SKYWARNEWS

National Weather Service State College, PA

Spring 2011

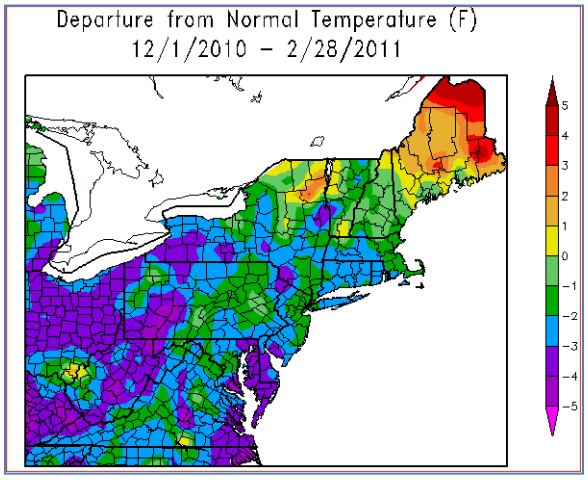
"Working Together To Save Lives"

Winter in Review

John La Corte, Senior Forecaster

Unlike last winter that started with record snows as early as mid October, this past winter took its time moseying on in but as of late Spring has yet to totally release its grip on the region.

For ease of record keeping, the traditional meteorological winter consists of the months of December, January and February. This year will be best known more for prolonged and pretty much relentless cold, but not necessarily for record setting chill.



Temperature

Figure 1 Temperature Departures Winter of 2010-11

The region ended up averaging just below normal temperature-wise over eastern areas…ranging to between 4 and 5 degrees colder than normal over the Laurel Highlands (Fig 1.)

While the winter was overall chillier than normal, much of it was "front-loaded" with the temperatures in February actually rebounding and averaging a bit above normal over about the southern 2/3 of the region. However it was not enough to tilt the scales back into the mild column making it the second winter in a row of below normal temperatures over most of our forecast area.

Precipitation

Winter precipitation ranged from slightly below normal over the southeastern portion of the region to slightly above normal in the northwest (Fig 2.)

Precipitation varied month by month with only January showing a clear dry signal with much of the central part of the state ending up much below normal. In general however the area that was most consistently drier than normal was over southeastern Pennsylvania.

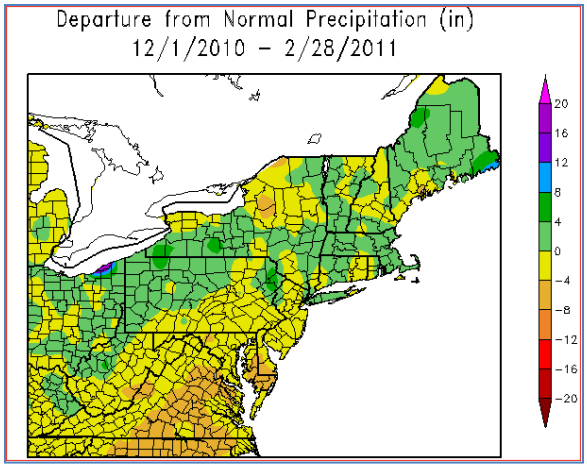


Figure 2 Precipitation Departures Winter 2010-11

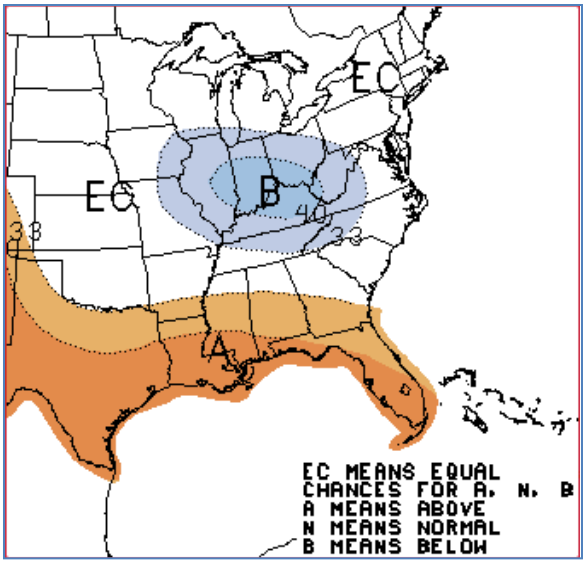


Figure 3. Summer Seasonal Temperature Outlook

Snowfall

Other than lake effect snows which were at times significant in the usual snow-belt areas of the northwest and parts of the Laurel Highlands, the two biggest snowstorms of the season that mostly had eastern areas in their sites arrived roughly a month apart in December and January. The first storm dropped about a foot of snow around the Philadelphia metro area on the day after Christmas, and the second nearly a foot and a half of snow on the 26th and 27th of January.

While eastern parts of the state saw the visits from the nor'easters, central Pennsylvania saw its snowfall arrive at the hands of many smaller systems, none dropping particularly significant amounts of snow at any one time. For the season our climatalogical sites ended up within just a few inches either side of seasonal normals unlike last winter when most areas ended up much above normal.

Seasonal Outlook

After the long winter we always take heart in the lengthening days and the arrival warmer weather, wondering what the upcoming summer might hold in store for us.

Last summer it might be recalled was long and hot. After the cold winter of 2009-10, temperatures flipped over to warmer than normal early in the spring and remained so through most of the fall months as well.

This year we see a weakening La Niña in the equatorial Pacific. While the "signal" over much of the northeastern US during La Niña (colder than normal in the equatorial Pacific) or El Niño (warmer than normal…) years is generally weak, there are some indicators as to which way things may lean during the upcoming months. With this pattern indications are for temperatures to favor being slightly below normal on average over much of the Ohio Valley into the lower Great Lakes (Fig 3.). Here in central Pennsylvania however the official forecast is labeled as "EC" or equal chances. That means the local signal is sufficiently weak there is no real skill added to the forecast even after accounting for the La Niña.

As far as precipitation is concerned, most of Pennsylvania once again finds itself encompassed by an "EC". The further east and north one goes, there appears to be an increasing chance that the summer will be on the wet side (Fig 4.).

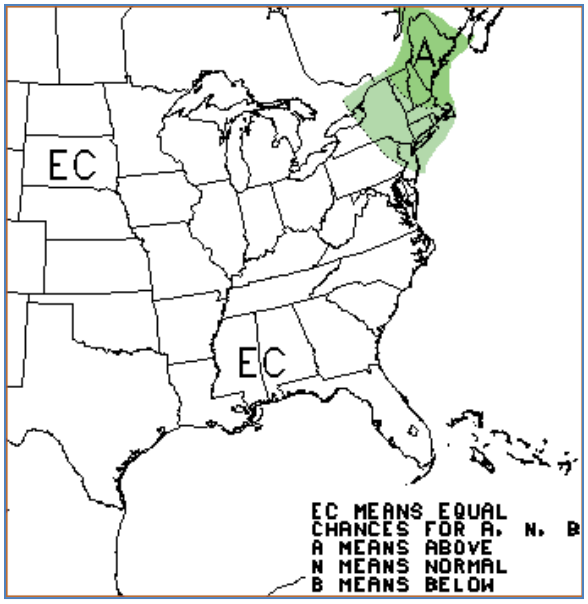


Figure 4. Summer Seasonal Precipitation

The Tropics

Another seasonal forecast that many look forward to at this time of year is what the expected upcoming hurricane season might be like. Traditionally La Niña years favor an active season in the Atlantic Basin and this especially held true last year.

During an average year there are 9 or 10 named storms (9.6 officially) with roughly 6 of those reaching hurricane strength. Last year there were a whopping 19 named storms with 12 that reached hurricane strength. The US dodged a bullet however as we were spared any major storms making landfall. Other than a couple of tropical storms that affected southern Florida and Texas (Bonnie and Hermine), the strongest storm that moved closest to the mainland was Earl that was a major hurricane as it neared the outer banks of the Carolinas before re-curving just offshore and heading over Nova Scotia. While there was heavy rain and beach erosion, the coastal areas missed the brunt of the storm as it churned north away from the mainland.

While the La Niña is forecast to continue to weaken, it is still expected to be the dominant pattern throughout the summer months. NOAA will release its official seasonal forecast later in the spring but already the team forecasters from the Colorado State University predicts another active year. Their forecast is below.

Atlantic Basin Hurricane Season Forecast 2011

	Normal	Forecast
Named Storms	9.6	17
Hurricanes	5.9	9

Whatever transpires, here's hoping we all enjoy the upcoming season and we look forward to the next issue of the newsletter this fall.

Meteor Shower Gazing Spring through Fall of 2011

Barry Lambert, Senior Forecaster

Lucky Star by Madonna, Bon Jovi's Blaze of Glory, Man on the Moon by REM, Southern Cross from Crosby Stills & Nash, and Golden Earring's 1982 hit – Twilight Zone. These are just a few popular (but perhaps not so familiar) pop/rock songs from the 1980s and 1990s that you may consider listening to (and having a little fun with) while scanning the night sky for the fleeting and elusive streak of a meteor.

So, what exactly are meteor showers? Well, they're actually caused by debris from comets. As comets orbit the Sun, they shed an icy, dusty debris stream along their orbit. If the Earth travels through this stream, we will see a meteor shower. Depending on where Earth and the stream meet, meteors appear to fall from a particular place in the sky, maybe within the neighborhood of a constellation. They blaze through the Earth's upper atmosphere at speeds generally between 15 and 30 miles per second!

Meteor showers are named for the constellation from which meteors appear to fall, a spot in the sky astronomers call the "radiant". For instance, the radiant for the Leonid meteor shower is located in the constellation Leo. The Perseid meteor shower is so named because meteors appear to fall from a point in the constellation Perseus.

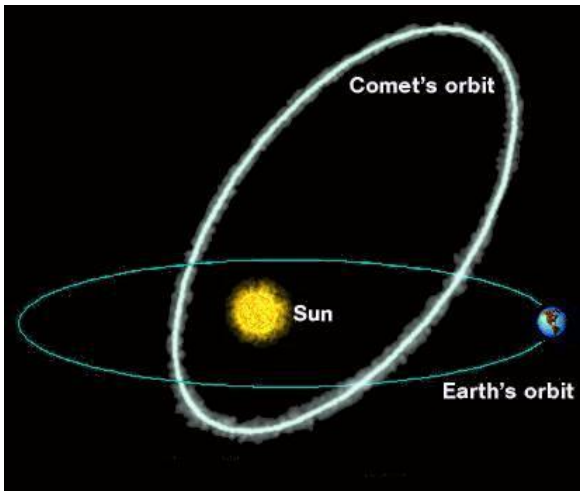


Figure 1 Earth's orbit intersecting the debris from a comet orbiting the sun, leading to a meteor shower

How can I tell that the sky is dark enough to see meteors?

If you can identify and see each star of the Little Dipper, your eyes have become "dark adapted," and the spot you've chosen to star gaze is likely dark enough. Under these conditions, you will be able to see plenty of meteors.

What should I pack for meteor watching?

Treat meteor watching like you would the 4th of July fireworks. Pack comfortable chairs, bug spray, food and drinks, blankets, plus a red-filtered flashlight for reading maps and charts without ruining your night vision. Binoculars are not necessary. Your eyes will do just fine.

Here are some more details about each of the meteor showers listed above.

The April **Lyrids** are known for their luminous dust trains that can often linger for several seconds. Another minor meteor shower with Lyra as its radiant (and known as the June **Lyrids**) occurs from June 14-16. The rate of this shower is only about 10 per hour.

Late July's **Delta Aquarids** produces 10-20 yellow-colored meteors per hour. Occurring almost simultaneously during July 29-30 are the **Capricornids**. They too are often yellow in color, but frequently quite bright. Although their frequency is lower with a rate of about 15 per hour, their slower speed often affords better viewing, and occasionally produces a brilliant "fireball".

The **Perseids** of mid August are typically one of the top 2 meteor showers each year. They streak across the sky at an average rate of around 1 per minute.

The **Draconid** meteor shower during the second week of October displays one of the lower fall rates (only 6 to 10 per hour). However, in 1992 one of these meteors that made it too earth's surface before burning up, actually bounced of the hood of a car in upstate New York!

The **Orionids** of October 21-22 is one of the more colorful events, displaying yellow and green meteors. This shower also

Principal Meteor Showers

SHOWER	BEST VIEWING	POINT OF ORIGIN	DATE OF MAXIMUM*	NO. PER HOUR**	ASSOCIATED COMET
Quadrantid	**Predawn**	**N**	**Jan. 4**	**25**	—
Lyrid	Predawn	S	Apr. 22	10	Thatcher
Eta Aquarid	Predawn	SE	May 4	10	Halley
Delta Aquarid	Predawn	S	July 30	10	—
Perseid	**Predawn**	**NE**	**Aug. 11–13**	**50**	**Swift-Tuttle**
Draconid	Late evening	NW	Oct. 9	6	Giacobini-Zinner
Orionid	Predawn	S	Oct. 21–22	15	Halley
Taurid	Late evening	S	Nov. 9	3	Encke
Leonid	Predawn	S	Nov. 18	10	Tempel-Tuttle
Andromedid	Late evening	S	Nov. 25–27	5	Biela
Geminid	**All night**	**NE**	**Dec. 13–14**	**75**	—
Ursid	Predawn	N	Dec. 22	5	Tuttle

May vary by one or two days* ***Moonless, rural sky* **Bold = *most prominent*

Table 1 Approximate dates and times for this year's meteor showers over the Lower 48 states. Also listed are the directions in the sky to look for their origin (radiant).

contains the swiftest of all meteors, with the comet debris chunks zipping across the sky at nearly 42 miles per second, or over 150,000 mph!

November's **Leonids** are well-known for their 33-year peaks. These incredible events feature hundreds of meteors per hour. Unfortunately for us, we'll have to wait about another 23 years to witness a similar display, since the last peak was in 2001.

The year's notable events will close out with the **Geminids** on December 13-14. This is typically the "most reliable" (and colorful!) show each year. The Geminids contain multi-colored trails with 65% being white, 26% yellow, and the remaining 9% blue, red and green.

Some links to star charts (created for ~40 deg North Latitude) that will help you to locate the radiant (and constellation) of each meteor shower are listed here.

http://starryskies.com/The_sky/constellations/spring_skies.html

(for Spring events)

http://starryskies.com/The_sky/constellations/summer_skies.html

(for Summer events)

http://starryskies.com/The_sky/constellations/winter.html

(for Autumn and Winter)

What on earth is a Bolide meteor?

A fantastic and highly rare daytime fireball was witnessed by many people throughout the northeast Megalopolis (from near Baltimore and Washington…to New York City and Boston) around lunchtime on February 14, 2011. This Bolide meteor tracked across the sky from northwest to southeast at 12:40 pm EST. The image below illustrates how the information submitted by eyewitnesses is used to plot the exact path of the fireball.

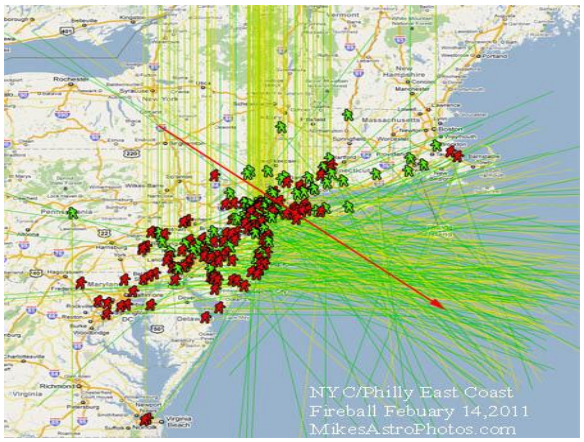


Figure 2 Plotted tracks of the meteor from observers in the Middle Atlantic Region and Southern new England

Figure 3 Possible returns from the meteor as viewed by the National Weather Service Doppler Radar Mount Holly New Jersey (KDIX).

The "red person" symbol (Fig 2) means the witness saw the meteor traveling left to right. The green symbol means the person saw the meteor traveling right to left. The green line is the direction the witness first saw the fireball. The yellow line is where they last saw it. The red line is an approximation of the path of this

fireball based on early reports. Over 230 observations of the NYC February 14th fireball have been submitted to the AMS website making 2/14/11 NYC/Philly Meteor the 2nd most reported meteor of all time, second only to the Wisconsin Meteor of 2010.

Bill Cooke from NASA's meteoroid office noted this about the meteor. "We did pick up this event at the Bermuda station, with the back azimuth consistent with the Doppler radar as reported by Mark Fries. **Energy estimate is ~10 tons TNT, which equates to ~0.9 m diameter rock, with a mass of about 850 kg.**"

Figure 4 Mike Hankey, who's an avid meteor photographer and meteor hunter (and manages the website – mikesastrophotos.com) stands by meteor that's roughly equivalent in size to the one on 2/14/11.

http://www.mikesastrophotos.com/comets/daytime-fireball-makes-waves-in-philly-2011-02-14/

Figure 5 Photo of a "Bolide" meteor (similar in size to the one in Figure 4) taken on March 2, 2010 in the United Kingdom

Other highly interesting information can be found on these links.

http://stardate.org/nightsky/meteors

http://www.almanac.com/content/meteor-showers-guide

http://starryskies.com/The_sky/events/meteors/origin.html

Protect Yourself from the Summer Heat

(Taken from NOAA's Safety Talk and Tips)

The summer season poses a special hazard for those working outdoors or in buildings that are not air conditioned who need to protect themselves from dangerous combination of heat and humidity.

If your body is not able to maintain a normal temperature, heat related illnesses and even death can occur. Here is a list of factors that

make it hard for your body to maintain a normal temperature.
• Hot temperatures
• High humidity
• Direct sunlight
• Little or no air movement
• Physical exertion
• Poor physical health
• Some medications

DEFINITIONS
The following are some terms that are used to describe various levels of a heat related illness.

Heat Cramps: Occurs as a result of hard physical labor and is attributed to an electrolyte imbalance. In many cases this occurs due to lack of water replenishment which degrades the cooling mechanism of the body.

Heat Exhaustion: Occurs as a result of a combination of excessive heat and dehydration which could result in fainting or heat collapse. Warning signs and symptoms include headache, nausea, dizziness, weakness, thirst, and possibly giddiness.

Heat Stroke: This most serious heat related illness occurs as a result of an increase in body temperature to critical levels. This is a medical emergency that could result in death! The primary signs and symptoms include confusion, irrational behavior, loss of consciousness, convulsions, hot skin, an abnormally high body temperature and usually a lack of sweating. If a person shows signs of heat stroke, seek medical attention immediately by calling 911.

Here are some tips that can reduce your chance of a heat related illness

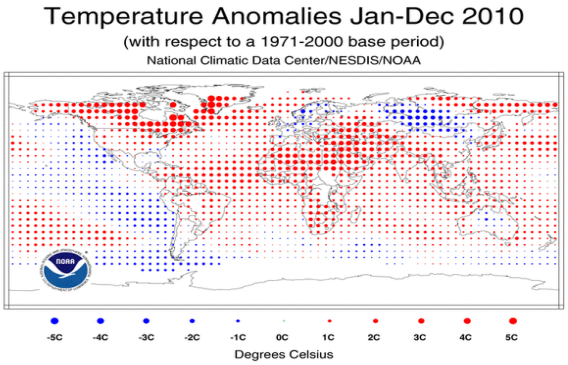
• Wear lightweight, light colored, loose-fitting clothes.
• Drink at least one cup of water every 15 minutes.
• At the most only eat only a small meal before working outside.
• Avoid caffeine, alcohol or large amounts of sugar.
• Reduce physical exertion.
• Take frequent breaks, preferably in the shade or an air conditioned building.
• Avoid being in the sun as much as possible.
• Work outside during the early morning hours rather than the middle of the day. Or better yet, work in an air conditioned building on days when the heat index is expected to be 105 degrees or greater.
• Slowly increase the time spent in high heat and humidity conditions so that your body can adapt.
• Know the signs and symptoms of heat related illnesses.

2010 Tied For Warmest Year on Record

(NOAA News)

According to NOAA scientists, 2010 tied with 2005 as the warmest year of the global surface temperature record, beginning in 1880. This was the 34th consecutive year with global temperatures above the 20th century average. For the contiguous United States alone, the 2010 average annual temperature was above normal, resulting in the 23rd warmest year on record.

This preliminary analysis is prepared by scientists at NOAA's National Climatic Data Center in Asheville, N.C., and is part of the suite of climate services NOAA provides government, business and community leaders so they can make informed decisions.



For the full report check:
http://www.noaanews.noaa.gov/stories2011/20110112_globalstats.html

Japan Tsunami Mar 11, 2011

(Taken from NOAA's Science on a Sphere at: http://sos.noaa.gov/datasets/Ocean/japan_tsunami.html)

On March 11, 2011 at 2:45 p.m. local time, a 9.0 magnitude earthquake occurred 81 miles (130 km) off the east coast of Sendai, Honshu, Japan, triggering a massive tsunami. A tsunami is a series of ocean waves generated by sudden displacements in the sea floor, landslides, or volcanic activity. In the deep ocean, the tsunami wave may only be a few inches high. The tsunami wave may come gently ashore or may increase in height to become a fast moving wall of turbulent water several meters high. Forecasted wave heights in Japan were up to 66 ft (20 m) and there were many reports of tsunami waves three stories high in parts of Japan. Across the Pacific Ocean, many countries issued evacuations along the coasts because of the predicted tsunami waves. Propagation of the tsunami was computed with the NOAA forecast method using the MOST (Method of Splitting Tsunami) model with the tsunami source inferred from DART data. Approximately 25 minutes after the earthquake, the tsunami was first recorded by one of the DART buoys.

The NOAA Center for Tsunami Research (http://nctr.pmel.noaa.gov/honshu20110311/) located at NOAA PMEL in Seattle, WA runs the MOST model and produced this dataset. The main objective of the forecast model is to provide an estimate of wave arrival time, wave height and inundation area immediately after a tsunami event. Tsunami forecast models are run in real time while a tsunami is propagating in the open ocean; consequently they are designed to perform under very stringent time limitations. In addition to the forecasted 66 ft wave heights, the model also shows over 130 ft (40 m) of runup, which is the highest topographic elevation that the tsunami reaches. Observations have confirmed the run-up height of 130 ft in parts of Japan. As the tsunami radiated out from Japan, it encountered the complex topography and bathymetry of sea floor, causing the wave to scatter and reflect. After 8 hours, the tsunami hit Hawaii and after 9.5 hours, the tsunami made landfall on the west coast of the United States. At the 16 hour mark, the tsunami wave entered the Indian Ocean and at the 22 hour mark, the wave had propagated throughout the entire Pacific Ocean and was an incredibly complex wave due to the varied topography and bathymetry of the sea floor. The yellow dots mark the locations of the DART buoys. The final frames of this dataset show the maximum wave amplitude and the arrival time of the tsunami wave. Other Japan Tsunami datasets are available at

http://sos.noaa.gov/datasets/Ocean/japan_quake_tsunami.html.

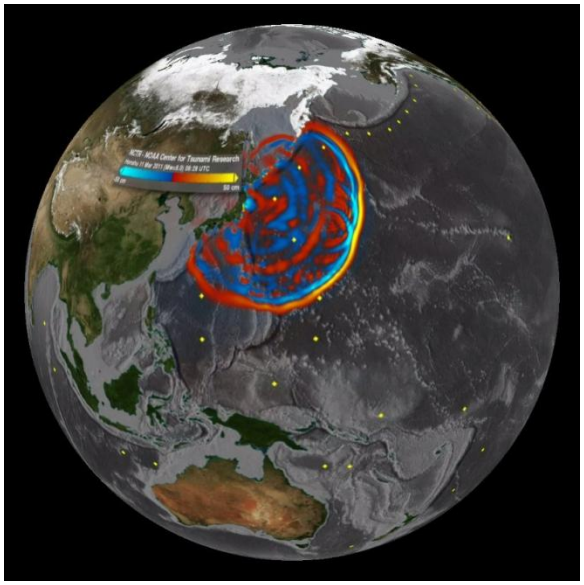


Figure 1 Wave propagation from the Japan Earthquake

Social Media and the National Weather Service

Social media broadly describes online tools used to share and spread information through social interaction. This mode of dissemination, based on real-time simple publishing techniques online, relies as much on the audience as the publisher. Social media provides a platform from which content transforms into community.

At a time in our history when people prefer to be part of the conversation, and continue to reject the idea of being "talked at" by the government, the government is turning to social media to share news and information with the public, unlocking the mysteries that once surrounded our programs and activities and truly being more open. Learn more about social media in government.

NOAA is using social media tools to share information and greatly increase the potential for better understanding for all about our oceans, coasts, climate and weather sciences. To provide a forum for the public to interact with and help define NOAA's path is a very exciting prospect for the agency.

The National Weather Service is now on Facebook.

Facebook fan pages lets users create their own sets of "fans" among whom they share brief updates, photos, links, or other information. NOAA's Facebook fan pages offer users a place to follow updates and share information. Visit us at:

http://www.facebook.com/US.National.Weather.Service.gov

NOAA's National Weather Service is the U.S. Federal agency responsible for weather, water & climate forecasts & warnings. For the official source of information about the National Weather Service and weather forecasts, warnings and advisories, please visit our homepage at http://www.weather.gov.

Just one example of one of the services we provide is the forecasts from the Storm Prediction Center. Beyond forecasting the potential for severe weather, it has a nice suite of Geographic Information System (aka GIS) data on severe weather. Figure 1shows tornado tracks with EF scale colors. The importance of producing such data is that it allows other users to incorporate a wide variety of data (population, roads, building locations, etc) to answer impact questions very quickly or do other necessary studies. http://www.spc.noaa.gov/gis/svrgis/

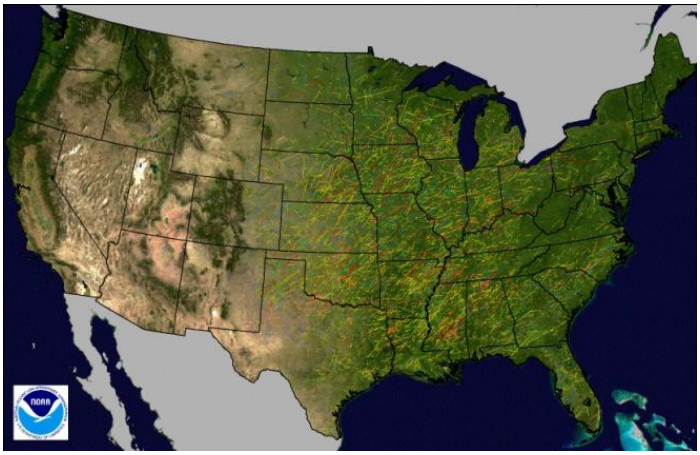


Figure 1 Tornado track and EF scale plots

We also have a presence on Twitter, You Tube and a variety of RSS (Really Simple Syndication) feeds used to publish frequently updated digital content. You can connect to all of these via your home or work computer as well as your smart phone. It's a high tech wired world and we hope to see you there online!

Update your spotter contact information

Bill Gartner, General Forecaster

Please help us to keep your contact information up to date. While we hope to get a report from you when severe weather occurs, from time to time we call or email spotters to investigate significant storms. Thus, it is important to keep your contact information current. If any of your contact information (name, phone number/s, addresses, etc) has changed recently, please let us know. Send an email or 'snail mail' note to us at one of the addresses below.

Email: william.gartner@noaa.gov

U.S. mail:

William Gartner/Skywarn Spotter update
NWS/WFO State College
328 Innovation Blvd, Rm #330
State College, PA 16803

If you are not sure that we have the most up to date information on file, go ahead and send us an email or note with your current information anyway and we will verify it.

Please note that your personal information (address, phone #, email mail address, etc) is NOT shared with or given to anyone else outside of the NWS (unless your permission is gained first) and is used only to contact you in the event of severe weather, send you SkywarnNews, or communicate important program changes.

Go Green…Save a tree

In our continuing efforts to save natural resources (by using less paper) and conserve government resources (by reducing printing and mailing costs), we provide spotters the option of being notified by email when a new issue of SKYWARNEWS is available. Instead of getting SKYWARNEWS in the mail, you can read it online or download and print it if you choose.

If you currently get the printed version and would like instead to be notified by email, send an email to william.gartner@noaa.gov and include 'SKYWARNEWS via email' or something similar in the subject line. Please be sure to include your name, spotter ID # and the county in which you live in the body of the email.

Warm season reporting criteria:

For your convenience, a list of reporting criteria is available on our web page, *www.weather.gov/statecollege*. Click on "Send Us Reports" in the left-hand column. It is the fourth selection under the Current Hazards header.

- Tornadoes or funnel clouds (be very wary of look-alikes; watch for rotation)
- Wall clouds, especially if they are rotating
- Hail of any size (Please be specific with regard to size when you call)
    - Quarter-Size (1") and larger is severe!

Other sizes/descriptions to use for hail:

* Pea 0.25 - .375 inch
* Small marble 0.50 inch
* Penny 0.75 inch
* Nickel 0.88 inch
* Quarter 1.00 inch (15/16")
* Half dollar 1.25 inch
* Walnut/Ping Pong 1.50 inch
* Golf ball 1.75 inch
* Lime 2.00 inches

* Tennis Ball 2.50 inches
* Baseball 2.75 inches
* Large Apple 3.00 inches
* Softball 4.00 inches
* Grapefruit 4.50 inches
* Computer CD/DVD 4.75 - 5.00 inches

- Wind Gusts (40 mph or greater; specify whether estimated or recorded)
  - large branches downed (specify diameter of branch)
  - Trees/power lines downed
  - Structural damage to buildings (roof, windows, etc.)
- Rainfall
  - 1 inch or greater in an hour (NOT a 1"/hr. rate for 10 minutes)
  - 2 inches or greater storm total
- Flooding
  - Streams/Rivers -- also, when nearing bank full
  - Street (when more than the usual poor drainage puddles)

Tornado Outbreak of 26-28 April 2011

John La Corte, Senior Forecaster

Just prior to the publication of this edition of the Skywarn Newsletter the eastern United States suffered through its worst tornado outbreak in over thirty years.

While tornadoes in springtime are not rare in the United States, the number and ferocity of storms so far this spring has indeed been noteworthy.

The storm system that spawned the tornadoes starting on April 26th ended up triggering at least 312 twisters with as many as 226 of those forming in the 24 hour period from 8AM on April 27 through 8AM on the 28th. Included in these were at least 6 tornadoes that affected parts of central Pennsylvania. *It is noteworthy that the tornadoes that formed locally occurred largely late at night into the early morning hours, which is very rare for our part of the country.*

While we were lucky to not suffer any fatalities locally, the death toll to our south was staggering with preliminary reports indicating at least 344 people were killed. This represents the largest tornado death toll since April 5-6, 1936 when 454 people were killed from Mississippi to Georgia. 334of those deaths occurred during the 24 hours from 8AM on the 27th through 8AM the 28th. This was the deadliest single day for tornadoes since March 18, 1925 when 747 fatalities occurred across seven southern states.

How could so many die during this day and age of advanced technology when warnings and detections are at an all time best? It is a question that surely will be studied for years to come.

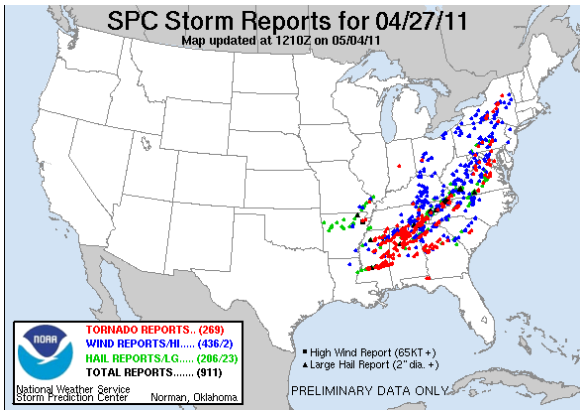


Figure 1 Preliminary SPC Storm Reports for April 27, 2011

SKYWARNEWS

National Weather Service
328 Innovation Blvd

Suite #330

State College, PA 16803

TO: