanes hitting the East Coast of the U.S. This complete lack of East Coast landfalls was noted in just 10 other seasons since 1945. El Nino helped to create stronger than normal, westerly winds and subsidence across the Southeastern U.S. and Gulf Coast region, which is detrimental to the development of tropical storms and hurricanes.

An ENSO neutral or weak La Nina pattern across the equatorial Pacific this summer is expected to translate into weaker upper level winds "downstream" over the breeding grounds for storms throughout the Gulf of Mexico, Northern Caribbean, and Atlantic waters near the Bahamas. The result will be an "above normal" 2007 hurricane season for the Atlantic Basin based on early forecasts made by experts Dr. William Gray and Phillip Klotzbach of Colorado State University. The season

stretches from June 1st to November 30th. Named storms are expected to total 14, which is well above both CSU and NOAA long term (50 and 55 year averages) of 9.6 and 11.0 respectively. The number of hurricanes and major hurricanes is projected to 7 and 3 (also above the respective normals of about 6 and 2.5). This forecast and comparative historical information can be found at http://hurricane.atmos.colostate.edu/Forecasts.

Grandfather (Felix). In many respects, both the expected large scale flow pattern at low latitudes, along with the forecast number and intensity of tropical storms and hurricanes is similar to the 2001 season which coincided with a weak La Nina/ENSO Neutral conditions (Fig. 1), and the 2003 season which occurred following a winter time El Nino (similar in strength to the one we experienced this past winter). Other years that represent an

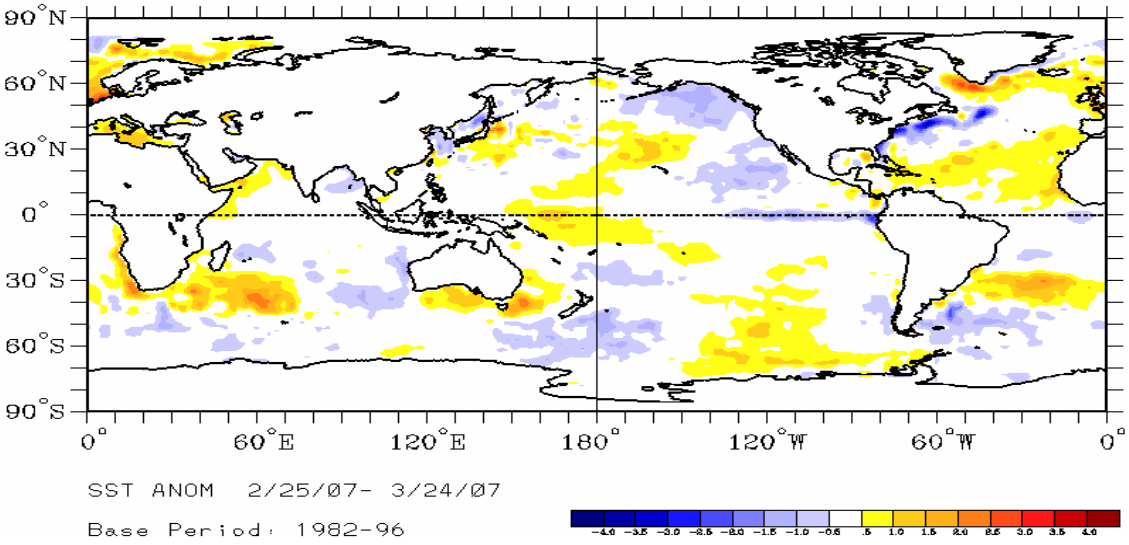

Figure 1. Latest Monthly Sea Surface Temperature Anomaly (blue = below normal)

The 2007 season is also projected to have a 20-30% greater chance than the long term average (52%) of having a major (category 3 or greater) hurricane make landfall somewhere on the U.S. mainland (Gulf Coast and East Coast combined).

The upcoming hurricane season contains most of the same names as the 2001 season. From a personal perspective, both seasons surprisingly contain the men's names in the past three generations of the Lambert family - the author's name (Barry), my father's (Jerry) and

analog to the upcoming season were 1952, 1958 and 1966.

Excellent references and discussions on ENSO and hurricanes can be found at the following sites -
http://www.nhc.noaa.gov/
http://mywebpages.comcast.net/herbwx/hurrnews.html
http://ggweather.com/enso/years.htm
http://www.cdc.noaa.gov/ENSO/enso.mei_index.html

NOAA's Tropical Prediction Center will be releasing its forecast for the upcoming

hurricane season shortly, and it should be fairly similar to the one provided by the experts at CSU.

2006 PUBLIC VERIFICATION RESULTS

By Dave Martin, General Forecaster

Ever wonder how we at the National Weather Service can say we are accurate 95% of the time? It's because every forecast that we make gets evaluated and scored.

I have served as public verification focal point at State College since September 2005. Temperature and precipitation forecasts are verified against computer guidance products to give forecasters here in State College (and NWS-wide) an idea how we do. The goal of course is to improve our skills and better serve you, the general public.

Our forecast temperatures and Probability of Precipitation (POP) are coded into a product called the Coded City Forecast (CCF).

An example of a section of a CCF is given below.

MDT BB 074/048 065/038 061 06212
UUUBB 033/058 036/060 042/061
044/063 2211233333

This part of the CCF is for MDT (Middletown PA). The first 2 letters after MDT are the type of weather expected the next 2 forecast periods at MDT (today and tonight would represent 2 forecast periods). This is followed by the high temperature (74) forecast for the afternoon period, then a low (48), then the high for the next day (65), followed by another low (38), the last period forecast high temperature is 61.

A 2 digit forecaster ID number, in this case 06, follows the temperature group. Then the probability of precipitation for today is given. The number "2" corresponds to a 20 percent chance of measurable precipitation for today. This is followed by a 1 (10 percent for tonight) and another 2 or 20 percent for the next day.

This ID/POP group is followed by another group (in this case UUUBB) of expected weather for the next 5 periods of the forecast. This is followed by temperatures for the next 8 periods, and POPS (Probability of Precipitation) for the next 10 periods. It's a bit confusing to try and decode by hand, but it enables computer programs to strip the data and calculate skill scores. If you want to take a stab at looking at the raw forecasts, go to the Internet at:

http://www.srh.noaa.gov/productview.php?pil=CCFCTP

CCF's are issued for 9 cities in Central Pennsylvania. They are MDT (Middletown), IPT (Williamsport), BFD (Bradford), JST (Johnstown), AOO (Altoona), UNV (University Park), SEG (Selinsgrove), LNS (Lancaster), and THV (Thomasville). CCF's are issued twice a day.

As stated earlier, these forecasts are scored against guidance from various computer models including the North American Forecast Model (NAM), the Nested Grid Model (NGM) and the Global Forecast System Model (GFS).

Verification temperature scores are simply the difference between the forecast

temperature and the observed temperature at a site. For example, if we forecast a high temperature of 70 and 68 ends up being observed, we have incurred a 2-degree error.

The sign of the error rate is also important. A positive number implies we have a "warm" bias or tend to forecast temperatures a higher than what ends up being observed. A negative number yields a "cold" bias. So, the closer to zero we can get the better.

For precipitation, it is little more complicated. A "Brier Score" is calculated by noting if measurable precipitation is observed (.01 inches or more). If measurable precipitation is observed and low POPS are forecast, then one gets a high Brier Score. Likewise, if one forecast high POPS, and measurable precipitation does not occur, then we also earn a high Brier Score. An ideal Brier Score is as close to zero as possible. The Brier Score is calculated by difference in the POP and 0 if no measurable precipitation, or the POP and 100 if measurable precipitation. The result is then squared.

Some examples:

We have a forecast POP of 20 percent, and no rain occurs (0). One then takes the difference (.2) and squares it to get .04. (0 - .2 = -.2, squared = .04)

Had one forecast a POP of 80 percent, and measurable rain occurred, then the Brier Score would again be .04. (1 - .8 = .2, squared = .04).

The obvious strategy is then to forecast very low probabilities when we think the chances for precipitation are very slight and to forecast high probabilities when we are confident measurable precipitation will be observed

Of the 9 verification sites, MDT is used as a national verification forecast site. Locally, we keep track of how we do at all our sites.

2006 VERIFICATION RESULTS

Results vary from site to site, and month to month. In addition, there tends to be a lot of seasonal and even annual variation. Last year was a warm year, while we have seen a trend toward cooler conditions so far in 2007. Also last spring was dry, while so far this year it has been wet.

For 2006, we did best with temperatures in the warm season. For POPS, results tend to show less of a trend. In general, we usually to do better forecasting precipitation probabilities in the cool season when widespread areas of rain or snow tend to affect the region. This is in contrast to the warm season when the "hit and miss" showers and thunderstorms make for a much tougher forecast.

Any way you look at it, forecasting is a very tough business, and when we are scoring everything we do, it's especially tough to maintain such a high success rate.

The utility of spotter reports

By Dave Ondrejik, Warning Coordination Meteorologist

Have you have ever wondered why the NWS trains spotters and covets their reports? Well there are several reasons.

The first relates to the direct protection of lives and properties (part of our mission). When you call in a report of damaging winds, hail or even a tornado on the ground, we use that information to alert communities in the path of the storm. Spotters that report weather conditions and damage before a storm arrives in your neighborhood will help us alert you to the impending conditions. Additionally, the NWS Doppler radar cannot see what is happening on the ground, therefore your credible reports are of even greater importance.

Remember, we want your report of large hail, extreme wind gusts, wind damage (i.e. trees knocked down, damage to structures, etc) and tornadoes to arrive as fast as possible. However, if you encounter areas of damage even a day or two later, please call in those reports also. These reports allow us to help verify the quality and necessity for issuing weather warnings.

Second, we use your real-time (and delayed) reports of damage to verify if a warning was actually necessary. We track the verification of warnings along with other parameters such as the number of minutes between the issuance of the severe weather warning and the actual occurrence of damaging weather. Our skill scores are then tabulated and reported to our Regional and National headquarters where they are scrutinized for areas of possible improvement. Additionally, our verification scores are combined with the scores from every NWS office in the country. These data are reported to Congress on a yearly basis. Congress uses this data as a way of measuring our success and to set goals for future years.

For example, our goal as set by Congress is to forecast tornadoes 13 minutes before they touchdown. This goal has been hovering around 13 or 14 minutes for the past several years. The reason…there hasn't been a breakthrough in science or technology that will allow us to forecast tornado touchdown with greater lead times. In the future, we are hoping to upgrade the Doppler radars throughout the U.S. with new technology and new strategies for scanning the atmosphere. This leap in technology will hopefully allow us to forecast the development and touchdown of tornadoes with greater accuracy and lead time.

Finally, your reports allow us to interact with the spotter community. This allows you to ask us questions and likewise we can pick your brain for useful reports.

So, you can see…we take your reports very seriously and crave more. Don't hesitate to call the spotter number if you have any significant weather to report. We want to know anytime you encounter the following:

Tornadoes, Funnel Clouds (confirm rotation)

Hail the size of a penny or greater

Damaging winds (causing trees or power lines to fall as well as any damage to structures)

Flooding of small streams and creeks

Rain of 1 inch or greater in a time frame of 3 hours or less.

AND, since you are "all seasons" spotters, we want to know anytime you have 6

inches of snow or more, and any occurrence of sleet or freezing rain.

Call in reports to 1-800-697-0010 or report them via the internet at

weather.gov/statecollege

On the left side of our web page you will see a link labeled “Send us your reports”. Simply click on that link and follow the instructions.

We at the NWS want to thank you for all the reports you send, especially this past winter. We received a plethora of snowfall reports that were very valuable to our operations.

Again, we are waiting by the phone to talk to you. As always, be careful when spotting weather. **Always put your safety first and never attempt to view or call in a report when conditions are threatening.** Allow the storm to pass and then phone in your report. That is a smart Skywarn procedure.

Keep an eye to the sky!

SKYWARNEWS

National Weather Service
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TO: