



DAILY BAMS



2009 Annual Meeting

Issue 4 – Wednesday, January 14, 2009

Climate in 2008 Had Plenty of Extremes But No Teleconnections

Because the global atmosphere lacked long-term teleconnections, most big news was from localized events, according to the speakers at the “Impacts: Weather of 2008” conference.

Tropical Cyclones: Six consecutive tropical cyclones struck the United States, making 2008 the second costliest U.S. hurricane season behind 2005, while overall it was the deadliest weather year since 1991 with more than 138,000 killed or missing in Myanmar alone following Category 4 Tropical Cyclone Nargis in early May. Yet, only the Atlantic Basin realized above-average hurricane activity. The Northwest Pacific had just one but it swamped Micronesia with record coastal flooding. In the Caribbean, Cuba was hit by three major

hurricanes for the first time in the satellite era. Hurricane Gustav’s whopping 212 mph gust (before the anemometer blew over) was a record for a non-mountain station.

Tornadoes also showed dichotomies. An outbreak of 54 tornadoes killed 7 people on January 7–8 and a swarm of 87 tornadoes on February 5 killed 57 on Super Tuesday election day. May had 460 confirmed tornadoes and June saw 289 tornadoes. Then, suddenly on June 15, the tornadoes virtually shut off the rest of the year.

China and the Middle East endured a long stretch of record cold and winter storms early in the year. Baghdad had its first snow in a century, while large areas in northern China experienced rare blizzards that clogged roads and cut off entire



Surfs Up! – AMS members look on as Bill Ward, NOAA/NWS, Pacific Region Headquarters, Honolulu, Hi., (not shown) discusses the 18–20 foot surf involved in an unusual low in the Northwest Pacific Ocean during World-Wide High Impact Weather.

states, running up damages of \$21 billion and killing at least 129 people. Bitter cold and snow caused more than 1,000 deaths in Afghanistan. Ironi-

cally, Israel and Lebanon were on common footing as both nations enjoyed unusual snowfall

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Coffee pots and bagels draw a large crowd as AMS members take in the morning poster viewing session.

As the Solar Cycle Heats Up, So Does Space Weather Activity

Speakers at Monday’s Sixth Symposium on Space Weather highlighted key research, new forecasts, and better instruments that are expected to provide an increased level of protection for the onslaught of solar storms anticipated with the 2011–13 peak in sunspot activity.

Raising the urgency with this solar cycle is our growing reliance on satellites and satellite communications, including cell phones, satellite radio

and TV, and GPS capability. All of these technologies are vulnerable to the increasingly frequent geomagnetic storms during the peak of the cycle.

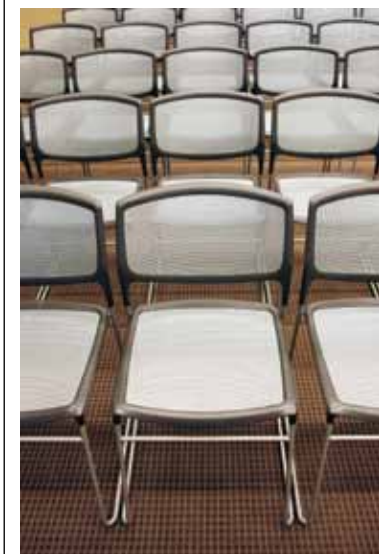
At the conference, Jack Hayes, head of the National Weather Service, which includes the Space Weather Prediction Center, assessed just how vulnerable we are. He noted that about 250 satellites costing billions of dollars

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Kristen Averyt, University of Colorado, speaking at the panel session, Water in the West:

“I don’t go to the articles in *JAMA* when I have a sore throat to diagnose myself. I go to my doctor. It sounds silly to say, but in climate science we really don’t have enough doctors. In medicine, students who are going to be doctors are actually taught how to work with the patients. That doesn’t happen in climate sciences.”



You are sitting on recycled car batteries and seat belts.

NEWS FROM THE EXHIBITS

The IIPS Conference this morning in Room 121BC devotes a session to the new Advanced Weather Interactive Processing System workstation. **Raytheon** is the architect and builder of the multiyear process by which the old

AWIPS is being transformed into AWIPS II, which should bring advanced functionality to weather forecasters in the field, while simultaneously simplifying code and consequently strengthening system performance. The first release of AWIPS II is slated for mid-2009, with deployment scheduled for 2010.

AWIPS is used by the National Weather Service to analyze and

disseminate operational weather data, including time-sensitive, high-impact warnings. Its complex



network of systems ingests and integrates meteorological, hydrological, satellite, and radar data.

It also processes and distributes the data to and among 140 plus NWS forecast offices and environmental centers nationwide.

The Raytheon AWIPS Team provides hardware, software, and communication services to the entire AWIPS network, including NWS Weather Forecast Offices, River Forecast Centers, regional headquarters, and Environmental Prediction Centers dispersed

across the United States and its territories.

The Raytheon AWIPS team has also executed numerous sustaining engineering, product improvement, and technology refresh projects. These include site relocations as well as hardware replacements that are designed to

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Networking the Mesoscale Networks Could Be Data User's Dream

Today's Town Hall Meeting on "Observing Weather and Climate from the Ground Up—A Nationwide Network of Networks" (12:15 p.m., Room 125A) features findings and recommendations by a National Academy of Science committee on developing a vision for an integrated, flexible, adaptive, and multipurpose mesoscale meteorological observation network.

The committee's final report, to be summarized at today's Town Hall Meeting, offers steps that can be taken for near-term and long-term improvements in U.S. mesoscale observations. At an IIPS session on Monday, Richard Carbone of NCAR characterized the report as an effort to "preserve the energy" of the nation's current mesoscale networks, which have sprouted up independently across the

nation. Often these networks have been formed for a single purpose, sometimes for private use, and hence they vary considerably in standards, density, and configuration. This "grass roots" effort has involved governmental agencies, collectives, emergency responders, large companies, and even weather hobbyists.

The emphasis of the proposed network is to allow coordination and hence greater usefulness of the data on a national scale. It would be built largely out of these existing mesoscale networks, but if implemented with uniform standards and requisite metadata, could help characterize the planetary boundary layer (up to 2–3 kilometers altitude) and improve forecasts on timescales up to 48 hours.

In addition, certain types of measurements need to be introduced in many areas be-

cause of the singular purposes of individual mesonets the report has found. For instance, the current infrastructure falls short in air quality and chemical composition monitoring—including low-level ozone, carbon monoxide, and small particulate matter—and measurements of solar radiation and soil temperature and moisture. Urban, coastal, and mountainous regions also are currently under-sampled, despite the fact that these are areas where mesoscale observations are greatly needed due to high population density and special geographical characteristics that influence regional weather.

The report calls for an overarching national strategy to achieve this integration. A proposed entity, a sort of "Corporation for Environmental Monitoring," could archive data and help people find rel-

evant information, maintain the network and its standards, and provide expert assistance to users and providers, Carbone said.

Eventually, Carbone suggested, the current disparate

networks could be joined by futuristic "smart" sources of other data, like numerous coordinated low-powered radar and the sensors on cars that control things like windshield wiper speeds.



AMS Incoming President Tom Karl, NOAA NCDC, Asheville, NC, shares a laugh with AMS Past President Donald Johnson, University of Wisconsin/MSN SSEC, McFarland, Wis., between meetings.

Failure to Predict Space Weather Could Be Costly

Solar Cycle
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circumnavigate Earth, and have about a \$250 billion impact on the United States economy each year. A hit from a major solar storm, he says, would be devastating ... and that doesn't even include impacts on the ground.

"There are studies that estimate that if we don't have weather prediction capabilities, we could subject the nation to a \$1–\$2 trillion impact" from a severe geomagnetic storm causing a widespread power grid blackout, he said, adding that "it could take 4–10 years to recover."

To bolster defenses, NASA

is preparing a new satellite—the Solar Dynamics Observatory (SDO)—for launch later this year. Outfitted with the latest technology, it will join more than a dozen other high-tech NASA and NOAA satellites already in orbit aimed at the sun that are working in concert to improve space weather observations and forecasts.

One of the many phenomena from the sun and in Earth's space environment that cannot yet be fully explained or adequately forecast are violent bursts of particles known as coronal mass ejections, or CMEs. Yet Richard Behnke of the National Science Founda-

tion noted in his presentation that even here scientists are making progress. "We're getting closer to predicting the next CME."

Calling space weather research a "team effort," U.S. Air Force Director of Weather, Fred Lewis, said that expansion and partnerships are creating the "capability to expand the solar patrol."

Cautiously optimistic, Lewis accepts but brushes off such challenges to space weather observations and forecast as instrumentation replacement and putting data into models to make three-day forecasts.

"We're ready for the next solar max ... knock on wood."

NEWS FROM THE EXHIBITS

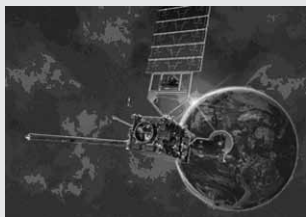
Continued from page 1

increase system responsiveness, avoid obsolescence, enhance security, and reduce system reliability risks.

NASA last month selected Lockheed Martin to build the Geostationary Operational Environmental Satellite R-Series, known as GOES-R, for

NOAA. The basic contract is for two spacecraft. Two options each provide for one additional spacecraft. The total estimated value of the basic contract including options is \$1.09 billion.

"We are proud to have been selected by NASA to provide this vital environmental satellite system for our nation," said Joanne Maguire, executive vice president



of Lockheed Martin Space Systems Company. "GOES-R will expand capabilities for weather forecasting that will help to better protect lives and property."

Lockheed Martin's GOES-R solution builds upon the A2100 geosynchronous spacecraft bus and precision imaging capabilities from previous remote sensing programs.

The A2100 satellite fleet currently consists of 36 satellites and has achieved an accumulated 200 years of successful in-orbit operations.

"Our team is ready to move forward to design and field this important national system," said Jim Crocker, vice president of Sensing and Exploration Systems at Lockheed Martin Space Systems Company. "We look forward to continuing our ongoing relationship with NOAA and NASA includ-

ing two previously awarded GOES-R instruments—the Solar Ultra-Violet Imager and the Geostationary Lightning Mapper."

Lockheed Martin Space Systems Company has a long history of developing civil and military weather and environmental satellite systems including Landsat, TIROS, Terra, and DMSP.

The Lockheed Martin GOES-R program office will

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Tsunami Research Looks Beneath the Surface to Improve Forecasting

To ensure early detection of tsunamis and acquire data critical to real-time forecasts, Deep-ocean Assessment and Reporting of Tsunami (DART) stations are positioned in regions with a history of generating destructive tsunamis. Eddie Bernard of NOAA/PMEL and chair of the session “Advances in Tsunami Research with Application to Forecasts and Warnings for Coastal Regions,” which took



place Tuesday, explained that NOAA’s DART Project is an effort to detect tsunamis in the open ocean.

Paul Moersdorf of NOAA/NDBC said that the network, which began as only six stations in 2001, has been expanded rapidly, with installations as recent as March 2008. “This is information we didn’t have four years ago,” Moersdorf comments. “And now we have almost 40 sites to retrieve it.”

At each DART station an acoustic link transmits data from an anchored pressure recorder on the seafloor to a surface communication buoy. According to Moersdorf, the real-time experimental forecasts show the method is highly efficient and boasts up to 90% accuracy in amplitude.

Nazila Merati, NOAA Center for Tsunami Research, Seattle, noted the importance of real-time tsunami forecasting beyond saving lives. “Forecasting tsunamis is critical to warn people, but it is also an economic issue,” she said. Some of the future plans and chal-



lenges for forecasting tsunamis include developing the forecast system for further accuracy, refining the network, and using community models to optimize forecasts. “Modeling technique is not a static thing,” concluded Merati. “We need to look to next generation models and continue working toward better forecasts.”



Joshua P. Howe, Stanford University, speaking at the History Symposium on scientists’ reluctance to show political motivation, especially prior to the IPCC:

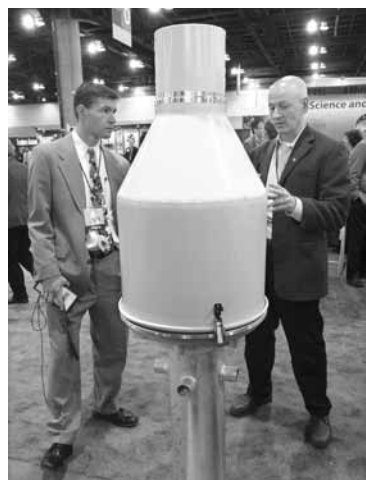
“Rather than using scientific debates as proxies for political battle, as has become the habit of scientists from across the political spectrum, perhaps it is time for climate scientists to drop the false veil of political neutrality and begin discussing their science and politics as two sides of the same coin.”

Without Patterns, the Local Extremes Stood Out in Wild Weather Year

*Impacts
Continued from page 1*

in late January. Stateside, an active storm track in January and February unleashed a record 101 inches of snow on Madison, Wisconsin, more than doubling its winter average and surpassing the previous seasonal snow

record, set in 1978–79, by more than two feet. The storm track resumed nearly a year later, creating the snowiest December on record in Madison with 40.4 inches. To the north, a very unusual snowpack stretched across Canada the same month. And Alaska faced bitter cold, with Chalkyitsik bottoming out at –58°F.



James Brylawski, left, Geonor, Inc., fields questions about the T-200B series precipitation gauge from John Macphee, Msc-Ontario Surface Networks, Aurora, Ontario, Canada.

Cold and Snow: While anomalous cold and snow gripped Siberia and much of North America during the first two months of the year, it didn’t last. In fact, globally, March was the second warmest on record. Heavy rain soaked the Midwest, creating the worst flooding in the region since 1993. Amazingly, some of the same areas flooded again in early summer, and then drought hit. In Keokuk, Iowa, an 27-foot crest on the Cedar River dropped to 4 feet in a month, which was 12 feet below flood stage. The Southeast United

States suffered through another summer of drought, but by December, the area of “exceptional” drought across the nation had dropped below 20%, its lowest level in 7 years. Record wet conditions pocked western Africa. Localized flooding struck Nigeria—unheard of!—while Algeria suffered its worst flooding on record.

Heat and Fires: Anomalously wet weather across the Philippines and northern Australia during Austral Summer turned to drought, heat, and even wildfires in and around Sydney by fall. The beginning of summer in America triggered an early but vigorous start to California’s wildfire season. Lightning from rare thunderstorms in late June ignited more than 100 wildfires inland from the San Francisco Bay area, which raged uncontained into July.

La Niña: The culprit for much of the year’s extreme

weather could be blamed on La Niña, says Klaus E. Wolter of NOAA’s Earth System Research Laboratory and the CIRES Climate Diagnostics Center. The winter months in the Northern Hemisphere featured the biggest La Niña since 1988–89. “But it faded about as fast as possible during spring only to stage a late comeback,” Wolter says. By September it was returning. But, predictors NOAA’s Climate Prediction Center uses to forecast ENSO did not reveal La Niña’s return until December. By then, it was back in full force, and the pattern of unusual weather had returned to parts of the globe. Because of La Niña, 2008 was definitely cooler than 2007. However, Wolter points out that while extreme drought followed by extreme precipitation mimicked a “brave, new GHG (greenhouse gas) world,” the extreme snow anomaly in northern China was “just natural variability.”



Fits right in.

be located at its Space Systems Company facilities in Newtown, Pennsylvania. The program will also rely on company capabilities in Colorado and California. Northrop Grumman is responding to the challenge of implementing GEOSS (the Global Earth Observing System of Systems) capabilities with a distributed information system for integrating operational data and product providers through architecture development and

scenario demonstrations. The scenarios ensure responders align their efforts. Northrop Grumman has reached interoperability agreements with multiple community data providers whose goal is to make their data and products integrated components of the Global Earth Observing System of Systems. These organizations are working with Northrop Grumman to make their data and products discoverable and accessible.

Northrop Grumman is providing services necessary to make the data compliant with GEOSS open standards. Ronald Lowther of Northrop Grumman is the lead author on a presentation today at 1:30 p.m. (Room 129A) to demonstrate these concepts. The hurricane and flood scenario for the Port of Houston will show an enterprise model for disaster management. “The centrality of the community portal in creating a coordinated

disaster response cannot be overstated,” Lowther writes in his abstract. “As data and products of USGEO community members are integrated within GEOSS, the whole of GEOSS becomes much more than the sum of its individual components.” At today’s 2:30 p.m. IIPS poster session, Richard Ice of **Wyle Information Systems** is scheduled to document a new method of automatically identifying and filtering areas of radar returns

with ground clutter. The Clutter Mitigation Decision Algorithm, a product of several years of development at NCAR, has now been implemented, integrated, and qualified at the WSR-88D Radar Operations Center. During implementation, the algorithm was refined for effective application in the WSR-88D and for use in generating

Exhibitors of the 89th AMS Annual Meeting

The AMS Annual Meeting is the host to the largest exhibit in the atmospheric, oceanic, and related sciences anywhere. Exhibitors come from the United States and abroad with over 100 organizations showcasing a wide range of products, publications,

and services. Listed below are exhibitors for the 89th Annual Meeting of the AMS. Don't miss the opportunity to browse the exhibit floor and learn what these organizations have to offer you!

Exhibit Show Hours	
Wednesday	11:00 A.M.—6:30 P.M.
Thursday	11:00 A.M.—4:00 P.M.

	<u>Booth</u>		<u>Booth</u>
AAI Corporation	707	Leosphere	128
Aanderaa Data Instruments	235	LI-COR Biosciences	244
ABB, Analytical	525	Lockheed Martin	201
Accu Weather, Inc.	535	Logotronic, Inc.	236
ADSS, Inc. (formally ADA Tech.)	816	Met One Instruments, Inc.	703
Advanced Designs Corporation	100	Metek (GmbH)	120
AER, Inc.	710	Microcom Design, Inc.	540
Air Force Weather	238	Midland Radio Corporation	135
All Weather, Inc.	441	MODEM	717
American Meteorological Society Publications	811	NASA Science Mission Directorate	136
Asheville Area Chamber of Commerce	134	National Center for Atmospheric Research	613
ASLI—Atmospheric Science Librarians International	809	National Research Council of the National Academies	722
Ball Aerospace & Technologies Corporation	229	National Science Foundation (NSF)	310
Baron Services	111	National Oceanic and Atmospheric Administration (NOAA)	401
Belfort Instrument Company	628	Navy Meteorology and Oceanography Command	601
Bristol Industrial Research Association	116	NOAA Center for Atmospheric Sciences at Howard University and NOAA-CREST	804
Boeing Company	117	Nortel Government Solutions	708
CA DWR	437	Northern Video Graphics, Inc.	346
Cambridge University Press	803	Northrop Grumman	219
Campbell Scientific, Inc.	627	NovaLynx Corporation	713
Center for Disease Control & Prevention	536	NPOESS/Northrop Grumman	125
Climatronics Corporation	701	ProQuest/MGA	807
Coastal Environmental Systems	427	Proton Energy Systems, Inc.	341
COMET (A Part of UCAR)	609	Radiometrics Corporation	731
Davis Instruments Corporation	334	Raytheon Company	101
Design Analysis Associates	124	Remtech, Inc.	800
DeTect	826	RM Young Company	529
DOE/ARM Program	517	SAGIM S.A.	720
DOE Global Change Education Program	440	Satel-West	336
Droplet Measurement Technologies	817	Science Applications International Corporation (SAIC)	511
EKO Instruments Co., Ltd.	335	Scintec AG	329
Enterprise Electronics Corporation	418	SeaSpace Corporation	534
ESRI	716	Sonalysts, Inc.	523
Geonor, Inc.	434	Springer	805
Gill Instruments Ltd	106	STG, Inc.	709
Global Imaging, Inc.	605	Sutron Corporation	704
Global Science & Tech, Inc.	102	Techsense Solutions Sdn Bhd	822
GRAW Radiosondes GmbH & Co	234	Tower Systems, Inc.	802
Hach Environmental	436	UNIDATA	616
Harris Corporation	311	Unisys Corporation	110
High Sierra Electronics	830	UCAR EO	623
HMEI, Association of Hydro-Meteorological Equipment Industry	812	UCAR, Office of Programs	617
I. M. Systems Group, Inc.	537	University of Oklahoma	721
IBL Software Engineering	236	University of Wisconsin—Madison, Space Science & Engineering Center	435
INSITU Inc.	447	Vaisala, Inc.	301
International Environmental Data Rescue Organization	819	Weather Decision Technologies, Inc.	727
International Met Systems	312	WeatherBug®	241
IPS MeteoStar, Inc.	700	Wiley-Blackwell	801
ITT	411	Wyle Information Systems	211
Japan Meteorological Business Support Center	541	Yankee Environmental Systems, Inc.	126
JENOPTIK Laser, Optik, Systeme GmbH	622		
Kipp & Zonen	726		

The Daily BAMS is funded in part by the exhibitors of the 89th Annual Meeting.



Soroosh Sorooshian, Center for Hydrometeorology and Remote Sensing, University of California, Irvine, delivers the Walter Orr Roberts Lecture on Climate Variability and Hydrologic Extremes.

Ocean Panel Reports on Science and Technology Priorities, Progress

A recent report by the U.S. Joint Subcommittee on Ocean Science and Technology (JSOST) outlines an approach for enhancing society's use of—and interaction with—the world's oceans. Today's Town Hall Meeting on Progress towards Ocean Research Priorities (12:15 p.m., Room 125B) reviews this effort and details progress made in achieving its goals.

The report, "Charting the Course for Ocean Science in the United States for the Next Decade: An Ocean Research Priorities Plan and Implementation Strategy," highlights three central scientific elements in improving the nation's relationship with the ocean: 1) the capability to forecast key ocean and ocean-influenced processes and phenomena; 2) the provision of scientific support for ecosystem-based management; and 3) the deployment of an accu-

rate ocean-observing system, which will revolutionize our view of the ocean and enhance research.

Using these elements as a guide, the report outlines 20 long-term (7–10 years) and 4 near-term (2–5 years) research priorities. Today's meeting will focus on near-term priorities, which include forecasting the response of coastal ecosystems to persistent forcing and extreme events; comparing ecosystem organization; developing ecosystem sensors; and assessing variability of meridional overturning circulation and its implications for rapid climate change.

The meeting will provide updates on implementation of these priorities, including their influence on a National Research Council study of how science and technology in oceanography will shape future infrastructure needs, and gather community input.



Kathy Jacobs, Arizona Water Institute, on motivation for dealing with water scarcity:

"In South Australia the reservoirs have run dry. They're getting zero allocation of water. This has a tendency to raise awareness! It's amazing how having no water actually causes people to think that there might be more dramatic solutions that might be appropriate."

Wednesday Highlights

Poster Session

2:30–4:00 p.m., Exhibit Hall 5

An all new set of posters are ready for viewing. These sessions offer the unique opportunity for the community to come together and discuss ongoing research in an informal setting. Grab a cup of coffee and browse the aisles of close to 300 posters.

Bernhard Haurwitz Memorial Lecture

5:00–6:00 p.m., Room 125B

Joseph Pedlosky, Woods Hole Oceanographic Institute, talks on "Kelvin's Theorem, the Tunneling of Rossby Waves, and the Circulation around Planetary Islands." The Bernhard Haurwitz Memorial Lecturer is selected in recognition of significant

contributions to the understanding of atmospheric and oceanic fluid dynamics, the circulation of the middle atmosphere, or the dynamics of climate. Pedlosky received this year's award "for contributions to the theory of baroclinic instability, the paradigm-shifting theory of the ventilated thermocline, and for outstanding contributions as a teacher and textbook author."

Awards Banquet Reception

5:30–6:30 p.m., Exhibit Hall 4

Join your colleagues in the Exhibit Hall for a reception prior to the Annual Awards Banquet and continue browsing the products and services of the over 100 exhibiting companies. A cash bar will be available.

Don't Miss Arizona Science Center!

A Special Offer for AMS Attendees

Weather, planets, space and sky...We've got it all! Pop on over to Arizona Science Center, across the street from the Phoenix Convention Center, at 7th Street and Washington and see science education at its best. Not only will our state-of-the-art NanoSeam dome thrill your senses in our Dorrance Planetarium but our Forces of Nature Gallery will blow you away...literally! Stand on our immersion theatre and experience an earthquake, a monsoon, a tornado, and even a hurricane while exploring the natural phenomena of our planet.

NEWS FROM THE EXHIBITS

Continued from page 3

offline clutter maps. Deployment in the NWS WSR-88D network is scheduled for spring 2009. Ice will also present potential integration of the algorithm with polarimetric radar techniques.

Wyle Information Systems has been providing innovative

solutions for IT consolidation, telecommunications, computer network defense, systems engineering, and related areas for 15 years.

Climate and weather enterprise continues to grow in the Asheville, North Carolina, area, which exhibits at the AMS Annual Meeting for the third year in a row and remains the only U.S. community to do so.

In October 2008, the National Environmental Satellite Data

and Information Service invited applications for the Cooperative Institute for Satellite Climate Studies that will focus on research and applications, observations, and modeling. The announcement calls for the consortium of institutions that win the bid to have a presence in Asheville in order to work closely with the National Climatic Data Center there and their significant efforts for data stewardship, and to support NOAA's strategic goal to "understand and

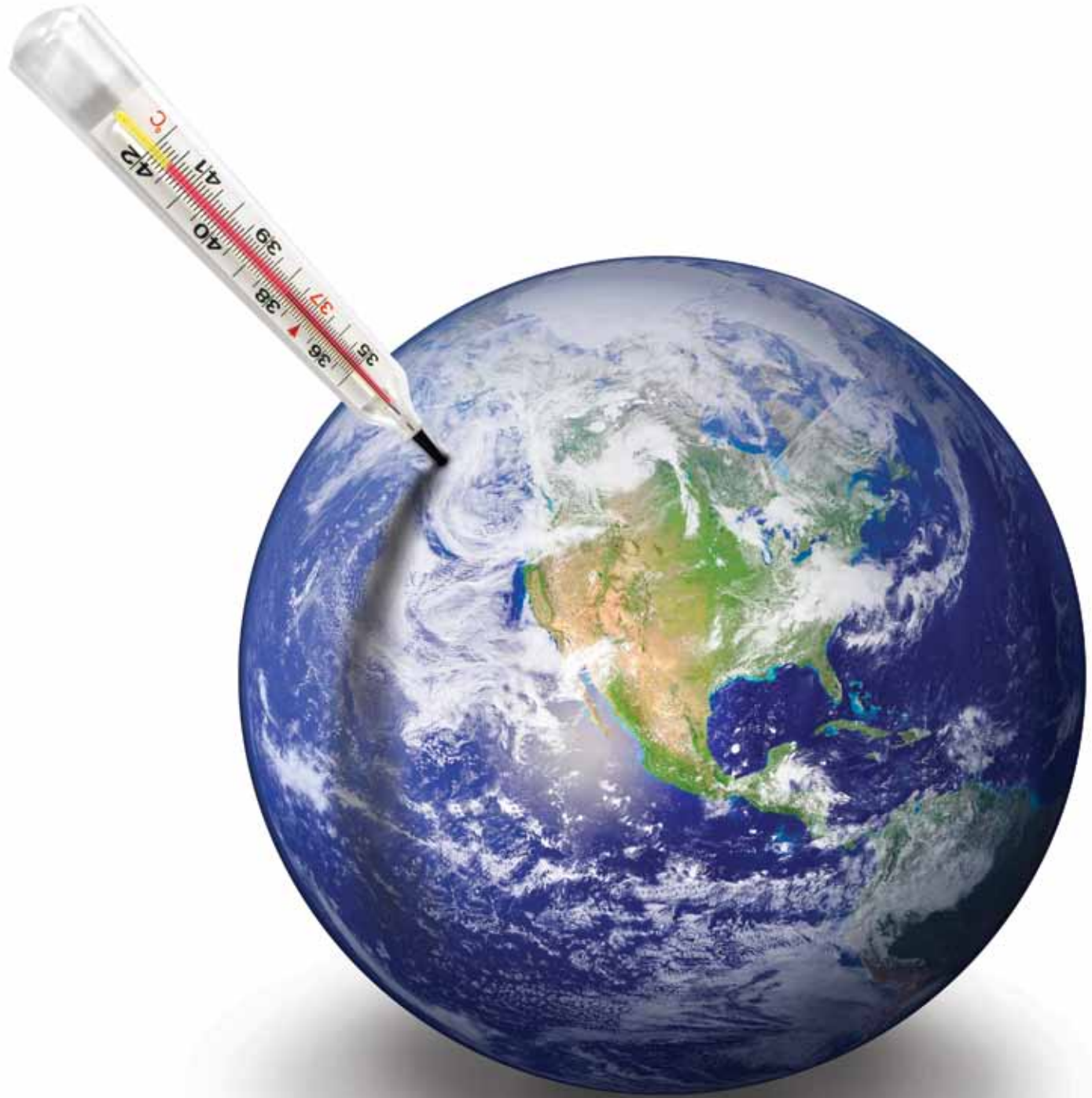
describe climate variability and change to enhance society's ability to plan and respond."

In May 2008, Scientific Research Corporation (SRC) established a new Earth sciences operation in Asheville to support climate and Earth science initiatives, including those pertaining to climate change and national security. SRC's expansion gives impetus to efforts by the Centers for Environmental and Climatic Interaction (CECI) to bring ad-

ditional federal agencies and programs to Asheville, and to attract academic and commercial partners in climate change and related services. In the past 18 months, CECI has emerged as new player in developing collaborations among federal and state agencies, academic institutions, nonprofits, and the private sector to serve the climate change-related needs of the nation.

For over 40 years, ITT has been a world leader in advanced climate and environmental monitoring systems. Our end-to-end solutions allow you to anticipate nature's next move, whether it's in the next hour, the next year, or the next century. ITT's proven-reliable sensors, systems and software capture, process, visualize and analyze data quickly and accurately. So scientists and policymakers can have the data they need to make the best-informed decisions about managing climate change and making the planet more livable. For more information go to itt.com/ams.

**We make climate change more measurable
so we can make the planet more livable.**



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