

The Lake Breeze

NATIONAL WEATHER SERVICE BUFFALO, NY
FORECAST OFFICE

Photo Credit: David Church

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Spring 2021

Welcome to the latest edition of The Lake Breeze newsletter.

It's been a chilly spring with a late season snow-fall in April and a cool, rainy start to May. It may not feel like it but summer is almost here. We hope you enjoy this issue.

-The Editors

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A Note from the Meteorologist in Charge

By Judith Levan

A year ago, I started my article with “Under the shadow of COVID-19, we make our transition from spring to summer.” Who could have imagined we’d still be operating under that shadow? We continue to support our core partners, including emergency management, in the weather and non-weather hazards they may deal with. We are still operating with our adjusted staffing, trying to minimize the number of folks in the office at one time, and practicing social distancing and wearing masks at all times while in the office. That said, a minimum of two forecasters are always in the office – more if there’s active weather – keeping a constant weather watch, making forecasts and issuing any needed headlines.

In some ways, the pandemic has helped how we connect with you – our customers. We’ve increased our social media presence with a teleworker often dedicated to posting to and monitoring social media – especially in times of active weather. We continue to offer our SKYWARN training sessions virtually – allowing us to reach out to some of the more rural or remote areas that we weren’t able to reach personally. We’ve done dozens of school outreach visits virtually.

But honestly, we do miss the outreach we still aren’t able to do – whether it’s the in-person SKYWARN sessions, the school visits, the speaking engagements at civic organizations, meeting with our emergency management partners and, of course, the office tours!

Throughout this pandemic, your National Weather Service continues to be there for you. As we’re able to gather more outdoors again this summer, remember to check the forecast before you head out and keep an eye to the sky. Remember that in addition to severe storms, summertime heat and humidity can also be dangerous.

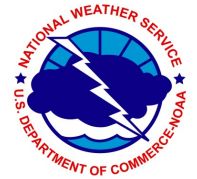
Look out for each other. Be well. Stay safe.

Meet the Observer—Dave Duboy, COOP Observer, Warsaw, NY

By Dan Kelly

Dave Duboy grew up in South Warsaw, and moved to his current location on a hill southwest of Warsaw in 1984. He worked as a Maintenance Mechanic for the New York State Department of Transportation for 33 years before retiring in 2015. Dave was introduced to the NWS Coop program while working for the state with the NWS Buffalo Coop Program Manager’s son, Ray West. It just so happened that the NWS was looking for a Coop observer near Warsaw. On October 26, 1998, Ray moved the weather station up the road to Dave’s house and he has been taking observations ever since.

(continued on page 3)



Planning on Boating? Know BEFORE you Go

By Jason Alumbaugh

Whether you are boating on the wide open waters of the Great Lakes or heading to one of the many inland lakes in the region, our goal at the National Weather Service is to provide you with the best marine forecasts. This way you can be safe and have fun during the boating season. This year, Safe Boating Week is May 22nd through May 28th, 2021.

One of the first things you should do before you head out on the water is to check the latest forecast. On the Great Lakes, the best way is to go to weather.gov/greatlakes. Here you can find out if there are any hazards in effect and also what winds, waves and weather are expected. If you are heading out to an inland lake, a point and click forecast is also available on weather.gov/greatlakes or on weather.gov/buf. Wave height forecasts for inland lakes and waterways are not available due to the smaller scale of these lakes and waterways compared to the Great Lakes.



In addition to forecasting high winds and waves, sudden thunderstorms, areas of dense fog and cold water, especially early in the season, can put a damper on your boating activities. Thunderstorms can be a mariners worst nightmare. They can develop quickly, producing strong gusty winds, pounding rain, deadly lightning and large hail with very few places to seek shelter. Even marginal thunderstorm winds can capsize smaller boats and other watercraft. If you are out on the water and can see clouds building and darkening in the distance, it may be thunderstorms developing. Don't wait until you hear thunder or see lightning before getting off the water. It is best to head to port or safe shelter at the first sign of a developing storm. Special Marine Warnings are issued for severe storms on the open waters. If you are on the water and encounter fog, navigation can quickly become a challenge. Fog is considered dense on the water when visibility is reduced to less than one mile. It can take time to stop or turn a marine vessel. Fog can form quickly and catch boaters off guard. Visibility can be reduced to just a few feet which can disorient even the most experienced boaters.



The last hazard is not as obvious, cold water. We can't say it enough, be cautious in cold water. This doesn't apply to just the Great Lakes, but inland lakes as well, especially in the spring and early summer. The air temperatures may be warm, but water temperatures may not be. Water temperatures this time of year can be as cold as 40 and 50, which can cause hypothermia within one hour. Did you know that sudden entry into cold water (falling or jumping) can lead to cold water shock which can cause dramatic changes in breathing, heart rate and blood pressure, creating a greater risk of drowning even for confident swimmers in calm waters. In rougher open water this danger increases. Unplanned immersion in cold water can be life-threatening for anyone without protection from the temperatures or a lifejacket to help

you stay afloat. Drowning can be instantaneous. Wearing a life jacket significantly increases your survival chances. For more information on cold water and hypothermia, visit www.weather.gov/safety/coldwater

Once on the water, a NOAA weather radio (the frequency of which can also be picked up through most marine radios on the weatherband) is the most direct way to receive forecasts and alerts from the NWS. Though marine warnings are not issued for inland lakes, severe thunderstorm, tornado warnings and special weather statements are issued for these areas. All of these types warnings and statements come through directly on NOAA weather radio. Visit weather.gov/nwr/newyork for coverage maps of the different transmitters in our forecast area. The different hazards you will hear broadcast on NOAA weather radio include:

Small Craft Advisory: winds or frequent gusts 18-33 knots (21-38 mph) and/or waves 4 feet or greater
Gale Warning: winds or frequent gusts 34 to 47 knots (39 to 53 mph). Can be preceded by Gale Watch

(continued on page 6)

Meet the Observer (continued)

One of Dave's memorable experiences while working for the State of New York, was helping out with the cleanup after Hurricane Sandy in the New York City region. He traveled to Islip, NY, on Long Island and commuted several hours to the maintenance base in Brooklyn. This was the location where trucks were kept in top running condition from clearing up debris from the super storm. Dave recalls putting in 16 hour days during the cleanup! Even after retirement, Dave keeps quite busy at a local maintenance shop, and by driving trucks for local farmers.

About 15 years ago, Dave started growing large vegetables with his two sons as a 4H project. This introduced Dave to the world of giant pumpkins. This past summer, Dave grew his largest pumpkin, which weighed a very impressive 1407.5 pounds! This pumpkin earned Dave 4th place at the annual weigh-off at the Great Pumpkin Farm in Clarence NY. Additionally this pumpkin ranked 201 out of over 1370 in a world-wide competition! After the Great Pumpkin Farm weigh-off, the large pumpkin was donated to SUNY Geneseo and put on display on campus. Dave also grew another pumpkin this past year, which weighed in at 1166 pounds. This second pumpkin was sold to an individual, who turned the large pumpkin into a boat for a competition in the midwest.

One of Dave's most memorable weather events occurred on June 2, 1998, when Dave watched a tornado form to his north. The tornado touched down in a farm field and tracked to the east. Unfortunately, a trailer was destroyed but thankfully no one was injured. In the winter, in an area that averages 141.9 inches of snow a year, large snow storms are common however there are two snow storms that stand out. The first, a blizzard in March 1993 which caused Dave to spend the night at work. The next day, he made it up the hill to his house, but could not get in his driveway. He had to climb over the snow bank and could barely see his truck over the snow! The second snow storm that stands out is one that occurred on Christmas Eve about 10 years ago. This was a lake effect snowstorm that dumped feet of snow across the area. It took Dave over 45 minutes to get home. The county had plowed his road but left a large snowbank near his house. Dave remembers flooring it to get through the snow bank causing the light fluffy snow to fly in all directions.

In the past 32 years, Dave Duboy has measured an accumulated total of 1,529.78 inches of liquid precipitation and 5011.3 inches of snow (as of 04/15/2021!)

An Elevated Mixed Layer and it's Significance Associated with Severe Weather on June 3rd 2020

By Aaron Reynolds

Severe thunderstorms produced large hail, damaging winds, and flooding rain during the late evening of June 3rd, 2020 in the Buffalo area. One of the ingredients that produced these severe thunderstorms was an Elevated Mixed Layer (EML). Hot and dry boundary layer air can be transported downstream of a mountain range such as the Rockies. Over time, this hot and dry well mixed layer can reach the Northeastern United States as an EML.

EML's are well known to be associated with significant severe weather. The importance of the EML is due to two ingredients, the CAPPING inversion and the DRY air found in that layer. The capping inversion initially limits storm development in the early stages of a severe weather event. This allows for the buildup of energy (CAPE) in the lower levels of the atmosphere. This only holds until additional daytime heating or other forcing mechanisms help to overcome the cap. Above the cap, the Elevated Mixed Layer is a very unstable environment which allows for the explosive growth of air parcels that are able to breach the cap, which in time can produce strong convection. In addition to the capping inversion, the EML also provides a dry layer of air at mid-levels. This dry layer near the developing moist up-



Dave Duboy, Cooperative Observer for Warsaw, shown with his large pumpkin at the Great Pumpkin Farm in Clarence NY. His pumpkin, weighing 1,407.5 pounds, came in 4th place at their annual pumpkin competition.

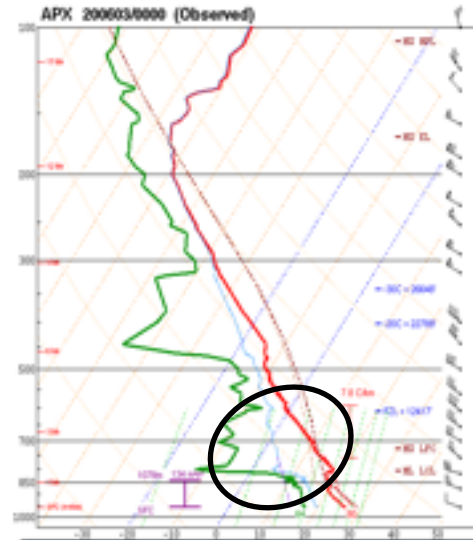
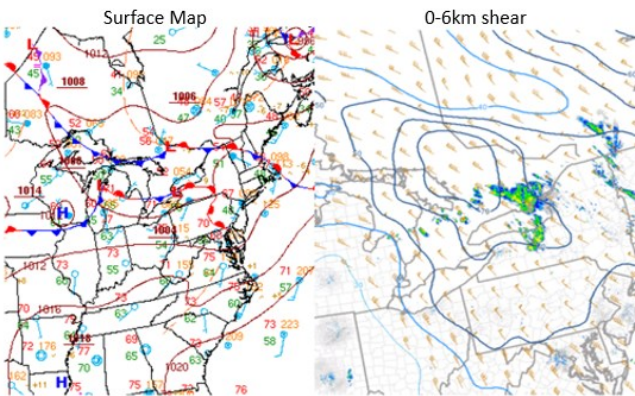
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Elevated Mixed Layer and Severe Weather on June 3rd 2020 (continued)

draft of a storm can lead to dry air entrainment. By entraining dry air into the updraft of a storm evaporative cooling takes place. This leads to negative buoyancy in that region of the storm and when combined with precipitation loading in the column, a strong downdraft can occur leading to damaging winds.

On June 3rd, the 00Z (7PM CDT) Gaylord, MI (KAPX) sounding upstream of Buffalo, NY (KBUF) clearly showed an EML (see image to the right.) There was the presence of a capping inversion near the 850 mb level, steep lapse rates of 7.8C/KM and 1947 J/KG of CAPE. Furthermore, a dry layer was also established between 850mb to 650mb.

The next ingredient needed is something to overcome the capping inversion. In this case, a shortwave trough and weak surface front were in the process of moving towards Western NY from the northwest. Surface analysis at 03Z (11PM EDT) depicts this feature over the Niagara Peninsula (see image below.) Accompanying this feature, 60 to 70 knots of 0-6KM shear was rapidly moving into the region (see image to the left.) This was quite impressive and will help organize and maintain any updrafts from storms that do form.



So what happened? Supercells with strong mid-level rotation were initially observed over southern Ontario, and while the impressive mid-level structure of the cells weakened some as they moved southeast towards our region, storm tops blossomed to over 50,000 ft. Locally, our anticipation of these storms set the stage for impressive lead times, particularly for the initial Special Marine Warning, Special Weather Statement, and subsequent Severe Thunderstorm Warnings. Lead time for some of the severe weather reports were close to 60 minutes of advanced warning!

As anticipated, these severe thunderstorms supported large hail with several reports of hail up to 1.5". These supercells were also very efficient rain makers, producing rainfall amounts of 1.5" in 20-30 minutes. This resulted in widespread urban flooding in Buffalo and in some of the immediate suburbs.

In the velocity image from the Buffalo radar, a microburst (circled red and green area) was evident, which was evidence of damaging winds. This was later verified by a video in the Buffalo Metro area. The strong and sustained updraft with this storm also produced abundant lightning, which was captured by many on Social Media forums. As the storms tracked southeast into the Southern Tier, the storms developed into a linear Mesoscale Convective System (MCS) with very strong surface wind gusts in excess of 70 mph suggested by radar and later verified by numerous damage reports.

In summary, all the signals were there before the storms arrived, from an EML to the trigger (shortwave trough and front) to support high confidence in a severe weather event.



Velocity (left image) showing the microburst and hail (1.5in) and wind damage (right images)

Q & A with NWS Buffalo - Jeff Walsh, Electronics System Analyst

By Heather Kenyon

What is the role of an Electronic Systems Analyst (ESA) at the National Weather Service?

The ESA position covers quite a bit of area. I work with our IT specialist to maintain the computer systems and the AWIPS system. I work with the MIC on all facilities issues. I manage the electronics section of the office.

What is the best part of the job?

I love to see how and why things happen in the Weather Service. This position gives me the opportunity to see things develop at the regional level and make their way down to the field. It's very eye opening to see all the moving parts that are needed to make things work in the agency.

We appreciate all the hard work the Electronic Staff provides to the forecasters, especially during hazardous weather. Is there any weather event that stands out to you?

The most recent event that immediately comes to mind was the "knife" lake effect snow event from a couple years ago. It was amazing to see how much snow fell in a concentrated area and within a mile either side of the lake band was virtually nothing! I was born and raised here and had the most amazing snow fort during the blizzard of '77. I've been able to be a part of many cool weather events. The best part of them all, though, is that they all melted away. I'll take a heavy snow event over a real tornado, hurricane, forest fire or any other disaster that other parts of the country get.

What was your career path to your current position?

I've been learning electronics since High School. I joined the Air Force and specialized in aircraft electronics on C130 aircraft. I got a fulltime job at the Reserve Base in Niagara Falls in 2001 and worked there until 2011 when I became part of the Weather Service. I also worked 12 years as an electrician.

What do you like to do outside of work?

I love/need to stay active! I am constantly making improvements on my house-it never lets me down for things to do! I love camping with the family going on all types of little road trips. I do a lot of hiking, walking, biking, boating, fishing and kayaking with my wife Merrie and our kids. The kids are getting older now though so it's important that Merrie and I keep each other motivated. We're not fans of getting older! Oh yeah, I'm somewhat of a Buffalo Bills fan too!

What is the craziest piece of equipment you've worked on?

I loved working on airplanes throughout my Air Force career and our Weather Radar is an amazing piece of equipment. There is so much to know on the Radar and it's always throwing something different at you. But, as far as crazy and different, I would have to say working on a rock crusher as an electrician. It's a very large system of conveyor belts and motors that take street millings and concrete slabs and pulverises them into reusable stone and blacktop fill. You have to work on them live to troubleshoot electrical contactors and limit switches. It is very loud and it is constantly bouncing and vibrated from crushing the concrete. I was getting pelted with pieces of rock constantly. It was a blast!

Summer Seasonal Outlook 2021

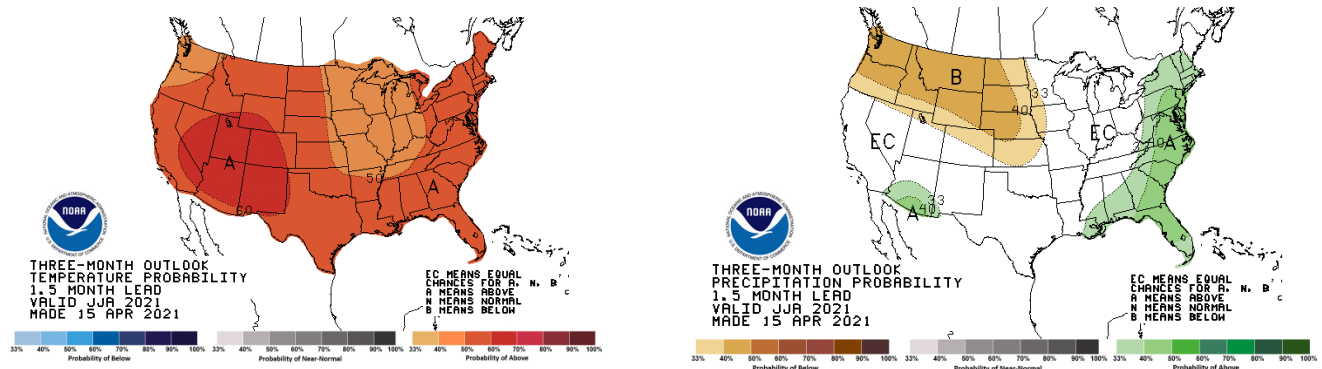
By David Thomas

Meteorological summer is defined as June, July and August and these three months are typically our three warmest months of the year. Last year was one of the warmest summers for portions of our region in quite some time, and the current prediction for this summer is to again have strong odds for above normal warmth. This would buck the trend of recent summers that displayed alternating warm and cool summers.

A typical summer day in Western and North Central New York will have high temperatures in the mid 70s to around 80°F. Normal low temperatures during the summer months will drop back into the mid 50s to around 60°F. The new climate normals that were recently released show that Western and North Central New York summers have warmed, as the difference in 30 year normals from 1991 - 2020 and 1981 - 2010 displayed around a half degree rise. This was more noticeable in the minimum temperatures which increased more than the maximum temperatures.

Precipitation last summer was around normal for our region, with some areas above and other areas below a typical summer total. This is not uncommon as thunderstorms and their heavy, but localized rainfall can trend some locations much wetter than others. For this summer, the Climate Prediction Center (CPC) located in College Park, Maryland has tilted our region, and especially our eastern zones to odds that favor wetter than normal conditions.

In summary, another warmer than normal summer is likely for our region, with our eastern zones most likely to experience wetter than normal conditions.



Safe Boating (continued)

Special Marine Warning (eg. marine severe thunderstorm): Wind gusts of 34 knots or greater (39 mph or more), hail $\frac{3}{4}$ inch diameter (eg. penny sized hail) and waterspouts. Typically short duration of 2 hours or less. Note: criteria for wind and hail is less than severe thunderstorm warnings on land.

Marine Weather Statement (eg. marine non-severe thunderstorm): Typically issued for winds less than 34 knots and pea to dime sized hail. Could also be issued for heavy downpours and frequent lightning.

Severe thunderstorm warning (eg. land areas and inland lakes): Wind gusts of 50 knots or greater (58 mph or greater) and/or hail at least 1 inch in diameter (eg. quarter sized hail).

Tornado warning (eg. land areas and inland lakes): Tornado has been sighted or indicated by weather radar

Special Weather Statement (eg. land areas and inland lakes): Non-severe winds and hail on land. Could also be issued for heavy downpours and frequent lightning.

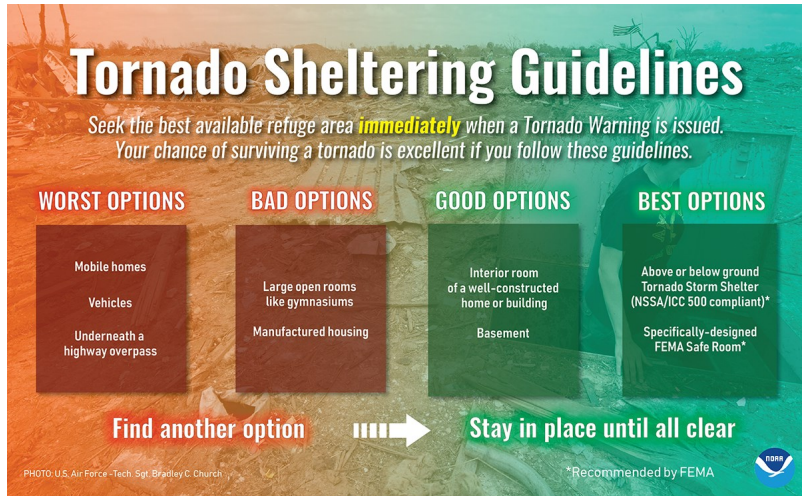
Know where to get the latest weather information and how to get the latest alerts when on the water. This will put you in the best position to have a fun and safe boating season, whether it is on the Great Lakes or on one the many inland lakes. For more information about safe boating, visit weather.gov/safety/safeboating-week.

Looking Back on Severe Weather Awareness Week

By Mike Fries

National Weather Service offices across the country observe awareness weeks during several intervals through the year to promote safety in differing hazardous weather conditions or in activities that are highly dependent upon weather. These weeks are summarized in a calendar that is indexed by state and is available at https://www.weather.gov/safety/events_calendar. In another article in this edition of The Lake Breeze, our marine program leader, Jason Alumbaugh, is writing about the upcoming Safe Boating Week, which is the next of the awareness weeks we will be celebrating. However, one of the more notable awareness weeks of the year just took place from April 25 to May 1. That was Severe Weather Awareness Week.

During Severe Weather Awareness Week, each day we sent out coordinated social media posts and public information statements that focused on specific threats due to severe weather, communications and warning reception for severe weather warnings, safety during severe weather outbreaks, and survival during extended utility outages that sometimes accompany severe weather outbreaks. The summary of all of the public information statements made during the week about severe thunderstorms, lightning, tornadoes, hail, flash flooding, NOAA weather radio reception, and survival kit safety tips can still be found on our 2021 Severe Weather Awareness webpage at https://www.weather.gov/buf/swaw_21. Likewise, Facebook and Twitter posts featuring similar material are just a simple scroll back in our feeds on those respective platforms.



While western and north central New York do not tend to have the widespread and frequent severe weather of the Great Plains and southern United States, that does not mean we are immune to it. In a typical year, virtually every county in our area will see severe weather at some point. Likewise, while late spring and summer tend to be our busiest times for severe weather, we have seen it during every month of the year in the past across our area.

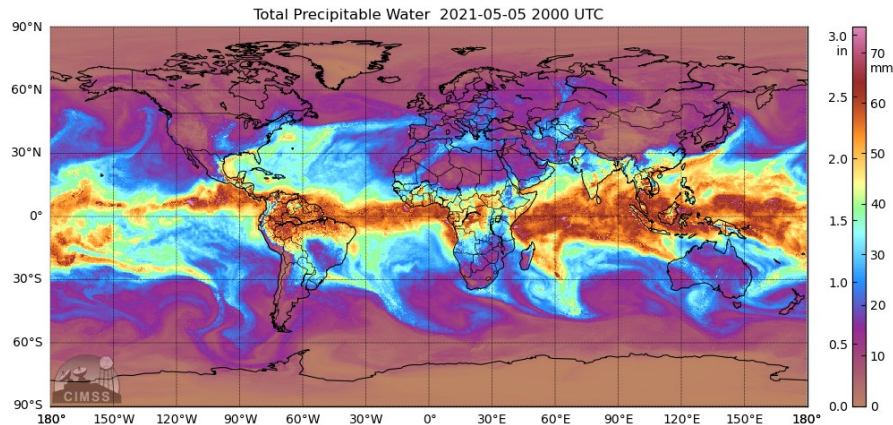
Thus, it pays dividends to you and your family's safety to remain weather aware throughout the year. And always remember, while severe thunderstorms technically are only those that produce wind gusts of 58 mph or greater, hail of 1 inch diameter or greater, or tornadoes, both cloud-to-ground lightning and flash flooding can be killers associated with severe weather. Remember to heed all warnings and seek shelter as appropriate during those warnings either in your basement or a sturdy interior room of your house until the warning has ended.

More information on how to create your severe weather survival kit can be found at <https://www.weather.gov/owlie/emergencysupplieskit>.

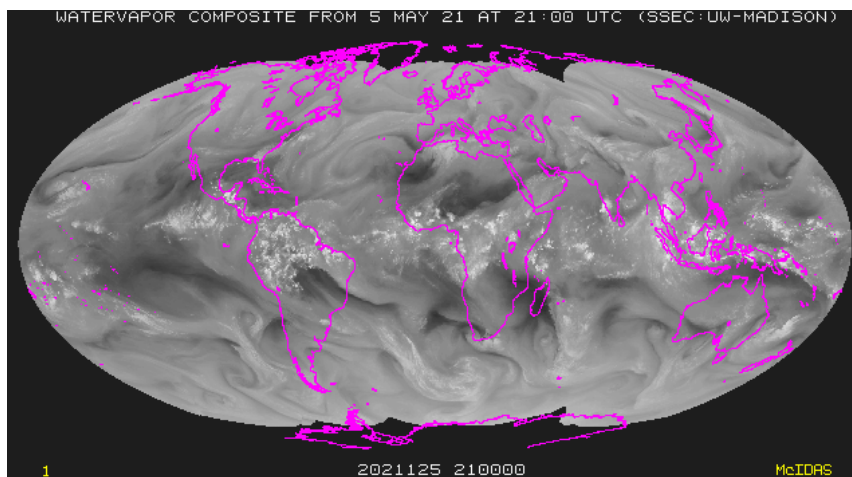
Atmospheric Rivers

By Dave Zaff

We often focus on our little region on Earth, specifically Western or Central New York. So, here's an article that focuses on the bigger picture. We've all heard of currents that exist in rivers, lakes, and oceans. But did you know that we have currents in the sky called atmospheric rivers? Take a look at this Total Precipitable Water image from May 5, 2021, and see how many atmospheric rivers you can spot over the Northern Hemisphere. From west to east, there's one off the U. S. West Coast, and a rather broad one off the East Coast. Interestingly, there's a third over part of the normally dry Africa Saharan region heading into the Mediterranean Sea. There's possibly one moving poleward from the Indian Ocean, but the Himalayan range may be blocking this one. Another can be found east of Japan.



The image uses a combination of data from multiple polar orbiter satellites. This data is then morphed with forecast model analysis data to produce this unique view of atmospheric moisture. This particular image has a fancy name: "MIMIC TPW" which stands for Morphed Integrated Microwave Imagery at CIMSS Total Precipitable Water (TPW.)



We can compare the TPW product with another satellite product called Water Vapor. They may look similar but Water Vapor picks up on cloud features. In the image above, we can see convection or thunderstorms near the equator. Atmospheric rivers can be hard to pick out on water vapor imagery when compared to the MIMIC TPW image. MIMIC TPW is sensing data throughout the entire atmosphere and can essentially see through clouds (much like weather radar), while a water vapor product can only see partway through the atmosphere. Most of the time, the water vapor product misses out on the abundant moisture closest to the surface. TPW data is often used for tropical weather, but it can be used for forecasting heavy rain events over land areas (including the Great Lakes.) We are also learning that this data may have applicability for winter storms too.

Climate Word Find

B E F G E T C W J V N Y T
 S I R V A L U O V Q H A D
 B T N U I U X N G Q K D O
 W E A M T D G S R L S E A
 G H A T P A Q E T T E E A
 I T S O I O R H R J N R X
 E L C N S O G E I S S G P
 U W I Y R C N F P R O E B
 D S A H C N X H R M R D M
 L A M R O N X A R U E M Y
 M E A S U R E M E N T T A
 P R E C I P I T A T I O N
 O B S E R V A T I O N Z E

The following words associated with climate and the new set of 30 year normals are hidden in the puzzle. See if you can find all listed words

- | | |
|-------------|---------------|
| Climate | Precipitation |
| Degree Day | Sensor |
| Gauge | Snow |
| Measurement | Station |
| Normal | Temperature |
| Observation | |

Word Scramble

Unscramble the words on the left, placing one letter per box to form a word that is associated with boating. Using the letters that fall within the circled boxes, answer the question on the right.

Ouyb

○			
---	--	--	--

Cahorn

○				○	
---	--	--	--	---	--

Gawrinn

	○			○		
--	---	--	--	---	--	--

Sewav

				○
--	--	--	--	---

Ucintala

			○			○
--	--	--	---	--	--	---

Using the letters within the circles at left, what is a type of boat often seen on the Great Lakes?

Answers:

Buoy, Anchor, Warning, Waves, Nautical, Sailboat

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data, forecasts and
warnings for the
protection of life
and property and
enhancement of the
national economy.”***



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SKYWARN® News
By Jon Hitchcock, Meteorologist

Spring 2021 SKYWARN training is in full swing. SKYWARN is a national effort to train an extensive network of severe weather spotters to aid the National Weather Service in warning the public of severe weather. Doppler radar is a powerful tool that allows meteorologists to gain insight into the potential for hail, strong winds, tornadoes, and heavy rain in thunderstorms. SKYWARN spotters still play a critical role in quantifying the magnitude and impacts of severe weather on the ground during thunderstorms by reporting hail size, wind damage, and flood severity. Doppler radar can show meteorologists detailed imagery of rotation in a thunderstorm, but real-time ground truth reports from SKYWARN spotters are needed to confirm if the rotation is producing a tornado. Simply put, SKYWARN spotters help the National Weather Service do a better job of warning the public and protecting lives and property during severe weather.

The SKYWARN training presentation from the National Weather Service in Buffalo covers the basics of how thunderstorms form, the ingredients that allow some thunderstorms to become severe, tornado formation, flash flooding, severe weather and flooding safety, and how to report to the National Weather Service. We update the training presentation every year with new images, videos, and concepts, so even if you have taken the training before, there will be some new information.



All of our SKYWARN spotter training sessions are being held virtually again this spring. Almost 200 spotters have taken the training in four virtual training sessions so far. There are two more virtual SKYWARN training sessions left on the schedule if you are interested in updating your training or taking SKYWARN for the first time. Virtual training will take place on Wednesday May 12 at 7PM, and Tuesday May 25 at 7 PM. Visit <https://www.weather.gov/buf/Skywarn> to register.

The Lake Breeze—Spring 2021 Contributors:

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