Fall 2007

Newsletter

National Weather Service

Northern Exposure

The Outreach Corner

Hi again everyone. It has been a busy and productive outreach year for NWS Gaylord, and I wanted to fill you in on a few happenings since the last newsletter. We had a very successful Skywarn spotter training season this past spring. We were able to reach 24 of our 25 counties in Northern Michigan, with over 500 people in attendance. We also signed up more than 100 new spotters, which should further compliment our severe weather spotter network across the area. Believe it or not, we now have nearly 1200 official National Weather Service spotters across Northern Michigan. Local newspaper and television stations were terrific in their efforts to regularly promote our presentations. I truly appreciate their willingness to get involved in our safety preparedness classes.

We were also able to have an NWS presence at several community events and school functions across the area. We gave presentations at several area schools including Gaylord, Grayling, Atlanta, Cheboygan and Traverse City. We also demonstrated weather instruments to grade school kids at the annual Tool School in Boyne City. When school wasn't in session, we were involved in several community events such as the annual Maritime Festival in Alpena and the Chippewa County Fair in Kincheloe.

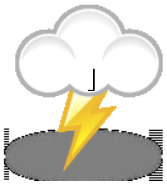
Although the weather may be turning cooler, our outreach program at NWS Gaylord remains active. We will be giving a series of winter talks at several locations across Northern Michigan. These talks will focus around the science of winter weather forecasting, accurate snow measurement and a winter outlook. And we are already planning for several outreach events for 2008. Keep an eye on our webpage for the latest schedules of upcoming outreach events.

Please don't hesitate to give me a call if you ever have a weather question, want to schedule a tour of our facility, or would like to have a weather speaker for your organization. You can reach me at (989) 731-3384 Ext 726 or via e-mail at james.keysor@noaa.gov. I always look forward to meeting my customers and helping them to better understand the weather that they observe everyday.

Enjoy the upcoming winter season.

Jim Keysor
Warning Coordination Meteorologist

Summer '07 Severe Weather Wrap-Up



After busy summers in 2005 and 2006, the summer just past was a significant change of pace. As one would expect in a dry year, severe weather was hard to come by. It just didn't rain that often – which meant it didn't storm that often – which meant we didn't have severe thunderstorms that often. We had two relatively busy stretches: from June 2nd to the 8th, and from July 5th to the 10th. Over half of our

Inside this issue:

Summer '07 Severe Weather Wrap-Up (continued)

severe weather warnings for the year were issued during those two weeks.

At press time at the end of September, the National Weather Service office in Gaylord had issued 75 severe thunderstorm warnings on the year. By comparison, we issued 170 warnings in 2006 – well over twice as many. We average about 95, so 2007 was a quiet year, but we've had quieter. In 2004, we issued just 63 severe thunderstorm warnings.

But when it came to tornadoes, we were actually busier than normal. We average about one per year in Northern Michigan, and we had two this year. On July 9th, a brief touchdown occurred just northeast of Standish, ripping the roof off of a mobile home. The very next day, a waterspout on Torch Lake came onshore just south of Alden, tearing up some docks on the lakeshore. Our last multiple-tornado year was 2002, which featured a tornado in Boyne City and two on Black Lake (all on the same day).

Your National Weather Service office in Gaylord had warnings in place in advance of severe storms 78% of the time. Our average lead time, from warning to severe weather report, was 13.7 minutes. *Our spotters and volunteer observers are a big part of our success*. **Thanks for your reports this summer!!!**

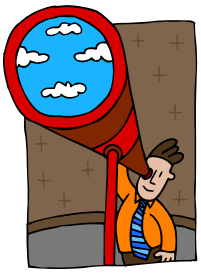
The most significant severe weather episodes of 2007:

June 7-8th: A line of thunderstorms developed along a strong cold front moving across Eastern Wisconsin and Northern Lake Michigan late on the 7th. This line brought wind damage to parts of Northwest Lower Michigan in the very early morning hours of the 8th. Numerous trees were downed onto vehicles and homes, especially in Cadillac, northern Missaukee County, and on Mackinac Island.

July 5th: Several hail-producing thunderstorms developed in Northeast Lower Michigan on a hot and humid day. The Long Rapids/Lachine/Alpena Airport area was hit repeatedly, with hail as large as half-dollars covering the ground in spots.

Jeff Zoltowski
Severe Weather Verification Program Leader

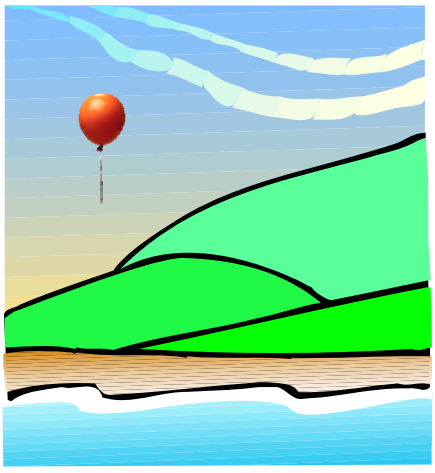
Welcome to the Radiosonde Replacement System



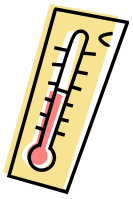
Back on August 16th at 7 pm, the last upper air flight using the Microcomputer Automatic Radio-Theodolite (Micro-Art) was performed. Having been employed since the late 1980s, the Micro-Art system was dismantled in favor of the Radiosonde Replacement System (RRS), which took about a week to install. This new RRS system incorporates a state of the art Global Positioning System (GPS) tracking antenna and a 1680 MHz Radiosonde. It offers several advantages over the previous system including increased data resolution from six seconds to one second data intervals, increased data accuracy, and the ability to track the balloon overhead. One of the major improvements will be the accuracy of wind data with the use of GPS. Location of the radiosonde is determined by the positional change of the radiosonde's location in relation to the satellites, which is then transmitted via the radiosonde's GPS antenna back to the GPS ground station. Because wind data is directly determined from these calculations, accuracy of wind data will improve as much as five times than that of wind calculations using the old RDF (Radio Direction Finding) equipment. The new RRS workstation is a Microsoft Windows-based unit that collects, processes, and transmits upper air data from the radiosondes. The workstation is much more interactive and user-friendly, and allows a high degree of control over the data products that are generated and transmitted.

A little over half of the 69 upper air stations have been upgraded to the RRS system, with the deployment schedule for the remaining sites well into next year. Regardless, two upper air flights are conducted by each station every day of the year, centered around 7 am and 7 pm Eastern Daylight Time, or 6 am and 6 pm Eastern Standard Time. A typical flight travels upwards about 33,000 meters or about 100,000 feet and lasts about 2 hours in duration. The radiosonde measures data such as atmospheric pressure, temperature, relative humidity, wind speed and direction, which is then transmitted to a ground station at its parent office where it is incorporated into national prediction models and used for local severe weather, aviation, and marine forecasts. If you are interested in watching a balloon release, you can always observe a launch from Passenheim road, or for a more in-depth look, you can call ahead and schedule a tour. For more information about the upper air program, check out the NWS Upper Air Observations Program at http://www.ua.nws.noaa.gov.

MikeCellitti
Upper Air Program Leader



Warm and Dry Weather Prevails for Summer '07



The summer months of June, July, and August, provided mild and dry conditions across most of Northern Michigan. This was the third straight summer with above normal temperatures. Out of the last 11 summers, 8 have recorded above normal temperatures. July, which is typically one of the hottest months in Northern Michigan, came in fairly close to normal with regard to temperatures, while June and August were much above normal. Here is how several sites ranked with respect to their warmest summer on record:

Sault Sainte Marie (1888-2007) ---- 10th Warmest

Houghton Lake (1964-2007) ---- 19th Warmest

Alpena (1916-2007) ---- 15th Warmest

Traverse City (1896-2007) ---- 27th Warmest

In addition to the warm weather, June, July and August were not kind to Northern Michigan in the rainfall department. Only one location of note, Gaylord, recorded above normal precipitation. This above normal precipitation was mainly due to some heavy localized rainfall in June and August. The driest areas were across Eastern Upper and Northwest Lower Michigan. However, nearly every location felt the effects of the dry conditions to some degree. Here are a few sites which made it into the top 20 for their driest summer on record:

Sault Sainte Marie (1888-2007) ---- 4th Driest

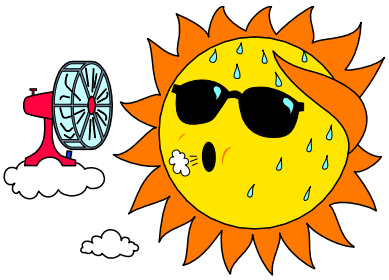
Traverse City (1896-2007) ---- 17th Driest

Below is a summary of the number of days with high temperatures at or above 90 degrees during the summer months of June, July, and August and the normal number of days at or above 90:

	SSM	HTL	TVC	APN	GLR
Days 90° or Above	3	5	12	7	3
June/July/August Avg.	1.5	3.3	8.7	6.8	3.6

	SSM	HTL	TVC	APN	GLR	ALL
June Max	+4.7	+3.4	+3.1	+5.7	+1.4	+3.7
June Min	+4.6	+1.3	+1.8	+2.7	+2.0	+2.5
July Max	+0.9	-0.6	-0.8	-0.3	-2.5	-0.7
July Min	+2.0	-0.5	-0.4	-0.1	-0.7	+0.1
August Max	+2.1	+2.0	+1.4	+4.2	+0.8	+2.1
August Min	+3.1	+1.7	+2.0	+1.8	+1.7	+2.1

The tables to the left and below provide another look at how a few locations fared with respect to temperatures during the summer of 2007 (June, July, and August):



	SSM	HTL	TVC	APN	GLR	ALL
Summer Max	+2.6	+1.6	+1.2	+3.2	-0.1	+1.7
Summer Min	+3.2	+0.8	+1.1	+1.5	+1.6	+1.6

	SSM	HTL	TVC	APN	GLR
June Precipitation (in)	1.74	3.53	1.42	2.59	5.12
July Precipitation (in)	1.50	2.15	1.67	4.38	2.00
August Precipitation (in)	1.03	2.82	2.19	2.05	4.24
Total Precipitation (in)	4.27	8.50	5.28	9.02	11.36
Departure from Normal	-5.34	-0.90	-4.57	-0.19	+1.59

The table to the left shows how a few locations fared with respect to precipitation during the summer of 2007 (June, July, and August):

Kevin Sullivan
Climate Program Leader

What Do All The Headlines Mean?

When these products are issued, they are viewable from the point and click map on our homepage.

Here are the main winter products issued by the National Weather Service:

Hazardous Weather Outlook (HWO)
The Hazardous Weather Outlook includes any potential weather hazard out to seven (7) days. It is used for planning purposes and will include a short description of what the weather threat is, when it is expected, and how much it may impact the region. The HWO is issued daily around 5:00 AM, and updated during the day as needed.

Winter Storm Watch, Lake Effect Snow Watch (WSW)
Watches are issued when there is a potential for a winter storm to affect the region during the next 1 to 3 days. It does not always mean the area will be hit by a winter storm, but there is still some uncertainty in the exact path or timing of the event. This is a planning stage. Use this time to ensure you have supplies at home, like some extra food, medications, baby items, etc.. If travel is planned, check ahead and see if a different route or delaying your departure may make your trip safer. Be alert for changing weather conditions.

Winter Weather Advisory, Snow Advisory, Lake Effect Snow Advisory (WSW)
Advisories are issued for those winter weather events that are expected to be more of an inconvenience and should not become life-threatening if caution is exercised. These are often issued for 3 to 6 inches of snow, blowing and drifting snow, freezing drizzle, or a combination of these elements.

Winter Storm Warning, Heavy Snow Warning, Lake Effect Snow Warning (WSW)
Warnings are usually issued when dangerous winter weather is expected, occurring, or imminent. Criteria includes snowfall of 6 inches or more in 12 hours (8 inches in Eastern Upper) or 8 inches in 24 hours (10 inches in Eastern Upper). Avoid unnecessary travel.

Blizzard Warnings (BZW)
The most dangerous winter event is certainly the blizzard. Blizzard Warnings are issued when snow or blowing snow lowers visibilities to a 1/4 mile or less, wind gusts hit 35 mph or higher, and the storm lasts for 3 hours or more. Travel is dangerous and should be avoided if possible.

Ice Storm Warning (WSW)
Ice storm Warnings are issued when freezing rain will cause widespread glazing. A coating of ice is expected to reach 1/4 inch thick or more on objects and make travel nearly impossible. For lesser amounts of ice, we would normally issue a winter weather advisory. Remember, even a thin glaze of ice can make travel difficult.

Wind Chill Warning (WSW)
Issued when wind chills of -35 F or lower in Eastern Upper Michigan, and -30 F or lower in Lower Northern Michigan. A wind chill advisory is issued for values between -20 and -30 F. Dress warmly and cover as much exposed skin as possible.

Jim Keysor
Warning Coordination Meteorologist

We Need Your Snowfall Reports!

We need your snowfall reports!

Snowfall reports from spotters help the National Weather Service in a number of ways. In addition to providing ground truth observations, the snowfall reports frequently appear in forecasts, warnings, climate summaries, and other public statements. Here are some helpful tips on how to accurately measure and report snowfall.

Snowfall measurement:

· Look for any hard, flat surface that is not prone to drifting (i.e. backyard deck, patio)

· You can use a standard ruler or yardstick

· Try to take 2 or 3 readings in different areas and then average the results

Winter weather reporting:

· All snow reports are helpful, regardless of when you report them

· Ideally, report snowfall 2 times a day with 12 hour totals (between 5-9 am and 5 -9 pm)

· Each report should contain new snowfall, the time over which the snow fell, and total snow depth (if possible)

· Report freezing rain events with ice accumulation and any ice related damage

· eSpotter — Free online spotter reporting system: www.crh.noaa.gov/espotter

Thanks for your commitment to our spotter program. Your service is greatly appreciated!

Jim Keysor
Warning Coordination Meteorologist

A New Approach to Lake Effect Snow Forecasting

This winter, forecasters at the National Weather Service office in Gaylord will begin using an experimental "Lake Snow Parameter" to help them assess the location and intensity of lake effect snow. This new, locally developed forecast parameter is based on data collected during four previous northern Michigan winter.

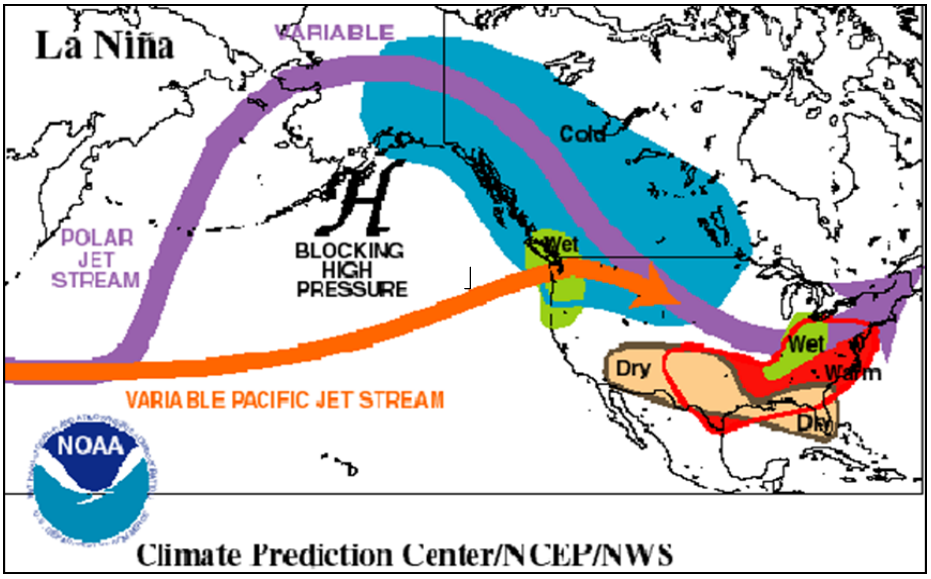
It is well known that lake effect snow forecasting is challenging. This is in large part due to the fact that there are many contributing factors, including: air temperature, moisture, wind speed and wind direction (just to name a few). While anticipating whether lake effect snow will occur is relatively straightforward, it is often much more difficult to differentiate between minor snow events and those that produce more significant snow. Meteorologists often find that while two lake effect snow events may produce widely different snowfall amounts, the meteorological differences can be far more subtle.

The lake snow parameter calculation attempts to combine the effect of three key ingredients for lake effect snow -- air temperature, moisture, and wind speed -- understanding that deficiencies in any one ingredient may preclude heavy snow. For example, the air temperature 4 to 5 thousand feet above the water surface is very critical. The air must be sufficiently cold (relative to the water) to support lake effect snow, and also fall within a critical range (roughly -13C to -20C) to support "large" snowflakes and heavy snowfall. Moisture within the lowest 8 to 10 thousand feet of the atmosphere also plays an important role, by ensuring that snow forms through a deep layer of the atmosphere. Lastly, wind speed near the surface of the water must be strong enough to promote heat and moisture transfer into the air (this is the essence of "lake effect"). By mathematically including all three of these ingredients into a single lake snow parameter, forecasters will be able to more easily anticipate when and where lake effect snow will be heaviest.

It is hoped that this innovative approach to lake snow forecasting, when combined with our "tried and true" traditional techniques, will yield more accurate lake effect snow forecasts this winter.

Bruce Smith
Science and Operations Officer

La Nina Defined



What is it? A periodic cooling of ocean surface temperatures in the central and east-central equatorial Pacific that occurs, on average, every 3 to 5 years.

Prediction - Observations, dynamic models, and ENSO (El Nino Southern Oscillation) experts predict further development of weak, to borderline moderate, La Nina conditions across the Central Pacific. The forecast calls for these conditions to continue through the upcoming winter months.

Impacts on Northern Michigan Weather – In general, statistical evidence shows little support for significant impacts of La Nina on Northern Michigan winters. Since 1970, La Nina conditions in the Pacific have been present in 12 of the 37 winters. Using our official climate data sites (Houghton Lake, Alpena, and Sault Ste Marie), on average about half of the winters have observed above normal temperatures and above normal snowfall. As expected, it appears short term indices, such as the North Atlantic Oscillation (NAO) and Pacific-North American Pattern (PNA) play a very significant role on our weather during the winter. Unfortunately, these are relatively unpredictable beyond a few weeks. However, despite a relatively small sample size, there is some support for above normal snowfall and colder than normal temperatures **if** La Nina remains relatively weak (less than 1 degree Celsius below normal ocean surface temperatures in the central and east-central equatorial Pacific) following a previous winter which featured an El Nino (which is the situation heading into this

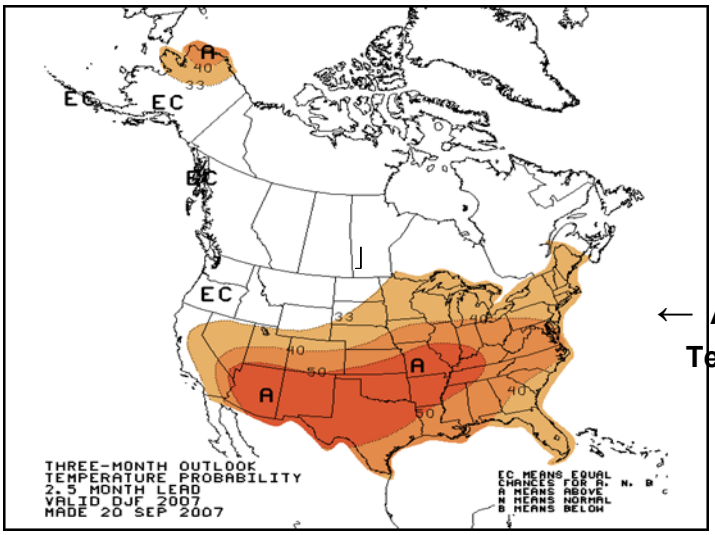
La Nina Defined

winter). For example, there have been 4 previous winters which had this set-up: 1964-1965, 1978-1979, 1995-1996, and 2005-2006. Almost all sites analyzed had above average snowfall and colder than normal temperatures during these winters. For example, here in Gaylord, average snowfall during these winters were all above normal with an average of 174 inches and the average temperature was 18.8, about a 1.3 degrees below normal (and we all heard what happened during the fabulous winter of 1995-1996).

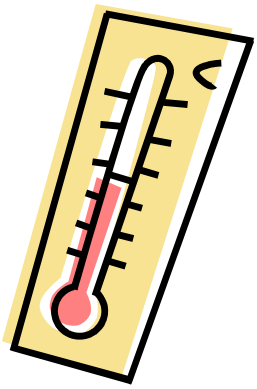
What about the rest of the U.S.? Main impacts of La Nina on winter for the rest of the country include wetter than normal conditions in the Pacific Northwest and Ohio Valley; drier than normal across the extreme south; colder than normal from the North Central Plains into the North-west; and warmer than normal from the South Central States into the Mid Atlantic States. See map for further details.

Mike Boguth
Climate Prediction Program Leader

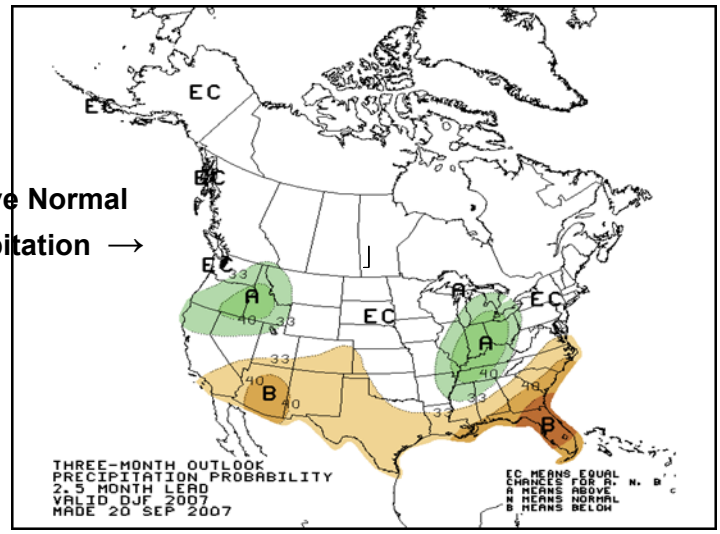
Official CPC Winter Forecast Released



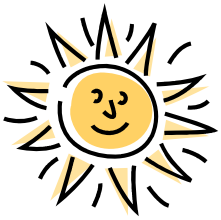
← **Above Normal Temperatures**



Above Normal Precipitation →



Winter Weather Lore...Fact or Fiction?



Growing up, I'm sure many of us heard various statements of weather lore from our parents or grandparents. Even though many of these statements have been around for hundreds or even thousands of years, are they true? Can plants tell us anything about how bad the winter will be? Does fog tell me when it will rain or snow? Is the woolly bear caterpillar able to forecast the severity of the upcoming winter?

Let's take a look at a few weather lore statements and see how accurate they really are.

Weather lore:

Onion skins very thin, mild winter coming in. Onion skins very tough, Winters going to be very tough.

Is there any science behind this?

Partially yes. Warm and wet summers are necessary for very good plant growth, leading to the thicker skins. Frequently, weather patterns will swing from periods of warm weather to periods of cold weather. So if the weather for the summer was very warm and wet, it is likely that at some point into the fall or early winter, the pattern will shift and it will become unseasonably cool.

Weather lore:

A summer fog for fair,
A winter fog for rain.
A fact most everywhere,
In valley or on plain.

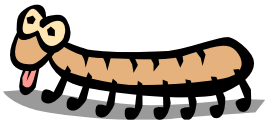
Is there any science behind this?

Partially yes. In the summer, radiation fog is normally formed when the sky is clear and high pressure is in control.

In the winter, most fog events occur because warm, moist air blows over the cold ground. This is called advection fog. So fog in the winter usually would be associated with warmer weather and possibly rain (instead of snow).

Weather lore:

The amount of brown on the woolly bear caterpillar foretells the severity of the coming winter. The wider the band, the milder the winter will be.



Is there any science behind this?

No. The woolly bear's band length actually has more to do with age than with predicting the weather. As the caterpillar prepares to overwinter, the caterpillar molts, becoming less black and more reddish-brown as it ages.

Weather lore:

Pale moon rains;
Red moon blows.
White moon neither rains nor snows.

Is there any science behind this?

Partially Yes. Precipitation cannot form unless it forms around a "condensation nucleus," which is a dust particle, ice crystal, or some similar microscopic object suspended in the air. When moonlight passes through air laden with condensation nuclei, it will appear pale or reddish.

But it doesn't mean that it will rain or snow soon. There may just be more soot or particulates in the air (for example a fire with lots of smoke). When the air is very clear and dry, the moon appears white.

The parts of weather lore that are rooted in science are mainly for very short term weather trends such as increasing moisture, increasing clouds or dropping barometric pressure. Most of the long range weather lore using caterpillars, onion skins or groundhogs is not based very much in science. Even if they are not always scientifically based, weather lore is interesting to read about and observe.

Jim Keysor
Warning Coordination Meteorologist

From Our Observation Guy...

Happy Autumn!

It's that magical time in the glorious north woods, where the leaves are changing, the deer are moving and the weather is about as pleasant as it can be, all year long (can you tell, I'm a little bias). Also, depending on your perspective, it can be a high or low point pending the upcoming winter. We have a lot of snow lovers here in the office, so it's a constant debate over whether this is the best time of year or not.

There was a flurry of activity in Gaylord's observing programs this year. We successfully deployed our new upper air system (see Mike's article) in August which was pretty intense. We had new long-term climate monitoring equipment installed, which is a partnership with our sister agency, the National Climatic Data Center. In the COOP program, we say hello to a new observer (Hi David) at North Central Michigan College in Petoskey…and "Welcome Back" to our Wellston Observer, whom we're excited to have back on the roster (Thanks Phil!).

Speaking of old friends…last fall, we brought back a familiar face for many of you. Scott Rozanski returned to the office and we are delighted to have him back. Scott got out to see a good number of COOP's this year with Denny and I and is quickly coming up to speed on all aspects of the program.

I am currently in the middle of my semi-annual SAWRS inspections. SAWRS observers are folks who man a weather observing operation at our local airports, providing weather observations for the aircraft landing there. I try to couple these trips with some COOP visits as well…and it has been nice to see many of you this year.

We are expanding our winter talk series this winter. I'll be participating with this group of vagabonds…so be sure to check if the "Traveling Snow Show" is coming to a town near you. We'd love to get the chance to meet you and talk about "the weather" (it's what we do).

Have a fun and safe winter season!

Keith Berger
Observation Program Leader

National Weather Service

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"Saving Lives and Property"

www.weather.gov

National Weather Service Mission Statement

" The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community. "

NWS Gaylord, Michigan Office Vision

" Lead in developing innovative ways to improve the quality of weather services to our customers and set a standard of excellence for products and services unique to Northern Michigan. "

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