NORTHEASTERN STORM BUSTER

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FEATURES

DEPARTMENTS

Northeastern StormBuster is a quarterly publication of the National Weather Service Forecast Office in Albany, New York, serving the weather spotter, emergency manager, cooperative observer, ham radio, scientific and academic communities, and weather enthusiasts, all of whom have a special interest or expertise in the fields of meteorology, hydrology and/or climatology.

THERE'S A STRONG EL NIÑO A-BREWIN'

Hugh Johnson
Meteorologist, NWS Albany

A strong El Niño is underway across the central Pacific Ocean. An El Niño occurs when the central waters of the Pacific warm to several degrees above normal. This El Niño affects weather patterns across the Northern Hemisphere. It has already brought some unusually large amounts of rain to southern California this summer, and lots of rain also to western states such as Colorado.

According to long-range meteorological forecasters at NOAA, there is a greater than 90 percent chance that this El Niño will continue through the winter, based on many ensemble long-range computer forecasts. In fact, it looks as if it could be one of our strongest El Niños on record. Appropriately, El Niño, which is actually a Spanish term translating to "The Christ Child", typically peaks around Christmastime.

How could this impact our weather during the upcoming months? We will take an historical look back at the four strongest El Niño events on record. These are the winters of: 1997-98; 1982-1983; 1972-73, and; 1965-66. A couple of interesting observations are noted across our region. The autumns preceding these El Niño winters were somewhat cooler and much wetter than normal. The rains that fell during the autumn of 1966 were enough to bring an end to a four-year drought.

Accounting for the autumn months preceding strong El Niños, the month of October was usually the wettest month; and the largest snowstorms of the 1972-1973 and 1997-98 winters actually occurred during November. The November '72 snowstorm, which peaked on the 14th, was especially noteworthy in that it represented our earliest seasonal snowfall to ever exceed a foot, contributing towards our snowiest November on record, with 24.6" recorded at Albany. The 11.8" that accumulated during November of 1997 is currently tied for our 9th-snowiest November ever in the record books.

All of the aforementioned strong El Niño winters were a bit milder than normal (especially 97-98). However, all but the '97-'98 seasons saw above normal snowfall in our area, and that year was only slightly below normal. A January '83 snowstorm buried Albany with nearly two feet of snow, the biggest January snowstorm on record.

Each El Niño season provided a slightly different "flavor" of weather for our region. It is still not certain how strong this El Niño will ultimately become. Some scientists have asserted that since the El Niño has already strengthened over the summer, it could perhaps weaken by winter. We will keep you posted on the evolution of this El Niño.

JUST ONE TORNADO IN THE ALBANY FORECAST AREA THIS SUMMER

Thomas A. Wasula
Meteorologist, NWS Albany

The National Weather Service (NWS) in Albany forecasts the weather for eastern New York and western New England. Only one confirmed tornado occurred in Albany's Forecast Area (FA) during the 2015 meteorological summer (June 1st to August 31st), and there were no tornadoes during the meteorological spring that preceded it (March 1st to May 31st). A damage survey conducted by NWS Albany's Meteorologist-in-Charge, Raymond O'Keefe, on June 9th confirmed a quick spin-up EF0 tornado plus microburst damage in the Village of Scotia in eastern Schenectady County. The microburst and EF0 tornado occurred at 241 p.m. EDT. The damage was most intense on 5th, 6th, and Bruce Streets, where trees fell on some homes and cars, large tree limbs were snapped, and some storage units or garages were heavily damaged and blown in. One very large tree was uprooted and felled on a home on Bruce Street (**Figure 1**).

Figure 1: Tree Damage on Bruce St. Photo contributed by Christene Dickershaid.
(Source: http://cbs6albany.com/shared/weather/images/maps/ClimateData//weather_historical_daily/2015/June9_Tornado)

A strong upper-level disturbance and secondary cold front focused scattered showers and strong to severe thunderstorms over the area early that afternoon. The atmosphere was very moist and unstable ahead of the upper-level disturbance. The primary severe threat was damaging winds with the developing lines of strong to severe convection. There were 20 severe weather reports in the Albany FA. They occurred mainly in the Capital Region, Lake George-Saratoga Region, and western New England (**Figure 2**).

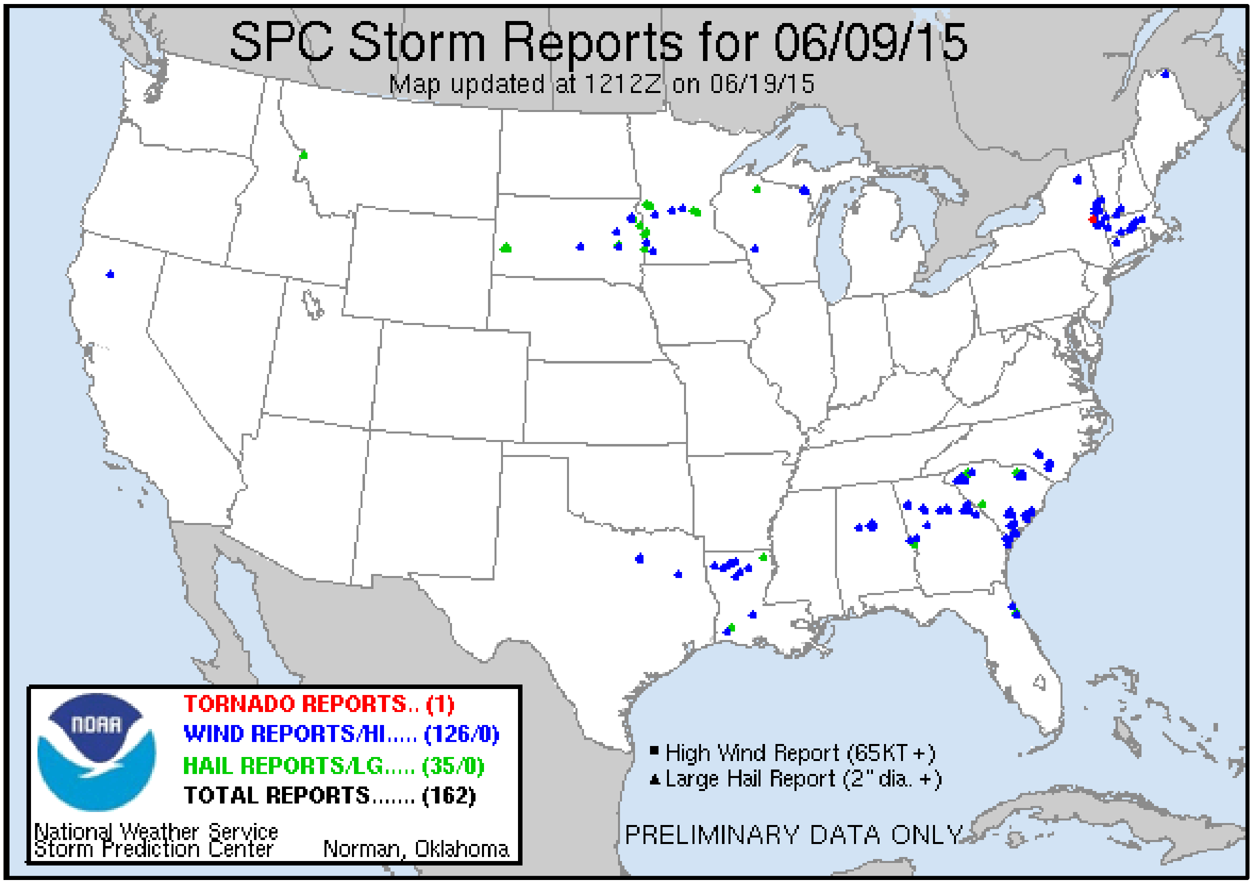

Figure 2: SPC Storm Reports from June 9, 2015
(Source: http://www.spc.noaa.gov/exper/archive/event.php?date=20150609)

The EF0 tornado occurred where a small break occurred in a line of thunderstorms. There was a severe thunderstorm warning along the line (**Figure 3**), but it was difficult to determine if a small spin-up tornado was occurring. The estimated maximum sustained winds on the EF0 tornado were determined to be 80 mph based on the damage, with a path width of 25 yards, and a path length of one quarter mile. It was likely on the ground for a few seconds, with no fatalities or injuries having resulted. The operational Enhanced Fujita Scale is a set of wind **estimates** based on damage. This tornadic damage scale (which used to be the Fujita Scale) was put into effect February 1, 2007 by a team of meteorologists and engineers. The EF scale ranges from 0 to 5, and has estimated 3-second wind gust ranges in miles per hour (mph). An EF0 (like the June 9th event) has wind gusts of 65-85 mph; an EF1, 86-110 mph. An EF2 has estimated 3-second wind gusts of 111-135 mph, while an EF3 has gusts of 136-165 mph. The estimates of the damaging gusts are based on the subjective judgment of the survey team on 8 levels of damage to 28 structural and vegetative indicators. More information on the EF scale and the transition from the Fujita Scale can be found at the following website:

http://www.ncdc.noaa.gov/oa/satellite/satelliteseye/educational/fujita.html

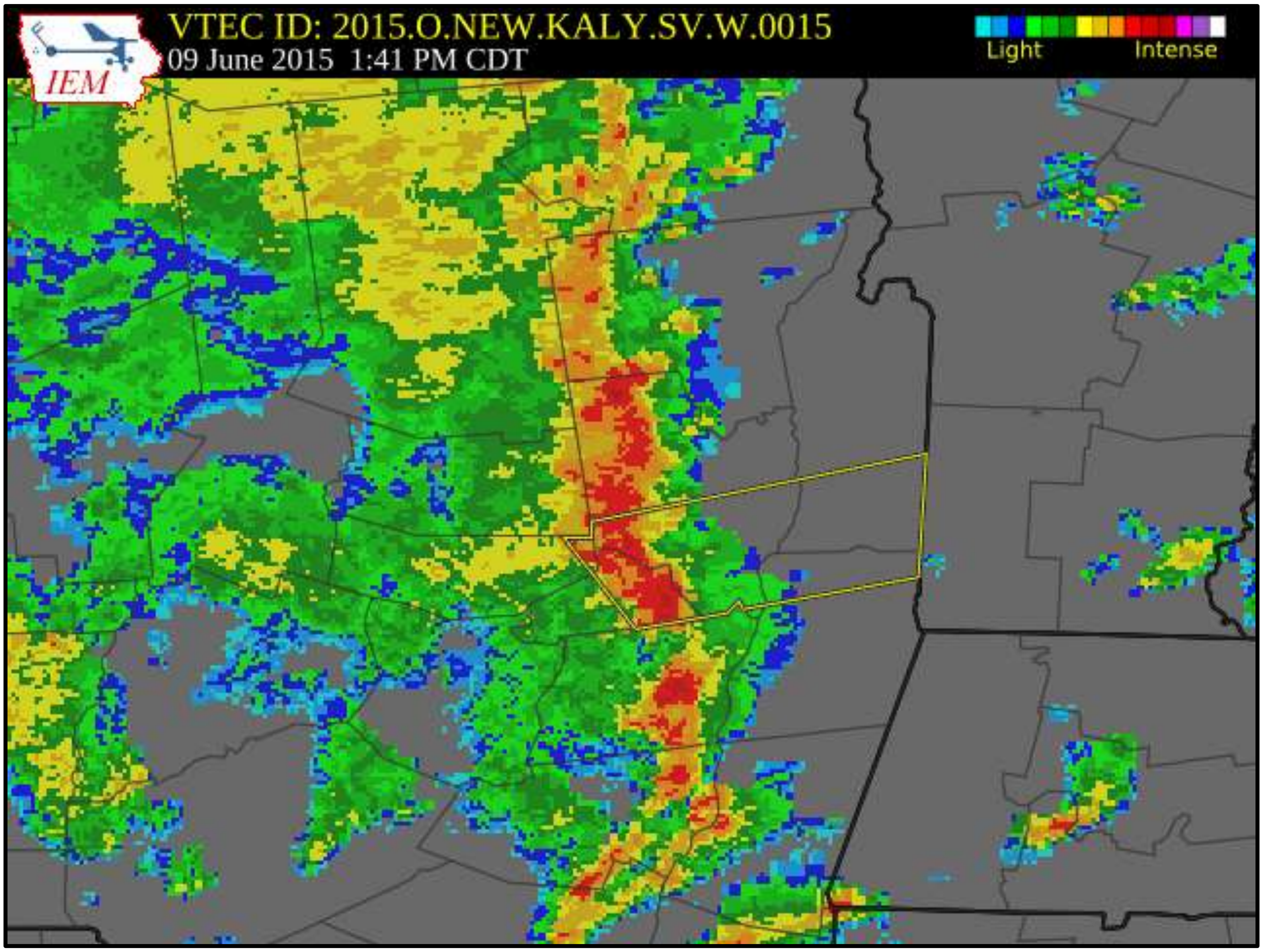

Figure 3: The KENX radar 0.5° Base Reflectivity image at 2:51 p.m. EDT (1:51 p.m. CDT) showing the line of strong to severe thunderstorms. The yellow polygon is the severe thunderstorm warning that was issued at 2:51 p.m. EDT for eastern Schenectady, southern Saratoga, southern Washington, and northern Rensselaer Counties.
(**Source**: https://mesonet.agron.iastate.edu/vtec/#2015-O-NEW-KALY-SV-W-0015/USCOMP-N0Q-201506091845)

The Albany FA averages two to three tornado events each year, based on a tornado climatology spanning from 1950 to 2010. This was the fourth tornado to touch down in Schenectady County during the past 5 years! Last year, on May 22nd, an EF3 tornado struck Duanesburg, producing maximum sustained winds of 140 mph, as evidenced by the near-complete destruction of a home. Most of the damage was EF0-EF1 in scale in both Schenectady and Albany Counties. Two years ago, on May 29th, 2013, a significant tornado struck Schenectady County. Its long path length of 13 miles started in extreme eastern Montgomery County near the town of Florida, and moved eastward across most of Schenectady County, producing EF2 damage in Mariaville. It was up to a mile wide at times. Yet another tornado touched down in Montgomery and Schenectady Counties, in Cranesville and West Glenville, on September 4, 2011. This was a significant EF1 tornado that was nearly a half mile wide at times. The June 9th tornado from this summer was only the sixth one to strike Schenectady County since January 1, 1950!

Microbursts, or straight-line winds, can be just as powerful and destructive as tornadoes. The majority of the damage in Scotia was from an intense microburst with estimated winds of 80 mph, a path length of 300 yards, and a path width of a half mile. A microburst is a convective downdraft with an effective outflow area of less than 2.5 miles. Peak winds from a microburst usually last less than 5 minutes. Microbursts can cause tremendous property damage, and can adversely affect aircraft in flight. Straight-line winds are differentiated from tornadic winds by a lack of rotation. Fortunately, with the EF0 and microburst in Scotia, there were no injuries or fatalities. Severe weather safety is extremely important. It is imperative that you always follow this rule…"When thunder roars, go indoors!" The best action you can take in terms of tornado safety is to get inside a basement, under sturdy protection, and stay away from windows. If a household does not have a basement, then go to the lowest floor in a center room, typically a bathroom. In microburst wind situations, it is important to seek shelter in a sturdy building and stay away from windows, too. Always stay tuned to your local National Weather Service for the latest severe weather warnings that may impact you.

SUMMER TEMPERATURE CLIMATOLOGY

Brian Montgomery
Senior Meteorologist, NWS Albany

Evan L. Heller
Climatologist, NWS Albany

Albany finally achieved its first heat wave of the season on September 9th when the mercury topped out at 92°. This followed 90°+ temperatures on the 7th and 8th. So, what is a heat wave? In the northeast part of the country, we define a heat wave as temperatures reaching at least 90 degrees Fahrenheit for three or more consecutive days. Prior to September, we had come close twice this summer, once in late July, and again in mid-August. Each time, we had two consecutive 90-degree days, with the third day falling short by only a degree or two. Yes…the apparent temperature, or 'heat index', was above 90° on each of the two dates, but this parameter does not count toward declaring a heat wave… only true temperature. We receive many climate questions via phone calls, emails and our social media pages. Many answers to these questions can be found by examining our climate datasets via the following links:

http://w2.weather.gov/climate/index.php?wfo=aly

http://www.weather.gov/aly/climate
http://www.weather.gov/aly/SpecialDataALB

For 2015 thus far, we have hit 90 degrees Fahrenheit or higher on the following dates (all Albany International Airport observations). The heat wave is highlighted in red:

July 19th	91°F
July 28th	93°F
July 29th	95°F
August 17th	92°F
August 18th	91°F
August 20th	90°F
September 7th	92°F
September 8th	94°F
September 9th	92°F

We average approximately 10 days a year when we observe temperatures of 90°F or higher. So, in what year did we observe the greatest number of 90 degree days? That belongs to 1955, all during climatological summer, with 32 days, 19 of which occurred during the month of July alone! Demonstrating the other extreme would be the year 1998, when the temperature never even reached 90 degrees…only 89°F, which was observed three times: on August 24th; September 6th, and; even much earlier, on March 31st, the latter of which set a new record for the date that still stands.

Another interesting statistic for 2015 is the number of consecutive days our maximum temperature was 80°F or higher. 2015 came in with the 4th most consecutive days (highlighted in orange):

Rank	Consecutive Days	Dates
1	29	6/11/1949 through 7/9/1949
2	27	7/14/1898 through 8/9/1898
3	26	6/23/1966 through 7/18/1966
4	25	7/17/2015 through 8/10/2015

How about the number of consecutive days our maximum temperature was 75°F or higher? This year, we wound up in 2nd place, as highlighted in yellow:

Rank	Consecutive Days	Dates
1	69	06/10/1949 through 08/17/1949
2	67	07/05/2015 through 09/09/2015
3	57	06/15/1955 through 08/10/1955
-	57	07/06/1906 through 08/31/1906

5	50	07/21/2012 through 09/08/2012
-	50	06/18/1908 through 08/06/1908
7	49	07/18/1939 through 09/04/1939
8	48	07/15/1877 through 08/31/1877
9	46	06/30/2011 through 08/14/2011
10	44	07/13/1917 through 08/25/1917

More data can be obtained from the National Centers for Environmental Information (NCEI) at http://www.ncdc.noaa.gov.

SUMMER 2015: SLIGHTLY ABOVE NORMAL TEMPERATURES AND PRECIPITATION

Evan L. Heller
Climatologist, NWS Albany

The Summer of 2015 began rather normally. The average temperature for the month of June was off by less than a half a degree (Table 1), but it was also a rainy month. Rain fell on 24 of the days of the month (Table 2a). The greatest amount of rain on any given calendar day was 1.62", occurring on the 12th (Tables 1 and 2b). This, however, was not a record. With a 6.70" total, while June 2015 was not one of our 10 wettest Junes (falling just over a half an inch shy of making the list), it was the 77th-wettest month of all-time (Table 3a). Despite the significant rainfall, there were no other precipitation records set.

The start of astronomical Summer (June 21st) saw a few days with highs well into the 90s, but things didn't really begin to heat up until July. All but 6 days in July had highs in the 80s or higher. The highest reading of summer occurred on the 29th, when the mercury topped out at 95 degrees. But the hottest day, overall, was August 20th because the 81.5° average temperature for the day beat out July 29th by a half a degree (Table 1). August 20th also recorded the highest minimum temperature…73 degrees, but the high for the day was only 90°. July wound up being only 1.2 degrees above normal, while August was 3.0 degrees above. In August, all but 4 days reached into the 80s or beyond. However, there were no new daily temperature records. Both July and August cracked the Top 200 Months list for temperature. July tied at #99, with August following in a tie at #94 (Tables 3b and c). Each of the three summer months had one day with an inch or more of precipitation, the highest amount recorded August 11th when 1.84" was recorded (Table 1). A couple of wind speed records, one in June and one in August, were the only other records tied or broken during the season (Tables 3a and c).

Thunderstorms for the season were a little less frequent than normal at Albany. Thunder was heard at Albany International Airport on 12 days…15 is the norm. No hail was recorded there with any of these. Partly cloudy skies dominated the season…all but 21 of the 92 days were considered partly cloudy (Tables 4a-c). The strongest wind gust recorded was 43 mph, on August 15th.

Summing up, the season as a whole was only 1.3 degrees above normal, with precipitation a little more than 3 inches above normal (Table 1).

STATS

	JUN	JUL	AUG	SEASON
Average High Temperature/Departure from Normal	76.4°/-1.5°	83.7°/-+1.4°	83.9°/+3.5°	81.3°/+1.1°
Average Low Temperature/Departure from Normal	57.2°/+0.7°	62.3°/+0.9°	62.3°/+2.4°	60.6°/+1.3°
Mean Temperature/ Departure From Normal	66.8°/-0.4°	73.0°/+1.2°	73.1°/+3.0°	71.0°/+1.3°
High Daily Mean Temperature/Date	77.5°/23rd	81.0°/29th	81.5°/20th	
Low Daily Mean Temperature /Date	52.5°/1st	64.0°/4th	66.5°/28th & 29th	
Highest Temperature reading/Date	89°/23rd	95°/29th	92°/17th	
Lowest Temperature reading/Date	40°/7th	52°/3rd & 17th	53°/29th	
Lowest Maximum Temperature reading/Date	55°/1st	70°/4th	75°/27th	
Highest Minimum Temperature reading/Date	66°/22nd & 23rd	70°/7th, 18th, & 19th	73°/20th	
Total Precipitation/Departure from Normal	6.70"/+2.91"	3.42"/-0.70"	4.30"/+0.84"	14.42"/+3.05"
Total Snowfall/Departure from Normal	0.0"/-	0.0"/-	0.0"/-	0.0"/-
Maximum Precipitation/Date	1.62"/12th	1.27"/19th	1.84"/11th	
Maximum Snowfall/Date	0.0"/-	0.0"/-	0.0"/-	

Table 1

NORMALS, OBSERVED DAYS & DATES

NORMALS & OBS. DAYS	**JUN**	**JUL**	**AUG**	**SEASON**
NORMALS				
High	77.9°	82.3°	80.4°	80.2°
Low	56.5°	61.4°	59.9°	59.3°
Mean	**67.2°**	**71.8°**	**70.1°**	**69.7°**
Precipitation	**3.79"**	**4.12"**	**3.46"**	**11.37"**
Snow	**0.0"**	**0.0"**	**0.0"**	**0.0"**
OBSERVED TEMPERATURE DAYS				
High 90° or above	0	3	3	6/92
Low 70° or above	0	3	3	6/92
High 32° or below	0	0	0	0/92
Low 32° or below	0	0	0	0/92
Low 0° or below	0	0	0	0/92
OBSERVED PRECIPITATION DAYS				
Days T+	24	14	12	50/92/54%
Days 0.01"+	19	8	7	34/92/37%
Days 0.10"+	11	7	6	24/92/26%
Days 0.25"+	8	5	5	18/92/20%
Days 0.50"+	6	2	3	11/92/12%
Days 1.00"+	1	1	1	3/92/3%

Table 2a

NOTABLE TEMP, PRECIP & SNOW DATES	**JUN**	**JUL**	**AUG**
95+ Degrees	-	95°/29th	-
1.50"+ Precipitation	1.62"/12th	-	1.84"/11th

Table 2b

RECORDS

ELEMENT	**JUNE**	
Daily Maximum Wind Speed Value/Direction/Date | Previous Record/Direction/Year	37 mph/W/23rd	37 mph/NW/1988
200 All-Time Wettest Months Value/Rank | Remarks	6.70"/#77	Tie

Table 3a

ELEMENT	JULY	
200 All-Time Hottest Months Value/Rank | Remarks	73.0°/#99	5-way tie

Table 3b

ELEMENT	AUGUST	
Daily Maximum Wind Speed Value/Direction/Date | Previous Record/Direction/Year 200 All-Time Hottest Months Value/Rank | Remarks	43/W/15th 73.1°/#94	39/SW/2002 6-way tie

Table 3c

ELEMENT	SUMMER	
none	none	none

Table 3d

MISCELLANEOUS

JUNE

Average Wind Speed/Departure from Normal	5.8 mph/-1.5 mph
Peak Wind/Direction/Date	41 mph/NNW/12th
Windiest Day Average Value/Date	15.0 mph/8th
Calmest Day Average Value/Date	2.4 mph/30th
# Clear Days	0
# Partly Cloudy Days	18
# Cloudy Days	12
Dense Fog Dates (code 2)	None
Thunder Dates (code 3)	6th, 9th, 12th, 16th & 23rd
Sleet Dates (code 4)	None
Hail Dates (code 5)	None
Freezing Rain Dates (code 6)	None

Table 4a

JULY

Average Wind Speed/Departure from Normal	6.1 mph/-0.6 mph
Peak Wind/Direction/Date	30 mph/NE/24th
Windiest Day Average Value/Date	10.4 mph/18th
Calmest Day Average Value/Date	1.5 mph/3rd
# Clear Days	5
# Partly Cloudy Days	23
# Cloudy Days	3
Dense Fog Dates (code 2)	25th
Thunder Dates (code 3)	19th & 24th
Sleet Dates (code 4)	None
Hail Dates (code 5)	None
Freezing Rain Dates (code 6)	None

Table 4b

AUGUST

Average Wind Speed/Departure from Normal	5.8 mph/-0.3 mph
Peak Wind/Direction/Date	43 mph/W/15th
Windiest Day Average Value/Date	11.5 mph/10th
Calmest Day Average Value/Date	1.6 mph/17th &30th
# Clear Days	0
# Partly Cloudy Days	30
# Cloudy Days	1
Dense Fog Dates (code 2)	16th
Thunder Dates (code 3)	3rd, 11th, 14th, 15th & 18th
Sleet Dates (code 4)	None
Hail Dates (code 5)	None
Freezing Rain Dates (code 6)	None

Table 4c

For more climate data and records, please visit our climate page at: www.weather.gov/albany/Climate

STORM TRACKS

Low pressure systems, or mid-latitude cyclones, affect our weather in the northeastern United States in various ways, mainly depending upon the track or path they take. There are several notable storm tracks which occur across the United States – each of which have different impacts on our northeastern weather. Remember from past articles that the winds around low pressure systems in the Northern Hemisphere flow counterclockwise, and slightly inward relative to the center of the low pressure, as shown in Figure 1. So – if the low pressure system tracks to our west or north – we generally are on the 'warm' side of the storm track, with southerly or easterly winds. On the other hand, if they track to our south or east, we tend to be more exposed to winds from the north or west, and tend to be on the 'cold' side of the track.

One type of storm system that affects our region, mainly in the winter months, is known as an "Alberta Clipper". These systems, as the name implies, develop across the prairies of west central Canada, and then track east southeast across southern Canada, and across or just north of the Great Lakes. These clipper systems tend to be fast moving, and limited in overall moisture. However, during the winter months, they often bring very cold surges of air southward into the region. Sometimes they bring light to moderate snowfall as they pass by, especially if they track further south than normal. They are usually accompanied by gusty winds, as the upper-level jetstream tends to be nearby. Once these systems pass, Lake Effect Snow can increase in their wake, which can hit western and central New York particularly hard.

Another common storm track is one which originates over the southern Rockies, and then heads northeast over the western or central Great Lakes. Sometimes these storms are referred to as "Colorado lows", and their track is usually west of our region, placing us on their warmer side. These storms tend to bring showery weather as the cold front associated with these lows passes through. They are frequently accompanied by strong winds. Sometimes thunderstorms accompany the cold fronts, especially in the early fall and in spring.

Other low pressure systems form along the Gulf Coast states or over the Gulf of Mexico, and travel north or northeast. These systems tend to have an abundance of moisture accompanying them, as they tap moisture from both the Gulf of Mexico and the Atlantic Ocean as they approach. Depending on their exact track, cold air may remain entrenched across the region, leading to significant bouts of snow or wintry precipitation – even ice storms. These low pressure systems sometimes start to take a track up the west side of the Appalachian Mountains before redeveloping closer to the Atlantic Ocean. Or –

sometimes they develop in the eastern Gulf of Mexico and then head up the east coast, or develop off the North Carolina coast and head toward New England. If they take a track near or just off the east coast, they are often referred to as "nor'easters", and can become quite intense, often with strong winds. If enough cold air is in place as these storms approach and pass through, the combination of strong wind and heavy snow could create blizzard conditions.

So – as you can see, there are several different tracks that low pressure systems can take, all of which have different effects on our weather. These storm systems tend to be most active during the "cool season" – which runs from October through April. As we head through the fall months, keep an eye out for the different origins and tracks of these storm systems, as well as the weather that accompanies them here in eastern New York and western New England.

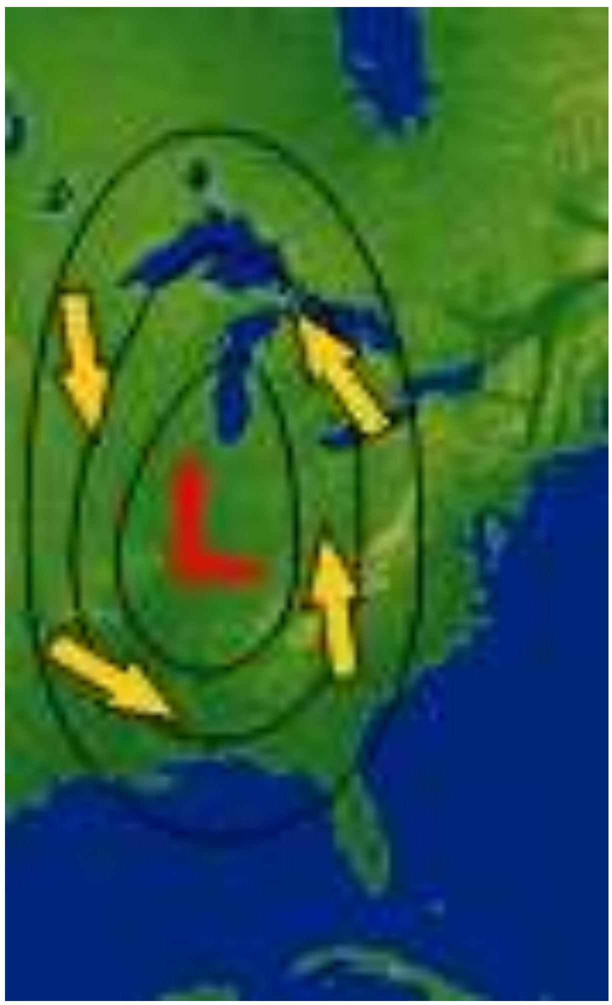

Figure 1. Wind flow around a low pressure system in the Northern Hemisphere is counterclockwise and inward relative to the center. From *NWS Jetstream: Online School for Weather*.

From the Editor's Desk

We are fully two weeks through September (and climatological fall) as I write this, but there still doesn't appear to be any autumn-like conditions on our doorstep. It is a pretty good bet, however, that our days of 90 degree weather for this year are behind us…but then again, you never know. Historically, we've had 90 degree weather as late in the season as September 23rd, but from September 7th on, all of our 90 degree events occurred prior to 1960. It actually took until September to finally get a heat wave this year. You can read all about it in our third and fourth feature articles in this issue. Our opening feature article discusses the El Niño we are presently under the influence of, and what we can expect as a result of it. Our second offering discusses the Capital Region's only Tornado of the year. This season's *Weather Essentials* talks about storm tracks, and how they affect the weather in the northeast. More great informative reading…enjoy! We'll see you again after the leaves have gone.

WCM Words

Steve DiRienzo
Warning Coordination Meteorologist, NWS Albany

As we transition out of summer into fall, and the leaves begin to change color, the National Weather Service (NWS) in Albany starts to see an increase in the number of questions from people interested in what the winter will be like. With winter in this part of the world usually cold, and often long, it makes sense to plan for the inevitable cold, snow and dreary days.

As mentioned earlier, a rather strong El Niño is expected through the early part of winter. Although the El Niño is centered in the equatorial Pacific Ocean, it will have an impact on our weather through this winter and into spring.

The NWS Climate Prediction Center (CPC) is the branch of our organization that issues the official forecasts for winter. The CPC forecasts, including monthly and seasonal outlooks and corresponding discussions can be found at:
http://www.cpc.ncep.noaa.gov/ and http://www.cpc.ncep.noaa.gov/products/predictions/90day/

The CPC will issue an "Initial" winter outlook around the third week of October. Their "Official" winter outlook is expected around the third week of November. So, if you are curious about what the upcoming winter will be like, you can check the CPC web pages and keep up with their latest forecasts.

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 Northeastern StormBuster, or any of the operations of the National Weather Service, please let me know at Stephen.Dirienzo@noaa.gov.