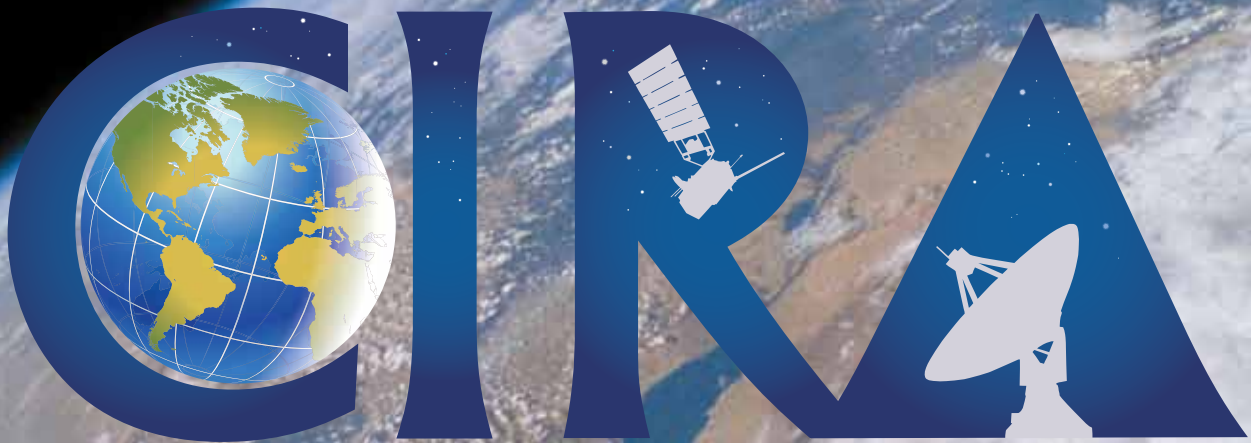


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Cooperative Institute for Research in the Atmosphere

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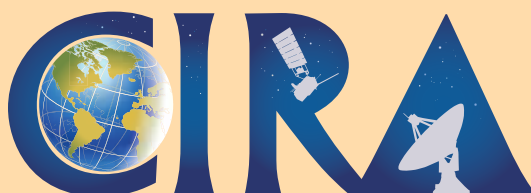
## Technical Committee

Donald Reinke, Renate Brummer, Marco Rodriguez, Jennifer Raab, and Holli Knutson

Cover design by Maureen Murray.

Earth image on front cover courtesy of NASA.

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Cooperative Institute for Research in the Atmosphere

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# DIRECTOR'S NOTE

As the incoming CIRA Director, I have been tremendously pleased by the obvious quality and dedication of both the research and support staff. While I still have not had a chance to meet with every group, I have been incredibly pleased to see that the ones I have met were not only enthusiastic about their own work, but were also aware of and dedicated to CIRA's Mission of serving as a conduit for advancing atmospheric research from academia to the applications that benefit NOAA and the Nation as a whole. In an era when short term forecasts of high impact weather such as tornadoes or flash floods may be just around the corner, it is indeed an exciting time to find oneself in the midst of this important research. Climate research is equally vibrant as we find society increasingly interested in what the climate future holds and as NOAA embarks on a bold new Climate Service initiative.

As a way of introducing myself, I come largely from a physics background but switched to Atmospheric Science and thesis in three-dimensional radiative transfer late in my Ph.D. work. This expertise led me to NASA/Goddard as a post-doc to work on developing physically based rainfall retrieval algorithms. I stayed at NASA beyond my post-doc focusing my research on the Tropical Rainfall Measuring Mission (TRMM). That was an exciting time as we began measurements using the first precipitation radar in space. I left to join the faculty at CSU in 2000. Since then, I have been heavily involved in NASA's Global Precipitation Mission scheduled for launch in 2013 as well as chairing the GEWEX Radiation Panel since 2007. My own research still focuses on global water and energy cycle issues.

People often ask me why I came to CSU and frankly I don't have an easy answer. Perhaps I just needed a change of scenery. No matter the reason, I am very happy that I made that transition. I find the additional interaction with our graduate students to be a great benefit that the Federal labs simply lack. Being in a position to help steer young scientists into areas that will be fruitful in the future is our responsibility not just to them, but to society as a whole. It is here that I think CIRA

employees on the front lines of research can and should have an impact in setting these directions along with faculty at CSU. A solid and long-lasting interaction between CIRA employees and the Department of Atmospheric Science, Colorado State University as a whole, and NOAA is still a cornerstone of the CIRA mission as we move forward. To that end, CIRA will set aside funds to support two graduate students beginning in the fall of 2011 with the intent that they will be mentored jointly by CSU faculty and CIRA research scientists. Additional details are forthcoming.

Beyond improving ties between NOAA and the University through graduate students and post-docs, I see great potential for future collaboration related to the overarching grand challenge called out in a recent NOAA science workshop. This grand challenge calls for the "Development and application of holistic, integrated Earth system approaches to understand the processes that connect changes in the atmosphere, ocean, space, land surface, and cryosphere with ecosystems, organisms and humans over different scales." It is clearly a challenge that crosses our traditional discipline lines and forces us to explore collaboration among groups that have traditionally not done so. At the same time, it is precisely how an organization like CIRA can play an important role in leveraging the broad strengths of university departments in areas such as ecology, soil sciences or biology, and bring to bear their unique perspectives on these grand challenges.

A second area where I foresee growth opportunities is in regional climate research and applications. There is tremendous expertise at CSU's Department of Atmospheric Science related to global and regional water and energy budgets, carbon cycling, and air quality. There is broader expertise at the University in this area as well. As these issues, together with data stewardship, computing and data dissemination grow in importance, I will focus some of CIRA's new energy on this area. Transitioning research into applications will become increasingly important as the Nation asks for concrete answers related to regional planning in the face of global climate change.



*Christian Kummerow officially took the reins of CIRA on Sept 17. His tenure coincides with the 30th anniversary of the Institute, making it one of the longest-serving Cooperative Institutes in the NOAA program.*

**Ongoing activities that I believe we can systematically grow to provide a more holistic benefit to NOAA and its stakeholders are the intelligent blending of satellite and in-situ data, developing the data assimilation methods that can take advantage of these regional observing systems, and the dissemination of this information to the public as is being pioneered by CIRA personnel as well as the Colorado Climate Center.**

# CIRA NEWS

## Our New CIRA Image

*Mary McInnis-Efaw and Steven Miller*

The newly formed CIRA Marketing and Outreach team has been hard at work behind the scenes to develop a fresh approach to communicating the role and impacts of CIRA research. Fall 2010 marks CIRA's 30th year as a cooperative research institute. In light of our successful re-competition last year, it is a good time to reintroduce ourselves to colleagues within the University and the greater atmospheric science research and operational communities at large. Inspired by new leadership under Dr. Kummerow and building on a strong legacy in research and operational transition, CIRA is looking to extend its reach and grow in lock-step with the visions of its research partners. Communicating what we do, who we are, and how our research benefits society at large is at the core of this effort.

CIRA's Marketing and Outreach Team (MOT) is comprised of Laura Leinen, John Forsythe, Jennifer Raab, Mary McInnis-Efaw, Maureen Murray and Karen Milberger. Maureen and Karen in particular have strong expertise in graphic design and outreach built upon many years of important contributions to the GLOBE Education and Outreach program (an internationally recognized program fostering environmental literacy via K-12 curricula and activities). Initial meetings of the MOT set about articulating a vision for a new CIRA image and its essential elements. Maureen, CIRA's resident graphic artist, collected our input and translated the words into images. After many interactions on the concept, the MOT solicited input from Director Graeme Stephens and Deputy Director Steven Miller. The final outcome emerged as a result of this group effort.

As the old saying goes, "a picture is worth a thousand words," our new image attempts to communicate what CIRA does and how we do it. You will recall that NOAA's open re-competition called for a "Cooperative Institute to Investigate Satellite Applications for Regional and Global Scale Forecasts." To this end, the image captures CIRA's foundation as an atmospheric science research institute that emphasizes the understanding of weather and climate via numerical model development and the collection, analysis, and application of satellite remote sensing observations. With heightened public awareness of climate change on regional-to-global scales, and increasing demands by stakeholders for timely and accurate characterization and prediction of weather phenomena, it is important to link CIRA research to advancing knowledge of our capabilities on multiple spatial and temporal scales. The new image draws a connection between the earth system (globe) and satellite remote sensing. The strong font is meant to convey our solid footing in science/research. Even the colors themselves (showing the glow of the horizon at dawn, transitioning to the deep blue/black of space above) were chosen to symbolize a connection between our satellite research and the dawning of new discoveries that are directed toward societal benefit.

We hope you are pleased with the outcome and encourage you to use the new image on future CIRA presentations. You may also be interested in playing the animation feature now on the CIRA homepage, which introduces the new image to the general public. With this important element of



*The new image celebrates the historical roots that underpin our success and the vision moving forward to harbor and cultivate future leaders in the atmospheric sciences.*



Cooperative Institute for Research in the Atmosphere



our branding initiative in place, the MOT will be working in the coming months on several other projects including updated business cards, updates/improvements to the CIRA website, and new marketing pieces among other items. Please don't hesitate to send suggestions to our team if you have ideas on the way forward.

Just as the CIRA building addition embodies a new era and plan for expansion, the new image celebrates the historical roots that underpin our suc-

cess and the vision moving forward to harbor and cultivate future leaders in the atmospheric sciences. Colorado State University operates at the cutting-edge of the atmospheric science field and our work is enhanced by the eminence of our faculty partners, the ingenuity, collegiality, and can-do spirit of our own research staff, and the dedicated support of our administrators and students. Our dedication to the important work of CIRA is well reflected in this updated image – wear it with pride!

## CIRA Hosts Student and Early Career Scientists

*John Forsythe*

Six young researchers visited CIRA in August 2010 as part of the NESDIS Cooperative Institute Student and Early Career Scientist Exchange Program. This program provides a mechanism for young researchers to visit other cooperative institutes and NOAA facilities to meet with experts in their field and learn more about science and careers within NOAA. Five students visited CIRA for two days after the NESDIS Cooperative Institute Science Symposium hosted by CIRA.

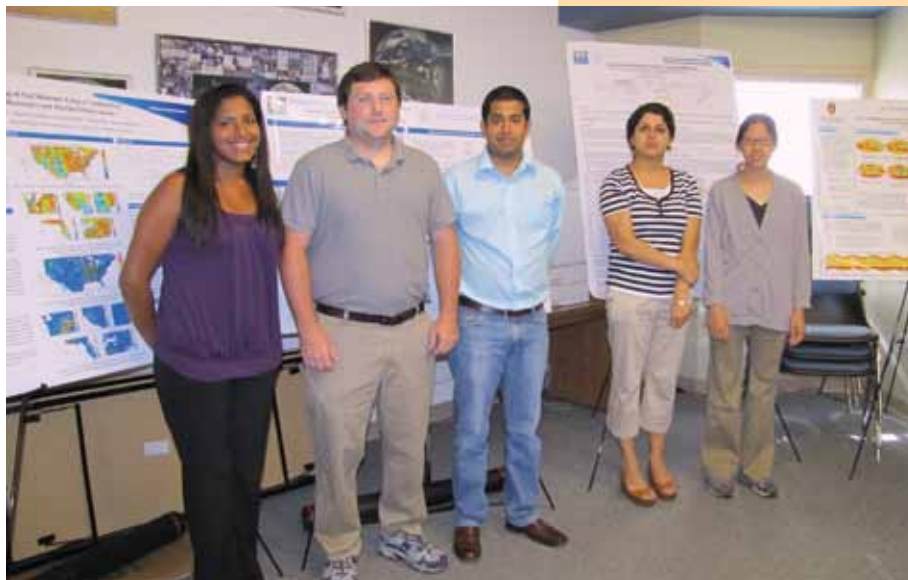
The students' topics were all related to satellite remote sensing and spanned a range of interests. They were:

- Estimation of surface snowpack properties using microwave remote sensing data (Muñoz-Barreto)
- Lake ice phenology analysis using AVHRR data (Nazari)
- MODIS cloud climatologies (Maddux)
- Validation of NOAA interactive snow Maps with ground-based NCDC data (Chen)
- A combination of passive microwave and thermal observations for a better monitoring of soil moisture in the United States (Vega-Martinez)

Dr. Yinghui Liu (CIMSS) attended CIRA later in August under this program and presented a seminar entitled "Preliminary Results of Arctic Cloud Macrophysical Characteristics from CloudSat and CALIPSO." The impact of surface ice coverage on remote sensing of clouds was particularly interesting.

Kelly Howell (M.S. CSU 2010) traveled to NOAA's National Climate Data Center in August under this program to discuss her topic "The relationship between total precipitable water and precipitation." Dr. Ken Knapp of NCDC was her host. Kelly presented a seminar and also learned about the new NESDIS cooperative institute at NCDC, the Cooperative Institute for Climate and Satellites (CICS-M). Thanks to NCDC for this collaboration!

A big thank you to the multitude of scientists at CIRA and CSU who met with the young researchers and assisted them with their research.



**Graduate student visitors at their poster session in the CIRA Director's Conference Room. (L-R) : Zulamet Vega-Martinez (CREST), Brent Maddux (CIMSS), Jonathan Muñoz-Barreto (CREST), Roya Nazari (CREST), and Christine Chen (CREST).**

# GOES

## The GOES-14 and GOES-15 Science Tests: Last of the Current GOES Series

*Don Hillger*, NOAA/NESDIS/STAR/RAMMB; *Renate Brummer*, CIRA/CSU

The data collection phase of the GOES-15 Science Test, the last of the current Geostationary Operational Environmental Satellite (GOES), has recently concluded. The Science Test, led by scientists from NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) Center for Satellite Applications and Research (STAR), ran from 11 August to 22 September 2010. NOAA Science Tests are critical steps to ensure operational readiness of the GOES series, and have been performed all the way back to GOES-8, which was launched in 1994. The first Science Tests were less formal, but have evolved into more rigorous testing with each new satellite.

The GOES-13 Science Test, as the first of the GOES-N series spacecraft, was mentioned in a previous *CIRA Magazine* article in 2007 (Volume 27). This follow-up article covers the GOES-14 and GOES-15 Science Tests, which occurred only about 9 months apart. These 2 satellites concluded the current GOES lineup, with the next satellite, GOES-R, still a few years away from completion and launch, likely in 2015. It is suspected that even more rigorous science testing will be needed with the start of the GOES-R series.

Recent Science Tests have been co-led by Don Hillger and Tim Schmit, both of NOAA/NESDIS STAR. However, many scientists have contributed, including scientists at cooperative institutes (CIRA, CIMSS, and CICS) as well as others from NOAA and NASA. Notable participation included the Office of Satellite Data Processing and Distribution (OSDPD), where GOES products are operationally generated; as well as NASA's Marshall Space Flight Center (MSFC), where GOES imagery was compared to data from lightning mapping arrays.

For all GOES check-outs, the goals of the Science Test include the following:

1. To assess the quality of the GOES radiance data. This is accomplished by comparison to other satellite measurements or by calculating the signal-to-noise ratio compared to specifications, as well as assessing the striping in the imagery due to multiple detectors.
2. To generate products from the GOES data stream and compare to those produced from other satellites. These included several Imager and Sounder products currently used in operations.
3. Rapid-scan and other special imagery of interesting weather cases are collected with temporal resolutions as fine as every 30 seconds for severe weather – a capability of rapid-scan imagery from GOES-R that is not implemented operationally on current GOES.

### Cooperative Participation and Unique Data

The GOES Science Tests are not only a result of cooperation among various NOAA, NASA, and Cooperative Institute scientists, but the Office of Satellite Operations is particularly helpful in creating and implementing the various scanning schedules that are needed to test and assess the data from each GOES – each being unique in its capabilities and challenges.

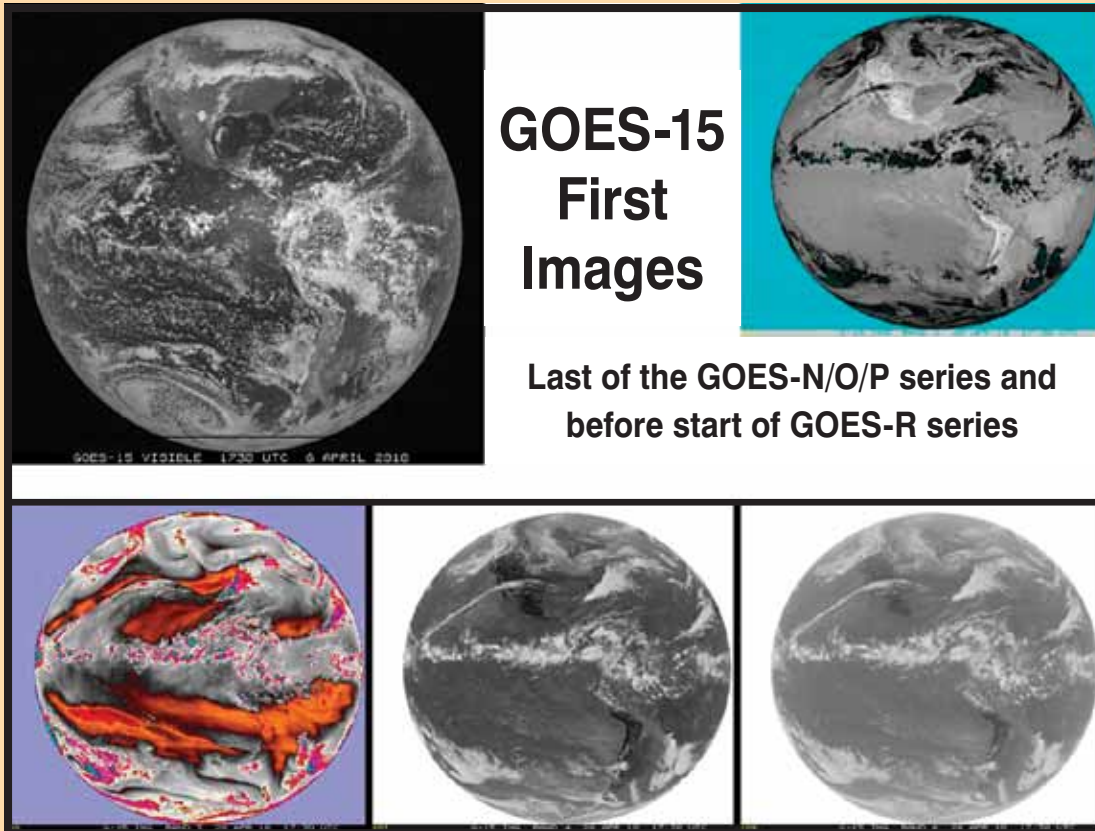
A number of special scanning schedules have been invoked with the GOES-15 Imager and Sounder during this Science Test. For example, special rapid-scan images of several hurricanes were completed. Because of the timing of the GOES-15 Science Test, a special 5-minute (GOES-R) Advanced Baseline Imager (ABI) – like CONUS – size sector was utilized for capturing hurricane-related imagery in connection with two hurricane field programs occurring at the time.

During the GOES-15 Science Test, the website <http://rammb.cira.colostate.edu/projects/goes-p/> was updated almost daily with new information. Information included the available test schedules, the schedules that have been implemented each



*Figure 1a (upper): The official GOES-P decal, produced before the satellite was renamed GOES-15 upon successfully reaching geostationary orbit.*

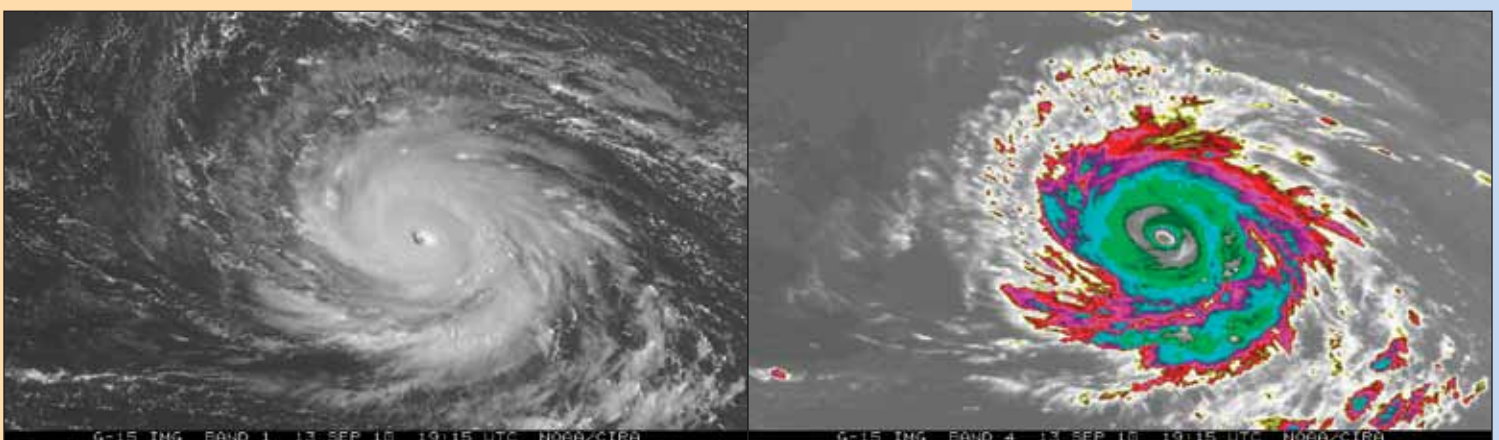
*Figure 1b (lower): As in Figure 1a, but the official GOES-O decal, produced before the satellite was renamed GOES-14.*



*Figure 2: First full-disk images from GOES-15, including the visible and four infrared bands that are available.*

day, and preliminary results of the Science Test. A special GOES-15 Regional and Mesoscale Meteorology Branch Advanced Meteorological Satellite Demonstration and Interpretation System (RAMSDIS) and GOES-15 RAMDIS Online were also utilized to display GOES-15 data in real time.

Special 30-minute interval full-disk imagery was also captured for 24 hours or more, from which continuous full-disk loops of the earth were created. Frequent full-disk imagery is not normally available from GOES due to the constraints of the operational environment.



*Figure 3: Visible (left) and infrared (right) images of Hurricane Igor on 13 September 2010, when continuous 1-minute rapid-scan imagery was selected to monitor this storm.*

# GOES

**Table 1: Summary of the Noise for GOES-8 Through GOES-15 Imager Bands (in temperature units; the Specification (SPEC) values are also listed).**

| Imager Band | Central Wavelength ( $\mu\text{m}$ ) | GOES-15                          | GOES-14 | GOES-13 | GOES-12 | GOES-11 | GOES-10 | GOES-9 | GOES-8 | SPEC |
|-------------|--------------------------------------|----------------------------------|---------|---------|---------|---------|---------|--------|--------|------|
|             |                                      | K @ 300 K, except band-3 @ 230 K |         |         |         |         |         |        |        |      |
| 2           | 3.9                                  | <b>0.063</b>                     | 0.053   | 0.051   | 0.13    | 0.14    | 0.17    | 0.08   | 0.16   | 1.40 |
| 3           | 6.5 / 6.7                            | <b>0.17</b>                      | 0.18    | 0.14    | 0.15    | 0.22    | 0.09    | 0.15   | 0.27   | 1.00 |
| 4           | 10.7                                 | <b>0.059</b>                     | 0.060   | 0.053   | 0.11    | 0.08    | 0.20    | 0.07   | 0.12   | 0.35 |
| 5           | 12.0                                 |                                  | –       | –       | –       | 0.20    | 0.24    | 0.14   | 0.20   | 0.35 |
| 6           | 13.3                                 | <b>0.13</b>                      | 0.11    | 0.061   | 0.19    | –       | –       | –      | –      | 0.32 |

Some of the special analyses of GOES data conducted at CIRA include the noise levels of the various spectral bands, both the Imager and Sounder. The results for the GOES-15 Imager were recently completed and are available in Table 1, along with the results back through GOES-8.

Note that the noise levels have generally decreased for newer GOES. But the spatial resolution has also increased for some spectral bands, thus the slight increase in noise for the 13.3  $\mu\text{m}$  band starting with GOES-14. (There were also changes in both the spatial resolution and spectral width of the water vapor (6.5/6.7  $\mu\text{m}$ ) band in the transition from GOES-11 to GOES-12.) Results for the GOES-15 Sounder have yet to be completed. Similarly, detector-to-detector striping will also be assessed for GOES-15, as that is an important measure of the quality of GOES imagery that is constructed from data from more than one detector per spectral band.

Another of the ever-improving capabilities of GOES is the operation through spacecraft eclipse that began with GOES-13, as a result of the new spacecraft bus and larger batteries. This allows additional imagery when the spacecraft is in the shadow of the earth. But what is new is the increased capability to take imagery even when stray light from the sun is affecting portions of the images. This was extensively tested with GOES-15.

Another unique test included the capture of images of the moon when available. This generally occurs infrequently, especially with the moon fully illuminated. Such images were requested by the calibration and validation sections of NOAA/NESDIS, for use as possible calibration targets for visible imagery from future GOES.

An important change that accompanied the increased spatial resolution (from 4 km to 2 km) of the 13.3  $\mu\text{m}$  band on GOES-14 was the necessary change or expansion of the heritage GOES Variable (GVAR) data format. An additional data block was needed for the data from the extra 13.3  $\mu\text{m}$  detector that was not anticipated in the original GVAR design. That GVAR change alone was a significant challenge at the time. It necessitated software changes at many ground stations, such as the one at CIRA, where GOES data are read out directly from the satellite. In addition, CIRA recently purchased new equipment to handle not only the data from the GOES-15 Science Test, but operational data from both GOES-East and GOES-West.

Before being placed in on-orbit storage, GOES-15 continued to emulate the GOES-East schedule through much of October 2010. GOES-15 is the second GOES now in storage, along with GOES-14, both waiting as needed, to replace the current operational pair – currently GOES-11 as GOES-West, and GOES-13 as GOES-East.





*Figure 4: An example of an image of the moon captured from GOES-15. The elongated nature of the image is due to the un-equal horizontal and vertical sampling of the GOES Imager.*

## GOES Reports and the Future

With the data collection phase of the GOES-15 Science Test completed just 9 months after the same testing for GOES-14, it is appropriate that the final report on the GOES-14 Science Test has been approved by NOAA for public release. The accumulated, reviewed, and edited results of the GOES-14 Science Test, for which the data collection occurred in December 2009, is available online as a PDF at the GOES-14 Science Test website <http://rammb.cira.colostate.edu/projects/goes-o/>. In addition, multiple copies of the *NOAA Technical Report NESDIS 131* have been written to CD and mailed to the NOAA Central Library for distribution to NOAA Libraries around the U.S. Copies of the CD will also be sent to anyone who requests one.

Similar technical reports have been formalized for Science Test results back through GOES-11. With the GOES-15 Science Test having just been completed, the GOES-15 report will take several months to compile and edit before it can be made available. Look for the report on the GOES-15 Science Test page.

Finally, there will be plenty of opportunities to participate in the next GOES Science Test, which will be part of the transition to the GOES-R series. Extensive science testing will be needed to test both the data and the capabilities of GOES-R, a revolutionary change in GOES series that will not have been seen for 20 years.

## Reference

Hillger, D.W., and T.J. Schmit, 2010: The GOES-14 Science Test: Imager and Sounder Radiance and Product Validations, *NOAA Technical Report NESDIS 131*, (August), 105 pp.

# RESEARCH

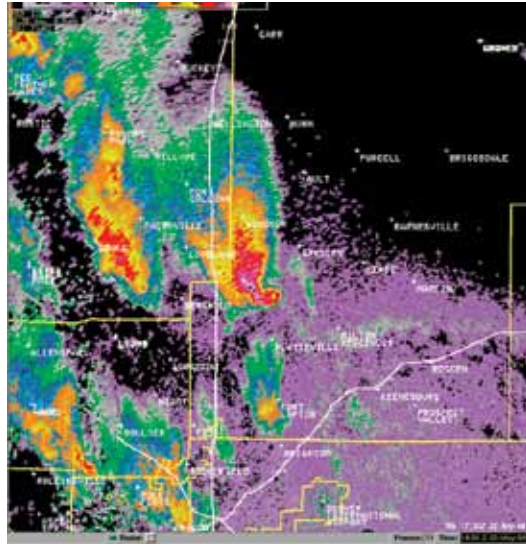
## Scrutinizing the Windsor Twister from All Angles

Courtesy of UCAR StaffNotes

Citation taken from:

[www.ucar.edu/staffnotes/research/scrutinizing-windsor-twister-all-angles](http://www.ucar.edu/staffnotes/research/scrutinizing-windsor-twister-all-angles)

A Doppler radar image from the National Weather Service shows the tornado-producing supercell thunderstorm near Windsor, Colorado, at 11:35 a.m. on May 22. (Image courtesy NOAA/NWS.)



May 12, 2010 – After a very unusual tornado caused extensive damage along a 34-mile (55-kilometer) swath of northern Colorado in 2008, a team of scientists from NCAR and Colorado State University undertook a multidisciplinary study integrating meteorology, climatology, and social science.

The study, published in *Weather and Forecasting*, dissects the May 22 tornado near the town of Windsor from a meteorological perspective, places it in a climatological context, and analyzes how severe weather information was communicated to and interpreted by decision makers and then passed on to the public.

The Windsor tornado, which caused one death and ranks as the costliest tornado in Colorado's history at \$193.5 million in damages, was rated EF3 on the Enhanced Fujita scale. Several characteristics of the tornado were unique for the region.

The storm formed in the late morning, in contrast to the usual pattern of afternoon storms. It moved toward the north/northwest (toward population centers) rather than along the more common eastward storm track. It was strong and long-lived for a tornado close to the Front Range, where weaker tornadoes are more common.

The unusual characteristics and rapid development of the tornado created a complex situation for decision makers, whose interpretations of warning information varied widely. For example, since most decision makers knew that tornadoes in the area typically move eastward, some downplayed the possibility that the tornado would move toward them, despite the fact that they were in the tornado's path. Many decision makers were surprised that such a strong tornado could occur in their area. Although none had been reported in the preceding 50 years, the study pointed out that the area near Windsor had been hit by strong tornadoes several times in the early 20th century.

The research underscores the growing recognition that societal factors are just as important for the effectiveness of weather warnings as the timeliness and content of those warnings. "To achieve the goal of better tornado warnings, we need to not only improve detection and prediction of tornadoes, but also understand how people receive, understand, and use warnings, so that the information that meteorologists have can be best communicated to decision makers and the public," says author Russ Schumacher, a professor at Texas A&M who undertook the study while a postdoctoral researcher at NCAR.

## Spotlight on Outstanding Researchers: William C. Malm

*Research Scientist/Scholar, CIRA; Retired Research Physicist, NPS Air Resources Division*

Dr. William C. Malm is a research scientist/scholar at Colorado State University's Cooperative Institute for Research in the Atmosphere (CIRA) and a recently retired research physicist in the National Park Service Air Resources Division where he was program coordinator for the visibility/particulate research and monitoring program.

He received his B.S. degree in physics and a minor in mathematics from Mankato State University in 1965 and his M.S. and Ph.D. degrees in physics from the University of North Dakota (1968) and the University of Missouri (1972), respectively. Previously, he worked as an Environmental Protection Agency (EPA) research scientist and as a professor of environmental science at Northern Arizona University in Flagstaff. Dr. Malm is a member of the Air & Waste Management Association (AWMA), the American Geophysical Union (AGU), and the American Association for Aerosol Research (AAAR) and has served as an organizing chair for special sessions in each of these associations and as a guest editor for the *Journal of Geophysical Research* (JGR) and the *Journal of the Air & Waste Management Association* (JAWMA). He is also a topic editor for environmental monitoring for the *Encyclopedia of Earth*.

Dr. Malm has received a number of awards for outstanding lectures and various research activities. In 2009, he received the George Wright Society 2008 Director's Award for Natural Resources, the EPA Thomas W. Zosel 2008 Outstanding Individual Achievement Award, and the Air & Waste Management Association's Frank A. Chambers Excellence in Air Pollution Control Award for his research contributions in the areas of visibility and air quality. Currently, he serves as a science advisor to the EPA as a member of the Clean Air Scientific Advisory Committee.

Dr. Malm's expertise is in the general area of visibility and related topics, and he made some of the first visibility and air quality measurements in the National Park Service system at the Grand Canyon in 1972. Since then, he has designed and built instrumentation to measure the effects of atmospheric aerosols on the scenic qualities of landscape features, as well as their optical and chemical properties. The radiation transfer algorithms he has formulated allow pictorial visualization of aerosol scattering and absorption effects on scenic landscape features.

He pioneered studies of visibility perception that elicit human responses, in terms of both psychophysical and value assessment, to changes in scenic quality as a function of aerosol optical properties. He has initiated and carried out large field campaigns to better characterize aerosol physical and optical properties, especially as they relate to aerosol hygroscopic properties, and to assess the relative contributions of various source types to visibility impacts in a number of national parks and wilderness areas.

In addition, he has pioneered a number of back-trajectory receptor modeling methodologies that allow estimates of the relative contributions of source areas to aerosol concentrations or visibility effects at selected receptor sites. Many of the results from this work have been incorporated into the Interagency Monitoring of Protected Visual Environments (IMPROVE) program and the EPA Regional Haze Rule (RHR).

For 30 years, Dr. Malm has demonstrated leadership, outstanding achievement, and a lasting commitment to promoting clean air and helping to achieve better air quality. The steadily improving visibility we enjoy in many parts of the United States is in large part due to his research and advocacy.



**For 30 years, Dr. Malm has demonstrated leadership, outstanding achievement, and a lasting commitment to promoting clean air and helping to achieve better air quality. The steadily improving visibility we enjoy in many parts of the United States is in large part due to his research and advocacy.**

# CIRA COMMUNIQUE

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## CIRA Education and Outreach Activities

*The Walking Through the Water Year effort headed by Nolan Doesken of the Colorado Climate Center and Department of Atmospheric Sciences has been supported in a modest way by CIRA. It is part of our efforts to support education and outreach on weather and climate topics.*



Visit <http://epresence.pdschools.org/1/Page/Published/3.aspx> to view our most recent TV/streaming video *Water Report*, a part of the Walking Through the Water Year effort, which has been supported for three years by the U.S. Bureau of Reclamation Eastern Colorado area office.

This marks the last show, for the time being, as our funding from USBR has ended. The Poudre School District will continue to maintain the Walking Through the Water Year website and will make all past shows available for online viewing. Also, monthly weather and water supply updates will continue to be posted and distributed to science teachers in our area with the help of ongoing support from the Cooperative Institute for Research in the Atmosphere.

After some downtime for assessing and evaluating, we will likely begin pursuing funding options again and see if we can be back into production later next year. We hope to be producing shows again in time for *Water 2012*.

The Poudre School District Department of Media and Technology has provided extensive in-kind support for Walking Through the Water Year and continues to be very supportive of this concept for the future.

—Nolan Doesken

## ATS Student Awards

On behalf of Richard Johnson, it is a pleasure to announce the 2010 winners of two annual ATS student awards. **Rachel Storer** was presented with the Herbert Riehl Memorial Award and **Daniel Ward** with the Alumni Award at the annual Herbert Riehl Reception on May 6.

Congratulations to Rachel and Dan for their outstanding research leading to these awards!

## Steve Albers: June 2010 GSD Team Member of the Month

The following nomination for GSD Team Member of the Month for June 2010 comes from Forecast Applications Branch Chief Zoltan Toth:

*The Forecast Applications Branch nominates Steve Albers for the GSD June 2010 Team Member of the Month. Steve is a solid performer all the time. His contributions in the past half year to achieving FAB and GSD goals were especially noteworthy. Beyond the scheduled LAPS science and technical upgrades, Steve initiated the transition of the regular LAPS analysis and forecast runs to the more reliable Virtual Machine framework, which is now almost complete. Jointly with Isidora Jankov and others, Steve had major contributions to the success of HMT-10 forecast season, recognized*

*by a DOC Gold Medal. The continual improvements to the cloud and microphysics initialization scheme keeps LAPS among the top schemes for warn-on-forecast applications. Steve is always looking for opportunities for further improvements. His current work with Isidora on convective-scale analysis and forecasting for the HWT domain will offer further insight into how convective processes can be best initialized for NWP applications."*

## CIRA Research Initiative Award Winners

Please join us in congratulating the following employees who were selected for the 2010 CIRA Research Initiative Award.

• **The Team of Steve Albers and Isidora Jankov:** This honor acknowledges contributions to Numerical Weather Prediction (NWP) forecasting—and more specifically research which focuses on the initialization of fine scale numerical models in GSD's Local Analysis and Prediction System (LAPS) and research efforts aimed at improved physical parameterization schemes and ensemble forecast techniques in NWP.

• **Dale Reinke:** This honor acknowledges contributions to the CloudSat Program and, specifically, design, development and implementation of what could be considered the most significant piece of software for the CloudSat ground data processing system – the Science and Engineering Data Ingest and Processing System. Development and implementation of the Data Distribution sub-system is also being recognized.

• **Laura Leinen:** This honor is for leadership of CIRA's Biz Hub and its efforts to better

serve CIRA's research activities by performing a multitude of administrative tasks for the CIRA Community as well as duties as the editor of the *CIRA Magazine* and organization of monthly confabs. Most noteworthy is the efficiency and willingness to work long hours to ensure the timely submission of numerous research proposals (especially ones requiring short turn-around time).

## Employee Promotions

The following employee promotions took effect this August. Thanks to all for your dedication and hard work!

- **Cindy Combs** was promoted to Research Associate IV.
- **John Forsythe** was promoted to Research Associate IV.
- **Lewis Grasso** was promoted to Research Scientist III.
- **Thomas Henderson** was promoted to Research Associate IV.
- **Kenneth Sperow** was promoted to Research Associate IV.
- **Jebb Stewart** was promoted to Research Associate IV.
- **Milija Zupanski** was promoted to Senior Research Scientist.

## CSU Department of Atmospheric Science at Top in New NRC Rankings

The National Research Council recently released its Assessment of Research-Doctorate Programs in the United States ([www.nap.edu/rdp](http://www.nap.edu/rdp)). Among "Oceanography, Atmospheric Sciences and Meteorology" programs, which are ranked together, our department comes out at the top in many key categories: direct faculty rank-

ings of peer departments, criteria selected by faculty as important in good programs, research activity, publication productivity, etc.

While we realize that rankings are not perfect, we take pride in the achievements over many years by our faculty, students, and staff that have led to this top ranking of our department. Most impor-

tantly, we continue to build on our strengths to advance the science in fundamental ways through basic and applied research in the atmospheric and ocean sciences and education at the graduate level of the next generation of leaders in the field.

– *Richard Johnson, Head,  
Department of Atmospheric Science*



# STUDENTS

## ESRL Scientists Help Lead Summer School in Earth System Modeling

Annie Reiser

This article appeared originally in the ESRL Quarterly (<http://www.esrl.noaa.gov/news/quarterly>).

*Dr. Stan Benjamin of ESRL encourages casual interaction between students and participating staff at the Summer School on Atmospheric Modeling (SSAM).*



For three days this summer, 25 students sat at computers at the National Center for Atmospheric Research (NCAR), running some of the most cutting-edge Earth system models around, models usually only accessible to experienced scientists. The students – from various universities nationwide as well as Colorado State University’s Center for Multiscale Modeling of Atmospheric Processes (CMMAP) – listened to lectures and initiated model runs on a supercomputer.

One enthusiastic student wrote on the workshop evaluation, “I liked getting hands-on experience with a supercomputing facility (a first for me). I also liked meeting people in the field.”

ESRL scientists from the Global Systems Division (GSD), and colleagues from Colorado State University (CSU), the Cooperative Institute for Research in the Atmosphere (CIRA), NCAR, NOAA’s National Centers for Environmental Prediction, and NASA led this first Summer School on Atmospheric Modeling (SSAM). The goal of the collaboration between those partners and NOAA’s Global Interoperability Program (at ESRL) was to build the professional skills of undergraduate and graduate students interested in global modeling for weather forecasting.

“This is the first time we’ve been proactive about getting a new modeling system out there for graduate students to test and use,” said GSD Director and CIRA Fellow, Steven Koch. “We’re hoping to pull a new generation of young scientists into the world of global Earth system modeling.”

This summer focused on ESRL’s new global Flow-Following Finite-Volume Icosahedral Model (FIM). The participating students were required to have senior-undergraduate training in atmospheric science with a focus on large-scale dynamics. Also recommended was familiarity with numerical methods for modeling.

The three-day summer school presented an overview of the design of FIM, with detail about the model’s innovative dynamical core and physical parameterizations. Classes included discussions on computational performance and hands-on experience with FIM. The students learned about hybrid vertical coordinates, geodesic numerics,

**“This is the first time we’ve been proactive about getting a new modeling system out there for graduate students to test and use. We’re hoping to pull a new generation of young scientists into the world of global Earth system modeling.”**

FIM diagnostics, computational issues, and vertical discretization as they evaluated the accuracy of summer and winter forecasts.

Students reported that they appreciated training on research-and-development systems, especially when their lecturers were the very scientists and engineers who developed those systems.

“I liked most the interaction with the scientists who built the model and the lectures concerning the creation/working of the model,” wrote one student. They also liked the open interactions among

modelers, including lively discussions about multiple approaches to solving some of the problems they deal with.

Tom Henderson and Jeff Smith are both CIRA-GSD software engineers who participated in the effort. Tom said that he and his colleagues put in many hours over weeks to prepare content, graphics, and slides for the lectures; to coordinate sessions; to test models; and address technical problems.

“It was a pleasure to see the genuine interest of all these NOAA scientists in educating the next generation of global modelers,” wrote David Randall of CMMAP in a letter of appreciation to ESRL Director and CIRA Fellow, Sandy MacDonald. Randall also thanked all of the behind-the-scenes staff from NCAR for their “superb support” for SSAM and making it a success. “Not only did

SSAM benefit the students tremendously as documented by their many favorable comments, but presenters benefited as well,” Randall said. “SSAM helped raise the profile of FIM, bringing well-deserved credit to ESRL and its Global Systems Division.”

Next summer SSAM will be hosted at NOAA’s Geophysical Fluid Dynamics Laboratory, and the focus will be on AM3, an atmospheric model which according to their website attempts to move in the direction of a more physically-based simulation of clouds and convection. Organizers will incorporate lessons learned during this student-modeling workshop, such as performing more dry runs for hands-on sessions.

“Overall,” Koch said, “this first SSAM was a successful attempt to initiate young talent into the real world of atmospheric science.”

## Job Opportunities in Atmospheric Science and Related Research

If you are interested in employment opportunities at CIRA, please visit [www.cira.colostate.edu/personnel/employment\\_opportunities](http://www.cira.colostate.edu/personnel/employment_opportunities) and enter your e-mail address. Then, when an open position is posted on the CIRA website, you will receive an e-mail prompt to view the position announcement and apply if interested/qualified. Topical areas relevant to CIRA include:

### **Research and Postdoctoral Research Fellowships**

- Satellite Algorithm Development, Training, and Education: development of algorithms and applications for weather forecasting, emphasizing regional and mesoscale meteorological phenomena. Development of environmental parameter retrieval techniques based on current and future satellites, potentially in concert with in situ, or other remote sensing observations. Development of training/educational materials for operational forecasters using distance learning methods and web-based demonstrations.
- Regional to Global Scale Modeling Systems: providing improvements to weather and climate numerical prediction. Topics include atmospheric and ocean dynamics, radiative forcing, clouds and moist convection, land surface modeling, hydrology, and coupled modeling of the Earth system.

- Data Assimilation: development and improvement of techniques to assimilate environmental observations (satellite, terrestrial, oceanic, and biological) to characterize the environmental state for use in analysis, modeling, and prediction of weather/climate.
- Climate/Weather Processes: use numerical models and environmental data, including satellite observations, to understand processes that are important to predicting weather and short-term climate and understanding the coupling between weather and regional climate.
- Data Distribution: identify effective and efficient methods for quickly distributing/displaying large environmental datasets (observational and model fields) using data networks, web map services, data compression algorithms, and other techniques.

### **Information Technology Support**

- Software Engineering, Electrical Engineering, Linux Cluster Administration, Linux and Windows IT, Data Acquisition, Large Data Set Processing and Archive, Satellite Operations, Infrastructure Management, Web Development, Database Development and Maintenance, Network Management

### **Administrative Support**

- Customer service, grants management and administration, and general office duties

CIRA is jointly sponsored by Colorado State University and the National Oceanic and Atmospheric Administration. Colorado State University is an equal opportunity/affirmative action employer and complies with all Federal and Colorado State laws, regulations, and executive orders regarding affirmative action requirements in all programs. The Office of Equal Opportunity and Diversity is located in 101 Student Services Building. In order to assist Colorado State University in meeting its affirmative action responsibilities, ethnic minorities, women and other protected class members are encouraged to apply and so identify themselves. Colorado State University is committed to providing a safe and productive learning and living community. To achieve that goal, background investigations for all final candidates being considered for employment are conducted. Background checks may include, but are not limited to, criminal history, national sex offender search, and motor vehicle history.

## **CIRA Vision and Mission**

The Cooperative Institute for Research in the Atmosphere (CIRA) is a research institute of Colorado State University.

### **The overarching Vision for CIRA is:**

To conduct interdisciplinary research in the atmospheric sciences by entraining skills beyond the meteorological disciplines, exploiting advances in engineering and computer science, facilitating transitional activity between pure and applied research, leveraging both national and international resources and partnerships, and assisting NOAA, Colorado State University, the State of Colorado, and the Nation through the application of our research to areas of societal benefit.

### **Expanding on this Vision, our Mission is:**

To serve as a nexus for multi-disciplinary cooperation among CI and NOAA research scientists, University faculty, staff and students in the context of NOAA-specified research theme areas in satellite applications for weather/ climate forecasting. Important bridging elements of the CI include the communication of research findings to the international scientific community, transition of applications and capabilities to NOAA operational users, education and training programs for operational user proficiency, outreach programs to K-12 education and the general public for environmental literacy, and understanding and quantifying the societal impacts of NOAA research.

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If you know of someone who would also like to receive the *CIRA Magazine*, or if there are corrections to your address, please notify us.