The NWA: Connecting operational meteorologists in pursuit of excellence in weather forecasting, communication, and service.

No. 12 – 7

Newsletter JULY 2012

Effective Communication of Lightning Safety

William Roeder, Private Meteorologist/Lightning Safety Advocate

Teaching lightning safety requires the same two basic elements of any public education effort: 1) motivation and 2) effective information. Motivating the public to learn lightning safety is easy. Lightning has been the second (now third) leading cause of storm deaths in the U.S., killing more than tornadoes or hurricanes. Lightning also inflicts life-long debilitating injuries on many more than it kills. Showing the contribution of lightning deaths relative to other weather phenomena is useful in states where lightning is among the leading sources of weather deaths. Timing for lightning safety education is also important. There are three times for best teaching lightning safety: 1) just before the start of the local lightning season, 2) just before a large lightning outbreak is forecast and 3) just after a local lightning casualty is reported by the media.

Using effective lightning safety information is also easy. A strong consensus on lightning safety recommendations has emerged over the past decades. This strong consensus and consistency in teaching that information is essential to credibility. Several techniques for teaching lightning safety have proven effective: make the information useful in the real world, easy to use, easy to remember, and interesting to learn. Several slogans have been developed to make lightning safety easy to remember, especially "When Thunder Roars, Go Indoors!" Fortunately, lightning naturally lends itself to dramatic pictures, video, and sound effects, which helps make lightning safety education interesting.

Enlisting the media, especially television, is one of the most efficient ways to spread the lightning safety message to the largest audience possible. Myth busting has proven to be very useful and interviews with lightning survivors can be very compelling. Lightning casualty demographics show that teaching lightning safety to children 10 years of age and younger has the most impact. An interactive game using a cartoon character 'Leon the Lightning Safety Lion' was developed to help teach lightning safety to children, along with several posters. Surprisingly, adults also like the game. Many resources for teaching lightning safety are at the NOAA lightning safety website (www.lightningsafety.noaa.gov). Assistance on teaching lightning safety is available from William Roeder (wroeder@cfl.rr.com).

New NWA Scholarship in Statistical Meteorology

Dr. Harry R. "Bob" Glahn, longtime and recently retired Director of the National Oceanic and Atmospheric Administration (NOAA)/National Weather Service Meteorological Development Laboratory, is providing full funding for a new National Weather Association Scholarship. The "NWA Bob Glahn Scholarship in Statistical Meteorology" will be offered for the first time this year with the application period closing on Oct. 25. The scholarship will be $2,500 - the largest scholarship offered by the NWA. Students in their final two years of undergraduate study when the scholarship is disbursed in January 2013 are eligible.

This scholarship is to support someone with a true interest in statistics and might be interested in a career in meteorology related to statistics. Good evidence of this would be some coursework in statistics or probability theory plus an expressed and demonstrated interest in this aspect of the profession.

See profile of Glahn on page 2

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Dr. Bob Glahn, Longtime NWA Member, funds New Scholarship

Courtesy of NOAA

Dr. Bob Glahn, a member of the National Weather Association for more than 30 years, is recognized worldwide for ground-breaking work in the use of applied statistics in automated weather forecasts. He is a key figure in the history of modern meteorology and operational weather forecasting. In the '70s he conceived and led the development and implementation of the Model Output Statistics (MOS) method of producing weather forecasts. MOS uses advanced statistical techniques to improve the accuracy of forecasts generated by computer models.

Glahn also played a critical role during the sweeping modernization program conducted by the National Weather Service in the '90s. He identified a new path to harness information technology that would move the products and services of the NWS into the digital age. Forecasters were freed from the traditional burden of hand typing hundreds of text forecasts. A high-resolution forecast database was developed leading to a myriad of new digital products, which could be automatically produced. He has envisioned a process where forecasts would become more accurate, timely, detailed and automated. He promoted probability forecasts and decision theory concepts that can now be fully exploited with the National Digital Forecast Database by private enterprises. A world expert in meteorological data formats and compression technology, he has worked with the World Meteorological Organization to develop gridded formats that have allowed the National Weather Service and weather services around the world to significantly reduce the cost of data transmission across wideband data networks.

See box on page 1 about the scholarship he is funding.

Number of NWA Seals Approaches 1,000!

The NWA Weathercaster Seal of Approval program started in 1982 to promote quality weather broadcasting. The Seal certification number format (yymm###) includes the last two digits of the approval year and two digits for the approval month followed by a successive number (numbers began with 101). As of July 15, 2012, 928 NWA Weathercaster Seals of Approval have been awarded.

2011 New Seals

NAME	STATION	LOCATION	SEAL NUMBER	DATE QUALIFIED
Jeff Porter	WWMT-TV	Kalamazoo MI	11021004	27-Feb-2011
Chita Johnson	KHOU	Houston TX	11031005	7-Mar-2011
Adam Musyt	WKTV TV Utica	Utica NY	11031006	7-Mar-2011
William Kardas	WKTV TV Utica	Utica NY	11031007	23-Mar-2011
Mark Holley	WEAU-TV	Eau Claire WI	11031008	23-Mar-2011
Kevin Jeanes	WEIU-TV	Naperville IL	11031009	14-Apr-2011
Christopher Sowers	Freelance	Glassboro NJ	11041010	14-Apr-2011
Raphael Miranda	WNBC 4	Jersey City NJ	11051011	19-May-2011
Paul Milliken	WRIC-TV	Midlothian VA	11061012	5-Jun-2011
Trent Okerson	WPSD-TV	Paducah KY	11061013	28-Jun-2011
Evelyn Taft	KRON4-TV	Los Angeles CA	11061014	30-Jun-2011
Chris Gervat	WWMT-TV	Wayland MI	11081015	9-Aug-2011
Hallie Shulman	KAKE-TV	Wichita KS	11081016	22-Aug-2011
Martha Spencer	WBTW-TV	Myrtle Beach SC	11091017	8-Sep-2011
Alissa Carlson	KGET-TV Bakersfield	Bakersfield CA	11091018	29-Sep-2011
Mike Rawlins	KRTV-TV	Great Falls Montana	11111019	3-Nov-2011
Jillian Reale	WKTV TV Utica	Utica NY	11121020	19-Dec-2011

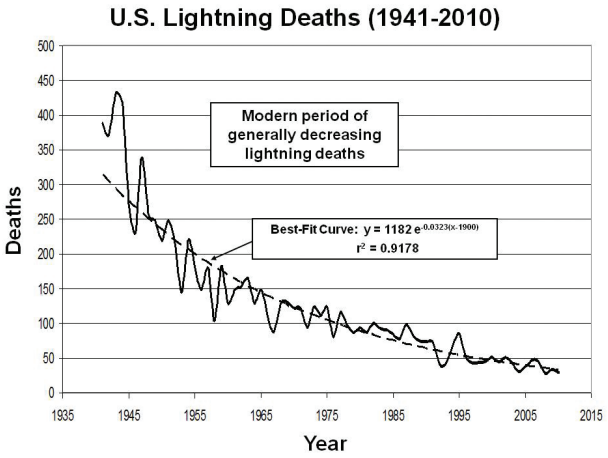
2012 New Seals

Clint Misselhorn	WSIL TV 3	Carterville IL	12021021	9-Feb-2012
Jeff Jumper	WSFA-TV	Montgomery AL	12021022	29-Feb-2012
Lauren Jones	WXIN FOX 59	Louisville KY	12031023	29-Mar-2012
Ryan Snoddon	CBC RADIO Canada	Newfoundland Canada	12041024	16-Apr-2012
David Law	KHQ-TV Spokane	Spokane WA	12041025	16-Apr-2012
Jason Dunning	WBBH-TV	Fort Myers FL	12051026	7-May-2012
Travis Herzog	KTRK-TV	Houston TX	12051027	21-May-2012
Richard Scott	WVUA TV	Northport AL	12051028	21-May-2012
Rich Rogers	WAGT TV	Augusta GA	12061029	7-Jun-2012
Kristen Kirchhaine	WFFT-TV	Fort Wayne IN	12071030	12-Jul-2012

A Statistical Model for U.S. Annual Lightning Fatalities

William Roeder
Private Meteorologist/Lightning Safety Advocate

The number of fatalities from lightning has been steadily declining in the U.S. for decades. This makes it difficult to estimate the expected number of lightning fatalities in a particular year. One common practice for estimating weather fatalities is to use the most recent 30-year running average. Unfortunately, that can be misleading if the fatalities from a particular weather phenomena have a significant trend during that period. For example, the current 30-year running average for the U.S. is 55 lightning deaths, as compared to 33 deaths expected from statistical curve fitting, a 67 percent error. One common remedy is to use the most recent 10-year running average to make the estimated rate more representative of the current time. Unfortunately, this method has the drawback that a single extreme event, large or small, can skew the results. In addition, a 10-year average doesn't completely eliminate the lag so the estimate is still not completely representative for the current year. The current 10-year running average for the U.S. is 39. A better approach to estimate the current fatality rate, when that rate is significantly changing, is statistical curve fitting over many years. This will also allow estimating the error bars for hypothesis testing to see if the rate is significantly different from other weather phenomena fatality rates. Finally, this will also allow projection of the estimated fatality rate and its error bars into the near future.



The expected annual lightning fatality rate in the U.S. is given by the following equation:

$$y = 1182.00*\exp^{(-0.0323(x-1900))},$$

where x is the year. This is based on the period 1941-2010 (see figure) with r2 = 0.92.

For example, for 2011 the expected lightning fatality rate is:

$$1182.00\exp^{(-0.0323(2011-1900))} = 32.8.$$

The 5th and 95th percentile for the expected number of lightning deaths in the U.S. for any year is:

$y = 649.49*\exp^{(-0.0297(x-1900))}$ with r2 = 0.92, and
$y = 1457.40*\exp^{(-0.0304(x-1900)}$ with r2 = 0.94, respectively.

These statistical models can be used to raise awareness about lightning safety to the public. For example, if the number of lightning fatalities in a year is significantly higher than expected, that can be used to emphasize the need for more lightning safety education in the next year.

More details are available from William Roeder at wroeder@cfl.rr.com.

YOU are the NWA – YOU can Effect Change Here

Did you know we have about 3,000 members in the NWA? Whether you consider that number big or small, it represents growth and diversification in our organization. Over the last year, our largest growing membership category is that of student member. I have mentioned before how we are large enough to have an impact, yet small enough that anyone can make a difference. Our 2012 NWA Annual Meeting Program Chair, Jordan Gerth, started as a student member on the Council just 1.5 years ago. When the Council met last month at the mid-year meeting many questions were asked: How do we stay relevant? How do we increase the value the organization brings to you while maintaining our focus on affordability? How do we hang on to long-time members while attracting young members who have grown up in an entirely different world? People like Jordan who have stepped up quickly into leadership roles are making a big difference in helping us look to the future. If you are a new student member, you don't need to earn your stripes to make a difference. Find your interest and join a committee – there is a place for you now.

Speaking of making a difference, the mid-year meeting also highlighted an immediate challenge we face. We have traditionally offered scholarships and grants as a means of rewarding effort in the field of science and meteorology, as well as a way to introduce young potential members into the organization. This month's newsletter highlights a new scholarship opportunity (see article on Bob Glahn Scholarship) that illustrates one member's way of furthering the growth of the organization. Many of our grants and scholarships are perpetuated by NWA Member donations. The number of scholarships awarded, as well as their monetary amount, is based on these donations. Donations can be made by clicking on the NWA Member Portal button in the top left of the NWA home page (www.nwas.org). Links to donations for our scholarships are in the Resources box just below the membership signup links. Whether you start your own scholarship, or just want to ensure this vital service continues by making an online donation, please consider doing so. Imagine the huge difference 3000-plus members can facilitate by making a small contribution now!

Liz Quoetone, President

The Applied Meteorology Unit: Lessons Learned on Transitioning Research into Operations for America's Space Program

John T. Madura, NASA, Kennedy Space Center, Fla.
William H. Bauman III, ENSCO, Inc., Cocoa Beach, Fla.
Francis J. Merceret, NASA, Kennedy Space Center, Fla.
William P. Roeder, 45th Weather Squadron, Patrick AFB, Fla.
Frank C. Brody, NWS/Spaceflight Meteorology Group, Houston, Texas
Bartlett C. Hagemeyer, National Weather Service, Melbourne, Fla.

The Applied Meteorology Unit (AMU) provides technology transition and technique development to improve operational weather support to America's space program. The AMU is funded and managed by NASA and operated by ENSCO, Inc., a contractor that provides four meteorologists with a diverse mix of advanced degrees, operational experience, and associated skills including data processing, statistics, and the development of graphical user interfaces. The AMU's primary customers are the U.S. Air Force 45th Weather Squadron (45 WS) at Patrick Air Force Base, 30th Operational Support Squadron Weather Flight at Vandenberg Air Force Base, NASA's Ground Systems Development and Operations Program, NASA's Launch Services Program, the National Weather Service Spaceflight Meteorology Group at NASA Johnson Space Center, and the National Weather Service Forecast Office in Melbourne, Fla.

The AMU has transitioned research into operations with 122 projects over 20 years. They have developed a wide range of tools to satisfy customer requirements. A list of those projects and reports is at the AMU website (http://science.ksc.nasa.gov/amu). During this rich history, the AMU and its customers have learned many lessons on how to effectively transition research into operations. Some of these lessons include

- Instituting customer-driven tasking,
- Involving the customer throughout the process,
- Collocating with the operational customer and visiting geographically separated customers,
- Maintaining flexibility throughout projects,
- Providing high skill level and flexible skills mix,
- Managing and funding separately from the operational units, and
- Paying attention to customer relations.

A useful technique has been to assign a 'prime advocate' from the customers for each project in addition to the normal organizational liaison to the AMU. This advocate is usually the one with the most need for that project and so has the strongest interest in that project succeeding. Customer involvement has been critical to the AMU's remarkable success and many awards from NASA, the National Weather Association, and two citations from the Navy's Center of Excellence for Best Manufacturing Practices.

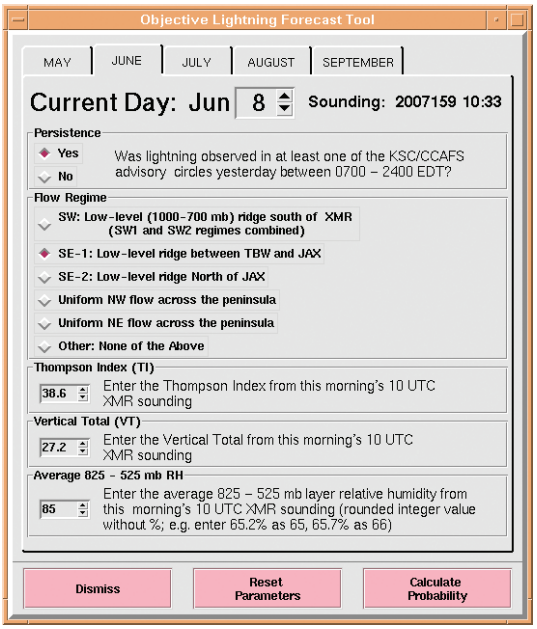


Fig.1. Example of the input (top) and output (bottom) from the AMU-developed lightning probability tool.

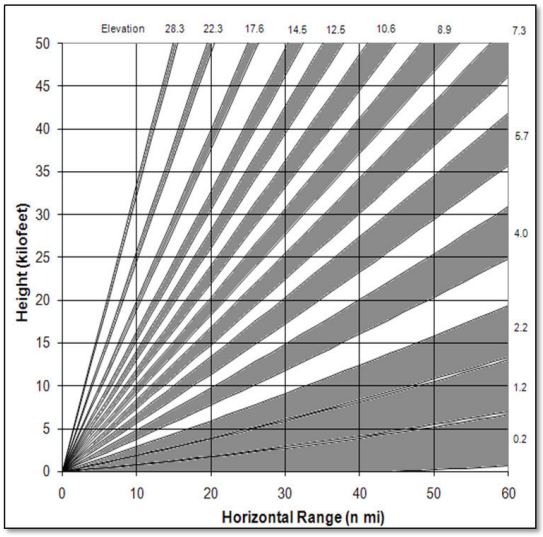


Fig. 2. The scan strategy developed by AMU to optimize operational utility from the new weather radar used by the 45 WS.

Following are two brief examples of AMU projects. 1) The AMU developed the lightning probability tool (Fig. 1), which integrates the important factors for lightning at Cape Canaveral Air Force Station (CCAFS) and NASA Kennedy Space Center (KSC) to produce a single optimized lightning probability. The new lightning probability tool provided a skill score 56% better than the previous operational tool. 2) The AMU improved the scan strategy of the 45 WS's radar (Fig. 2) to optimize for the various weather support requirements at CCAFS/KSC. It includes beam angles to detect low-level boundaries that are critical to the development of summer thunderstorms in Florida, to predict the onset of lightning, to evaluate Lightning Launch Commit Criteria, and to reduce the cone of silence. This new scan strategy improved the radar's vertical resolution in the key atmospheric electrification layer by 34% compared to the previous scan strategy.

More at http://science.ksc.nasa.gov/amu or contact AMU Chief Dr. Lisa Huddleston at lisa.l.huddleston@nasa.gov.

The National Weather Association presents

The 10th Annual Scholarship Golf Outing

Saturday, October 6, 2012

Yahara Hills Golf Course

Madison, Wisconsin

$85 per golfer

Price includes golf fees, lunch and donation to the NWA Scholarship Fund.

Please contact Betsy Kling to sign up:

betsykling@wkyc.com

Students: Apply Now for Fall 2012 NWA Scholarships

The application period for the three Fall NWA scholarships is now open; they will be accepted through Oct. 25. In addition to the Arthur C. Pike and Phillips Family Scholarships, the NWA is pleased to offer for the first time the Dr. Bob Glahn NWA Scholarship in Statistical Meteorology (see page 1). The new scholarship will be presented to an undergraduate student who is in their last two years of study and who has demonstrated a true interest in statistics and might be interested in a career in meteorology related to statistics.

http://nwas.org/committees/ed_comm/application/

NWA 37th Annual Meeting Information

October 6–11, 2012 in Madison, Wisconsin

The meeting sessions will be held in the beautiful Frank Lloyd Wright designed Monona Terrace Convention Center in downtown Madison

Location & Schedule

Monona Terrace Convention Center
One John Nolen Drive, Madison, WI 53703

The 2012 NWA Annual Meeting will include the annual Broadcaster Workshop and DVD swap, and the Fifth Annual Student Session both on Sunday, Oct. 7.

The general sessions will be held Oct. 8–11. The NWA annual awards luncheon will be held on Wednesday, Oct. 10.

Exhibits from NWA Corporate Members and others will be available Sunday through Tuesday.

Theme

"Synthesizing Weather Information for Society: From Observations to Action across our Communities".

Today's meteorologists understand that the best forecast means collaborating with weather partners in education, emergency management, government, research, broadcast media and more. At this year's meeting, the breadth of the professional community is invited to explore the emerging technologies, ideas, and science that not only allow us to improve weather forecasts but also to fine tune the message to customers and the general public.

Hotel Rooms Filling Up

If you have not reserved your hotel room yet, they are booking up quickly!! We urge you to make a reservation today: http://nwa2012.com/hotels/

More Info on Madison, the Meeting, the Program Planning & Social Media:

The meeting blog at http://nwa2012.com/ will be maintained by the NWA Annual Meeting Program Committee, for information on the events, the agenda, the hotels and the local area as well as breaking news.

NWA will also provide updates on this Web page, on the NWA Facebook page, Twitter and other social media. Please use the hashtag #NWAS12 for any tweets associated with the 2012 Annual Meeting. Attendees are most welcome to use their Twitter accounts to send out information, and retweet liberally.

All Annual Meeting information is located at:
www.nwas.org/meetings/nwa2012

The Quantitative Precipitation Forecasting Component of the 2011 NOAA Hazardous Weather Testbed Spring Experiment

David Novak[1], Faye Barthold[2], Robert Oravec[1], Bruce Sullivan[1], Andrew Orrison[1], Mike Bodner[1], Steve Weiss[3], Andy Dean[3], Israel Jirak[3], Chris Melick[3], Jack Kain[4], Adam Clark[4], Fanyou Kong[5], Ming Xue[5], Patrick Marsh[5], Kevin Thomas[5] and Keith Brewster[5]

[1]*NOAA/NWS Hydrometeorological Prediction Center, Camp Springs, MD;*

[2]*NOAA/NWS and I.M. Systems Group, Inc., Camp Springs, MD;*

[3]*NOAA/NWS Storms Prediction Center*

[4]*NOAA/ National Severe Storms Laboratory*

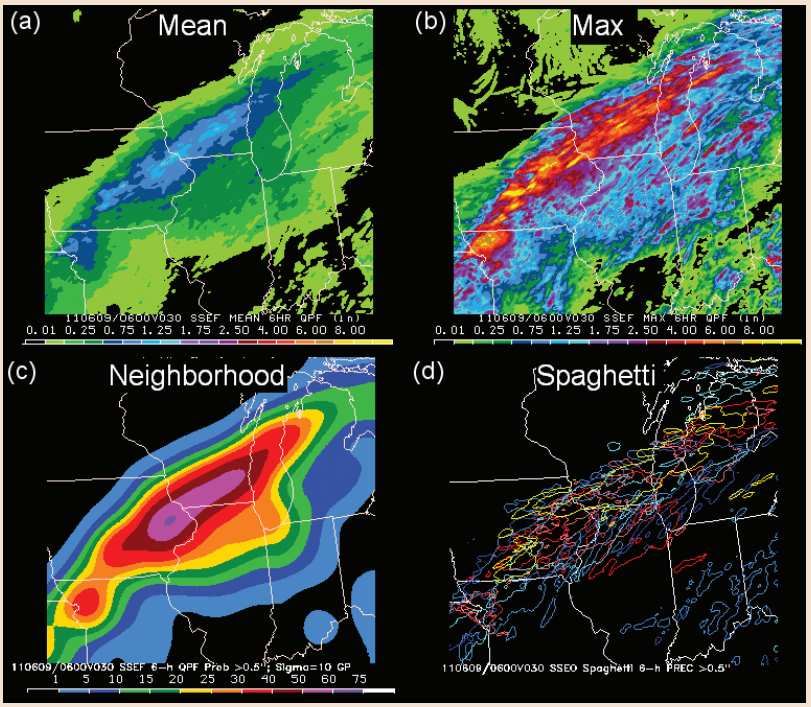
[5]*University of Oklahoma*

The NOAA Hazardous Weather Testbed's (HWT) Spring Experiment provides a unique collaborative environment that brings the research and operational forecasting communities together to explore emerging model guidance and forecasting techniques. The 2011 Spring Experiment was conducted over a five week period from May 9 to June 10, 2011, and featured quantitative precipitation forecasting (QPF), severe weather and convective initiation components. The QPF component, led by the NCEP Hydrometeorological Prediction Center (HPC), explored the use of storm-scale (~4 km grid spacing) deterministic and ensemble model guidance for forecasting precipitation associated with warm season convection.

Participants used storm-scale model guidance and observations to forecast the probability of exceeding 0.5 and 1.0 inch of precipitation during three near term six-hour periods. The deterministic guidance featured a variety of Weather Research and Forecasting (WRF) model configurations with grid spacing of ~4 km. The experiment also featured output from a 24-member Storm Scale Ensemble Forecast system (SSEF) with 4 km grid spacing provided by the Center for Analysis and Prediction of Storms (CAPS) at the University of Oklahoma. Finally, a seven member Storm Scale Ensemble of Opportunity (SSEO) consisting of readily available 4 km convection allowing model runs was also available.

The performance of the high resolution models relative to their operational counterparts was evaluated. The new 4 km NAM nest was rated as the best deterministic guidance source by both subjective participant assessments and objective verification conducted by the Developmental Testbed (DTC). Both the SSEF and SSEO were found to provide considerable value over the operational NCEP ensemble. The positive feedback about the SSEO was particularly significant because the SSEO relies on currently available high resolution

See HAZARD, page 7



Example of experimental ensemble forecast guidance for the 30-hour forecast from the SSEF valid 0600 UTC June 9, 2011, including (a) ensemble mean, (b) ensemble maximum, (c) neighborhood probability (smoothed probability field) of 0.50 inch, and (d) spaghetti plot of the 0.50 inch threshold.

PROFESSIONAL DEVELOPMENT

NWA sponsored Annual Meetings, Conferences and Special Events

Oct. 6-11: 37th National Weather Association Annual Meeting

This Annual Meeting will be held in Madison, Wisc. See page 5 and http://www.nwas.org/meetings/nwa2012.

Other Meetings, Conferences and Special Events

Oct. 2-4: 16th Annual Great Divide Weather Workshop

VIRTUALLY hosted by the National Weather Service Forecast Offices in Billings and Glasgow. Registration information is available at http://www.wrh.noaa.gov/wrh/greatdivide/welcome.php?wfo=byz.

Jan. 6-10, 2013: 93rd American Meteorological Society Annual Meeting

In Austin, Texas. http://annual.ametsoc.org/2013/?CFID=12137&CFTOKEN=14711286

April 8–12, 2013: NOAA Satellite Conference for Direct Readout, GOES/POES, and GOES-R/JPSS User

In Miami, Fla. http://satelliteconferences.noaa.gov/Miami2013

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model guidance. A variety of visualizations of ensemble precipitation guidance were also assessed. Examples are shown in Fig. 1. Based on a subjective evaluation by the participants, spaghetti plots (Fig. 1d) were favored over more sophisticated ensemble visualizations.

The experimental forecast and model evaluation process has helped raise awareness of the challenges associated with warm season QPF, and has influenced model development by identifying guidance that adds significant value compared to the current operational models. As a direct result of the experiment, many of the experimental datasets are now available to forecasters at the HPC. A full report of the 2011 Spring and other HWT experiments are available at http://www.hpc.ncep.noaa.gov/hmt/experimentsummaries.shtml.

[The 2012 HWT Spring Experiment was held May 7-June 8, 2012. For more: http://hwt.nssl.noaa.gov/Spring_2012/.]

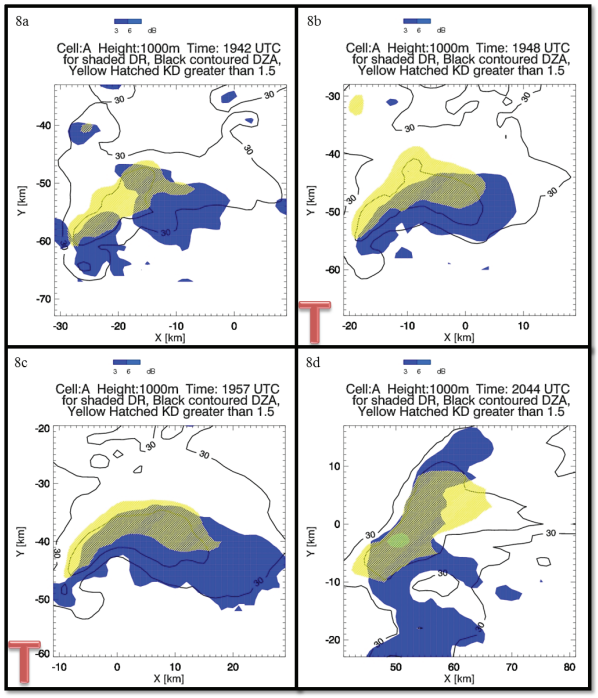
EJOM UPDATE

New Article in EJOM

Submitted by Michael Brennan, National Hurricane Center

A new paper was published in the NWA Electronic Journal of Operational Meteorology: 2012-EJ5, "Use of Dual-Polarization Signatures in Diagnosing Tornadic Potential" by Christina C. Crowe of NWS Huntsville, Ala., Christopher J. Schultz of University of Alabama in Huntsville, Matthew Kumjian of CIMMS at the University of Oklahoma and NOAA/OAR/NSSL in Norman, Okla., Lawrence D. Carey of University of Alabama in Huntsville, and Walter A. Petersen of NASA Wallops Flight Center in Wallops, Va.

The article builds upon previous research that indicated changes in dual-polarization fields (KDP and ZDR) are associated with varying dynamics and thermodynamics of the near-storm environment that may lead to tornadogenesis. Researchers analyzed C-band radar data for 20 storms from supercell, broken line, and quasi-linear convective system (QLCS) cases across northern Alabama. By studying the changes in values, spatial relationships, and evolution of the dual-polarization fields over the lifetime of each storm, differences were analyzed between the structures of the tornadic and non-tornadic storms. Links to several animations of the data are also provided in this article.



Four panel time trend of CAPPIs at 1 km elevation, for a tornadic cell from April 27, 2011 (Cell A). A tornado warning was in effect for all panels, and an EF4 tornado was on the ground from 1943-2033 UTC (indicated by the red T). Reflectivity (ZH) is contoured in black at 30 and 50 dBZ, specific differential phase (KDP) is shaded yellow for values greater than 1.5° km-1, and differential reflectivity (ZDR) is shaded blue for values greater than 3 dB (Figure 8 in paper).

New NWA Members from June 2012

Regular/Military/Retired

Jami Boettcher
Aric Cylkowski
Hiram Escabi Jr.
Linda Gilbert
Christopher Allen Hovanic
Kelly L. Jesmer
Dennis C. Kwilinski
Ed Mahoney
Austen L. Onek
Richard Orville
Lindsey B. Paster
Robert Allan Prentice
Charles Ross
William P. Runyon
Timothy William Troutman
Joi VonRentzell
Eric Waage

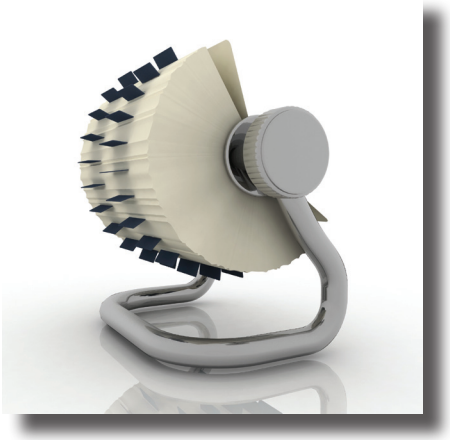
Students

Jennifer Marie Bentley
Lee W. Campbell
Robert K. Carroll
Mallory Cato
Johnathan E. Clark
Katelyn Dotson
Michael Groenke
Dale E. Herschlag
Taylor Kanost
Genki Robby Kino
Stacy Kraatz
Seth Kutikoff
Jonathan David Labriola
Glenn P. Mckeever
Thomas Brian McKenzie
Tiffany Meyer
Nicole Peterson
John Sears
John Turnbull
Quentin Walker
Michael W. Wilson
Peter Woolcox
James Zvolensky

Updating Your Contact Information

Have you moved recently, changed jobs, graduated from college, changed emails or phone numbers? If yes, please take a moment to double-check and update your NWA contact information. It is quick and easy to update via the NWA Member portal at member.nwas.org. Your information is secure; it is never sold and is only used in support of NWA member services.

If you have forgotten your password, you can request it to be reset in the member portal. If you have forgotten your log in, please contact assist@nwas.org or call 919-845-1546 for assistance. Thank you for taking the time to update your contact information. We want to ensure that you are receiving important information and communications from the NWA.



IMPORTANT DATES

Aug. 1: Nomination period for Annual NWA Awards closes

Sept. 6: Last day to reserve Annual Meeting hotel room at Inn on the Park

Sept. 7: Annual Meeting Preregistration Period ends

Sept. 8: Last day to reserve Annual Meeting hotel room at Concourse

Oct. 6 - 11: 37th NWA Annual Meeting, Madison, Wisc.

Oct. 25: Application period for NWA Arthur C. Pike, Phillips Family, and Bob Glahn Scholarships closes

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