



The Lake Breeze

The Newsletter of the Buffalo Forecast Office

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New Marine Data Platforms Support Our Boating Community

After two years of planning and cooperation from several agencies, two new Marine weather observing platforms have been installed on Lake Ontario as part of the Great Lakes Observing System (GLOS) initiative. The sites are located on the west pier of Olcott Harbor and the east pier of Rochester Harbor (Figure 1). The platforms provide the following information: Wind direction and speed, air temperature and barometric pressure.

Until recently, there have been very few stations reporting weather conditions on the New York shores of

Lakes Erie and Ontario. In fact, on Lake Ontario, the only official shoreline sites have been the Niagara and Rochester Coast Guard stations, which report once every couple of hours, and a National Ocean Service site at Oswego Harbor, which provides weather conditions over the web. While these sites provide some information, a denser network of observations would give our boating community a much better assessment of lake conditions. It will also aid our forecasters in predicting the smaller scale weather conditions that are common on these lakes.

Marine forecasting is a very difficult challenge on the Great Lakes. These bodies of water are more like inland seas than lakes and they produce their own weather throughout the year. During the late spring and summer, our land surfaces heat much more quickly than the water in the lake each afternoon. This "differential heating" causes local changes in air pressure, which in turn creates local breezes. On a summer afternoon, the temperature of air over the land may be in the 90s, while the lake water will be in the 60s. This difference will create a "lake breeze" in which winds blow from the lake to the shore. You

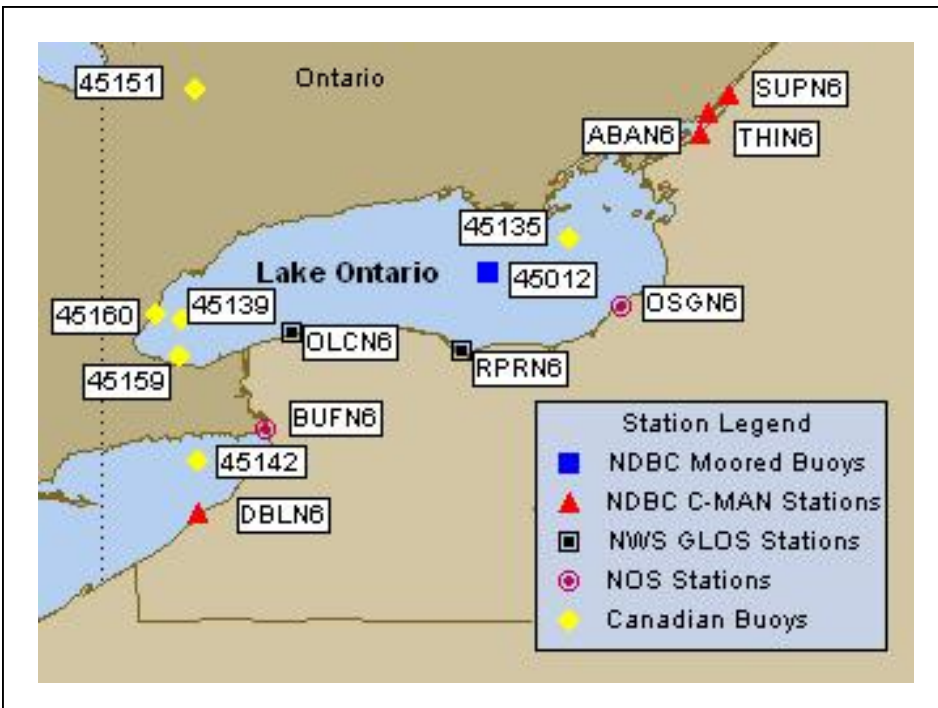


Figure 1: Map showing data buoys and platforms on Lakes Erie and Ontario. Our two new sites are at Olcott Harbor (OLCN6) and Rochester Harbor (RPRN6).

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will see our marine forecast often mention the term “onshore winds” to indicate this condition. These local winds may develop at one site a couple hours ahead of a site just a few miles down the lakeshore. These new weather platforms will more accurately report such conditions.

In addition, these platforms will help us verify severe weather conditions that affect our marine areas. In fact, just two days after our electronic technicians installed the Olcott weather platform, a severe thunderstorm produced 42 mph winds at the site, helping to verify the severe weather that this storm was producing as it moved along the shore.

This project was initiated by your National Weather Service at Buffalo, who partnered with the US Coast Guard and US Army Corps of Engineers to construct the platforms at the end of the piers where we can get the truest measurements of the weather conditions without any obstructions. As you can see in Figure 2, the sites are on top of US Coast Guard Navigation Light Towers located at the ends of these piers. Olcott is a few hundred feet out into the water and Rochester is almost a quarter mile out. Plans are in the works to install additional platforms on Lakes Erie and Ontario over the course of the next year. We will keep you posted on our web site as we get more of these sites on line.

These sites take weather readings every 10 minutes. At the top of each hour the data is transmitted to our weather satellite, which in turn sends it back down to a receiving station where it is displayed on Internet for everyone to use. You can get the latest weather information from these sites off our marine forecast page at: <http://www.erh.noaa.gov/buf/marine.htm> Just click on the site you would like once the map appears on your web page.

It is our goal at your National Weather Service Office in Buffalo to continue to improve the weather observing and forecast program for our marine community. Mariners are probably our most vulnerable customers when it comes to severe weather conditions and these types of initiatives will hopefully go a long way in providing us with the tools to conduct our mission, which is to “protect life and property” of our nation’s citizens.

Tom Nizio
Meteorologist In Charge



Figure 2: Photos of our two newest Great Lakes Observing Systems (GLOS) at Olcott Harbor (above) and Rochester Harbor (below).



Volunteer Marine Weather Observations
NOAA National Weather Service
Buffalo, NY

1-866-896-BOAT

Your report should include

<ul style="list-style-type: none"> • Location • Weather • Visibility (miles) 	<ul style="list-style-type: none"> • Wind Direction • Wind Speed • Wave Heights
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For Marine Forecasts: 716-565-0802

<http://www.weather.gov/buf/marep/marep.htm>

While on the water, stay alert. . .

- Check NOAA Weather Radio for latest warnings and forecasts.
- Watch for signs of approaching storms: dark, threatening clouds that may foretell a squall or thunderstorm; a steady increase in wind or sea; lightning flashes.
- If a thunderstorm is approaching, head for shore if possible. Get out of your boat and away from the water. Find shelter immediately.

History and Mystery of Lightning

There was another earlier time when lightning was the magic fire from the sky which man captured and used to keep warm at night . It kept the savage animals away. As primitive man sought answers about the natural world, lightning became a part of his superstitions, his myths and his early religions.

Early Greeks believed that lightning was a weapon of Zeus. Thunderbolts were invented by Minerva the goddess of wisdom. Since lightning was a manifestation of the gods, any spot struck by lightning was regarded as sacred. Greek and Roman temples often were erected at these sites, where the gods were worshipped in an attempt to appease them. The Moslems also attributed lightning and thunder to their god. The Koran says "He it is who showeth you lightning and launches the thunderbolts."

Scandinavian mythology alludes to Thor, the thunderer, who was the foe of all demons. Thor tossed lightning bolts at his enemies. Thor also gave us Thurs-day. In the pantheistic Hindu religion, Indra was the god of heaven, lightning, rain, storms and thunder. The Maruts used the thunderbolts as weapons. Umpundulo is the lightning bird-god of the Bantu tribesmen in Africa. Even today their medicine men go out in storms and bid the lightning to strike far away.

The Navajo Indians hold that lightning has great power in their healing rituals. Sand paintings show the lightning bolt as a wink in the Thunderbird's eye. Lightning is associated with wind, rain and crop growth.

As late as the early 1800s in Russia, when rain was wanted, three men climbed a tree. One would knock two firebrands together; the sparks imitating lightning. Another one would pour water over twigs, imitating rain. A third would bang on a kettle to attract the thunder. And throughout early Europe, church bell ringers would make as much noise as possible, hoping to scare away the storms from these holy dwellings which were struck frequently by lightning.

During the Napoleonic wars, more than 220 British tall ships were damaged--not by the French, but by lightning. The solution, of course, was to install lightning rods. But since that device had been invented by a "rebel colonist" named Benjamin Franklin,

His Majesty's Navy steadfastly refused. It took until the 1830's before the admiralty finally saw the light and forgot about old colonial rebellions.

Even Santa Klaus gets into the act with his reindeer Donner (thunder) and Blitzen (lightning).

Early superstitions were observed as Cause and Effect, which now has been fancified as science. Socrates said, "that's not Zeus up there, it's a vortex of air." Genghis Kahn forbade his subjects from washing garments or bathing in running water during a storm. Thales, the Greek philosopher, in 600 BC, rubbed a piece of amber with a dry cloth and noted that it would then attract feathers and straw. William Gilbert, court healer to Queen Elizabeth, in the late 1500s, also used amber to duplicate the earlier experiments. He named this via electrica, after electra which is Greek for amber. He didn't know it, but he was demonstrating static electricity.

Lightning is a big spark...static electricity on a giant scale. Machines for creating static electricity were invented...the Leyden jar was like a thermos bottle which stored volts. Friction machines could charge the jars and electricity could be carried around and demonstrated. "Electric magic" was in great demand at the royal courts of Europe as entertainment. The parlor tricks amused and fascinated people.

Science was in its infancy during these times. Sir Isaac Newton had proposed that basic mathematical laws were the foundation for understanding the forces of nature. With "electric magic" there was insufficient experimental investigation to explain its behavior. In 1746, Dr. Spence from Scotland came to Philadelphia. He there demonstrated some "electric magic" to an audience which included the local postmaster.

That man was Benjamin Franklin. Franklin was curiosity personified. At age 42, Franklin sold his Philadelphia printing business for half the profits for 20 years. He retired. He involved himself in social experiments like the American Revolutionary War and the Declaration of Independence. He dabbled with the electric Leyden Jar and pondered questions..."how many small jars would kill a chicken? How many large jars for a turkey? Why did an electrocuted turkey taste better than a conventionally-killed bird? What is lightning? Why is it burning down churches? Can it be captured to a Leyden jar? Can it be captured to earth safely?..." Then came the kites and keys experiments in 1752-53 and Franklin's deduction that lightning was, after all, electricity.

This was followed by his lightning rod invention and its duplication in France and usefulness throughout Europe. Franklin was a celebrated figure in his time. Franklin has been called America's patron saint of common sense. Perhaps, had he not been close to the French Royal Court, and been able to influence France to finance the American Revolutionary War, all of us here in the USA today might be speaking with English accents!

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Recently some scientists have concluded that lightning may have played a part in the evolution of living organisms. Nobel prize winning chemist Harold Urey proposed that the earth's early atmosphere consisted of ammonia, hydrogen, methane, and water vapor. One of his students, Stanley Miller, used an electric spark to duplicate lightning and introduced it into the chemical brew. He was careful to excluded any living organisms from the experiment. At the end of a week, he examined the mixture and found it contained newly-formed amino

acids, the very building blocks of protein. Did lightning play a role in creating life itself? Science now is pushing the envelope of lightning's secrets. More has been learned about this transient phenomenon in the past 3-4 years than in the preceding two hundred forty four years since Franklin's "kites and keys" experiments. Stay tuned...

Most of the above was adapted from Viemeister, P.: 1961, The Lightning Book, MIT Press, Cambridge MA. (Worth buying your own copy.)

Lightning Safety Facts

Through July 31st there have been 26 lightning fatalities in the U.S. Following some simple safety rules can prevent that number from increasing:

- The "30-30 Rule" offers easy to follow lightning safety guidance. When you see lightning, count the time until you hear thunder. If that time is 30 seconds or less, the thunderstorm is close enough to be dangerous. Seek shelter. If you can't see the lightning, just hearing the thunder is a good back-up rule. Wait at least 30 minutes after the lightning flash before leaving shelter.
- No place OUTSIDE is safe during a thunderstorm!
- A house, or other fully enclosed building with wiring and plumbing offers your best protection against lightning. Once inside stay away off telephones, computers and other electrical appliances and stay away from sinks, showers, indoor pools and other plumbing. Don't watch lightning from windows or doorways. Inner rooms are safer.
- A car with a metal roof and sides is your second best protection against lightning. As in a house, don't touch any conducting paths leading outside. It is the metal shell that protects you, not the rubber tires.
- Lightning is the #2 weather killer in the United States over a 30-year period, killing more than hurricanes and tornadoes combined! Only floods kill more.
- Lightning is the #1 weather killer in Florida, killing more than all other weather sources combined! Florida leads the U.S. in lightning deaths, injuries, and casualties!
- Lightning kills about 60 people in the U.S. each year and inflicts severe life-long debilitating injuries on at least a 1,000 people a year.

- Long-term lightning symptoms are primarily neurological and are difficult to diagnose. Though very variable, some of the more frequent symptoms include memory deficit, sleep disturbance, chronic pain, dizziness, and chronic pain. Lightning survivors sometimes have trouble processing information, are easily distracted, and have personality changes. Symptoms may not appear until months after the lightning strike. The 'lightning strike and electric shock survivors, international' is the main support group for lightning survivors (www.lightning-strike.org).
- Lightning causes about \$5 billion of economic impact in the U.S. each year!
- The odds of an individual being a lightning casualty in a year in the U.S. is about 280,000-to-1 – if you're an average person, in an average location, with average outside activities, and average lightning safety behavior. That's about 3,000-to-one over your lifetime, with about 300-to-one odds of being seriously affected by a family member or friend being a lightning survivor.
- The odds of an individual being killed by lightning each year in the U.S. is about 3 million-to-1, if you're an average person, in an average location, with average outside activities, and average lightning safety behavior. That's about 35,000-to-one over a life time, and about 3,000-to-one of being seriously affected by a family member or friend being killed by lightning.
- Keraunomedicine is the medical study of lightning casualties.
- For more information, go to www.lightningsafety.noaa.gov



Town of Cheektowaga is **StormReady**

The Town of Cheektowaga, New York has completed a set of rigorous warning criteria necessary to earn the distinction of being StormReady®.

StormReady encourages communities to take a new, proactive approach to improving local hazardous weather operations and public awareness. StormReady arms communities with improved communication and safety skills needed to save lives and property – before and during the event.

The Town of Cheektowaga becomes the only fourth municipality in the State of New York to be a StormReady Community. The recognition will be in effect for three years when the town will go through a renewal process.

The nationwide community preparedness program uses a grassroots approach to help communities develop plans to handle local severe weather and flooding threats. The program is voluntary and provides communities with clear-cut advice from a partnership between local National Weather Service forecast offices and state and local emergency managers. StormReady started in 1999 with seven communities in the Tulsa, Okla., area. There are now more than 1,200 StormReady communities across the country.

Earl Loder, emergency manager for Cheektowaga, said, "I am very grateful to all the people who made this recognition possible. Our town government supports this program and our police, fire and dispatchers always monitor NOAA All Hazards Weather Radio. All the town departments are always working harder to improve our awareness and preparedness to hazards in our community. We are proud of our citizens who attended the SKY-WARN storm spotter training making them a valuable asset to the forecasters of the National Weather Service. Cheektowaga's government leaders and citizens enjoy a



StormReady Recognition Ceremony, Cheektowaga, NY, July 2007. From left: Thomas Nizioł, MIC, WFO Buffalo; Judith Levan, WCM, WFO Buffalo; James Jankowiak, Town Supervisor; Earl Loder, Cheektowaga Emergency Manager.

great partnership with the National Weather Service in Buffalo and being StormReady is one of the many benefits that have come from the partnership. "

To be recognized as StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center;
- Have more than one way to receive severe weather forecasts and warnings and to alert the public;
- Create a system that monitors local weather conditions;
- Promote the importance of public readiness through community seminars;
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

NOAA Names Veteran Meteorologist to Lead NWS

NOAA announced the appointment of Jack Hayes as assistant administrator for weather services and director of the National Weather Service. Hayes will assume his duties on Sept. 2, 2007, and take responsibility for the day-to-day management of NOAA's weather, hydrologic and climate forecast and warning operations.



"Jack Hayes brings more than 30 years experience in all areas of atmospheric science including six years with NOAA," said retired Navy Vice Adm. Conrad C. Lautenbacher, Ph.D., under secretary of commerce for oceans and atmosphere and NOAA administrator. "Americans

have come to depend on the life saving products of the National Weather Service and having a seasoned professional like Jack at the helm will ensure we have skilled management supporting these vital services."

Hayes rejoins NOAA having served the past eighteen months as the director of the world weather watch department at the World Meteorological Organization. "I am very proud to be returning to NOAA," said Hayes. "Weather and climate-sensitive industries accounted for about \$4 trillion of the American economy in 2006, and I look forward to working with the talented staff at the National Weather Service, NOAA and our partners to meet the expanding demands for prompt, accurate weather information."

Student Volunteer Program

Each summer NWS Buffalo works with up to four undergraduate students who are majoring in Meteorology, Atmospheric Science, or Hydrology. The students often live in the Buffalo area and are on summer break from colleges in or around New York. In general, they are Juniors or Seniors, and already have a background in the latest meteorological theory. The students generally work between 8 and 12 hours per week as volunteers, although some students earn academic credit for their time here. While they do not get paid, the experience they get working next to forecasters is invaluable. They often witness and sometimes take part in the decision making process that goes into a forecast or even a severe thunderstorm warning. On occasion they'll even help us verify our warnings by contacting our spotter network.

During their time here, the students learn about our main hardware and software which allows us to analyze and forecast the weather: The Advanced Weather Interactive Processing System (AWIPS). Once familiar with this system, the students regularly create a weather summary used for NOAA Weather Radio All Hazards (NWR). This product is also placed on the Internet, and is often used in the weather forecast discussion (also known as our Area Forecast Discussion (AFD)).

In addition to this daily task, the students keep our numerous databases up to date. This includes updating our spotter network and ensuring our climate books, records, and

webpage information are all current. More recently, our students have begun delving into our Geographical Information System programs (GIS). This summer, the students edited and customized several road files that are now used operationally in AWIPS.

Each student participates in one or two balloon launches and goes through several on-line training modules that cover some of the weather process involved in producing severe weather. They also shadow each forecast desk, where they learn about how we forecast for the marine and aviation community, and how we produce our portion of the National Digital Forecast Database (NDFD). Lastly each student participates in a Weather Event Simulation (WES), where they get to issue a number of simulated severe weather warnings.

It's a pretty busy schedule for the students, but each day there's something new to learn. From the office standpoint, it's encouraging to see so many young faces interested in our profession. The science that goes into understanding and forecasting the weather continues to evolve, and there is no shortage of new ideas and theories to prove. We hope these young scientists are motivated by spending a portion of their summer at NWS Buffalo, and continue on to be future meteorologists.

David Zaff

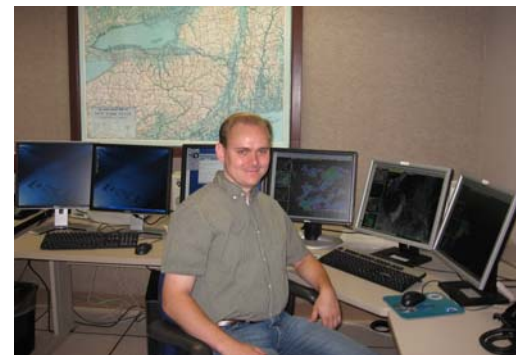
Science Operations Officer

New Meteorologist Intern at Buffalo

It's with great pleasure that we introduce our newest employee at NWS Buffalo. On July 9th, David Thomas joined the staff as a Meteorologist Intern.

David earned a B.S. in Meteorology from SUNY Albany in 2000 and a Masters Degree in 2003. He comes to us from AccuWeather where he spent the last 3 years in operational forecasting.

David was born and spent his early years in Richburg, N.Y., a small town in the Southern Tier of New York in Allegany county. David also lived for a few years in Geneva before his family moved to Poughkeepsie.



NOAA's 200th Celebration in 2007 will highlight the rich history of science, service, and stewardship provided to the American public by NOAA and its predecessors. For more information visit <http://celebrating200years.noaa.gov/>

Weather, Transportation Experts Collaborate

More than 200 experts representing operations, research and user communities participated in a collaborative symposium seeking to improve safety in surface transportation through improved weather forecasting and communications.

The Third National Surface Transportation Weather Symposium was hosted by the Office of the Federal Coordinator for Meteorological Services and Supporting Research and the Federal Highway Administration July 25-27, 2007, in Vienna, Va. The theme for the symposium was *Improving Commerce and Reducing Deaths and Injuries through Innovative, Weather-Related R&D and Applications for the Surface Transportation System*.

"Our ultimate goal is to reduce weather-related deaths, injuries, damage and inefficiencies in the transportation system," said retired Navy Vice Adm. Conrad Lautenbacher, Ph.D., undersecretary of commerce for oceans and atmosphere and NOAA administrator. "We can accomplish these improvements through developing a sound observing strategy, identifying needed research, and improving products and services."

Weather accounts for a significant percentage of safety impacts on the nation's surface transportation systems. On roads, more than 24 percent of the 6,442,000 vehicle crashes each year are weather-related, with nearly 7,300



deaths and 670,000 injuries. On rail, 865 weather-related crashes occurred between 1995 and 2005, causing 8 deaths, 1,242 injuries and \$189 million in property damage costs. On water, weather-related causes accounted for 11 percent of mishaps and 3.6 percent of all recreational boating mishaps between 1996 and 2000.

"Real-time traffic and weather information plays a central role in preventing crashes and eliminating gridlock on our nation's transportation network, and can give travelers and carriers instant access to life-saving and time-saving navigational tools," said Jeffrey Shane, undersecretary for transportation policy at the Department of Transportation.

Participants prioritized research and development needs that will provide the basis for new or improved surface transportation weather products and services. The needs were ranked according to severity and the frequency of contributing to deaths, injuries, damage and inefficiencies in the transportation system. The objective is to further improve surface transportation safety and security, quality of life, and economic productivity.

For more information, visit the Symposium web site at <http://www.ofcm.gov/wist/wist.htm>

Panel Predicts Upcoming Period of Intense Solar Storms

All eyes are on the sun (though not directly with the naked eye) now that the NOAA-led Solar Cycle 24 Prediction Panel released its official consensus solar cycle forecast. The panel agreed that the Earth will soon experience the start of a period of intense solar storms and the exact number of solar storms expected will become clearer in time. "The next 11-year cycle of solar storms will most likely start next March and peak in late 2011 or mid-2012," said Doug Biesecker, a solar physicist from the NOAA Space Environment Center in Boulder, Colo., who also chaired the NASA-funded 12-person panel.

Although the effects of solar storms are often seen from Earth as beautiful lights dancing in the night sky (i.e., the Northern Lights or aurora borealis), looks can be deceiving. In reality, these storms can carry tremendous power and travel at speeds up to 5 million miles per hour. Solar storms have been known to knock out satellites, power supplies, communications and navigation systems. Many of these effects are transitory (and virtually invisible), but

they can be very disruptive and potentially dangerous — both to the systems themselves and in turn the nation's economy. Damage to these systems can also result in secondary effects that can disrupt virtually every major infrastructure dependant on them, including transportation, security and emergency response systems, telecommunications and other wireless networks and electronic equipment. Solar storms even create a biological threat to both astronauts and people flying in aircraft at high altitudes and latitudes.

Therefore, the Solar Cycle 24 Prediction Panel's forecast is being used by various industry and government groups for planning purposes, including power companies, communication networks, satellite manufacturers/operators and airline flight planners. Unfortunately, the nation's (and the world's) vulnerability to solar storms will only increase as we become even more dependant on these technologies.

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The NOAA SEC is the nation's first alert of solar activity and its affects on Earth. Just as NOAA's hurricane experts predict the upcoming season of Atlantic storms and forecast individual hurricanes, the agency's space weather experts issue outlooks for the next 11-year solar "season" and warn of storms occurring on the sun that could impact the Earth.

Eleven-year solar cycle forecasts predict the number of sunspots which will occur during a given solar cycle, and sunspots are known to generate solar storms that could potentially damage Earth systems. Like other long-term weather forecasts, the solar cycle forecast does not predict the time, intensity or duration of the solar storms. In this way, the solar cycle forecast is very much like NOAA's seasonal hurricane outlook — the overall level of activity for the season is forecast, but it doesn't predict the specific time, intensity etc. of any given storm. That is covered by more short-term space weather warnings issued by the NOAA the NOAA Space Environment Center.

Each 11-year solar cycle consists of a solar maximum characterized by a large number of sunspots (and solar storms) followed by a solar minimum characterized by a smaller number of sunspots (and solar storms). Currently, we are approaching the end of Solar Cycle 23 (a solar minimum) and are on the heels of the start of Solar Cycle 24 (a solar maximum) — so the topic on the minds of many people is the upcoming Solar Cycle 24, its much anticipated solar maximum, and the number of solar storms it will generate.

The sun, like Earth, has seasons. The sun's season is dictated by sunspots and is known as the 11-year solar cycle. Sunspots occur when strong magnetic fields emerge through the solar surface and allow the area to cool slightly, thus making it appear as a dark spot in contrast to the even hotter sun areas surrounding it. These magnetically disturbed regions are often the source of large solar flares and coronal mass ejections from the sun.

At the beginning of each 11-year solar cycle, sunspots first appear at high latitudes, but as the cycle continues, sunspots start emerging closer to the equator and eventually stop forming all together as the cycle comes to a close. Sunspots only last for a few weeks and are basically tangled knots of magnetism generated by the sun's internal engine that powers/drives the sun. Throughout their life, they decay, leaving behind weak magnetic fields as their 'remains.' Then the sun's "dynamo conveyor belt" comes along and skims the surface of the sun, sweeping up the magnetic fields of old, dead sunspots. The sunspot 'remains' are dragged toward the poles and then down to a depth of 200,000 km where the sun's magnetic internal engine reenergizes them. Once the sunspot 'remains' are reincarnated, they become buoyant, float back to the surface and create a brand new sunspot! It takes about 40 years to perform one complete circuit because the sun's conveyer belt only moves at a rate of about one meter per second. Researchers believe the turning of the belt — especially the speed of the belt — controls the sunspot cycle.

"The biggest question right now is when will we reach the solar minimum for the current Solar Cycle [23], because that will essentially mark the start of Solar Cycle 24," said Biesecker. "It will serve as a good 'litmus test' for the validity of the models used in making the final prediction. If a given model fails to accurately predict the start of Solar Cycle 24, then it is likely that it will also fail to accurately predict the timing, duration and intensity of the cycle's peak and may therefore need to be eliminated from future Solar Cycle 24 predictions. Therefore, as the cycle progresses and we get more data, the panel will need to re-evaluate its original predictions and periodically update it over the next few years."

According to Biesecker, we will have a better idea of what solar weather has in store for us in late 2008 when Solar Cycle 24 is on the rise.

For more information about NOAA Space Environment Center visit their website

<http://www.sec.noaa.gov/AboutSEC/index.html>

NOAA's
National
Weather Service



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EDITORS NOTE:

Published quarterly, each of issue of "The Lake Breeze" contain articles about our operations, products and services, and interesting weather submitted by various members of our staff and NOAA Headquarters. If you have a comment about our programs, or an idea for something you'd like to see included in an upcoming issue, we'd like to hear from you. You can email me at judith.levan@noaa.gov.

Judith Levan

Warning Coordination Meteorologist