NORTHEASTERN STORM BUSTER

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Evan L. Heller, Editor
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DEPARTMENTS

TROPICAL CYCLONES IN THE ATLANTIC BASIN

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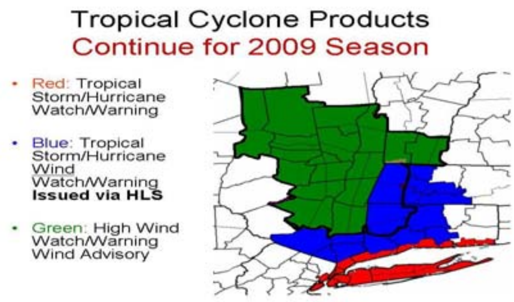
Welcome to the start of the 2009 Atlantic hurricane season! The season officially began June 1, and lasts through November 30, across the Atlantic basin, which includes the Gulf of Mexico and Caribbean Sea. This is the time of year when tropical disturbances, or clusters of thunderstorms, can organize, within areas of favorable atmospheric conditions and sufficiently warm water temperatures, into tropical cyclones. A tropical cyclone is a generic name for an organized cluster of thunderstorms which develops a low-level cyclonic circulation (i.e. counterclockwise circulation) over tropical or subtropical oceanic waters. In the Atlantic and eastern Pacific basins, such tropical cyclones are referred to differently, according to maximum sustained surface wind strength within each system. For instance, when a tropical cyclone has maximum sustained surface winds of less than 39 mph, it is referred to as a tropical depression. When it becomes stronger, with maximum sustained surface winds reaching between 39 and 73 mph, it is referred to as a tropical storm. When it reaches tropical storm strength, it is assigned a name from a World Meteorological Organization (WMO) name bank. Finally, when a tropical cyclone attains maximum sustained surface winds of 74 mph or greater, it is referred to as a hurricane.

There are several ingredients needed for a tropical disturbance to strengthen into a tropical cyclone. First and foremost, some type of initial atmospheric disturbance is needed to trigger convection, or thunderstorms. This often comes in the form of an easterly wave which moves westward across the tropical

Atlantic Ocean, often originating in northern Africa. However, a disturbance could also develop as the result of a weakening cold front that reaches subtropical latitudes. Once we have a disturbance, we need to maintain the thunderstorm activity associated with it. The fuel for such thunderstorms arises from warm water temperatures. Usually, water temperatures need to be at or above 80 degrees Fahrenheit to maintain or enhance these thunderstorms. Yet another ingredient which helps to transform a tropical disturbance into a cyclone is the existence of relatively light mid- and upper-level winds within the atmosphere – what is known as weak upper-level wind shear. If the winds in the higher levels of the atmosphere are too strong, they will tear, or “shear”, off the tops of the thunderstorms associated with the developing cyclone. Once these tops are sheared off, the thunderstorms may weaken and become separated from the cores of developing cyclones – limiting or weakening any circulation that may develop within them. Finally, in addition to weak upper-level winds, the flow in the upper levels of the atmosphere should also be somewhat divergent – blowing somewhat outward and away – from the thunderstorms beneath. This is known as “outflow” above a developing tropical cyclone, and helps maintain or strengthen the flow into the system at lower levels of the atmosphere. So – the combination of an initial disturbance, thunderstorms, warm water temperatures, light upper-level winds, and some upper-level outflow are all ingredients which are necessary to help transform a tropical disturbance into a more formidable tropical cyclone in the Atlantic basin – the king of all of them, the hurricane, being the prime example.

Now that we know a bit about tropical cyclones, you may wonder why we should be concerned here in eastern New York and interior western New England. Well, at the very least, the remnants of a tropical cyclone, after hitting a coastal area such as New Jersey, Long Island, or even North Carolina, can travel northward into our region. Such a system would most likely lose considerable energy as it becomes further removed from its main source of energy – warm oceanic water. But it can still dump heavy rainfall across the region, as the remnants of Hurricane Floyd demonstrated back in September 1999, when 6 to 12 inches of rain fell across portions of the region, resulting in significant flooding. And heavy rainfall is not the only hazard that can affect our region. Even though such systems may weaken in overall strength upon reaching our region, they can still produce strong winds, as Floyd did when wind gusts of 45 to 50 mph downed numerous trees across eastern New York and western New England. Our complex terrain may also lead to stronger winds, which tend to funnel and intensify within valley areas, depending upon the orientation of the surrounding terrain, and the direction of the winds.

For the Albany NWSFO County Warning Area (CWA), which covers eastern New York and western New England, there are various watches, warnings and advisories that would be issued, should a tropical cyclone, or remnant thereof, affect our region. For our southeast counties, namely Berkshire County in Massachusetts, and Litchfield County in Connecticut, a Tropical Storm/Hurricane Wind Watch would be issued when tropical storm (sustained surface winds of 39-73 mph) or hurricane (sustained surface winds of 74 mph or greater) force winds are possible within 36 hours. A Tropical Storm/Hurricane Wind Warning would be issued when tropical storm/hurricane force winds are expected within 24 hours. Such products would be issued via a Hurricane Local Statement (HLS). For other areas within the CWA, our office will issue either High Wind Watches, Warnings, or Wind Advisories, as appropriate, via the Non-Precipitation Warning (NPW) product. However, we do have the flexibility of issuing the aforementioned Tropical Storm/Hurricane Wind Watches/Warnings for these counties as well, such as for the extremely rare case of a fast-moving tropical cyclone heading northward up the Hudson River Valley, and which still retains tropical storm or hurricane force winds. The map below depicts the appropriate watches/warnings/advisories which would be issued in the case of a tropical cyclone affecting our CWA.



Tropical Cyclone Products issued by the NWS for counties in eastern New York and western New England. The NWSFO Albany CWA is contained within the thick black outline. Flexibility allows us to expand the Tropical Storm/Hurricane Wind Watches/Warnings into the green shaded areas, as appropriate.

You can also find tropical cyclone tracking information by visiting the National Hurricane Center's website at http://www.nhc.noaa.gov. This site also contains a plethora of information on tropical cyclones, including names, questions/answers, and historical tracks.

Let's hope for a quiet and uneventful 2009 hurricane season!

NWS'S 2009 HURRICANE OUTLOOK

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Climatologist, NWS Albany

On May 21, 2009, the National Weather Service's Climate Prediction Center (CPC) issued the 2009 hurricane outlook for the Atlantic Basin, which includes the Caribbean Sea and Gulf of Mexico, and…a "near normal" season is expected. A "normal" hurricane season in the Atlantic Basin spawns 11 named storms (tropical storm strength and greater), 6 being hurricanes, with 2 potentially attaining "major" status (those reaching category 3 or higher on the Saffir-Simpson Scale of hurricane intensity). The CPC expects the number of named storms this year to range anywhere from 9 to 14, with the expectation that 4 to 7 of them will reach hurricane status, 1 to 3 of them being major **(Fig. 1)**. The 2008 Atlantic hurricane season witnessed above normal activity, with 16 named storms, 8 of which reached hurricane status, 5 of them major. All three categories fell within the predicted ranges, as, in May of 2008, the CPC had forecast an above-normal season for the Atlantic Basin **(Fig. 1)**.

	2008 Forecast	2008 Result	2009 Forecast	Season Normal
All Tropical Storms	12-16	16	9-14	11
Hurricanes only	6-9	8	4-7	6
Major Hurricanes only	2-5	5	1-3	2

Fig. 1-The Climate Prediction Center's forecast number range of tropical storms and hurricanes for 2008, the results, the current forecast for 2009, and the seasonal normal.

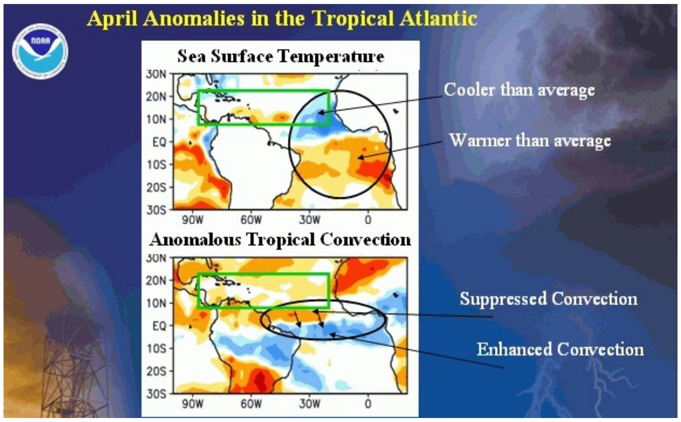


Fig. 2-Anomalies of sea surface temperatures (top), and convection in the eastern Atlantic Ocean, as depicted in April 2009. The blue denotes cooler sea surface temperatures, or reduced convection. This would inhibit tropical cyclone development within the main development region (green rectangle) of the tropical Atlantic Ocean. Image from the NWS's Climate Prediction Center.

The premise for this year's forecast is heavily weighted on three main factors. The first involves the presence of cooler than normal sea surface temperatures since mid-spring across the eastern tropical Atlantic Ocean, off the west coast of Africa **(Fig. 2)**, where the "seedlings" of eventual tropical cyclones normally traverse. Tropical cyclones need warm ocean temperatures to gather their strength – normally above 80° F. The initial atmospheric disturbances that can eventually transform into tropical cyclones pass through this region of the tropical Atlantic Ocean on their long journey toward the western Atlantic Ocean. If water temperatures remain cooler than normal (below 80° F), these initial disturbances often remain disorganized and weak, failing to reach tropical storm or hurricane strength. Cooler sea surface temperatures in this region are usually the result of strong surface winds blowing from east to west along the northwest coast of Africa. These persistent easterly winds force the water currents to move away from the coast, allowing cooler water well below the ocean surface to move upward, in a process known as "upwelling". This process often arises when a stronger than normal high pressure system develops and persists across the northeast and east central Atlantic Ocean, allowing for a clockwise flow of air to cause persistent easterly winds around the southern periphery of the high.

The second main factor weighted in this year's forecast, which should reduce the chance for an abnormally active hurricane season, is the presence of warmer than normal sea surface temperatures across the eastern Pacific Ocean. What do Pacific Ocean water temperatures have to do with hurricanes over the Atlantic Ocean? Well, unusually warm water temperatures in the eastern and central tropical Pacific Ocean enhance thunderstorm development in this region. Normally, thunderstorms tend to occur much further west in the tropical Pacific. However, when warmer waters shift further east, toward the western South American coast, the thunderstorms also tend to shift eastward. This causes a change in the circulation pattern within the mid- and upper levels of the atmosphere, expanding from the tropical Pacific Ocean to the tropical Atlantic Ocean. The main affect of this change in the circulation pattern is that upper-level winds intensify over a large area of the tropics, which tends to rip apart the tops of thunderstorms across the tropical Atlantic. This hampers the ability of thunderstorms to organize into a tropical cyclone. So, based on the recent warming sea surface temperatures in the eastern Pacific Ocean, it appears that upper-atmospheric conditions may remain somewhat unfavorable for tropical cyclone development in the Atlantic Basin this year.

There is one additional factor included in the forecast, one that favors tropical cyclone development in the Atlantic Basin, an enhanced African monsoon, a feature which has been present since 1995. This enhanced monsoon activity is believed to be part of a longer-term active cycle, and has been associated with more active Atlantic hurricane seasons. Therefore, taking these three main factors into account, the outlook is for a more or less normal season, overall.

Summing up, the official forecast for the 2009 Atlantic hurricane season issued by the CPC favors a "near normal" season, based mainly on these three factors. Of course, any changes to these factors could easily alter this year's outcome. The CPC will issue an updated forecast in August 2009, taking into account these and other factors, and adjusting accordingly.

NATIONAL HURRICANE CENTER CHANGES FOR 2009

Steve DiRienzo
Service Hydrologist, NWS Albany

The National Hurricane Center (NHC) has decided to implement some changes for the upcoming hurricane season. This article outlines three of the changes. More information can be found at:

http://www.nhc.noaa.gov/

The first change is to the Saffir-Simpson Hurricane Scale, which will not contain any reference to storm surge or the storm's central pressure. The second change is to the NHC Tropical Weather Formation Outlook. The threshold for low chance of tropical cyclone formation has changed. The final change is to the size of the error cone for the tropical cyclone forecast tracks. Due to increased accuracy in forecasts over the past 5 years, the width of the cone has decreased slightly.

The Saffir-Simpson Scale has been renamed the Saffir-Simpson Hurricane Wind Scale (experimental). The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 categorization based on the hurricane's intensity at the indicated time. The scale provides examples of the type of damages and impacts in the United States associated with winds of the indicated intensity. In general, damages rise by about a factor of four for every category increase.

The maximum sustained surface wind speed (peak 1-minute wind at 10 m [33 ft.]) is the determining factor in the scale. The scale does not address the potential for such other hurricane-related impacts as storm surge, rainfall-induced floods, and tornadoes. The wind-caused impacts are to apply to the worst winds reaching the coast, and the damage would be less elsewhere. It should also be noted that the general wind-caused damage descriptions are to some degree dependent upon the local building codes in effect, and how well and how long they have been enforced.

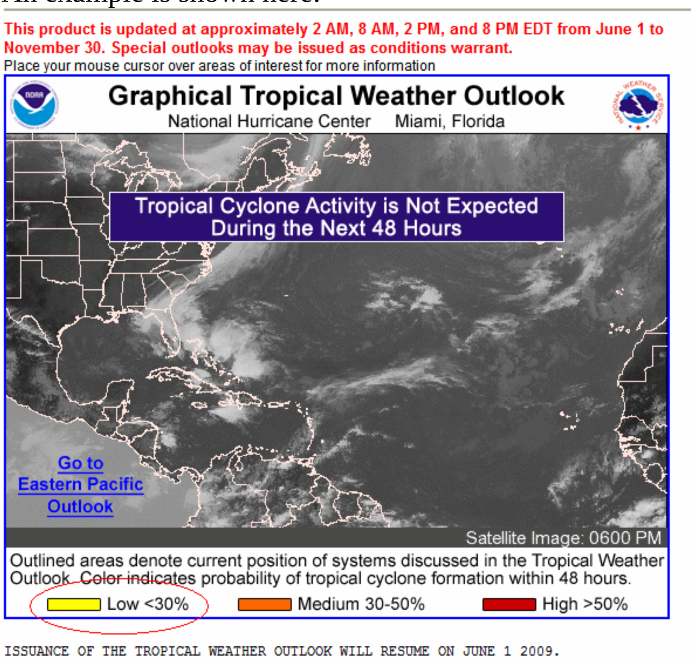
Earlier versions of this scale, known as the Saffir-Simpson Hurricane Scale, incorporated central pressure and storm surge as components of the categories. The central pressure was utilized during the 1970s and 1980s as a proxy for the winds, as accurate wind speed intensity measurements from aircraft reconnaissance were not routinely available for hurricanes until 1990. Other aspects of hurricanes, such as the system's forward speed and angle to the coast, impact the storm surge that is produced. The storm surge ranges, and flooding impact and central pressure statements are being removed from the scale, and only peak winds are employed in this revised version: the Saffir-Simpson Hurricane Wind Scale. Complete definitions of each category in the Saffir-Simpson Hurricane Wind Scale can be found at:

http://www.nhc.noaa.gov/aboutsshs.shtml

The NHC has changed the value for what is considered a low threshold for tropical cyclone formation. The low threshold for 48-hour formation potential has changed from less than 20% to less than 30%. Medium formation probability is now between 30 and 50%, and high tropical formation potential is still considered to be greater than 50%. The NHC Atlantic Graphical Tropical Weather Outlook can be found at:

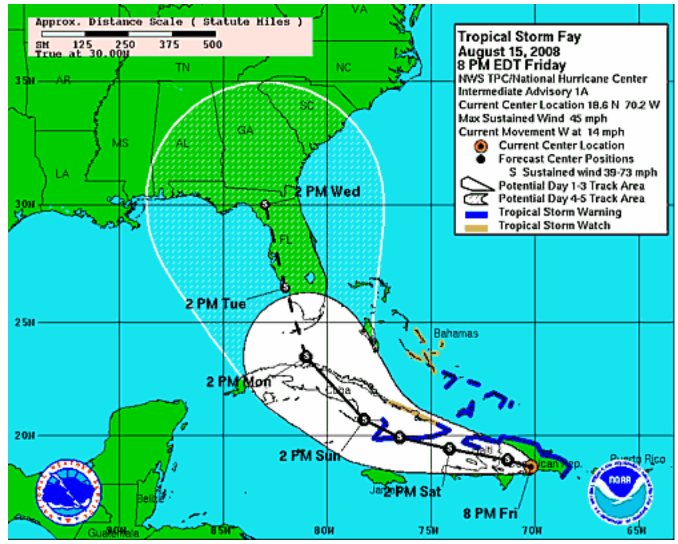
http://www.nhc.noaa.gov/gtwo_atl.shtml

An example is shown here:



The final change is to the size of the error cone for the tropical cyclone forecast tracks. Due to increased accuracy in forecasts over the past 5 years, the width of the cone has decreased slightly (by a few miles) at the 12, 24, 36, 48, 72, 96 and 120 hour points. An example from tropical storm Fay from August of 2008 follows:

DID YOU KNOW
???
EVERY YEAR IN THE U.S.…
HURRICANE SEASON
OFFICIALLY BEGINS JUNE 1ST
AND ENDS NOVEMBER 30TH
???



To form the cone, a set of imaginary circles are placed along the forecast track at the 12, 24, 36, 48, 72, 96, and 120 h positions, where the size of each circle is set so that it encloses 67% of the previous five years of official forecast errors. The cone is then formed by smoothly connecting the area swept out by the set of circles. The forecast error cone outlines the area within which there is a 67% chance a point along the actual track will fall. There is still a 33% chance that the actual track could fall outside this error cone. This is an important concept to remember, as many people falsely believe that the tropical cyclone will always track within this cone. It is also important to realize that a tropical cyclone is not a point. Their effects can span many hundreds of miles outside the center.

Graphics for Atlantic tropical cyclones are normally issued every six hours: 5:00 AM EDT, 11:00 AM EDT, 5:00 PM EDT, and 11:00 PM EDT (or 4:00 AM EST, 10:00 AM EST, 4:00 PM EST, and 10:00 PM EST). The graphics will also be updated when intermediate public advisories are issued, and special graphics may be issued at any time due to significant changes in warnings or within the cyclone itself.

THREE-BODY SCATTER SPIKES

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Meteorologist, NWS Albany

National Weather Service meteorologists can use a “Three-Body Scatter Spike” (TBSS) radar signature as justification for issuing a Severe

Thunderstorm Warning for large hail potential. The TBSS is sometimes called a hail spike. A TBSS showing up on a radar display nearly always indicates severe thunderstorm hail (greater than or equal to three-quarters of an inch in diameter). It is typically identified by a spike of weak reflectivity echoes extending out from a thunderstorm's strong reflectivity core, and away from the radar location.

The TBSS, or hail spike, occurs as a result of the scattering of radiation. The spike results from the microwave energy of the radar striking the hail, and being deflected to the ground. The energy reflects from the ground back to the wet hail, and then finally returns to the radar. These three scatterings produce the triple reflection that gives this signature its name. The radar beam energy hitting the ground at least once, and the hail many times, then results in a weaker return echo than the initial radar energy that went from the radar to the hail, and right back to the radar. The hail spike results due to the energy taking more time to go from the hail to the ground and back, in contrast to the energy that went from the hail right back to the radar. Putting it another way, this radar feature is caused by the radar beam hitting the wet hail, scattering to the ground below, then scattering back upward into the sky, then finally, being scattered by the hail aloft. Figure 1 is a schematic of the TBSS. A TBSS appears only at the height levels aloft that accompany the most intense hail. Hail cores are most intense typically at higher radar elevation heights.

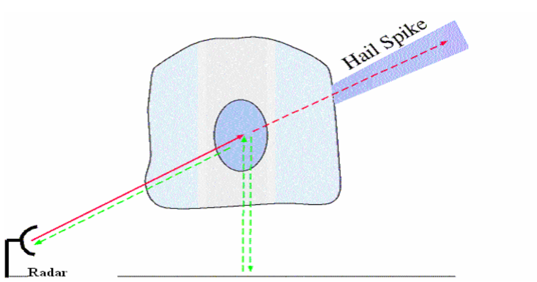

Figure 1: Diagram of a Three-Body Scatter Spike (TBSS) (courtesy of Lyndon St. College, VT - http://apollo.lsc.vsc.edu).

On June 16, 2008, devastating, large-hail-producing thunderstorms struck portions of upstate New York. There was over $16 million worth of agricultural damage to orchards in Ulster County, and over a half million dollars worth in Dutchess County. A great example of a TBSS during this event was displayed on the Albany (KENX) radar over western Dutchess County. The storm was located north of Poughkeepsie near the Hyde Park area at 2146 UTC, or 546 pm EDT (Fig. 2). The KENX radar is located northwest of the hail core and its associated TBSS. The TBSS showed up on the 0.5°, 0.9° and 1.3° radar elevation angles (between 5,000 and 12,000 feet Above Ground Level (AGL)). A severe thunderstorm warning was issued 15 minutes earlier, mentioning the potential for golf-ball-size hail. The presence of the TBSS increased forecaster confidence that large hail was occurring. A tornado warning for a potential tornado was also issued, at 548 pm EDT, based on the reflectivity and storm-relative velocity radar data. No tornado was confirmed, but golf-ball-size hail was reported at Hyde Park at 555 pm EDT (Figure 3).

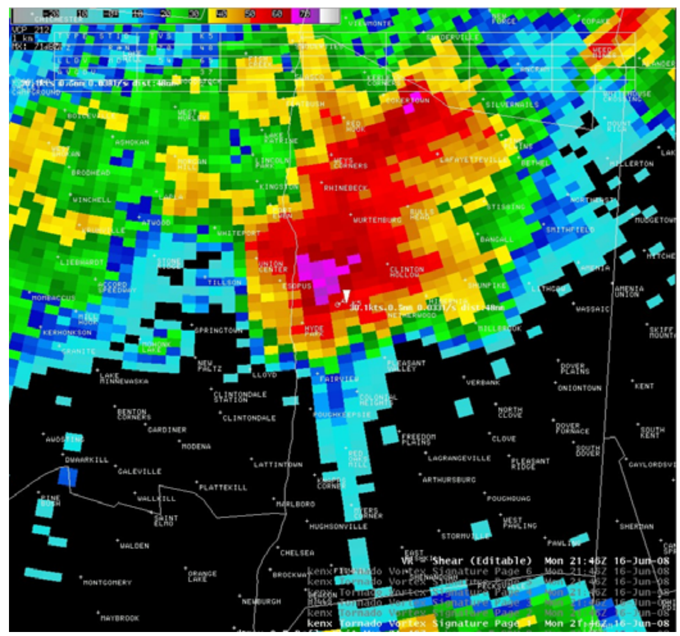

Figure 2: 2146 UTC KENX 0.5° Base Reflectivity data. The TBSS extends southeast from the 65-75 dBZ reflectivity core. The KENX radar is located northwest of the TBSS.

DID YOU KNOW ???
EVEN HAIL SMALLER THAN 3/4 INCH IN DIAMETER CAN CAUSE SIGNIFICANT DAMAGE TO AGRICULTURAL CROPS? ???

Figure 3: Golf-ball-size hail, presented by Hyde Park Cooperative Observer.

Hail spikes, or TBSSs, are radar features that are indicators of large, damaging hail, helpful in justifying issuing Severe Thunderstorm or Tornado Warnings (large hail can be mentioned in Tornado Warnings). Forecaster confidence in the potential for large hail (≥ three-quarters of an inch in diameter) increases when a TBSS shows up on a WSR-88D radar.

BLOCK THE SUN, NOT THE FUN

Brian Montgomery
Senior Forecaster, NWS Albany

As we head outdoors to enjoy the diversity of summer activities across eastern New York and adjacent western New England, protect yourself and your family by following these simple sun safety tips from the Sun Safety Alliance (http://www.sunsafetyalliance.org):

- Apply sunscreen that protects against both ultraviolet UVA and UVB rays whenever you are outdoors.
    - Adults should use sunscreen with SPF 15 or higher.
    - Children should use SPF 30 or higher.
- Apply sunscreen every two hours, as well as right after swimming, perspiring or toweling off.
- Wear UV-protective sunglasses.
- Wear a hat with a wide brim.
- Seek shade during peak sun hours (10am-4pm).
- Keep very young children (6 months of age or under) out of the sun.

Other factoids: Did you know you could sunburn even on a cloudy day? Concrete, sand, water and snow each reflect up to 90% of the sun's UV rays! On average, children get 3 times the UV exposure of adults! To assist in your outdoor plans, your National Weather Service produces a UV Index forecast that is available at several locations online:

- http://www.cpc.noaa.gov/products/stratosphere/uv_index/uv_current.shtml
- http://www.nws.noaa.gov/os/uv/
- http://www.epa.gov/sunwise/uvindex.html

The UV Index is categorized by the World Health Organization as follows:

Exposure Category	***UV Index***	***Protective Actions***
Minimal	0, 1, 2	Apply skin protection factor (SPF) 15 sun screen.
Low	3, 4	SPF 15 & protective clothing (hat)
Moderate	5, 6	SPF 15, protective clothing, and UV-A&B sun glasses.
High	7, 8, 9	SPF 15, protective clothing, sun glasses, and make attempts to avoid the sun between 10am to 4pm.
Very High	10+	SPF 15, protective clothing, sun glasses, and avoid being in the sun between 10am to 4pm.

SPRING 2009: ABOVE NORMAL TEMPS; BELOW NORMAL PRECIP AND SNOWFALL

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Temperatures averaged about a degree and a half above normal this spring. April was the most above normal (3.0º), but with May coming in very close to normal, this balanced out the difference to render the seasonal departure within reason. The warmest day of the season was April 25th. The mean temperature was 72.0º, which was a new record for the date by 1.0º (Table 3b). The other record eclipsed this day was the 86º high from 1915, when the mercury topped out at 89º. The third and final temperature record for the month, as well as the entire season, was a tie for the high minimum temperature for the 3rd. The low got down to just 52º for the first time since way back in 1892.

There was just one 90 degree day during the entire season, and this occurred on April 28th. However, this 90º high reading was a few degrees short of the record for that date. The coldest day of the season was March 3rd (Table 1). But the 13.5º mean for the day wasn't all that extreme, as normal early March temperatures are in the lower 20s.

The last freeze of the season at Albany was May 19th, and this was just 8 days prior to the city's latest recorded freeze date. The latest last freeze occurred in both 1968 and 1969.

Precipitation varied month-to-month (Table 1). April was most below normal, while May was nearly a half inch above. This resulted in seasonal precipitation being a little less than two inches below normal. However, this is far from extreme, as there were no monthly or seasonal top ten records. Snowfall, however, was another story. The 2.7" seasonal total was nearly a whopping foot short of normal for Albany. Most of it, 2.1", came on March 2nd. The monthly snowfalls were all way below normal.

While the city's last snowfall of the season occurred on April 8th, the last measurable amount occurred nearly a full month prior, on March 9th. The earliest recorded final snowfall of a trace or more occurred March 21st, in 1987.

The season's only day with an inch or more of precipitation was not the one daily record which was established in Albany. While 1.09" fell on the 27th of May (Table 1), the record was a 0.93" total on the 9th (Table 3a). Rain fell on nearly half of the days of the climatological spring season (Table 2).

This past spring was not a particularly windy season as all months averaged below normal (Tables 4a-c). May was the windiest month of the three. A few dates did stand out as being particularly windy, yet none were associated with thunderstorms. The windiest date was May 10th, with an average wind speed of 18.4 mph. The season's peak gust, 49 mph, occurred on April 23rd. Yet, oddly, none of the windiest days nor peak gust days for any of the three months were associated with thunderstorms, despite it being the first of the two thunderstorm seasons. The three thunderstorm days recorded during the season fell about 2 short of the normal. No thunderstorms were recorded at all during April.

The season was quite sunny in Albany. More than half of the 92 days were regarded as clear (Tables 4a-c), with May recording the most clear days. There were no dense fog days in either April or May.

The first half of June averaged a little cool and a bit wet to kick off the summer, but there was not a drop of rain in Albany the first seven days of the month. So far, the month is averaging cloudier than the previous three months. The talk is that summer may wind up being one of our coolest on record. We'll just have to wait and see.

STATS

	MAR	APR	MAY	SEASON
Avg. High/Dep. From Norm.	45.9°/+1.4°	60.6°/+3.3°	69.0°/-0.8°	58.5°/+1.3°
Avg. Low/Dep. From Norm.	26.7°/+1.3°	38.5°/+2.6°	46.9°/+0.4°	37.4°/+1.5°
Mean/ Dep. From Norm.	36.3°/+1.3°	49.6°/+3.0°	58.0°/-0.1°	48.0°/+1.4°
High Daily Mean/date	54.0°/28th	72.0°/25th	70.5°/21st	
Low Daily Mean/date	13.5°/3rd	37.0°/6th&8th	45.0°/18th	
Highest reading/date	67°/28th	90°/28th	88°/21st	
Lowest reading/date	6°/4th	27°/13th	32°/19th	
Lowest Max reading/date	20°/3rd	42°/7th	54°/18th	
Highest Min reading/date	44°/29th	55°/25th	58°/9th	
Ttl. Precip./Dep Fm. Norm.	2.63"/-0.54"	1.47"/-1.78"	4.08"/+0.41"	8.18"/-1.91"
Ttl. Snowfall/Dep. Fm.Norm.	2.7"/-8.2"	T/-2.9"	0"/-0.1"	2.7"/-11.2"
Maximum Precip/date	0.93"/9th	0.40"/3rd	1.09"/27th	
Maximum Snowfall/date	2.1"/2nd	T/6th, 7th & 8th	0"	

Table 1

DID YOU KNOW
???
Albany, new york
Averages 23
thunderstorm days
per year
???

NORMALS, OBSERVED DAYS & DATES

	MAR	APR	MAY	SEASON
High	44.5°	57.3°	69.8°	57.2°
Low	25.4°	35.9°	46.5°	35.9°
Mean	35.0°	46.6°	58.1°	46.6°
Precip	3.17”	3.25”	3.67”	10.09”
Snow	10.9”	2.9”	0.1”	13.9”
OBS. TEMP. DAYS 2009				
High 90º or above	0	1	0	1/92
Low 70º or above	0	0	0	0/92
High 32º or below	5	0	0	5/92
Low 32º or below	21	6	1	28/92
Low 0º or below	0	0	0	0/92
OBS. PRECIP. DAYS 2009				
Days T+	12	15	18	45/92/49%
Days 0.01+	11	10	16	39/92/40%
Days 0.10+	8	5	8	23/92/23%
Days 0.25+	3	3	6	12/92/13%
Days 0.50+	1	0	3	4/92/4%
Days 1”+	0	0	1	1/92/1%
PRECIP. & SNOW DATES				
1.00”+ value/date	-	-	-	[redacted]
3.5” snow value/date	-	-	-	[redacted]
3.5” snow value/date	-	-	-	[redacted]
3.5” snow value/date	-	-	-	[redacted]

Table 2

RECORDS

ELEMENT	MARCH			
	1st		2nd	
Precipitation/Date|Prev Rec./Yr.	0.93”/9th	0.77”/1998	/	/

Table 3a

ELEMENT	APRIL			
	1st		2nd	
High/Date|Prev Rec./Yr.	89º/25th	86º/1915	/	/
Hi Min/Date|Prev Rec./Yr.	52º/3rd	52º/1892	/	/
Hi Mean/Date|Prev Rec./Yr.	72.0º/25th	71.0º/1913		/

Table 3b

ELEMENT	MAY	
	1st	2nd
NONE	NONE	

Table 3c

ELEMENT	SEASON
NONE	NONE

Table 3d

MISCELLANEOUS

MARCH

Avg. wind speed/Dep. Fm Norm.	8.2 mph/-1.7 mph
Peak wind/direction/date	46/W/30th
Windiest day avg. value/date	17.8 mph/11th
Calmest day avg. value/date	1.5 mph/21st
# clear days	17
# partly cloudy days	8
# cloudy days	6
Dense fog dates (code 2)	2nd, 7th, 8th & 9th
Thunder dates (code 3)	29th
Sleet dates (code 4)	9th
Hail dates (code 5)	-
Freezing rain dates (code 6)	-

Table 4a

APRIL

Avg. wind speed/Dep. Fm Norm.	8.9 mph/-0.5 mph
Peak wind/direction/date	49/WNW/23rd
Windiest day avg. value/date	18.2 mph/4th
Calmest day avg. value/date	2.7 mph/21st
# clear days	14
# partly cloudy days	12
# cloudy days	4
Dense fog dates (code 2)	-
Thunder dates (code 3)	-
Sleet dates (code 4)	-
Hail dates (code 5)	-
Freezing rain dates (code 6)	-

Table 4b

MAY

Avg. wind speed/Dep. Fm Norm.	7.7 mph/-0.5 mph
Peak wind/direction/date	44/S/14th
Windiest day avg. value/date	18.4 mph/10th
Calmest day avg. value/date	2.0 mph/4th
# clear days	18
# partly cloudy days	9
# cloudy days	4
Dense fog dates (code 2)	-
Thunder dates (code 3)	9th & 23rd
Sleet dates (code 4)	-
Hail dates (code 5)	-
Freezing rain dates (code 6)	-

Table 4c

WCM Words

Raymond G. O’Keefe
NWS Albany Warning Coordination Meteorologist

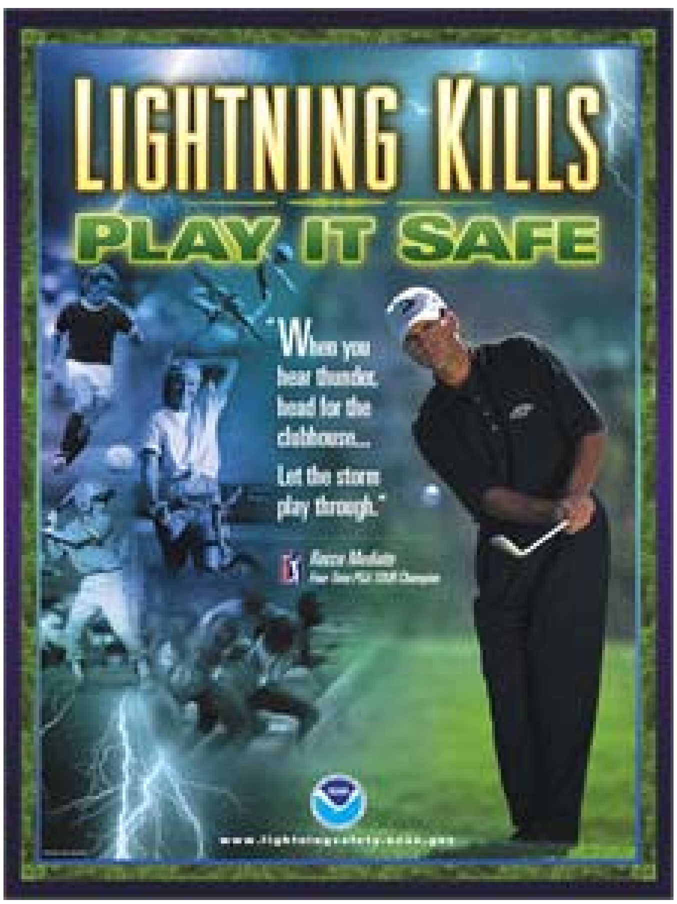
Just a reminder to our spotters that we rely on your timely reports throughout the summer severe weather season. We always appreciate your reports!

Have a fun and safe summer season.

From the Editor's Desk

Summer has officially begun. Hurricanes are the main focus of this issue of StormBuster, and our first three articles deal with this topic. We then follow-up with articles on other aspects of summer: thunderstorms, and playing it safe in the summer sun. We end the main section with a review of spring. A special thanks goes out to our contributors.

National Lightning Safety Awareness Week was just getting underway as I was writing this on the day of the summer solstice. While this is only a one week event, lightning safety is actually a season-long concern, particularly from mid-spring through the end of summer. Be sure to get indoors when you hear thunder, and stay away from windows when inside. Keep yourself safe this season so that you can enjoy the seasons to come. And have a joyous summer!



Temescal Valley, CA
Photo courtesy of Willi Wilkens