NORTHEASTERN STORM BUSTER

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FEATURES

1 A Review Of the 2011 Atlantic Hurricane Season
A look back at an active season!
/By Brian Montgomery

2 Fall Of 2011: Mild And Moist
A recap of a much above normal season.
/By Evan L. Heller

3 Summer 2011 Arctic Sea Ice Extent
Where do we stand now?
/By George J. Maglaras

4 My Temporary Assignment At Eastern Region Headquarters
Island adventures of a NWS Albany Forecaster!
/By Hugh Johnson

5 Wrapping Up 43 Years In Weather!
Recollections of an employee with much tenure!
/By Bob Kilpatrick

DEPARTMENTS

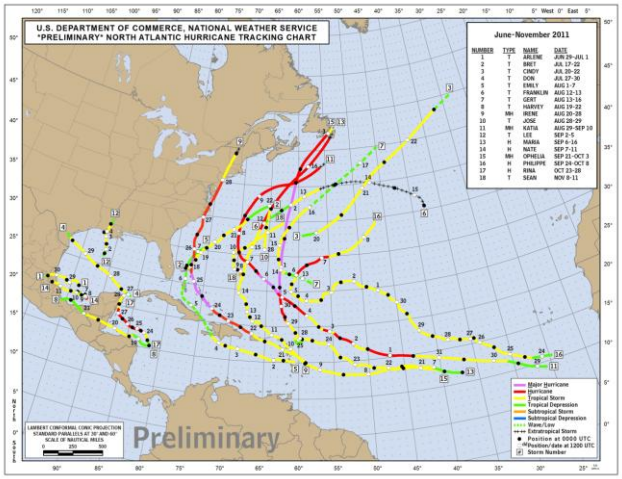
7 From the Editor's Desk

7 WCM Words

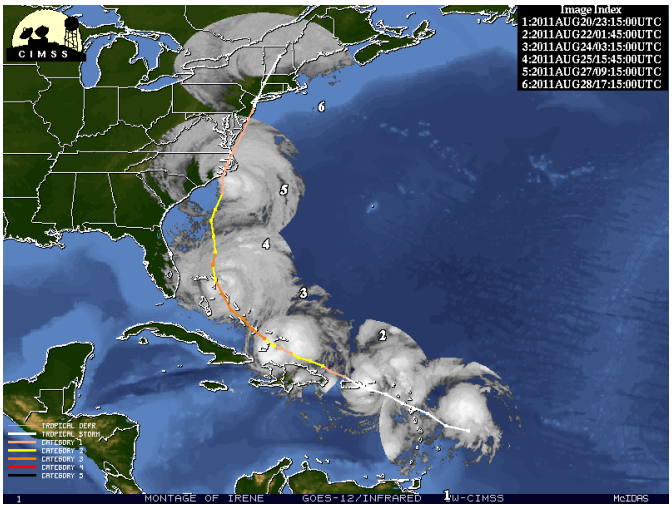
A REVIEW OF THE 2011 ATLANTIC HURRICANE SEASON

Brian Montgomery
Senior Meteorologist, NWS Albany

The 2011 Atlantic Hurricane Season saw 19 named storms, 7 of which were hurricanes, 3 of them intense, compared to a season that has an average of 11 named storms, 6 being hurricanes, 2 intense. This represents the third-highest total (tied with 1887, 1995 and 2010) since official records began in 1851. This past year's totals include: a post-storm decision to upgrade Tropical Storm Nate to hurricane status, and; the addition of a short-lived, unnamed tropical storm that formed in early September between Bermuda and Nova Scotia. This unnamed storm, along with several other weak, short-lived named storms, could have gone undetected were it not for modern satellite technology. The strongest hurricane of 2011 was Hurricane Ophelia, which peaked as a Category 4 with 140 mph winds and a central pressure of 940 mb (barometer of 27.76" Hg) on October 2, when it was just northeast of Bermuda. Below is the preliminary track summary map from the National Hurricane Center.



Hurricane Irene was the most notable storm of the season. This storm developed on the evening of Saturday, August 20th, east of the Leeward Islands. It had a peak wind of 120 mph, making this storm a major hurricane…Category 3 on the Saffir-Simpson scale. Irene was the lone hurricane to hit the United States in 2011, with its landfall near Cape Lookout, North Carolina, at approximately 7:30 a.m. EDT on Saturday, August 27th. This was the first hurricane to make landfall in the United States since Ike struck southeast Texas in 2008. Irene was also the most significant tropical cyclone to strike the Northeast since Hurricane Bob in 1991. From historic flooding to strong winds producing structural damage, Irene left a permanent mark in its wake. We have a preliminary overview available on our web page at: http://www.erh.noaa.gov/aly/Past/2011/Irene_Aug2011/Aug_28_2011.htm



Satellite imagery montage and track of Irene, August 2011.

FALL OF 2011: MILD AND MOIST

Evan. L. Heller
Climatologist, NWS Albany

It was another impressive climate season in Albany. Fall of 2011 was marked by rather significantly warmer than normal temperatures. As indicated in Table 1, all three months were at least 2 degrees above normal, for all of the monthly means, highs and lows. This rendered a seasonal mean that was more than 4 degrees above normal. This resulted in the Fall of 2011 being our 7th warmest of record (Table 3d), having averaged 54.1°, 4.4° above normal (Table 1). November was the most above normal of the months, and this placed the month at no. 9 for warmest November on record in Albany, with a mean of 5.2° (Table 3c). The average daily high temperatures for the month contributed most to this achievement, contributing a whopping 7.3° above normal to the November average high. This figure placed November 2011 in 2nd place for warmest mean maximum Novembers in Albany. Only 1975 experienced warmer November average high temperatures. In contrast, September 2011 was almost as far off for average low temperatures, as November was for the highs, but this fell short of it being able to crack the Top 10 list for Warmest September Mean Minimum.

Despite the unusual warmth, there were only a couple of daily temperature records that resulted in Albany, and these were both ties. It began on October 8th, with the 79° high tying a 1993 daily record high for the date (Table 3b). Then, on November 28th, a 1990 high minimum temperature record of 48° for the date was tied (Table 3c).

The warmest day in September was the 4th, with a mean of 75.5° (Table 1), the coolest, 51.5°, on the 16th. For October, these values were 66.0° on the 10th and 14th, and 34.0°, on the 29th, respectively. And for November, they were 57.0°, on the 20th, and 31.5°, on the 22nd, respectively. The highest reading recorded was 83°, and this occurred three times…on September 13th and 26th, and again on October 10th. The coldest reading was 22°, measured on November 6th.

Precipitation totaled 12.02" for the season, with more than half the total arriving in September (Table 1), partly due to the remnants of one or more tropical systems. But there was a reversal in the trend of above normal precipitation throughout the season, and by November, Albany was trending below normal. Despite the wetness, September fell just short of making the Top 10 list of Wettest Septembers. However, there was one daily record (Table 3a) set when 1.76" fell on the 7th, shattering the less-than-one-inch 1897 record for the date. But the 6.62" monthly total was enough to place September in at #82 for all-time wettest month in Albany.

Albany had two early-season record-breaking daily snowfalls, both occurring in late October (Table 3b). November, however, was free of measureable snow. October normally receives just 0.2" of snow (Table 2), so the 5.4" total this year was many times above normal. Meanwhile, November normally receives

5.1", and received only a trace. Averaged out over the season, however, Albany's total snowfall was just 0.1" above normal (Table 1).

Some miscellaneous tidbits of note: November, usually the cloudiest, was the sunniest of the three fall months (Tables 4a-c), with the most number of clear days (tied with October), and the least number of cloudy days; the windiest day of the season was the last day of climatological fall, with the average wind speed for the day at 13.2 mph; the month of November was the windiest, overall, and; the last day of thunder in Albany was on October 14th, thus closing out Albany's thunderstorm season.

STATS

	SEP	OCT	NOV	SEASON
Avg. High/Dep. From Norm.	73.6°/+2.3°	61.9°/+2.2°	54.8°/+7.3°	63.4°/+3.9°
Avg. Low/Dep. From Norm.	56.7°/+6.8°	43.8°/+5.0°	33.9°/+3.1°	44.8°/+5.0°
Mean/ Dep. From Norm.	65.2°/+4.6°	52.9°/+3.6°	44.4°/+5.2°	54.1°/+4.4°
High Daily Mean/date	75.5°/4th	66.0°/10th & 14th	57.0°/20th	
Low Daily Mean/date	51.5°/16th	34.0°/29th	31.5°/22nd	
Highest reading/date	83°/13th & 26th	83°/10th	69°/20th	
Lowest reading/date	43°/19th	26°/31st	22°/6th	
Lowest Max reading/date	61°/16th	38°/29th	38°/23rd	
Highest Min reading/date	69°/4th	57°/14th	50°/14th	
Ttl. Precip./Dep. Fm. Norm.	6.62"/+3.31"	3.54"/+0.31"	1.86"/-1.45"	12.02"/+2.17"
Ttl. Snowfall/Dep. Fm.Norm.	0"/-	5.4"/+5.2"	T/-5.1"	5.4"/+0.1"
Maximum Precip./date	1.76"/7th	1.05"/14th	1.09"/23rd	
Maximum Snowfall/date	0"/-	3.8"/29th	T/several	

Table 1

NORMALS, OBSERVED DAYS & DATES

	SEP	OCT	NOV	SEASON
NORMALS				
High	71.3°	59.7°	47.5°	59.5°
Low	49.9°	38.8°	30.8°	39.8°
Mean	60.6°	49.3°	39.2°	49.7°
Precip	3.31"	3.23"	3.31"	9.85"
Snow	0.0"	0.2"	5.1"	5.3"
OBS. TEMP. DAYS				
High 90º or above	0	0	0	0/91
Low 70º or above	0	0	0	0/91
High 32º or below	0	0	0	0/91
Low 32º or below	0	5	17	22/91
Low 0º or below	0	0	0	0/91
OBS. PRECIP. DAYS				
Days T+	15	17	17	49/91/54%
Days 0.01+	13	16	14	43/91/47%
Days 0.10+	11	9	10	30/91/33%
Days 0.25+	9	5	6	20/91/22%
Days 0.50+	4	2	5	11/91/12%
Days 1"+	1	1	2	4/91/4%
PRECIP. & SNOW DATES				
1.00"+ value/date	1.76"/7th	1.05"/14th	1.09"/23rd	

Table 2

RECORDS

ELEMENT	SEPTEMBER	
Precipitation/Date|Previous Record/Year	1.76"/7th	.99"/1897
Top 200 All-Time Wettest Months Value/Rank|Remarks	6.62"/#82	-

Table 3a

ELEMENT	OCTOBER	
Maximum Temperature/Date|Previous Record/Year	79° (tie)/8th	79°/1993
Snowfall/Date|Previous Record/Year	1.6"/27th	0.2"/1957
Snowfall/ Date| Previous Record/Year	3.8"/29th	0.4"/2000

Table 3b

ELEMENT	NOVEMBER	
High Minimum Temperature/Date|Previous Record/Year	48° (tie)/28th	48°/1990
Top 10 Warmest Novembers Value/Rank|Remarks	44.4°/#9	-
Top 10 Warmest November Mean Max Value/Rank|Remarks	54.8°/#2	-

Table 3c

ELEMENT	FALL	
Top 10 Warmest Autumns Value/Rank|Remarks	54.1°/#7	-

Table 3d

MISCELLANEOUS

SEPTEMBER

Avg. wind speed/Dep. Fm. Norm.	4.7 mph/-1.9 mph
Peak wind/direction/date	29 mph/WNW/16th
Windiest day avg. value/date	9.7 mph/16th
Calmest day avg. value/date	0.3 mph/26th
# Clear days	1
# Partly Cloudy days	18
# Cloudy days	11
Dense fog dates (code 2)	19th, 20th & 21st
Thunder dates (code 3)	5th, 22nd, 27th & 29th
Sleet dates (code 4)	-
Hail dates (code 5)	-
Freezing rain dates (code 6)	-

Table 4a

OCTOBER

Avg. wind speed/Dep. Fm Norm.	5.4 mph/-1.9 mph
Peak wind/direction/date	40 mph/S/20th
Windiest day avg. value/date	12.4 mph/15th
Calmest day avg. value/date	0.6 mph/23rd
# Clear days	5
# Partly Cloudy days	13
# Cloudy days	13
Dense fog dates (code 2)	29th
Thunder dates (code 3)	14th
Sleet dates (code 4)	-
Hail dates (code 5)	-
Freezing rain dates (code 6)	-

Table 4b

NOVEMBER

Avg. wind speed/Dep. Fm Norm.	6.7 mph/-1.8 mph
Peak wind/direction/date	38 mph/S/30th
Windiest day avg. value/date	13.2 mph/30th
Calmest day avg. value/date	0.6 mph/1st
# Clear days	5
# Partly Cloudy days	16
# Cloudy days	9
Dense fog dates (code 2)	9th & 16th
Thunder dates (code 3)	-
Sleet dates (code 4)	22nd & 23rd
Hail dates (code 5)	-
Freezing rain dates (code 6)	22nd & 23rd

Table 4c□

SUMMER 2011 ARCTIC SEA ICE EXTENT

George J. Maglaras
Senior Meteorologist, NWS Albany

Trends in Arctic sea ice extent are frequently used as a measure of climate change, especially the

summer minimum extent. While changes in weather patterns and ocean currents from one season to the next can cause large variations from year to year, a multi-year trend of increasing sea ice extent is seen as evidence of a cooling climate, while a trend of decreasing sea ice extent is taken as evidence of a warming climate. This article will present the latest Arctic sea ice extent statistics.

Arctic sea ice extent is defined as an area of sea water where ice covers 15 percent or more of that area. Thus, for any square mile of sea water to be included in the ice extent total, at least 15 percent of that square mile must be covered with ice.

Based on satellite measurements of Arctic sea ice extent which began in 1979, the average summer minimum Arctic sea ice extent for the period from 1979 to 2000 is 2.59 million square miles. For 2011, the summer minimum extent was reached on September 9, and was 1.67 million square miles. As a result, the 2011 minimum extent was 35.6 percent below the 1979-2000 average. It was the second-lowest summer minimum extent since the satellite record began in 1979.

There has been a noticeable trend of decreasing ice extent since satellites began measuring Arctic sea ice extent in 1979. The lowest summer minimum ice extent occurred in 2007, and was measured at 1.60 million square miles (38.2 percent below the 1979-2000 average), and the minimum extent for 2011 was only 70,000 square miles more than 2007. There continues to be concern that global warming may be accelerating, and that the Arctic could be ice-free during the summer months within a relatively small number of years, thereby further accelerating the impacts of global warming.

During the summers of 2008 and 2009, the summer minimum ice extents had shown a modest upward trend compared to 2007, but the 2010 and 2011 summer minimum ice extents have reversed that trend. The 2010 minimum extent was only 11.3 percent above the 2007 summer minimum extent, and the 2011 minimum was only 4.4 percent above the 2007 minimum.

MY TEMPORARY ASSIGNMENT AT EASTERN REGION HEADQUARTERS

Hugh Johnson
Meteorologist, Albany NY

As part of a requirement for a Department of Commerce Leadership Course known as the Aspiring Development Leadership Program (ADLP), I completed a 45-day assignment outside of the Albany office. From early April through much of May, and again during the first half of June, rather than performing as a forecaster in a Forecast Office, I worked down at Eastern Regional Headquarters in Bohemia, Long Island, New York.

So, what exactly did I do while down there? I was assigned to work on the upcoming Advanced Weather Interactive Processing System (AWIPS) II, and also helped tackle a Quantitative Precipitation Forecast (QPF) collaboration issue amongst the River Forecast Centers. In addition, I worked with the Regional Aviation Manager on some aviation issues.

As I was out running with an Eastern Region co-worker during my last evening on the Island, it had occurred to me what I'd actually gotten most out of this trip to Long Island. It wasn't even work-related. We were running in a park with no people, but were surrounded only by fox, deer and geese. You read that sentence correctly - no concrete, cars, or even people. I was very lucky to discover some of the many hidden jewels of Long Island, so hidden that many of the natives seem to know nothing of them. We'd almost gotten lost in the park with no way out, but luckily that story didn't completely unfold. We were actually able to get back to our car well before sunset after running more than 10 miles.

There were the peaceful bike rides on the south shore through many relaxing residential streets with a low volume of traffic, there were the friendly people, and there was the occasional view across the Great South Bay to Fire Island. I biked to Heckscher State Park, a very biker-friendly park with more open views from the bay overlooking Fire Island.

I finally got to go onto Fire Island after a few failed attempts. I biked from Robert Moses State Park, first, to the Fire Island Light House, climbing this 168-foot structure built in 1858. The view was great, and, unlike most lighthouses I have climbed, the railing at the top was only about waist high! Next, I biked into the hamlet of Fair Harbor, with a population of less than a

thousand folks. I was amazed at how narrow the roads were, often made up of just a fragmented slab of concrete, or just plain old sand. They actually had a posted speed limit of 8 mph! The only cars allowed on the island belonged to the natives, who have special permits. I ate in the one and only food joint in town, and was amazed at how anyone could live here year-round. The distance from the ocean to the bay was, at most, 200 yards. There are 12 more hamlets on Fire Island; each separated one to the next by very sandy roads.

I found the weather fascinating on Long Island; very challenging to forecast, yet different from upstate New York. During the last week of April, upstate New York was experiencing an unusually warm and humid spell, while at the same time on south central Long Island, for four straight days like clockwork, the fog would roll in off the cold waters of the Atlantic right at 5:00 p.m. (when I got out from work), and shroud the south shore. It felt like London in November; dark, drizzly and dank. I could normally see the tower at nearby Long Island MacArthur Airport from my hotel window. However, it was impossible to see it through the fog, as was the black-glassed Eastern Region Headquarters building right across the street! I don't recall seeing fog like this in April in Albany. April is probably one of Albany's least-foggiest months.

I learned a lot about how Eastern Region ticks, and a little about Long Island weather. Most importantly, I discovered some of the cool places on the Island that I otherwise would likely have never laid eyes on were it not for this assignment.

WRAPPING UP 43 YEARS IN WEATHER!

Bob Kilpatrick
Meteorologist, NWS Albany

At the end of this Christmas Season, I will be bringing my forty-plus year career in forecasting weather and rivers to a close. It's incredible the number of things that have happened, and the changes that have taken place during this time.

When I first came on board with the National Weather Service, the U.S. Post Office had been shut down by a strike. I was a young whippersnapper intern working in a facility known as a River Forecast Center, where the average age of the other employees was probably over 40. There was a computer in the office that took up the space of three large desks, and had less memory than a pocket calculator or cell phone. I looked and dressed differently than I do today. One major event I remember vividly from that period was the shootings at Kent State. Gas was only about 30 cents a gallon.

The River Forecast Center had a Weather Service Office that was part of the same complex. Forecasters plotted small sectional weather maps by hand from observations that were ripped from teletype machines. There was another machine known as a facsimile receiver, more popularly referred to as a fax machine, which would print out weather maps that were barely readable. Some of the more artistically inclined would color in features such as fronts or areas of fog, rain and snow. There would be an entire wall with these maps, including: surface maps; charts of model outputs; forecasted weather maps, and; upper-air maps. Coffee and cigarettes were a common sight.

For a while early in my career I was 'stationed' at the Forecast Office in Pittsburgh. During my time there, Hurricane Agnes brought record-breaking floods to much of Pennsylvania. Whenever the river gage would go out of service, one of our technicians would drive the Government van down to the bridge, put the hazard lights on, and go out to read the water level, leaving the van in the traffic lane on the bridge! He would get back in and drive to a phone to call the reading in.

A couple more moves took me to the Northeast River Forecast Center in Connecticut, then back to the Ohio River Forecast Center in Cincinnati. I didn't like Ohio or its climate, so when the hydrologist job in Albany opened up, I couldn't wait to get back to the East Coast far enough north to get some decent snow. I came to Albany in January of 1975, and have worked here ever since.

When I arrived, the office was on the top floor of the building over the fire trucks and maintenance shops at the Albany Airport. I liked working at the airport. The windows of our office looked out over the tarmac and runways so we could watch planes take off and land.

Being that the airport was, and still is, in a suburban setting, I was able to find a nice, cheap place to live that was only about four or five miles away, and best of all, it took me only about 15 minutes to get there. The office was rather dumpy looking, with a décor that resembled something out of World War II, with oversize gray desks, and walls of clipboards and papers. All that had to be done was to hang some 'potlid' light fixtures from the ceiling!

During my first five years, I built the office's hydrology program practically from scratch, played in a band, and found the love of my life and tied the knot. My favorite place to vacation was the south Jersey shore, where my aunt and uncle had a place on a barrier island. I usually went down there every other weekend between mid-June and late September. My wife introduced me to camping in the Adirondacks, and I began to work that in with my trips south.

I wasn't even technically a meteorologist at the time, but to determine what the rivers were going to do the next day or two, I had to figure out what the weather was going to do since almost every flood starts in the clouds. Even ice jams are caused by weather…rain and temperature changes! Since the only computer in the office at the time was used for upper air soundings, I had to draw up charts to use for forecasting the rivers.

Over the past 35 years, lots of changes have taken place. During the late 70s, computers of various kinds came onto the scene. The first system, known as AFOS, looked like the set in the original Star Trek, and it had no color capability, but it was a huge advance over teletypes and fax maps. The 1980 Winter Olympics in Lake Placid led to major improvements in forecasting for the Adirondacks. Tropical moisture led to a devastating flood near Elizabethtown, in which some U.S. Olympic contenders lost their lives. In the mid-1980s, the microcomputer came onto the scene, and was eventually followed by the personal computer. I went 'down the road' to UAlbany to take atmospheric science courses. Everyone agreed it was far more cost-effective than sending me elsewhere. Shortly after completing my courses, the office moved from the airport to the UAlbany campus. Since then, we have been working "aboard the boat", as many people felt our building looked like an out-of-place cruise ship. Indeed, the idea wasn't lost on the UAlbany faculty, who decided to hold their Christmas Party on the main floor of our building. The theme…you guessed it…going on a cruise!

The first radar we had was a WSR-3, which was a converted World War II job. A storm had to be pretty impressive to put an echo on it. Some time later, a WSR-74C radar was installed. While that was a significant advance, it was nowhere near the improvement that the Doppler radar system became when it was deployed in the 90s.

Our first satellite pictures came through a machine that was a photo finisher, complete with developer and fixer solutions. Eventually, we went to more modern equipment, including one that received electronic transmissions of GOES satellite images, which could then be overlaid and looped. The old 'Star Trek' computer system was replaced by a far more powerful and modern system known as AWIPS, which uses workstations that look like typical 'desktop' computers with color graphics. Old-fashioned paper hydrographs for rivers were replaced, first by a PC program that plotted them on a monitor, and then by a module in AWIPS that plots observed and forecast levels and flows. Another major advance in the forecasting realm, and occurring just within the past ten years, was the start of gridded map arrays to define weather elements like temperature, dew point, wind and other parameters. A 'grid' is simply a big computer file which might represent the temperature or dew point at, say, noon today, or the percent of cloud cover for a given hour. One would start a 'grid', usually from the output of a computer model, and then 'edit' or modify it as needed. The grid editing software lets us look at the grids of adjacent offices. The display of all these office's grids is sort of like looking at a giant jigsaw puzzle.

When I first came here, the only way for consumers to get our forecasts was to listen to a local radio station or watch TV…and even then they would often tweak what we had forecast. In the 1980s, NOAA weather radio, which had already been around for a while, finally came to this area. It had been in use in coastal areas for boaters, and in 'tornado alley', with tremendous success and popularity.

Probably the biggest improvement in making our work available to everyone has been making our products and data available on the internet. Today I can look at weather data and forecasts beyond my wildest dreams of just 20 years ago. As broadband internet data becomes more available to everyone, its benefits will simply increase.

So what will I be doing in the future?? Well, I don't plan to just sit around. There are several ways I can apply my knowledge and experience – environmental science, electronics, sound, music, photography, geography, mechanics, or business. And, besides, I have a wonderful wife, two kids, a son-in-law, and the two most adorable grandkids on the planet.

And while I might be leaving the National Weather Service, weather will always remain a part of my life. It's in my blood!

From the Editor's Desk

We here at the National Weather Service in Albany wish Bob all the best in his future endeavors. For me, he has been a joy to work with these past 13 years. Bob has contributed extensively to StormBuster on a variety of interesting topics. He is a great and highly knowledgeable conversationalist, and I have enjoyed all our hours of amusing discussions. We will surely miss him around here.

Bob's article wraps up our five StormBuster features this edition, which opens up with a wrap-up of an impressive hurricane season. A special 'thank you' goes out to all of this edition's contributors. Enjoy, Happy Holidays, and stay warm until we see you again in spring!

WCM Words

Steve DiRienzo
Warning Coordination Meteorologist, NWS Albany

I want to wish Bob Kilpatrick a healthy and happy retirement. Bob's knowledge of local waterways has been a great asset to the office. We'll miss him.

I would also like to remind folks that social media has come to the National Weather Service Forecast Office in Albany. Bob talked about all the changes he has seen in his 40+ years of service, and participating in social media is another benchmark for the office. We have been using Facebook for a while now, and beginning in the New Year, we will be using NWSChat; additional ways to get the latest weather updates from your National Weather Service.

Here at the National Weather Service, we strive to be the source of unbiased, reliable and consistent weather information. We're here to answer your weather and water questions 24 hours a day, 7 days a week. If you have concerns, please call us. If you have comments on StormBuster, or any of the operations of the National Weather Service, please let me know at Stephen.Dirienzo@noaa.gov.

Finally, I would like to wish everyone a great holiday season and a healthy and happy new year.□