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

No. 12 – 4

Newsletter
APRIL 2012

National Weather Center Debuts Art Biennale

Michael Bendure
Director of Communication at Fred Jones Jr. Museum of Art
University of Oklahoma

The National Weather Center at the University of Oklahoma has teamed with the Fred Jones Jr. Museum of Art and the Norman Arts Council to explore the theme of weather in art with the National Weather Center Biennale, the first international juried exhibition featuring art about weather. The biennale officially began this year on Earth Day, April 22. Artists can register on the biennale's official website at www.nwcbiennale.org. The National Weather Center Biennale is open to artists of any nationality over the age of 18.

Prizes totaling $25,000 will be offered to the top winners. An overall prize of $10,000 will be awarded to one work for Best in Show, with $5,000 given to the first-place winners in three categories: painting, works on paper and photography.

Artists may enter up to three works in any combination of categories. The entry fee is $25 for the first entry and $10 for each subsequent entry. Registration closes Oct. 1, 2012. The exhibition of selected works, including those of the prize winners, will open to the public on Earth Day, April 22, 2013 at the National Weather Center and will close June 2, 2013. Artists whose works are selected for the exhibition will be notified in late 2012.

Additional information about the exhibition is available on the website and the biennale's Facebook and Twitter pages.

Storm from the South, 2011; oil on canvas by Tony Abeyta (Navajo, b. 1965), 36 x 48 in. On loan from a private collector.

2012 NWA ANNUAL AWARD APPLICATION PROCESS NOW ONLINE!!

Nominate a deserving professional for the 2012 NWA Annual Awards. Awards will be presented during the Awards Banquet on Oct. 10 during the 37th NWA Annual Meeting in Madison, Wisc.

Nominations close on Aug. 1, 2012
Go to http://www.nwas.org/awards/index.php for details.

INSIDE THIS EDITION ...

The Tennessee Floods of May 2010: A Satellite Perspective

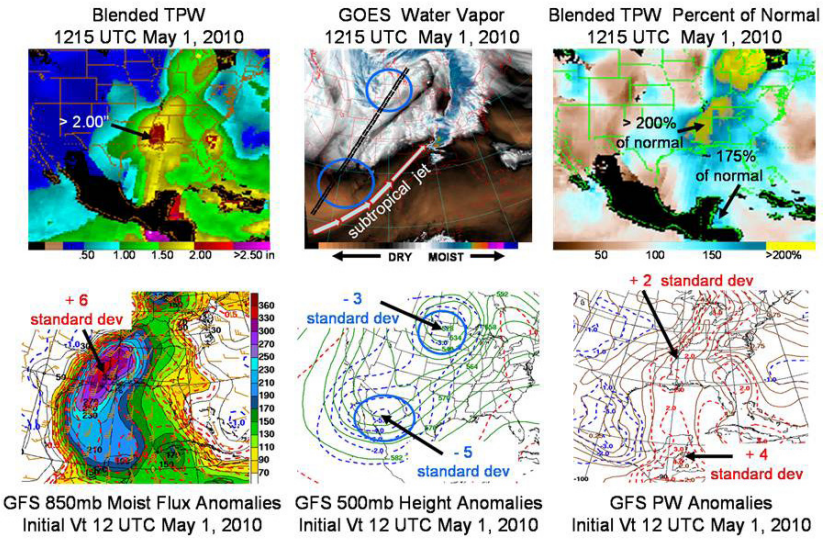
Part III

Sheldon Kusselson
NOAA/NESDIS

In early May 2010 an unprecedented multi-day heavy rainfall and flash flooding event occurred over portions of Tennessee and surrounding states. Part I of this series, published in the December 2011 NWA Newsletter, showed a sequence of National Oceanic and Atmospheric Administration (NOAA) Blended Total Precipitable Water (BTPW) and Percent of Normal product images of the large scale evolution of various deep low level moisture sources leading to the event. Part II, published in the February NWA Newsletter, discussed the use of the Geostationary Operational Environmental Satellites (GOES) 6.7 micron water vapor (WV) channel and BTPW product for analyzing various moisture and lifting mechanisms that contributed to this event, reinforcing the need to incorporate satellite imagery into the analysis and forecast process to help improve forecasts of the location and amount of heavy precipitation, and the lead time for issuing flash flood watches and warnings. This concluding article of the series, Part III, shows how BTPW and GOES WV satellite data can supplement initial computer model standardized anomaly (SA) information to gain a better perspective of the potential magnitude and historic aspects of the May 2010 heavy rainfall/flash flood event.

NOAA/National Environmental Satellite, Data, and Information Service (NESDIS) operational satellite analysts make use of BTPW products and WV imagery to analyze heavy rainfall and the potential for flooding. The NOAA/NESDIS operational unified BTPW product is created by blending TPW products from various sensors on polar-orbiting and GOES satellites, and ground-based Global Positioning System (GPS) equipment (Forsythe et al. 2009, Kusselson et al. 2009). The BTPW Anomaly or Percent of Normal product compares the current BTPW product to a 1988-1999 climatology of Defense Meteorological Satellite Program Special Sensor Microwave/Imager (DMSP SSM/I) TPW over the ocean and a mix of radiosonde and Television Infrared Observation Satellite (TIROS) Observational Vertical Sounder (TOVS) soundings over land (John Forsythe of the Cooperative Institute for Research of the Atmosphere (CIRA)/Colorado State University 2006, personal communication). By accessing the BTPW products and anomalies, forecasters can better predict the development and evolution of potential heavy or near record rainfall events. The ability to monitor moisture plumes hour by hour from the BTPW and Percent of Normal products could be of considerable value in the forecast process. GOES WV imagery can provide a subjective way to analyze the intensity of a mid- to upper-level trough approaching an area of concern.

National Center for Environmental Prediction (NCEP) Hydrometeorological Prediction Center (HPC) operational forecasters also make use of SAs to evaluate deterministic numerical weather prediction forecasts. A daily climatology featuring data every six hours and for multiple forecast fields was computed using a 62-year (1948-2009) NCEP/NCAR Reanalysis dataset (Kalnay et al. 1996). A 15-day centered average filter was used to compute the 62-year average and standard deviation for each field's day and time period. In real time, HPC standardized anomalies are generated by first projecting the forecast model data onto a 2.5 x 2.5 degree grid, subtracting the daily climatology from the model forecast, and then dividing by the standard deviation to obtain the normalized anomaly values. These values are plotted along with the actual forecast field from the model.



The individual satellite products (top row) complement and supplement the particular GFS initial analysis SAs (bottom row) for 1200 UTC May 1, 2010: BTPW (top left) and GFS 850mb moisture flux anomalies (bottom left); Analyzed GOES 6.7 micron WV image (top middle) and GFS 500mb height anomalies (bottom middle); BTPW Percent of Normal (top right) and GFS PW anomalies (bottom right). Vt means verifying time.

Quantified SAs were first described by Hart and Grumm (2001) to rank significant weather events. The Second Forum on the Future Role of the Human in the Forecast Process (Stuart et al. 2007) identified the need for forecasters to be able to recognize the problem of the day and to discern anomalous, relatively rare weather situations that may necessitate deviating from model guidance. Grumm and Hart (2001) and Stuart and Grumm (2006) have shown that SA fields can aid in the prediction of such anomalous weather situations.

Satellite data and SAs are powerful tools in assessing the potential for heavy precipitation and flash flooding. Matching the right satellite and SA product so they supplement each other to help forecasters pinpoint heavy rainfall and flash flood

Continued page 3

Continued from page 2

concerns can be challenging. In Fig. 1, BTPW and GOES WV satellite products in the top row were matched with initial Global Forecast System (GFS) SA analysis information that could provide added value to the forecaster in identifying areas of heavy rainfall and potential flash flooding. Forecasters should not feel obligated to just use the below matched satellite products (top) with the SA directly below it. Mixing and matching is encouraged if it helps the forecaster determine the heavy rain and flash flood potential of the day.

BTPW was matched with GFS 850 mb moisture flux anomalies to get a clearer sense of the anomalous transport of a concentrated area of moisture, or plume, to help improve the lead time and location forecast of the significant heavy rainfall and flash flooding event. GOES WV was matched with GFS 500 mb height anomalies to get a sense of the forcing mechanisms and anomalous heights that would drive the efficient squeezing of moisture from the atmosphere to the ground, increasing heavy rain and flooding potential. Lastly, BTPW Percent of Normal was matched with GFS PW anomalies to further confirm whether the event was going to be abnormal and by how much.

Since the BTPW products and GOES WV imagery are updated hourly and half hourly, respectively, their greatest value is providing information between the initial run times of the GFS SAs. Forecasters are encouraged to mix these and other satellite products with SA analysis parameters to increase their confidence in forecasting significant anomalous events like the early May 2010 event in Tennessee.

References:

Forsythe, J., S. Kidder, S. Kusselson, A. S. Jones, and T. H. Vonder Haaral, 2009: Increasing the land coverage of blended multisensor total precipitable water (TPW) products for weather analysis. Preprints. *16th Conf. on Satellite Meteorology and Oceanography*, Phoenix, AZ., Amer. Meteor. Soc., JP8.12.

Grumm, R. H. and R. Hart, 2001: Standardized anomalies applied to significant cold season weather events: Preliminary findings. *Wea Forecasting*, 16, 736-754.

Hart, R. E. and R. H. Grumm, 2001: Using normalized climatological anomalies to rank synoptic-scale events objectively. *Mon. Wea. Rev.,* 129, Issue 9, 2426-2442. 2001.

Kalnay, E. and M. Kanamitsu, R. Kistler, W. Collins, D. Deaven, L. Gandin, M. Iredell, S. Saha, G. White, J. Woolen, Y.Zhu, A. Leetmaa, R. Reynolds, M. Chelliah, W. Ebisuzaki, W. Higgins, J. Janowiak, K. C. Mo, C. Ropelewski, J. Wang, R. Jenne, D. Joseph, 1996: The NCEP/NCAR 40-year reanalysis project. *Bull. Amer. Meteor.Soc.*, 77, No. 3, March 1996, pp 437-471.

Kusselson, S. J., S. Q. Kidder, J. M. Forsythe, A. S. Jones and L. Zhao, 2009: An update on the operational implementation of blended total precipitable water (TPW) products, Preprints, *23rd Conf. on Hydrology*, Phoenix, AZ., Amer. Meteor. Soc., 8.5.

Stuart, N. A., D. M. Schultz, and G. Klein, 2007: Maintaining the role of humans in the forecast process: Analyzing the psyche of expert forecasters. *Bull. Amer. Meteor. Soc.,* 88, 1893–1898.

Two sources of NCEP Real-time Standardized Anomaly data:

http://www.hpc.ncep.noaa.gov/training/SDs/
http://www.atmos.albany.edu/student/tomjr/images/predict/pw/forecast.html

Satellite Image Resources:

Blended TPW Products: http://www.osdpd.noaa.gov/bTPW
GOES-EAST WV loop:
http://www.ssd.noaa.gov/PS/PCPN/DATA/RT/na-wv-loop.html
GOES-WEST WV loop:
http://www.ssd.noaa.gov/goes/west/nepac/loop-wv.html

What Will Your Legacy Be?

Sadly, this newsletter observes the passing of two men who were instrumental in defining the value and purpose of the NWA. Beyond their personal impacts, they each brought a perspective and energy that was important in shaping and expanding the value of this organization. They will be missed. (See p. 6.)

This is an appropriate time to ask 'What will be my legacy?'

I have a quote taped to my computer. It says, "It's amazing what we can accomplish when we don't care who gets the credit."

I'm quite sure this philosophy is much easier said than practiced and, more than likely, is counterproductive to the validation, existence and funding of the organizations and businesses that comprise our collective employments. That being said, I think it's still important to sit with that thought from time to time. Imagine a measure of success as being how well and how quickly a problem was solved or a need was met versus how much credit you got for the effort.

I have longed viewed the NWA as an umbrella under which problems and problem solvers can find each other. That's half the battle. The other half is being willing to share knowledge you have from your perspective, ask questions and then listen to the answers from those whose perspective may be very different. The problem's solution will likely involve bits and pieces from all perspectives. And in times where budgets and resources are under the gun, these collaborations are critical to solving weather-impact problems that benefit you, me, the people we love and the public at large. Your legacy can be that you made amazing contributions to the advancement of the science, the development of the technology, or the understanding of the human element in pursuing a solution. It could also be that you were able to do this most effectively and efficiently because of your ability to partner with so many others whose perspectives were critical in finding solutions. As a result, you were able to help make the impact of weather on people's lives as positive as it could be.

As for the quote, I don't know who said it. And I think I'd just as soon leave it that way.

Liz Quoetone, President

The ABI on GOES-R

Tim Schmit, NOAA NESDIS
Center for Satellite Applications and Research (STAR)
Advanced Satellite Products Branch (ASPB) ~ Madison, WI

The next generation geostationary satellite series will offer a continuation of current products and services, and enable improved and new capabilities. The Advanced Baseline Imager (ABI) on the GOES-R series will monitor a wide range of phenomena. As with the current GOES Imagers, the ABI information will be used for weather, oceanographic, climate, and environmental applications. The ABI will improve upon the current GOES Imagers with more spectral bands, faster imaging, higher spatial resolution, better navigation and more accurate calibration. The GOES-R is slated to be ready for launch in October 2015.

The ABI expands from five spectral bands on the current GOES Imagers to 16 spectral bands in the visible (2), near-infrared (4) and infrared (10) spectral regions. The current and ABI band frequencies are shown in Fig. 1 with their associated spatial resolutions. There will be an increase of the coverage rate leading to full disk scans at least every 15 minutes and continental U.S. (CONUS) scans every five minutes. High-time resolution loops over mesoscale regions will also be possible. ABI spatial resolution at the satellite sub-point will be nominally 2 km for the infrared bands and 0.5 km for the 0.64 μm visible band. All the ABI bands will also have on-orbit calibration.

High-quality simulated data, as shown in Fig. 2, and other satellite observations are being used in a number of ways to prepare for the ABI era. For example, 1-minute loops from the post-launch science test of current GOES are being used to showcase the potentials of continuous rapid scan imagery. Current plans call for 25 baseline products to be generated from the ABI including imagery, cloud properties, legacy temperature and moisture profiles and derived imagery (Lifted Index, Total Precipitable Water, etc.), aerosols, atmospheric motion vector winds, hot spot characterization, volcanic ash, etc. Of course the imagery can be combined in many red-green-blue composites, to highlight various features, such as cloud phase, dust, etc. Thirty one products are being readied by the Algorithm Working Group (AWG), although currently not slated for operational implementation. These products include Low Cloud and Fog, Cloud Ice Water Path, Cloud Layers/Heights, Cloud Liquid Water, Ozone Total, Aircraft Icing Threat, Aerosol Particle Size, Visibility, Surface Albedo, Ice Cover, Absorbed Shortwave Radiation at the Surface, Probability of Rainfall, Tropopause Folding Turbulence Prediction, Vegetation Index, and Upward Surface and Top of the Atmosphere Longwave Radiation. A full list of the 31 products is available on the GOES-R website.

In summary, the ABI on GOES-R will improve over the current GOES Imager in many aspects as just described, plus improved image navigation and radiometer performance. These improvements will greatly assist forecasters through improving performance of many applications, especially on the regional and meso-scales.

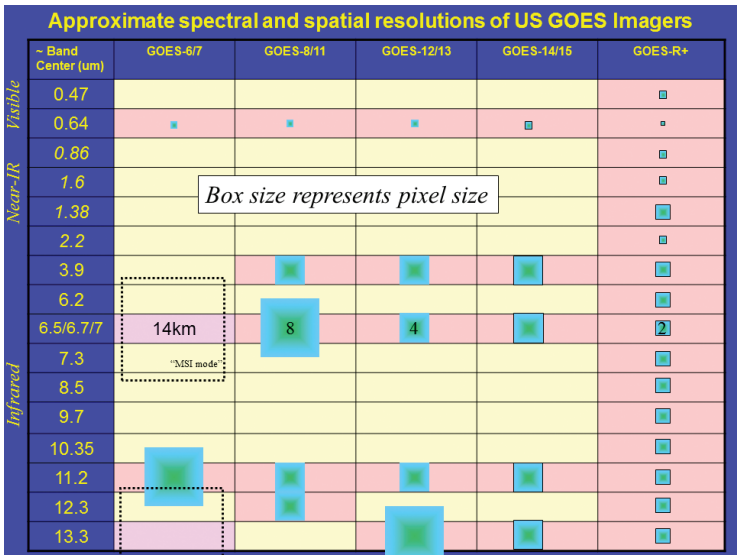


Figure 1. Approximate spectral and spatial resolutions of U.S. GOES Imagers. The box size represents the nominal pixel size. The ABI will have more spectral bands, plus finer spatial resolution measurements.

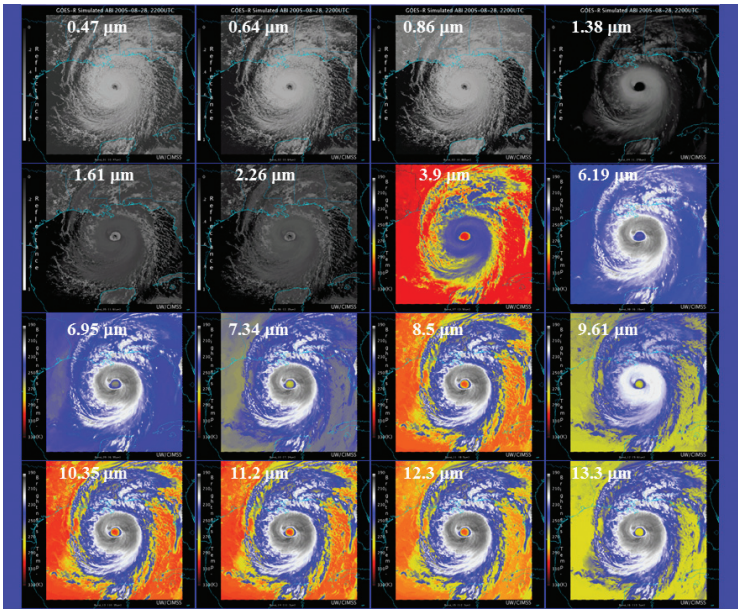


Figure 2. Simulated images of the 16 ABI bands for Hurricane Katrina. These images were simulated via a combination of high spatial resolution numerical model runs and advanced forward radiative transfer models (Image provided by the AWG/Cooperative Institute for Meteorological Satellite Studies (CIMSS).
The current GOES image only has five spectral bands.

More information on the ABI and other GOES-R features can be found at:
www.goes-r.gov

SOL HIRSCH EDUCATION FUND GRANTS
apply until June 1

Sol Hirsch Education Fund Grants are awarded annually to teachers/educators of grades K-12 to help improve the education of their students, school and/or community in the science of meteorology. Up to seven grants ($750 each) are awarded each year.

http://www.nwas.org/grants/solhirsch.php?

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.

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

Abstract & Poster Submissions

Submit abstracts requesting oral presentations by 25 May 2012 and abstracts requesting poster presentations by 29 June 2012.

Abstracts should be sent via the online form and will be published as submitted, so please make sure that they have been carefully reviewed and edited. Presenters will be notified via e-mail regarding disposition of their abstracts by 20 July 2012. A preliminary agenda will be posted on the NWA web site by early August for presenters to review and proofread.

Undergraduate and graduate students can apply to become eligible for monetary awards given for the best oral presentations and posters.

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.

In Memory ....

STANLEY WASSERMAN 1934 - 2011

Editor's Note: Stan Wasserman was a charter member of the NWA, joining in 1976. This obituary was provided by Fred Zuckerberg, another NWA charter member who has maintained his membership since the beginning of the association.

A few outstanding individuals appear in each generation and Stanley Wasserman was one. Stan was full of energy, insightful and curious about the atmosphere and life in general. He studied meteorology at the City College of New York and received a M.S. in meteorology and did additional graduate work at New York University.

Stan's entire career was spent in the National Weather Service (NWS), except for a two-year stint in the U.S. Army at Ft. Huachuca, Ariz., providing meteorological support for artillery. Stan's career in the NWS began at Newark, N.J., and progressed in research in the Scientific Services Division, the Data Acquisition Division and as Chief, Meteorological Services Division — at the Eastern Region of the NWS. He concluded his long government career as Meteorologist-in-Charge at the forecast office in New York City. He was instrumental in improving interpretation of satellite information, probability forecasting, issuance of watch and warnings, hurricane preparedness and nuclear plant disaster readiness. During his career he also found time to act as a consultant to NBC on early manned space flights and to teach part-time at the SUNY Maritime College. He received numerous awards from the U.S. Department of Commerce, the NWS and the American Meteorological Society (AMS). As a Certified Consulting Meteorologist his counsel was sought and he brought credit to the profession. He also served as Chair of the NYC Chapter of the AMS and the Atmospheric Science Section of the New York Academy of Science.

He was too energetic to retire to a life of leisure and became a real estate broker after retirement. He had many Chinese clients and came to understand their culture of feng shui in searching for a home. He also was one of the first to express apprehension about sub-prime mortgages which would later lead to the great recession. On 9/11/2001, we played golf as we did twice a week since retirement. Suddenly there was a cacophony of sirens and smoke rising about 20 miles southwest of the golf course. We all thought it was just another building on fire: Stan correctly assumed that it was the World Trade Center. We learned the terrible truth when we got back to the club house. Stan is survived by his wife Muriel, a daughter, two sons and six grandchildren.

By Fred Zuckerberg with the aid of Mark Kramer

KENNETH W. REEVES

Ours is a small fraternity. Those of us who study, forecast, teach and apply our knowledge of the atmosphere for the benefit of the greater good pursue a career path populated by small enough numbers to foster common friendships and acquaintances. We admire the accomplishments of our colleagues, we recognize individual effort with annual awards and we grieve as a community when we lose one of our own. Ken Reeves died on March 25 at the uncomfortably early age of 50, cutting short a vibrant life punctuated by a broad smile and an intense affection for our weather and the natural beauty that surrounds us.

I met Ken while working as The Weather Channel's Storm Analyst in 2001. Our friendship developed from our mutual respect for the other's knowledge and experience. Conversations were easily energized by the most recent storm or the recounting of an on-air experience that usually ended in a howl, from both of us. There was an infectious energy about him that was both entertaining and enlightening. He carried those qualities with him into any discussion, whether it was a vision for the most advanced display technology or the daily forecast.

I leveraged Ken's love of the synoptic when I asked him to give an invited talk during the 2008 annual meeting of the NWA in Louisville. John Gordon (Meteorologist-In-Charge at the NWS office in Louisville and Chair of the Annual Program Committee) and I decided the theme of that meeting would be applying knowledge of historic storms to the challenges of present day operational forecasting. I was confident that Ken would find my invitation to speak on the 1978 Cleveland "Bomb" too irresistible to deny and agree to join what turned out to be a summit of weather geeks. His contribution to the program was vintage Ken Reeves and included the almost mandatory, "I remember exactly where I was when…"

Ken was a longstanding and supportive member of the National Weather Association. It was his ardent backing that eventually enabled two undergraduates from Penn State to attend the NWA's annual meeting in Tucson in 2010. He would be pleased to know that the Penn State student membership in the NWA is healthy and continues to exceed our expectations. Ken might be equally surprised at the outpouring of grief over his passing expressed by his friends, his colleagues and even those he never met. We will miss the smile and the enthusiasm he gave so freely. We will remember his passion for the science and say a prayer of thanks that he chose to travel down a road similar to ours in this journey we call life.

By John R. Scala, National Weather Association 2008 President

New Member Benefit! Early Online Releases of Digest Papers

In an effort to be more timely with National Weather Digest papers, the National Weather Association is now providing early online releases of accepted manuscripts to the Digest on the Member's Portal. These manuscripts have been peer reviewed and are in the process of technical editing for publication. Manuscripts are in the form submitted to the editors after their acceptance, so there will be differences between early online releases and published versions due to formatting and technical editing. While the manuscripts are not in their final form, they contain the essence of the research and thus may be cited as any other published article from the Digest.

Distinguished Award for NWA Member Dr. John Knox

NWA member Dr. John Knox, associate professor of geography at the University of Georgia, was one of two meteorologists in the nation named recently to the Princeton Review's "Best 300 Professors" list.

This list, based partly on tens of thousands of anonymous student evaluations of teaching on the website www.ratemyprofessors.com, is apparently the first-ever data-intensive nationally standardized examination of teaching excellence across disciplines in American higher education history.

Knox has served the NWA as an associate editor of the National Weather Digest, a member of the NWA Remote Sensing committee, and was mentor to the first-ever winner of the NWA Meteorological Satellite Applications Award, Stino Iacopelli of Valparaiso University.

For more information on the "Best 300 Professors" project, see http://www.princetonreview.com/best-professors.aspx

New NWA Members from March 2012

NEW MEMBERS

Regular/Military/Retired
Janna Brown
Robert Deal
Lissette Gonzalez
Christopher Gress
Chris Johnson
Eric Lenning
Jason Luze
Andy Pearman
Patrick Poynor
Richard Ryrholm
Tim Stevens
Lewis Turner
Emili Weis

Students
Laura Bannon
Ed Bensman
Steve Beverly
Brittany Davila
Dexter England
Jessica Foxworth
Matthew Gray
Michael Hollan
Benjamin Johnston
Danielle Lorenz
Chris MacIntosh
Jeffrey Madison
Shanna Mendiola
Lindsey Moore
Catherine Simpson
William Turner IV
Thomas Ward
Jeremy Young

PROFESSIONAL DEVELOPEMENT

NWA sponsored Annual Meetings, Conferences and Special Events

Oct. 6-11, 2012: 37th National Weather Association Annual Meeting

This Annual Meeting will be held in Madison, Wisconsin. The meeting sessions will occur in the beautiful Frank Lloyd Wright designed Monona Terrace Convention Center in downtown Madison. Specifics are online and on page5. See more on past and future Annual Meetings at http://www.nwas.org/meetings/nwa2012

Other Meetings, Conferences and Special Events

July 15 - 20: Short-course: Studies in Air Quality for Science Educators

The Science Center for Teaching, Outreach, and Research on Meteorology (the STORM Project) at the University of Northern Iowa (Cedar Falls) will sponsor this intensive, one-week course designed specifically for middle school and high school science teachers. Participants will receive a stipend. Most expenses, including travel, will be covered by the STORM Project. Out-of-state teachers are encouraged to apply. For more information, see: http://www.uni.edu/storm/saqse/.

July 18-20: ORBCRE Symposium 2012

The Ohio River Basin Consortium for Research and Education Symposium 2012 will be held at Ohio University in Athens, Ohio. The theme is: Research and Education of Ohio River Basin: Transportation, Energy and Environment. Details at: http://www.orbcre.org/.

Students & Teachers!

2012 NWA Scholarships and Grants Applications Period is Open!

This year, the NWA is offering six scholarship opportunities and one grant for university students.

Four scholarships will be available this spring and two in the summer. Additionally, there will be seven education grants for K-12 Teachers.

Information for scholarships and grants are online:

www.nwas.org/committees/ed_comm/application/

www.nwas.org/grants/index.php

NWA Scholarships and Grants	Application Closing Date
Broadcast Meteorology Scholarship	Closed
David Sankey Minority Scholarship	Closed
AccuWeather Undergraduate Scholarship	May 15
Dr. Roderick A. Scofield Scholarship	May 15
Meteorological Satellite Application Award Grant	June 15
2012 Sol Hirsch Education Fund Grant for K-12 Teachers	June 1
Arthur C. Pike Scholarship	Oct. 25
Phillips Family Undergraduate Scholarship	Oct. 25

IMPORTANT DATES

May 15
Application period for NWA AccuWeather and Dr. Scofield Scholarships closes

June 1
Sol Hirsch Education Fund Grant application period closes

June 15
Meteorological Satellite Application Award Grand application period closes

Aug. 1
Nomination period for Annual NWA Awards closes

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

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Submit newsletter items to nwanewsletter@nwas.org using the Instruction for Authors at http://www.nwas.org/newsletters/newsletter_instructions.php.

Members receive the Newsletter and *National Weather Digest* as part of their regular, student or corporate membership privileges. Printed Newsletter subscriptions are available for $25 per year plus extra shipping costs outside U.S. Single copies are $3. Address, phone number, email and affiliation changes can now be made online: member.nwas.org.

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