NORTHEASTERN
STORM BUSTER
Emergency Manager & Storm Spotter Magazine

Spring, 2011 - *VOL. 16, NO. 2*
Evan L. Heller, Editor
Steve DiRienzo, Publisher
Ingrid Amberger, Webmistress

FEATURES

DEPARTMENTS

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WINTER WEATHER REFUSES TO 'CHILL OUT'

Rihaan Gangat
Student Career Experience Program Intern, NWS Albany

What a rough winter we've just had, with storms impacting the Mid-Atlantic and Northeast almost every week, and many locations breaking records for snowfall. A similar pattern occurred during the winter of 2009-10, with approximately 22 winter storms affecting the northeastern United States. A couple of large-scale features are thought to be responsible for producing these significant storms, and the severe winter trend may repeat for the next few winters in the Northeast!

For the past two winters, a negative Arctic Oscillation (AO) phase has occurred. A negative phase of AO exhibits relatively high pressure over the polar region, and low pressure at mid-latitudes. With a negative AO phase occurring, the Arctic region is warmer than average, and the mid-latitudes are colder. A general pattern of a North Atlantic blocking ridge takes shape, during which strong northwest Atlantic storms have been recognized over the past two winters. A very strong negative AO this past winter has been hypothesized to have kept the overall sea ice extent in the Arctic well below the 1979-2000 average. In January 2011, the Arctic sea ice extent was at its lowest since 1979, and, according to the National Snow and Ice Data Center, it was unusually low in Hudson Bay, Hudson Strait, and the Davis Strait, as well. Normally, these areas freeze over by late November, but this year, Hudson Bay did not completely freeze over until mid-January. The warm temperatures delaying the ice formation came from the wind pattern associated with the strong negative phase of the AO, bringing warm and dry winds into the region. When sea ice has not formed by fall and early winter, heat fluxes from the ocean continue to warm the air. Due to the resulting delayed formation and short life span of ice in the Polar regions, the increased heat stored in the ocean in summer is released into the atmosphere. This process weakens the polar vortex of strong circular winds at the North Pole, and allows cold air to move southward into the mid-latitudes.

With a correlation between reduced sea ice and higher vapor and barometric pressures at the North Pole, large-scale wind flow patterns over the Northern Hemisphere increase. Figure 1 shows these connections, with the arctic air moving south, producing low pressure systems and unusually cold winters in the eastern United States.

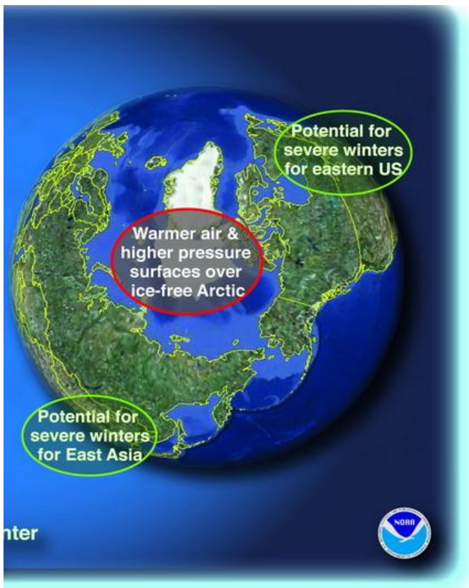

Figure 1. Severe winters in the Eastern U.S. may be related to the large-scale features of change in wind flow and pressure due to the loss of Arctic sea ice. Figure from NOAA.

Recently observed decreases in Arctic sea ice with strong negative AO can explain the Arctic climate feedback and its global connections. Warming is strengthened in the Arctic in response to the earth warming. More open water is exposed during summer, and more heat from the sun is absorbed by the ocean because of this. With warmer temperatures in the Arctic, the process to freeze water is slowed and delayed, resulting in a thinner wintertime sea ice. The increased heat absorbed by the ocean in the summer is released into the atmosphere in the fall, resulting in warming of the atmosphere, and a change in the pressure over the Pole. The core of warmer air and high pressure surfaces above the North Pole can change the overall flow pattern, likely permitting cold Arctic air to transfer southward towards mid-latitudes. Figure 2 explains this Arctic feedback and its global connections.

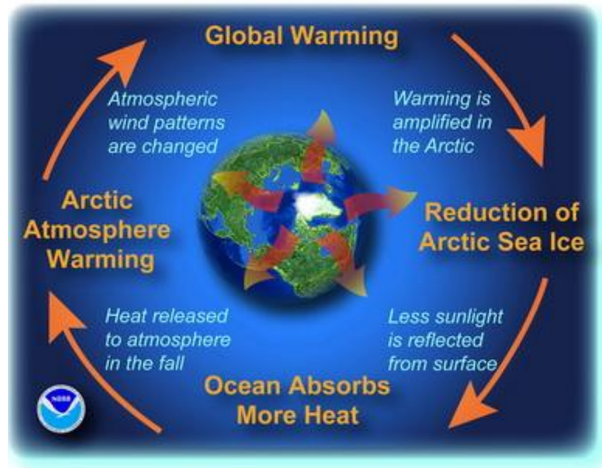

Figure 2. The Arctic climate feedback and its global connections. Figure from NOAA.

It's very important to keep in mind that these large-scale features have only been hypothesized based on a couple of interesting correlations between a strong negative AO and decreased polar ice. Hard evidence that these correlations cause severe winters in the eastern U.S. has not yet been established. Further research can be done. If the trend of severe winters continues, expect big impacts on the economy. Freezing rain and extreme cold, for instance, can bring a loss of electrical power to potentially millions of customers. Heavy snow events put added pressure upon city officials to adequately plan and coordinate road and street plowing, impacting potentially millions of commuters.□

THE SNOWY WINTER OF 2010-11

Evan. L. Heller
Climatologist, NWS Albany

While the climatological winter season is wrapped up, as far the snow and cold goes, it continues. Through the first 9 days of March, the total snowfall for the snow season thus far (since October 1st) was 83.6". This makes the 2010-11 season at least the 15th snowiest on record at Albany. Just 7 inches more will place us in the Top 10, and there is a good month or so of snow season left, as the normal snowfall for March is 10.9", and, for April, 2.9". The 1970-71 season is the snowiest on record. While its 112.5" total is achievable by the end of April, it is not likely. As I was writing this, more snow was in the forecast, but something well short of 7 inches. For the 3 months of climatological winter, the total was 76.2". This was more than 32 inches, or about 75% above the normal for the period (Table 1). The precipitation for the climatological winter season was only about 18% above normal, suggesting more of it was in the form of snow than is normal. December snowfall at Albany was actually slightly below normal. The amounts for January and February combined were more than twice the normal. There were 8 notable snowfall dates of 3.5" or more during the season (Table 2b), including 2, on January 12th and February 25th, that pulled in over 10 inches of snow apiece. The January 11-12 event totaled 13.4", making it Albany's 10th Greatest January snowstorm. The New York City Tri-State-crippling after-Christmas-Day snowstorm narrowly missed having the same impact on the Greater Capital Region as it had down there. That said, Albany still received 8.5" from this storm. The southern portion of our Forecast Area received the brunt of the impact. Amounts dropped off significantly to the north and west of Albany.

The records produced by all the snow (Tables 3b and 3c) include a daily record for January 12th, the 6th snowiest January and 14th snowiest month (January), and the 10th Greatest January snowstorm, as previously mentioned. February was almost as snowy as January, and was higher on the list for that month, at number 5. It is Albany's 28th all-time snowiest month. There were other records, related to the cold. All occurred in January. There was a 21-day deep freeze smack in the middle of the month, including the one double-digit below zero date, on the 24th. The month, with its 20.5° mean, was tied for 94th coldest month of all-time. There was just one other record for the season, a daily precipitation record on December 1st (Table 3a). There was even a little thunder thrown into the equation (Tables 4a-4c), with a thunderstorm recorded at Albany on February 5th. Other thunderstorms were in the area on December 1st.

Summing up the season in Albany, Winter 2010-11 was only about a couple of degrees below normal, but snowfall approached double the normal.

STATS

	DEC	JAN	FEB	SEASON
Avg. High/Dep. From Norm.	32.6°/-3.4°	27.4°/-3.7°	34.0°/-0.3°	31.3°/-3.0°
Avg. Low/Dep. From Norm.	19.2°/-0.9°	13.6°/+0.3°	13.8°/-1.9°	15.5°/-0.2°
Mean/ Dep. From Norm.	25.9°/-2.1°	20.5°/-1.7°	23.9°/-1.1°	23.4°/-1.6°
High Daily Mean/date	48.5°/1st	43.0°/1st	51.0°/18th	
Low Daily Mean/date	13.5°/15th	-4.0°/24th	10.5°/11th	
Highest reading/date	60°/1st	50°/1st	60°/18th	
Lowest reading/date	6°/15th	-13°/24th	-5°/11th	
Lowest Max reading/date	20°/14th, 26th & 27th	5°/24th	16°/1st	
Highest Min reading/date	37°/1st	36°/1st	42°/18th	
Ttl. Precip./Dep. Fm. Norm.	2.95"/+0.19"	2.37"/-0.34"	3.87"/+1.60"	9.19"/+1.45"
Ttl. Snowfall/Dep. Fm.Nrm.	11.7"/-1.1"	34.4"/+16.4"	30.1"/+17.4"	76.2"/+32.7"
Maximum Precip./date	1.39"/1st	0.77"/18th	1.11"/25th	
Maximum Snowfall/date	5.3"/27th	12.8"/12th	11.8"/25th	

Table 1

NORMALS, OBSERVED DAYS & DATES

NORMALS & OBS. DAYS	DEC	JAN	FEB	SEASON
NORMALS				
High	36.0°	31.1°	34.3°	33.8°
Low	20.1°	13.3°	15.7°	16.4°
Mean	28.0°	22.2°	25.0°	25.1°
Precipitation	2.76"	2.71"	2.27"	7.74"
Snow	12.8"	18.0"	12.7"	43.5"
OBS TEMP. DAYS				
High 90+°	0	0	0	0/90
Low 70+°	0	0	0	0/90
High 32-°	19	26	14	59/90
Low 32-°	30	30	27	87/90
Low 0-°	0	4	2	6/90
OBS. PRECIP DAYS				
Days T+	21	25	19	65/90/72%
Days 0.01"+	6	13	11	30/90/33%
Days 0.10"+	5	5	8	18/90/20%
Days 0.25"+	4	3	5	12/90/13%
Days 0.50"+	2	2	4	10/90/9%
Days 1.00"+	1	0	1	2/90/2%

Table 2a

NOTABLE PRECIP & SNOW DATES	DEC	JAN	FEB
1.00"+ value/date	1.39"/1st	-	1.11/25th
3.5"+ snow value/date	5.3"/27th	5.4"/7th	5.4"/1st
3.5"+ snow value/date	-	12.8"/12th	5.4"/2nd
3.5"+ snow value/date	-	3.9"/18th	11.8"/25th
3.5"+ snow value/date	-	4.6"/21st	-

Table 2b

RECORDS

ELEMENT	DECEMBER	
Precipitation/Date|Prev. Rec./Yr.	1.39"/1st	0.76"/1880

Table 3a

ELEMENT	JANUARY	
Snowfall/Date|Prev Rec./Yr.	12.8"/12th	10.2"/1996
Top Ten Snowiest Month Value/Rank|Remarks	34.4"/#6	-
Top 100 All-Time Snowiest Month Value/Rank|Remarks	34.4"/#14	-
All-Time Top 10 Snowstorm For Month/Date(s)|Rank	13.4"/11th-12th	#10
Deep Freeze Dates (10+ Days with High Temperatures of 32° or below)|# Days	6th-26th	21
-10 Degree Date|Value	24th	-13°
Top 200 All-Time Coldest Month Value/Rank|Remarks	22.2°/#94	6-way tie

Table 3b

ELEMENT	FEBRUARY	
Top Ten Snowiest Month Value/Rank|Remarks	30.1"/#5	-
Top 100 All-Time Snowiest Month Value/Rank|Remarks	30.1"/#28	-

Table 3c

ELEMENT	WINTER	
(none)	-	-

Table 3d

MISCELLANEOUS

DECEMBER

Avg. wind speed/Dep. Fm. Norm.	9.6 mph/+1.0 mph
Peak wind/direction/date	51 mph/W/1st
Windiest day avg. value/date	20.4 mph/27th
Calmest day avg. value/date	1.6 mph/18th
# Clear days	1
# Partly Cloudy days	18
# Cloudy days	12
Dense fog dates (code 2)	26th & 27th
Thunder dates (code 3)	-
Sleet dates (code 4)	-
Hail dates (code 5)	-
Freezing rain dates (code 6)	12th, 28th & 29th

Table 4a

JANUARY

Avg. wind speed/Dep. Fm Norm.	6.4 mph/-2.5 mph
Peak wind/direction/date	39 mph/W/9th
Windiest day avg. value/date	16.0 mph/9th
Calmest day avg. value/date	1.1 mph/25th
# Clear days	1
# Partly Cloudy days	17
# Cloudy days	13
Dense fog dates (code 2)	12th
Thunder dates (code 3)	-
Sleet dates (code 4)	18th
Hail dates (code 5)	-
Freezing rain dates (code 6)	18th

Table 4b

FEBRUARY

Avg. wind speed/Dep. Fm Norm.	8.4 mph/-0.8 mph
Peak wind/direction/date	53 mph/W/19th
Windiest day avg. value/date	22.0 mph/19th
Calmest day avg. value/date	1.7 mph/23rd
# Clear days	4
# Partly Cloudy days	12
# Cloudy days	12
Dense fog dates (code 2)	1st, 12th & 25th
Thunder dates (code 3)	5th
Sleet dates (code 4)	2nd, 5th & 25th
Hail dates (code 5)	-
Freezing rain dates (code 6)	2nd, 5th & 6th

Table 4c□

SEVERE WEATHER SEASON…
IS FAST APPROACHING!
SPRING SKYWARN SESSIONS WILL SOON BE POSTED

Check our website for up-to-date information

A LOOK AT ALBANY'S NEW 30-YEAR CLIMATE NORMALS

Evan L. Heller
Climatologist, NWS Albany

Ingrid Amberger
Senior Meteorologist, NWS Albany

A preliminary set of new 30-year climate normals for Albany has been compiled by National Weather Service Albany's Climate Services Program Leader, Ingrid Amberger. Every ten years, the National Climatic Data Center (NCDC) branch of the National Environmental, Satellite, Data, and Information Service (NESDIS), under the National Oceanic and Atmospheric Administration (NOAA), revises its 30-year climate normals for each of its official climate data locations throughout the country and its territories, based on accrued daily and monthly climate data from these sites, into a publication called *Climatography of the United States*. In doing so, the first ten-year period of the previous 30-year normals is dropped, and the latest 10-year period is figured in. The new 30-year normals run from 1981 to 2010. Normals are not merely averages of the period involved, but are a more smoothed over representation of the numbers. In anticipation of the official figures due out in the near future, Ingrid researched the climate numbers for Albany using official annual NOAA publications of *Local Climatological Data*, and incorporated this data into color bar graphs, with comparisons to the previous normals. Albany International Airport is the official source of the Albany climate data for the entire 30-year period. Internally, we now have a sneak peak at the preliminary new figures. The data has been examined, and following will be a brief overview of some of the climate changes of note. Unfortunately, because the data is, as yet, unofficial, the graphs and numbers could not be posted here at this time.

The mean annual temperature for the 1981-2010 period is showing that there was slight warming compared to 1971-2000…basically just a little under one degree Fahrenheit. Broken down by month, all twelve calendar months showed a temperature increase of at least 0.1 degree…with the months from June to August averaging the greatest increase…just about one degree. Precipitation has increased a little (less than an inch)…but snowfall is down by just over 2 inches. This opposing trend in the two parameters might just best be explained by the warming trend. Most of the twelve months averaged drier, although arguably, this was statistically insignificant for two of the months. October, and particularly July, stand out as having the greatest trend toward being wetter with the new numbers. The latter month averaged more than a half inch wetter. As for the snow, all months are about as snowy, or slightly less snowy, than what was normal for 1971-2000…except for December, which was just under an inch snowier.

Climatography of the United States provides normals of maximum, minimum and average temperatures, heating and cooling degree days, and precipitation, by month, season and year, with an individual publication for each site. The annual *Local Climatological Data (LCD)* publication, which provides both normals and real-time data for a given location, adds to this the 30-year normals of relative humidity and snowfall, but this publication does not provide seasonal breakdowns of its data. In addition, though, it also provides monthly and annual means and extremes data. Like *Climatography of the United States*, *LCD*, too, is published for individual sites, and thus is not a collective publication. Both of these publications are available to the public from NOAA for a fee. The new NCDC normals will be available in *Climatography of the United States, No. 84, 1981-2010*, expected to be officially deployed to National Weather Service field offices in June of this year. Until then, the 1971-2000 data is still in official use.□

SCHOOL SAFETY PLAN

Brian Montgomery
Senior Meteorologist, NWS Albany

Your NOAA National Weather Service is committed to assisting schools and communities in providing a safe environment when hazardous weather strikes. A school safety plan is a community issue that involves collaboration amongst the National Weather Service, schools, emergency response agencies, parents and the community. This is an enhanced safety plan that contains weather information to assist schools and communities in developing, implementing and strengthening their school safety plans in preparation for hazardous weather. An integrated school safety plan takes an all-hazards approach. The plan should educate students on hazardous weather, prevention, response, and planning for weather emergencies, as a first component of the plan. However, some emergencies or disasters cannot be prevented. In such cases, a second component, emergency response and emergency operations plans, are necessary to ensure an effective response.

By having an emergency response plan in place, schools will minimize the impact of an emergency or disaster due to weather. It is important for all involved response entities to coordinate and plan their activities in advance. Meteorologists can assist with prevention programs and emergency response plans. Please use this guide,
http://www.erh.noaa.gov/er/aly/Special/School%20Weather%20Safety%20Plan.pdf,
available from our web page, to begin the process of incorporating weather safety into your emergency action plans. If you have any questions, please contact our office or your local emergency manager for additional information. We will work together and save lives!□

From the Editor's Desk

It was a very busy winter. Lots of snow…lots of warnings…and now lots of flooding as we segue into spring. This is a sparse issue owing in part to the limited time our staff had available to work on articles. With this edition, our StormBuster Miniseries goes on a temporary hiatus, as there simply was no opportunity for our Countytop Weather author to explore new peaks. But he has assured us more interesting hikes will be detailed in the summer issue.

We open this issue with a contribution from our 2010-2011 Student Career Experience Program Intern, Rihaan Gangat, who examines large-scale features which may have played a part in producing our brutally snowy winter. Then, we look at the numbers and the records for the season here at Albany. Next, Brian Montgomery introduces us to a guide for developing a severe weather emergency plan for schools. And finally, we get a peek at the new 30-year climate normals for Albany. More cold weather appears to be heading this way for late March. But before long, parks, festivals, swimming pools, outdoor sporting and concert venues, and ice cream shops will be bustling with activity. We hope you enjoy this issue of Northeastern StormBuster, and the warm weather to come.□

Tulip Festival, Albany, New York

Troy Country Club, Brunswick, New York

Aerial view, Schoharie County, New York

WCM Words

Steve DiRienzo
Warning Coordination Meteorologist, NWS Albany

Severe Weather Awareness Week in eastern New York and western New England is May 1-7, 2011. Although the peak in severe weather for our area usually occurs in July, severe weather occurs frequently from May through August.

In 2009, the last year statistics were available for the United States, severe weather was responsible for 77 deaths and 811 injuries. Lightning caused the most deaths, while tornadoes caused the most injuries. Flash floods were the number two severe weather killer.

On a positive note, for the period ending in 2009, the ten year average number of deaths due to severe weather is lower than the 30 year average. Awareness, preparedness, training, and cooperation between the National Weather Service, emergency management agencies and trained spotters has helped increase warning lead time and verification, and aided in the protection of life and property. Our thanks to all those who assist us.

Remember, 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

SOON TO COME…

SPRING SKYWARN TRAINING SCHEDULE

Check our webpage for updates