Photo by Mike Cempa

Inside This Issue:

Spring Frost Dates	Page 2
Weather Review	Page 2
NWS in the Sky	Page 3
Dual-Pol Radar Upgrade	Page 5
CoCoRaHS Corner	Page 6
OPL Retirement	Page 7

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The Coastal Front

Spring 2012

Volume III-1

Portland Wicked Weather Forum

By John Jensenius, Warning Coordination Meteorologist

Come join us at The Portland Wicked Weather Forum which will be held Saturday afternoon, April 7th, starting at 1 pm in the Hannaford Lecture Hall at the University of Southern Maine in Portland. The event is a first of its kind in northern New England and is free and open to the public. All ages are welcome.

The purpose of the forum is to give the public an opportunity to learn more about weather and weather safety, and to introduce some of northern New England's television weather forecasters. Included in the program are talks about hurricanes, tornadoes, lightning, and nor'easters. Also included are talks on Portland and Mount Washington's weather extremes as well as how changing weather conditions could potentially affect water levels along the Maine coast and what can be done to build more resilient coastal communities.

In addition to the talks, the National Weather Service, Maine Emergency Management Agency, Mount Washington Observatory, and other organizations will be available in the lobby to answer questions and provide additional information about the weather and weather safety. No tickets are necessary and seating is on a first come basis. For more information about the forum or directions, please visit our web site at:
http://www.weather.gov/gray/portlandwickedweatherforum.htm

SPRING IS COMING!

By Margaret Curtis, Meteorologist Intern

While spring is on the way and many gardeners may be eager to get their plants started, winter still has plenty of time to make an appearance! The average last freeze date in Maine varies from early May along the coast to as late as the second week of June in sheltered locations in the mountains. In New Hampshire, most of the state south of the notches sees their last freeze by the second week of May while the northern mountains may see a freeze well into June. Mt Washington, NH sees frost year round! Table 1 to the left displays the average last freeze for selected locations.

Portland, ME	May 2
Augusta, ME	April 27
Farmington, ME	May 27
Lewiston, ME	April 26
Sanford, ME	May 10
Concord, NH	May 16
Berlin, NH	May 20
Epping, NH	May 16
Plymouth, NH	May 26
Hanover, NH	May 11
Lakeport, NH	May 8

Table 1: Average Last freeze dates

To assist gardeners and commercial growers the NWS has several products issued during the growing season (before the first killing freeze in fall and after the average last freeze in spring):

Frost Advisory is issued when temperatures are expected to fall between 33F-36F with calm and clear conditions that may result in frost formation.

Freeze Warning is issued when temperatures are expected to drop below 32F.

Winter Weather Review

By Chris Kimble, General Forecaster

Portland continued a warmer-than-normal trend through the winter months. In fact, the number of months with above normal temperatures stretched to 8 in a row. As a whole, the winter months of December, January, and February were the second warmest on record. It was also somewhat drier than normal, with significantly less snowfall.

	HIGH	LOW	AVE	PRECIP	SNOW
December	**42.0 (+4.7)**	**24.6 (+4.2)**	**33.3 (+4.5)**	**3.51 (-0.51)**	**2.5 (-10.7)**
January	**35.4 (+4.2)**	**18.4 (+5.0)**	**26.9 (+4.6)**	**4.29 (+0.91)**	**18.7 (-0.5)**
February	**39.8 (+5.2)**	**21.3 (+4.8)**	**30.5 (+5.1)**	**1.47 (-1.78)**	**2.3 (-9.7)**
Winter 2012	**39.1 (+4.7)**	**21.4 (+4.7)**	**30.3 (+4.7)**	**9.27 (-1.38)**	**23.5 (-20.9)**

Table 2: Winter 2011-2012 climate statistics for Portland.

Most of December was consistently warm, with only a few cold spells. Only one day recorded more than 1 inch of snowfall, December 23, just before Christmas. The warmth continued into January until a more sustained cold spell occurred during the middle of the month. Portland fell below zero three times during the month, with a few significant snowfall events that kept the snow total near normal. But the consistent warmth returned by the end of January and lasted through much of February with very little additional snowfall. Very little snow remained on the ground through the last half of February, which is normally the time when the highest snow depths of the season are observed.

CWSU Serves the Aviation Community

By Stacie Hanes, Senior Forecaster

I visited the Center Weather Service Unit (CWSU) in Nashua, New Hampshire in January 2012 along with our Meteorologist-in-Charge (MIC), Hendricus Lulofs. The CWSU in Nashua, NH, referred to as the Boston CWSU, is one of 21 such offices across the United States. All CWSUs are collocated in the same buildings as Air Route Traffic Control Centers (ARTCCs). The mission of the CWSU is to provide accurate weather information for the Federal Aviation Administration (FAA) so that our airspace is safe and travel flows smoothly.

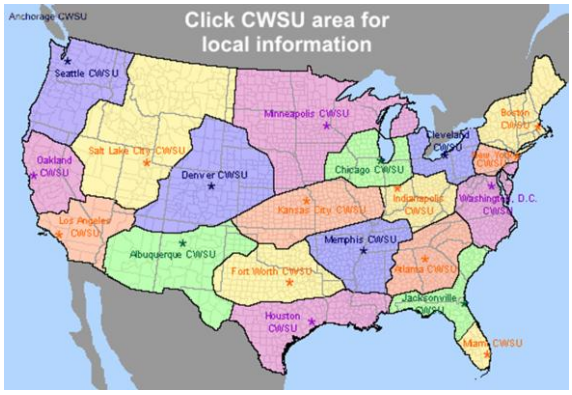

Figure 1: Map of CWSU areas of responsibility. The Boston CWSU covers much of New York and all of New England.

CWSUs are part of the National Weather Service and were formed after the Southern Airways flight 242 crash near Atlanta, GA in 1978. Since then, NWS meteorologists brief FAA controllers in person, giving them the crucial weather information they need to route air traffic safely. The FAA controllers routinely reroute planes based on weather information given to them by CWSU meteorologists.

One of the most important products the CWSU meteorologists issue is the Center Weather Advisory (CWA). The CWA is a short-term warning issued for up to 2 hours for hazardous weather in the area. This may include severe thunderstorms, icing, turbulence, or low-level wind shear. These warnings go out to the entire aviation community including commercial airlines, private pilots, air traffic control towers, and flight service stations. Flight service stations provide information to pilots before, during, and after flights.

Besides giving high-impact, short-term briefings, the meteorologists also give medium-range forecasts, called Meteorological Impact Statements (MISs), which last between 2-12 hours and are used for planning purposes. Forecasts are also conveyed graphically to ARTCCs, Terminal Radar Approach Control (TRACONs), and large airfields. A TRACON is an intermediate facility in charge of approach sequencing for large airports. Seasonally-driven forecast graphics provided by CWSU meteorologists include sea breeze information for Boston, convective forecasts for Boston and Cape Cod, and icing forecasts for Boston.

The Meteorologist-in-Charge of the CWSU, Scott Reynolds, gave us a tour of the entire FAA building, which included the CWSU section, an area for the manager in charge, and 5 FAA sectors. These sectors consisted of different areas of the CWSU's airspace. The Boston CWSU's area includes much of New York and all of New England (see Figure 1), including Boston Logan Airport, the New York City area airports, and the Portland Jetport.

Dual-Pol Radar Upgrade

By Chris Legro, General Forecaster

As part of a nationwide upgrade to the radar network, the National Weather Service in Gray will be receiving an exciting new piece of equipment this summer. The dual-polarization (dual-pol for short) radar upgrade will add fourteen new radar products to the existing ones, and provide forecasters with new and better ways to identify and track precipitation. The current schedule has the NWS Gray radar receiving the upgrade sometime in early August. While technicians are installing the new parts, the radar will be unavailable for approximately two weeks.

What exactly is dual-pol? The best place to start is with the current radar. The system is designed to send a pulse of energy (similar to your home microwave) into the environment. When this energy reaches a target, a small portion of the energy is reflected back while the radar "listens" and waits for the energy to return. This tells the forecaster the relative distance and intensity of those targets. Dual-pol will allow pulses to be sent out with a horizontally and a vertically oriented pulse. With both dimensions now being measured, forecasters will not only know the relative intensity and distance of targets but also have an estimate for size, shape and variety.

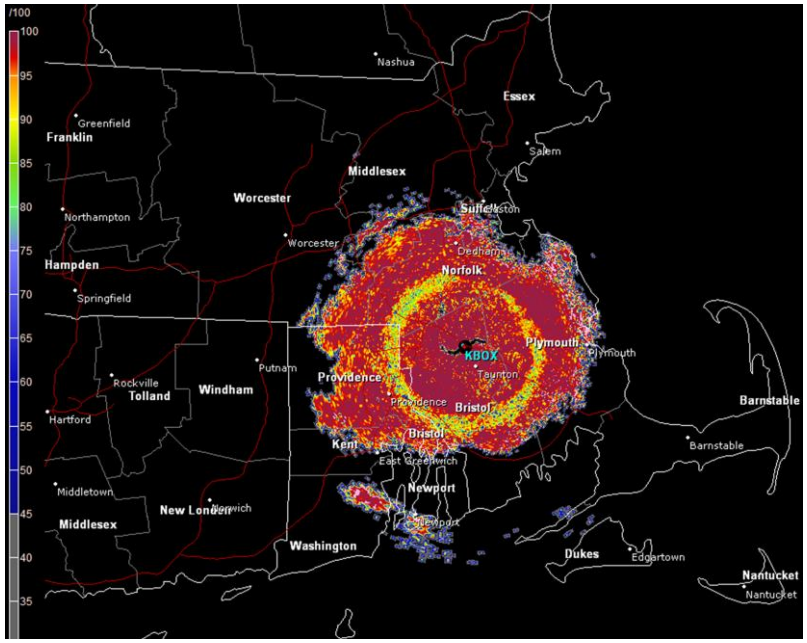

Figure 2: Correlation Coefficient example from the Taunton, MA radar showing a well-defined "ring" of mixed precipitation in the process of melting. High CC values (red) indicate all rain or all snow. Lower values (yellow and green) indicate the melting layer where snow transitions to rain as it falls closer to the ground.

One of the new products that focuses on size and shape specifically is differential reflectivity (ZDR), or the difference between the horizontal and vertical pulses. As a raindrop falls from the cloud it experiences some drag, which tends to flatten it into a hamburger bun shape. This means it is wider than it is tall, and the horizontal return minus the vertical return will be a positive value. So when ZDR is positive, the forecaster will know that the area being sampled contains raindrops. Conversely, a hail stone can be a variety of shapes but ultimately tends to tumble as it falls. The net result is something that is as wide as it is tall, creating ZDR values near zero. Now if a thunderstorm contains ZDR values near zero, forecasters will know that there is some hail within the storm. This product will be the most helpful in determining precipitation type.

A second product, the correlation coefficient (CC), determines the variations in precipitation size and shape. It attempts to tell how alike the targets are within the sample area. Pure raindrops will all have similar sizes and shapes, and the resulting CC will be high, likewise for pure snow. When snowflakes begin to melt, or when rain begins to mix with hail, there will be many sizes and shapes to target and the CC will be reduced. This also helps to differentiate between meteorological and non-meteorological targets. When the radar beam encounters birds, insects, or dust the sizes and shapes will be extremely different and the CC will be at its lowest. This product will be the most helpful in determining precipitation versus non-precipitation targets, as well as finding mixed precipitation and the melting layer. An example is shown in Figure 2.

The last of the three major product additions is perhaps the most complicated, specific differential phase (KDP). This product attempts to measure the change in angle of the radar beam as it passes through a target. All energy is distorted as it passes through a medium, and the radar beam is no different. Liquid water happens to be great at distorting the energy that is transmitted from National Weather Service radars (think of when you put your hand underwater and it looks disconnected from your arm). The more liquid water the beam encounters, the larger the change in angle, and the larger KDP value. High amounts of liquid water provide better estimates of which areas are more likely to produce heavy rainfall.

Some of the other eleven products will include a classification scheme to try to label the most likely precipitation types being sampled by the radar. There will also be a large number of precipitation estimation products, including both accumulation and rate products. Dual-pol will still have some of the limitations of the current radar system. For instance, dual-pol will not improve tornado lead times because it will still update every four to five minutes. It will also not be able to tell the forecaster precipitation type at the surface, as it can only tell the size and shape of targets at the beam level. For surface reports, the National Weather Service will still rely on the dedicated volunteers of the Cooperative Observer, Skywarn, and CoCoRaHS networks. However, there will be a whole host of benefits that dual-pol offers. Precipitation estimation will be improved because hail will no longer cause an overestimation with strong thunderstorms. Forecasters will be able to differentiate between rain, hail, snow, and sleet by analyzing the dual-pol products described above. This will lead to better forecasts and better communication during rapidly changing or mixed precipitation events. There will be better detection of non-meteorological targets such as ground clutter, birds, and insects. These will not get included in precipitation estimation products. Dual-pol will also be able to identify the melting layer, so forecasters can tell where snow is melting aloft or where the rain/snow line is near the ground.

There will be much more information to come as the dual-pol transition gets closer. So be sure to check our webpage (www.weather.gov/gray) later this spring for more explanations, animations, and even links to more in depth training for those who are curious.

CoCoRaHS Corner – Rain Gauge Placement

By Tom Hawley, Service Hydrologist

Figure 3: A well placed rain gage is far from any obstructions (including trees and fences), 4 to 5 feet off the ground, and level.

The Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) is a volunteer network of observers who provide valuable information about the weather on a local level. The reports of rain, snow, and hail are used by the NWS and many other organizations in research, forecasts, and warnings. You can be a CoCoRaHS observer! Just go to www.cocorahs.org to sign up. The CoCoRaHS Corner is a section of our newsletter dedicated to these valuable observers across Maine and New Hampshire. This week's topic is where to place your rain gauge.

Placement of the rain gauge is the key to accurate precipitation measurements. The most important thing to remember is to not place the rain gauge under an obstruction. The rain gauge should not be placed near trees or near the edge of a roof or even on a deck. The rain gauge should be placed in an open area approximately twice as far from an obstruction as the obstruction is high. For example if you have a tree 50 feet tall the rain gauge should be placed 100 feet from that tree. If your home is 28 feet tall, the rain gauge should be placed 56 feet from the house. We do understand that in New England this rule is difficult to adhere to due to the amount of trees and is even more difficult if you live in a built up area with a small yard. So if you fall into this category, try to be as far from an obstruction as possible.

The second thing to remember is wind has a great effect on the quality of precipitation measurements so try to place the rain gauge no higher than 4 or 5 feet above the ground. The higher off the ground the rain gauge is, the greater the effect the wind has on precipitation catch. Also don't attach the rain gauge to a fence. The wind blowing on the fence will cause updrafts and will prevent some of the precipitation from entering the rain gauge, especially when it falls as snow. The best method is to use a 4x4 inch post that has been beveled at the top to prevent water from splashing into the gauge (Figure 3). Finally, make sure the gauge is level.

Observation Program Leader Retires

By Hendricus Lulofs, Meteorologist-in-Charge

Butch Roberts, Observation Program Leader (OPL) at the National Weather Service in Gray, retired at the end of last year. Recently a retirement dinner was held for him. Upon his departure I shared the following with his co-workers:

> "After almost 40 years of Federal Service... including 7 1/2 half years in the Air Force Air Weather Service... Butch Roberts, OPL, Gray, Maine, retired December 31st, 2011.
>
> Butch has had the privilege of working in all four corners of the U.S. and a good bit of Europe. All have been his favorite locations, since they offered unique weather challenges. Locations where he has worked include: Hurlburt Field, FL; Bad Toelz, Germany; Phoenix, AZ; Kalispell, MT; and finally here in Gray, ME.
>
> He and his family are planning to stay in the Pine Tree State. Butch intends to continue bicycling, running, kayaking, snow skiing, sailing and doing some travel, as seasons allow. Near term on his "bucket list"... attempt a regular fixed daily routine (in other words no more shift work!), train for a marathon and participate in Century bicycle rides at various locations in the U.S."

Butch has been a pleasure to work with; his wit and humor will be missed. We wish him the best of luck in retirement.

For questions, comments, or suggestions contact us at
GYX-Newsletter@noaa.gov

Photo by Stacie Hanes