NORTHEASTERN STORM BUSTER

Winter, 2013-14 *- VOL. 19, NO. 1*
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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, along with weather enthusiasts, who all have a special interest or expertise in the fields of meteorology, hydrology and/or climatology.

THE OUTLOOK FOR THE WINTER OF 2013-14

By Hugh Johnson
Meteorologist, NWS Albany

Astronomical winter began on December 21st, when the sun reached its lowest point in the sky, shining directly above the Tropic of Capricorn. However, I think most would say that winter actually began earlier this year, as we have already had several snowfalls, and very cold temperatures. Climatological winter (the three-month period when the average temperature each month is generally colder than any of the other months) began on December 1st. So, what will the rest of this winter bring?

There is no scientific way to accurately forecast weather beyond about seven days. The best we can do is to examine anticipated trends in the long-wave teleconnection weather patterns, including the El Niño Southern Oscillation (ENSO) cycle, and others.

The ENSO, which is partially determined by the warmth of the waters in the central Pacific, looks to remain in a somewhat neutral phase (neither warm nor cold), which is the La Nada phase, the same as last winter. However, there have been some indications that the ENSO might be trending a little toward a warm (La Niña) phase, but not enough to move out of the La Nada threshold.

The Pacific Decadal Oscillation (PDO) is strongly in the cold phase. This cycle is one that generally lasts from 10 to as long as 30 years (as opposed to a typically shorter-lasting ENSO phase). This cold phase of the PDO means that the Pacific Ocean waters tend to stay much cooler in the northern and southern areas, with any warmer waters confined to the coastal sections. A cold PDO tends to favor more frequent La Niña cycles, and less frequent El Niño ones. Also, if an El Niño episode does take place, it is likely to be weak.

The Quasi Biennial Oscillation (QBO) has returned to a positive phase, meaning that winds in the stratosphere are westerly, which tends to inhibit "blocking" in the atmosphere. Such a blocking typically involves the presence of a large high-pressure ridge near Greenland, which helps keep arctic air locked in across the U.S. Rather, thus far this winter, we have been dealing with a very potent polar subtropical jet that has been stretched out across the country. This jet has become active since late November, slinging many storms across the country.

The wild card this year has been the fact that the arctic regions across North America have been a bit colder than usual, with more extensive ice present. While still below the 30-year average, this ice extent is the greatest in several years. So, despite the lack of a Greenland ridge, arctic air has been free to pour southward, occasionally making it into the southern portions of the U.S. Normally when there is no blocking, arctic air is confined to the more northern latitudes, and if it does migrate southward, it tends to modify fairly quickly. Not so this year; the arctic air has just kept on pouring in.

Based on a combination of all the above teleconnection indices, an overabundance of arctic air, and the fact that we have just passed the 11-year peak of sunspots (lower than previous peaks), the best analog (closest scenario) we could find to this winter is the winter of 1981-82. That winter was quite cold and snowy across our region. Impressive cold was especially noted in mid-January. An epic April snowstorm finished out the cold season. December was quite snowy as well. There were two notable volcanic eruptions prior to that winter that might have helped to cool the atmosphere more than normal.

Noting that no two analog winters ever play out exactly the same, and the fact there have been no significant volcanic eruptions of late, we believe temperatures this winter will be normal to only slightly colder than normal. Snowfall-wise, it looks as if it should be close to normal, too, but that depends on the exact track the storms take. A little shift could, and usually does, make a huge difference as to whether or not we get dusted or dumped on. Either way, it is always best to prepare for the worst that Old Man Winter could bring our way.

ARCTIC SEA ICE EXTENT: 2013 UPDATE

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 1981 to 2010 is 2.40 million square miles. For 2013, the summer minimum extent was reached on September 13, and was 1.97 million square miles, the sixth-lowest extent ever measured by satellite since 1979. The 2013 minimum extent was 17.9 percent below the 1981-2010 average, but 31.5 percent higher than the lowest extent, which occurred during the previous summer (2012).

The substantial increase in ice extent this past summer was likely the result of colder than normal temperatures across much of the arctic during the summer, and by favorable surface wind and ocean currents which keep the flow of ice out of the Arctic to a minimum. Although the increase in ice extent is important in terms of Arctic sea ice "health", even more important is the volume of sea ice. The volume of ice is estimated by taking the ice area and the ice thickness into account. Very recently, data from the European satellite CRYOSAT indicated that the volume of Arctic sea ice at the 2013 summer minimum had increased by 50% over the record low in 2012, but still remained below normal.

There has been a noticeable trend of decreasing ice extent since satellites began measuring Arctic sea ice extent in 1979, especially the summer minimum extent. There continues to be concern that global warming may be accelerating the decline of Arctic sea ice, and that the Arctic could be ice-free during the summer months within a relatively short period of time, thereby further accelerating the impacts of global warming.

Although this series of articles does not usually discuss Antarctic sea ice, it is interesting to note that the maximum Antarctic sea ice extent during the Antarctic winter was 19.47 million square kilometers, the greatest ever measured by satellite since 1979, and it occurred on September 22. The previous record high was 19.44 million square kilometers, which occurred the previous year (2012), and the third-highest was 19.39 million square kilometers, in 2006.

FALL OF 2013: VERY CLOSE TO NORMAL WITH NO TEMPERATURE OR PRECIPITATION RECORDS

Evan L. Heller
Climatologist, NWS Albany

The average temperature for climatological fall in Albany (September 1-November 30) was a scant 0.1° below the normal of 50.5° (Table 1). September was the closest to normal of the three months, but despite the 3 degree departures for both October and November, there were no temperature records of any kind recorded during the fall season in Albany. The warmest day of the season was September 11th, with a mean of 81.5°, helped by both the warmest reading recorded for the season, 93°, and the highest minimum temperature recorded, 70°.

Precipitation wasn't all that impressive, either. Again, no records of any kind were set. The seasonal precipitation total of 8.94" was 1.33" below normal. There were just two days that recorded precipitation of an inch or more, and both occurred in September (Tables 2a and b).

The only records broken during the fall of 2013 were daily wind gust records (Tables 3a-c). There were just three, and two of these were ties of existing records. The last thunder heard in Albany was on October 7th (Table 4b), and the growing season ended on the 24th with the first freeze at Albany (Table 2b). The first snowflakes arrived on November 8th, but measureable snowfall wasn't received until the 23rd. Overall, it was a very unmemorable fall season.

The STATS

	SEP	OCT	NOV	SEASON
Average High Temperature/Departure from Normal	72.7°/+0.5°	62.8°/+3.0°	46.2°/-1.7°	60.6°/+0.6°
Average Low Temperature/Departure from Normal	49.9°/-1.7°	42.4°/+2.8°	28.2°/-3.3°	40.2°/-0.7°
Mean Temperature/ Departure From Normal	**61.3°/-0.6°**	**52.6°/+2.9°**	**37.2°/-2.5°**	**50.4°/-0.1°**
High Daily Mean Temperature/Date	81.5°/11th	64.5°/7th	55.5°/1st	
Low Daily Mean Temperature /Date	51.5°/17th	37.5°/29th	20.5°/24th	
Highest Temperature reading/Date	93°/11th	78°/1st	70°/1st	
Lowest Temperature reading/Date	39°/17th & 18th	28°/29th	11°/25th & 30th	
Lowest Maximum Temperature reading/Date	62°/23rd & 27th	47°/29th	27°/24th	
Highest Minimum Temperature reading/Date	70°/11th	57°/17th	45°/6th	
Total Precipitation/Departure from Normal	**4.81"/+1.51"**	**2.29"/-1.39"**	**1.84"/-1.45"**	**8.94"/-1.33"**
Total Snowfall/Departure from Normal	**0.0"/-**	**0.0"/-**	**2.1"/-0.7"**	**2.1"/-0.7**
Maximum Precipitation/Date	1.39"/13th	0.94"/7th	0.89"/27th	
Maximum Snowfall/Date	-	-	1.7"/26th	

Table 1

NORMALS, OBSERVED DAYS & DATES

NORMALS & OBS. DAYS	SEP	OCT	NOV	AUTUMN
NORMALS				
High	72.2°	59.8°	47.9°	60.0°
Low	51.6°	39.6°	31.5°	40.9°
Mean	61.9°	49.7°	39.7°	50.5°
Precipitation	3.30"	3.68"	3.29"	10.27"
Snow	0"	0"	2.8"	2.8"
OBS TEMP. DAYS				
High 90° or above	1	0	0	1/91
Low 70° or above	1	0	0	1/91
High 32° or below	0	0	4	4/91
Low 32° or below	0	6	20	26/91
Low 0° or below	0	0	0	0/91
OBS. PRECIP DAYS				
Days T+	13	17	19	49/91/54%
Days 0.01"+	9	9	12	30/91/33%
Days 0.10"+	8	5	5	18/91/20%
Days 0.25"+	6	3	2	11/91/12%
Days 0.50"+	4	2	1	9/91/8%
Days 1.00"+	2	0	0	2/91/2%

Table 2a

NOTABLE TEMP, PRECIP & SNOW DATES	SEP	OCT	NOV
90°+ Event	11th (93°)	-	-
1.00"+ value/Date	1.03"/12th	-	-
1.00"+ value/Date	1.39"/13th	-	-
End of Growing Season (32° or less)	-	24th (31°)	-
First Snowfall	-	-	8th
First Measurable Snowfall	-	-	23rd (0.4")

Table 2b

RECORDS

ELEMENT	SEPTEMBER	
Daily Maximum Wind Speed Value/Direction/Date | Previous Record/Direction/Year	36 mph/SE/21st	36 mph/SE/2000 (tie)

Table 3a

ELEMENT	OCTOBER	
none	none	none

Table 3b

ELEMENT	NOVEMBER	
Daily Maximum Wind Speed Value/Direction/Date | Previous Record/Direction/Year	45 mph/S/18th	38 mph/ S/1987
Daily Maximum Wind Speed Value/Direction/Date | Previous Record/Direction/Year	39 mph/W/19th	39 mph/S/2003 (tie)

Table 3c

ELEMENT	AUTUMN	
none	none	none

Table 3d

MISCELLANEOUS
SEPTEMBER

Average Wind Speed/Departure from Normal	5.0 mph/-1.5 mph
Peak Wind/Direction/Date	36 mph/SSE/21st
Windiest Day Average Value/Date	12.8 mph/21st
Calmest Day Average Value/Date	0.8 mph/19th
# Clear Days	6
# Partly Cloudy Days	21
# Cloudy Days	3
Dense Fog Dates (code 2)	18th, 28th & 29th
Thunder Dates (code 3)	2nd, 10th, 11th & 12th
Sleet Dates (code 4)	None
Hail Dates (code 5)	None
Freezing Rain Dates (code 6)	None

Table 4a

OCTOBER

Average Wind Speed/Departure from Normal	5.1 mph/-2.1 mph
Peak Wind/Direction/Date	41 mph/WSW/7th
Windiest Day Average Value/Date	9.3 mph/7th
Calmest Day Average Value/Date	0.5 mph/30th
# Clear Days	3
# Partly Cloudy Days	20
# Cloudy Days	8
Dense Fog Dates (code 2)	9th & 10th
Thunder Dates (code 3)	7th
Sleet Dates (code 4)	None
Hail Dates (code 5)	None
Freezing Rain Dates (code 6)	None

Table 4b

NOVEMBER

Average Wind Speed/Departure from Normal	8.7 mph/+0.4 mph
Peak Wind/Direction/Date	45 mph/S/18th & 45 mph/W/28th
Windiest Day Average Value/Date	17.7 mph/23rd
Calmest Day Average Value/Date	2.5 mph/2nd
# Clear Days	2
# Partly Cloudy Days	22
# Cloudy Days	6
Dense Fog Dates (code 2)	23rd
Thunder Dates (code 3)	None
Sleet Dates (code 4)	26th
Hail Dates (code 5)	None
Freezing Rain Dates (code 6)	None

Table 4c

AN INVITATION TO OUR 2014 "SPRING-UP" FIRE WEATHER MEETING

Hugh Johnson
Meteorologist, NWS Albany

It's cold outside and the snow has been flying. The Yuletide season is here. However, it's not too early to start thinking about our annual "Spring-Up" Fire Weather Meeting. We have conducted these meetings every year since I have been the Fire Weather Program Leader for Albany, New York, beginning in 2005.

The purpose of this meeting is to discuss our local fire weather policies, and, for anyone who wishes, to recommend changes designed to improve the program. It's the time when our fire community can express concerns about perceived issues within our programs, including forecast-related ones. We prefer to do this before the Fire Weather season begins, usually in late March or early April. Although changes in policy do not occur overnight, any concerns will be taken up and discussed with other weather offices. If you are interested in fire weather, you can read our Annual Operating Plan, which is on our home webpage under 'Fire Weather'.

Last, but not least, my co-Program Leader, Ian Lee, will be discussing exciting new research he has undertaken in an effort to improve the forecasting of surface winds, and the prediction of "Red Flag" danger.

Anyone with an interest in fire weather is welcome to attend this meeting, which will be held in our conference room at 10 a.m. on Thursday, February 20th, 2014. There will be no snow date, and the meeting is unlikely to be canceled if there are weather concerns. You are welcome to attend remotely if you feel driving to our facility that day may be too much of a hazard.

If you're interested in attending the meeting, or would like more information, please send me an email at: hugh.w.johnson@noaa.gov.

Happy Holidays!

WEATHER ESSENTIALS

With Kevin S. Lipton

REASONS FOR THE SEASONS

Welcome to winter...that time of cold temperatures and snow, sleigh riding and ice skating, and drinking hot cocoa! Here in the northeast, it's great having four seasons – just when one season seems to get old, a new one is just about to begin. But, did you ever wonder why we even have seasons? And why do the weather patterns change with each passing one? You may already be familiar with the reasons for the seasons, but just in case you aren't, here we will discuss why we have them.

The seasons vary for two main reasons: the earth's axis is at a near-constant tilt off the vertical, and; the orbit of the earth around the sun coupled with this tilt varies the angle of the sunlight hitting it during the course of the year. Let's first discuss the earth's axis; it's actually off from a completely vertical position relative to its orbital plane by roughly 23.5 degrees, as is illustrated in the diagram below. By being tilted in this manner, some parts of the earth receive more direct sunlight and longer days than others at any given time, and this varies depending upon the time of year, which dictates the earth's location in the orbit around the sun. Using the Northern Hemisphere as a reference, when we approach the summer solstice, which always occurs between June 20th and 23rd, the Northern Hemisphere experiences its most-overhead sunlight, and its longest days. In other words, the sun will be higher in the sky during the day at this time of year relative to all other times of the year, and it also will take the longest time in a day for it to cross the sky, hence the longer days. The more intense sunlight over a greater duration this time of year will heat the ground most effectively, leading to the warmest temperatures occurring during summer.

After the summer solstice, on the earth's continued journey around the sun, the direct overhead rays of the sun gradually shift southward, reaching the equator around September 20-23. When the rays of the sun are directly above the equator, we have reached the autumnal equinox in the Northern Hemisphere – or more commonly, the start of the fall season. As this occurs, the sun's intensity decreases across the Northern Hemisphere at its fastest pace, and the days become shorter in the quickest fashion, heating the ground less, and producing a net cooling effect.

Finally, the direct overhead rays of the sun shift into the Southern Hemisphere, culminating in the southernmost extent of direct overhead rays of sunlight around December 20-22, also known as the winter solstice. At this time of year, the sun will be at its lowest point in the sky, and it will cross the sky in the shortest period of time, resulting in the shortest days. This combination of weakest sunlight intensity and shortest days is least effective at heating the earth's surface compared to the other times of the year. In fact, for extreme northern portions of the Northern Hemisphere, there is a period of no sunlight at all during the season! The net result is the coldest temperatures of the year occurring during the winter. Of course, after the winter solstice, the direct overhead rays of the sun eventually migrate back above the equator, reaching there around March 20-23 (spring/vernal equinox), along with rapidly lengthening days, and warming conditions, in the Northern Hemisphere. And the never-ending cycle repeats, with the summer solstice returning once again.

So, as you can see, the cause for the seasons is the earth being tilted at a near-constant angle along its axis of rotation, coupled with the revolution of the earth around the sun at that angle. Interestingly enough, there is no real connection between the seasons and how close the earth is to the sun. In fact, the earth is closest to the sun, also known as perihelion, in January, during the Northern Hemisphere winter, and is farthest in July, also known as aphelion, during the Northern Hemisphere summer.

You may also hear us refer to the terms "meteorological" or "climatological" in reference to seasons. These are offset about three weeks from the astronomical seasons previously described, as they are represented as whole calendar months, and are based more on average temperatures than on astronomical features. Thus, these seasons are in three-month intervals, or quarters, too, but with winter defined as the period from December 1 through the end of February; spring, as March 1 through May 31; summer as June 1 through August 31, and; fall, as September 1 through November 30.

No matter what your favorite season is, we hope you welcome in this new season and the New Year ahead with good health and happiness!

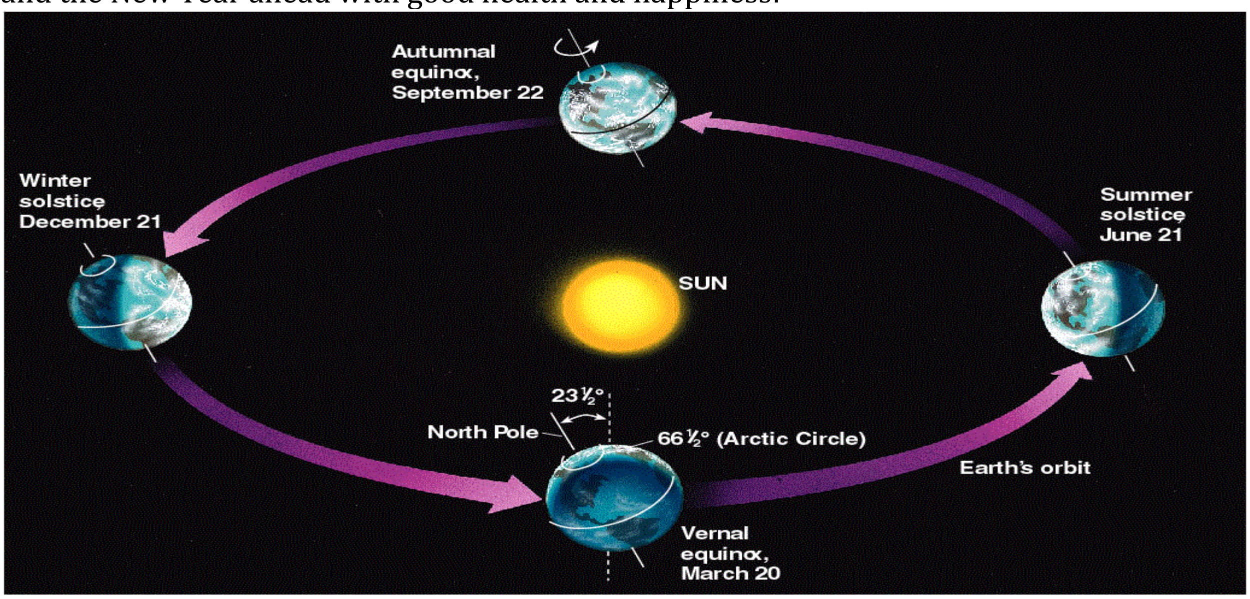

Image from http://curious.astro.cornell.edu/images/earthtilt.gif

From the Editor's Desk

Welcome to our winter 2013-14 issue of Northeastern StormBuster. We hope you enjoy our updated look as we offer you four feature articles in this issue. The winter solstice has just arrived as I write this, and so it is only appropriate that we open with an outlook of the winter season that has just begun. This will be followed by an update on the arctic sea ice extent. Then we have our fall climate summary, and last, but not least, an invitation to attend our local spring fire weather meeting. And speaking of the change of season, our Weather Essentials topic explains the reasons behind why we have seasons. All great topics for winter! Enjoy the rest of the holidays, and we'll see you again in spring.

WCM Words

Steve DiRienzo
Warning Coordination Meteorologist, NWS Albany

Winter is upon us, and it brings a new set of challenges to be prepared for. Cold temperatures, heavy snow, freezing rain, and frozen lakes and rivers can all have impacts on our daily lives. One of the primary concerns is the winter weather's ability to knock out heat, power and communications, sometimes for days at a time. Heavy snowfall and extreme cold can immobilize an entire region.

The National Weather Service issues watches, warnings and advisories to give notice of the threat of severe winter weather. This is so everyone can prepare to lessen the impacts. The Federal Emergency Management Agency (FEMA) has some very useful information on how to prepare for winter's hazards. Please see:

http://www.ready.gov/winter-weather for more information.

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.□