CIRA

Cooperative Institute for Research in the Atmosphere

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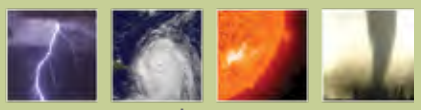

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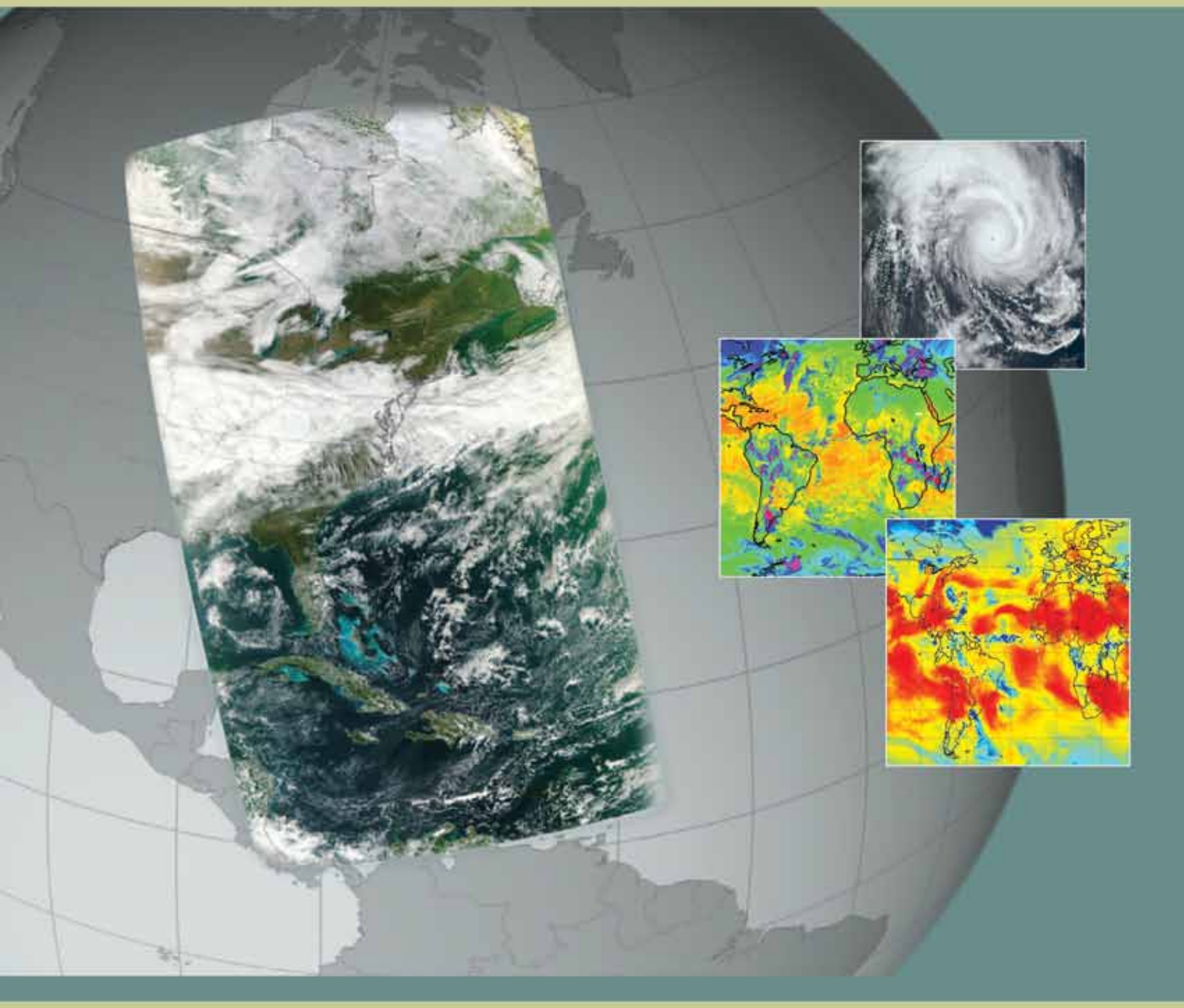

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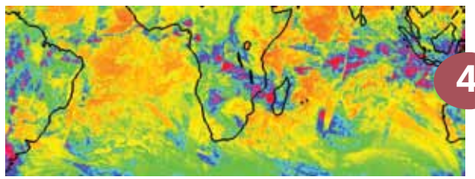

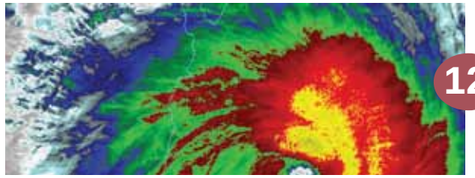

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From the Director's Desk . . .

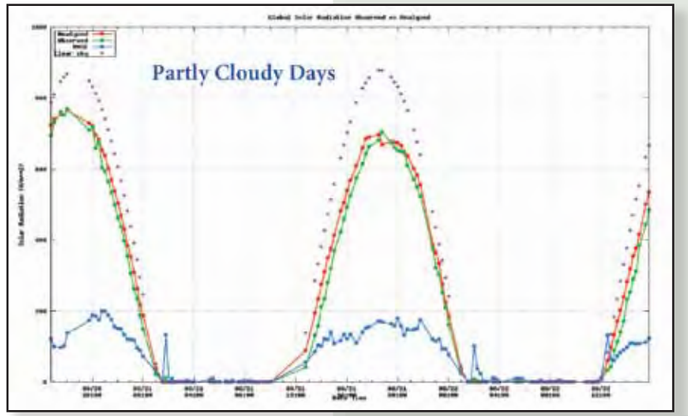
It has now been almost a year and a half since taking the position of Director; and slowly things are coming into focus. Aside from normal duties, in early October of last year I had the privilege of visiting the CIRA Research Scientists working for STAR in Camp Springs. It gave me an opportunity to get an in-depth look at the direction in which their research is going as well as their day-to-day science activities. As three of last year's winners of the CIRA Research Initiative awards came from Camp Springs, it also gave me a chance to visit with them before they came to visit us in Fort Collins to receive their awards and present seminars on their work.

In late October of last year, of course, we witnessed the launch of NPP which has since been renamed in honor of one of our great pioneers, Verner "Vern" Suomi. A new era in the U.S. operational environmental satellite program kicked off without a hitch on 28 October 2011, 2:48 AM PDT from Vandenberg AFB. Deployed in a 1:30 AM/PM sun-synchronous orbit, Suomi NPP serves the dual purposes of providing continuity to NASA's EOS climate mission (Terra and Aqua) while also providing risk reduction and operational gap-filling to NOAA's future Joint Polar Satellite System. The satellite carries a host of new remote sensing technologies for advanced characterization of the weather, climate, and land/ocean ecosystems. A team of CIRA and on-site NOAA/NESDIS/STAR scientists are actively involved in many aspects of NPP calibration, validation, and application development. These efforts begin with automated data acquisition and storage, led by Steve Finley and Deb Molenar, along with systems and web support from Hiro Gosden and Kevin Micke. Don Hillger leads the NPP imagery cal/val team, with Stan Kidder, Curtis Seaman, and Steve Miller supporting the quality control for the Visible/Infrared Imager/Radiometer Suite (VIIRS) sensor. Dan Lindsey, Miller, Yoo-Jeong Noh and Seaman are also assisting with VIIRS cloud product cal/val, coupling to our local CloudSat Data Processing Center with the assistance of Phil Partain for unique validation of cloud base height retrievals. CIRA's near real-time demonstrations of satellite applications to operational forecasters, via the Satellite Proving Ground (led by Miller and Renate Brummer), will be augmented by the new NPP observations. John Knaff, Mark DeMaria, and Andrea Schumacher have begun to exploit the high spatial and spectral resolution of NPP sensors to improve operationally-useful tropical cyclone monitoring and characterization tools. Training on the new capabilities of NPP is already underway with the assistance of Bernie Connell, Dan Bikos, and Jeff Braun. We anticipate CIRA's important role in the development of NPP science and applications to expand over the coming year and are excited about the prospects for innovation and discovery with this highly capable new addition to the environmental satellite constellation. After our initial flurry of activities, we plan to expand our efforts to include data fusion of NPP and Geostationary data in order to exploit not only the improved capabilities of Suomi NPP but to further leverage those capabilities to improve the ongoing nearly continuous observations from our geostationary platforms.

Let me conclude by saying that it has been largely a wonderful 6 months since the last magazine. CIRA, as an Institute, is in good financial shape thanks, ultimately, to its entire research staff. Although budget cuts have been announced and are now imminent at just about all federal agencies, we continue to broaden our research portfolio in order to mitigate negative impacts from cuts to specific programs as much possible. Cuts are never uniform; and, as long as we remain adaptable in our skill sets, we should be able to adapt even to this harsher fiscal climate. Sadly, we've lost one of our own earlier this spring when John Huddleston, working with the National Park Service, passed away. We will miss him.

Chris Kummerow

Better Weather Models = Better Renewable Energy Output



Accurate forecasts of solar radiation are of critical importance to energy providers (Credit: Steve Albers, NOAA/ESRL)

By Matt Rogers
CIRA

LAPS

The potential impact of renewable energy is an increasingly important part of the national energy economy, and the generation of electricity from wind, solar, and geothermal processes is generating a considerable amount of interest, both in private sector funding and government-led scientific research. Of particular interest is the forecasting of solar and wind energy resources. The extreme variability of sunshine over any given day due to cloud cover is of acute interest and an especially difficult forecast to make. As was covered in a previous article in this magazine, two tools are useful for unraveling the difficulties in cloud forecasting – numerical weather prediction models and satellite observations of clouds. And CIRA researchers, working with the NOAA Earth Systems Research Laboratory (ESRL), are finding new ways to combine the output of the two tools to create increasingly accurate model-based forecasts of cloud locations.

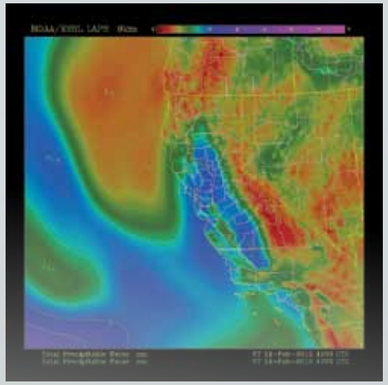
One of the most difficult things about running any forecast model is setting up the initial conditions that the model will base its forecast on. To a certain extent, the physical laws and parameterizations that make up the bulk of our forecast models are well known, and given any set of initial observations, will render a faithful representation of how the atmosphere might respond and evolve over time. For a weather forecast, however, this doesn't go far enough – a good forecast will actually predict the time and place of weather features (or 'verifies' in the lingo of forecasters) and to do this, you need not only an accurate physical model of how the atmosphere works, but an accurate and timely estimate of the current state of the atmosphere. For cloud forecasts, this is particularly difficult – 'counting' clouds in a manner that accurately captures their location and properties is an active area of research. Any advance in this area will result in a greatly improved model forecast, so a considerable amount of effort in improving these so-called model initializations is being made.

The Local Analysis and Prediction System (LAPS) is a sophisticated system that brings in data from satellite, radar, and other surface observations to create a high-resolution picture of the current state of the atmosphere suitable for ingestion into nearly any numerical weather prediction model. CIRA scientists in Boulder, working with the Forecast Applications Branch of NOAA ESRL, have continued to develop new techniques, such as the Space and Time Multiscale Analysis System (STMAS) to improve the initial picture of the atmosphere. Using satellite information from GOES sensors in the near and thermal infrared, along with radar data, the LAPS and STMAS create a current picture of cloud structures, which are ingested into the Weather Research and Forecasting (WRF) model. With a more accurate picture of where clouds start from, the model can do a better job of forecasting how those clouds will evolve throughout the forecast. And critically, for the renewable energy sector, the forecast for the amount of solar radiation reaching the surface through and around those cloud locations becomes more accurate as well.

LAPS and STMAS create a current picture of cloud structures, which are ingested into the (WRF) model.

Advanced model initiation techniques improve solar forecasting.

Solar photovoltaic power generation accounts for more than 2000 megawatts of power generated in the United States each year (Credit: NOAA)



Real-time model analysis of solar power generation blends radar and satellite observations for greater accuracy (Credit: Steve Albers, NOAA/ESRL)

Continued research in this field, using both the LAPS/WRF approach, along with satellite cloud advection schemes and analysis of the ultra-high resolution HRRR model, offers CIRA researchers a broad range of tools to make better forecasts of cloud location and solar energy resources. These tools represent a valuable resource for private energy sector producers, and with the solar energy industry approaching $30 billion in value, continued advancement in this research field will result not just in scientific advancement, but in considerable economic gains in the renewable energy field.

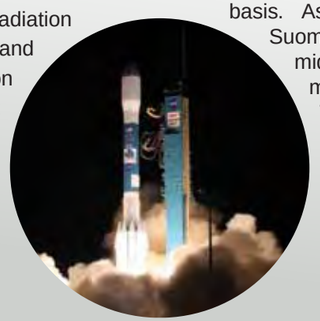
A Personal Connection

Suomi NPP

By Matt Rogers
CIRA

The Suomi NPP mission was renamed post-launch to honor the work of Prof. Verner E. Suomi, one of the pioneers of space-based earth observations and widely hailed as the 'father of satellite meteorology.' Former CIRA Director and founder Tom Vonder Haar, who has worked on Suomi NPP since 1997, was a student of Prof. Suomi's, and has several publications co-authored with the preeminent scientist. "This is the first of the new generation of weather and climate satellites," said Vonder Haar, speaking of NPP. "Our team has helped design the instruments and develop the algorithms that process the satellite data to get weather and climate information. We are part of a team of hundreds of scientists from around the country that is participating in the science and applications teams."

"This mission continues a long collaboration between CIRA and the nation's space agencies dating back to our founding director's work on the Earth Radiation Budget Mission, and later collaboration on the CloudSat mission" said current CIRA Director Christian Kummerow.



The launch of the joint NASA/NOAA Suomi National Polar-Orbiting Partnership (or the Suomi NPP) mission in October 2011 began a new chapter in monitoring the Earth's weather and environmental systems. Carrying five sophisticated instruments, the mission will simultaneously provide enhanced observations of the Earth and bridge the gap between the previous generation of Earth-observing satellites (such as NASA's EOS missions and the NOAA POES series of satellites) and planned missions including the NOAA-managed Joint Polar Satellite System (JPSS) mission.

Aboard the Suomi NPP satellite are five instruments. The Advanced Technology Microwave Sounder (ATMS) is designed to provide vertical profiles of temperature and water vapor amount that will be useful for, among other applications, initializing numerical weather prediction models. The CrossTrack Infrared Sounder (CrIS) is a Fourier-transform spectrometer observing in the infrared spectrum that will provide high-resolution, three-dimensional observations of temperature, atmospheric pressure and moisture profiles. Continuing in the heritage of previous ozone-measuring instruments (such as TOMS), the Ozone Mapping and Profiler Suite (OMPS), built by Ball Aerospace, is designed to monitor the Earth's fragile ozone layer. The Visible Infrared Imaging Radiometer Suite (VIIRS) is an advanced scanning radiometer operating at 22 channels, ranging from the visible through the thermal infrared, and including channels needed for true-color imagery of the Earth as well as a sophisticated day/night band sensor. Finally, the Clouds and the Earth's Radiant Energy System (CERES) sensor is part of the Suomi NPP package, extending a record of CERES observations that began with the Tropical Rainfall Measuring Mission (TRMM) and continued through the NASA Terra and Aqua missions.

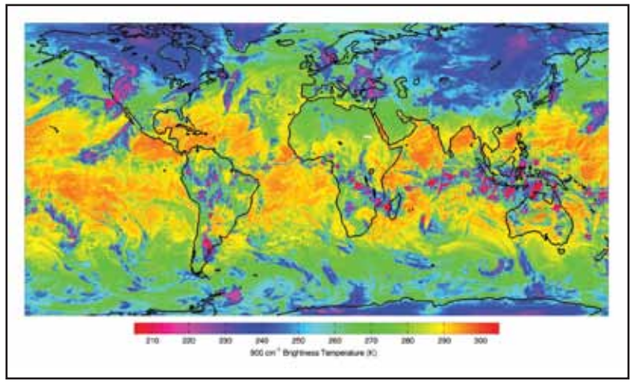
Suomi NPP is designed as a polar-orbiting satellite, with an equator-crossing time of 1:30pm local time – this allows NPP to get a consistent view of the state of the atmosphere at a fixed time. The spacecraft's orbital path takes it around the planet approximately 14 times per day, providing near-global coverage for the onboard instruments. The Suomi NPP mission successfully launched from Vandenberg Air Force Base atop a Boeing Delta II rocket on October 28th, 2011. Once in orbit, the spacecraft and its five instruments began a brief checkout period before beginning operations on an instrument-by-instrument basis. As this article went to press, four of the five instruments aboard Suomi NPP were taking observations – ATMS began observations in mid-November, followed by VIIRS later that month, with CERES and most recently CrIS beginning observations in February of 2012. The mission is managed by the Goddard Space Flight Center of NASA, with many scientific partnerships (including collaboration from CIRA) involved in calibration, validation, and analysis of data from Suomi NPP.

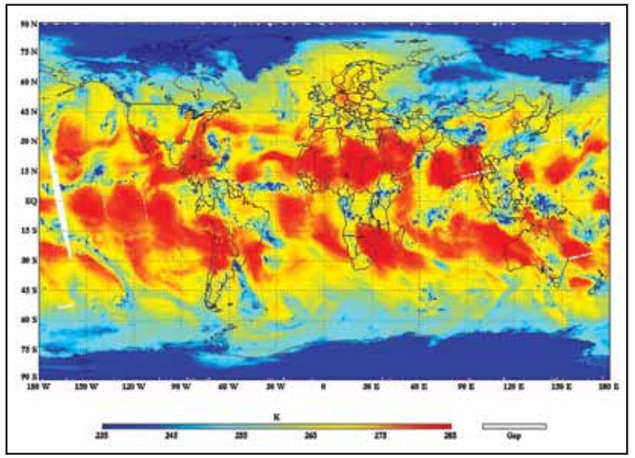
Continued on page 6

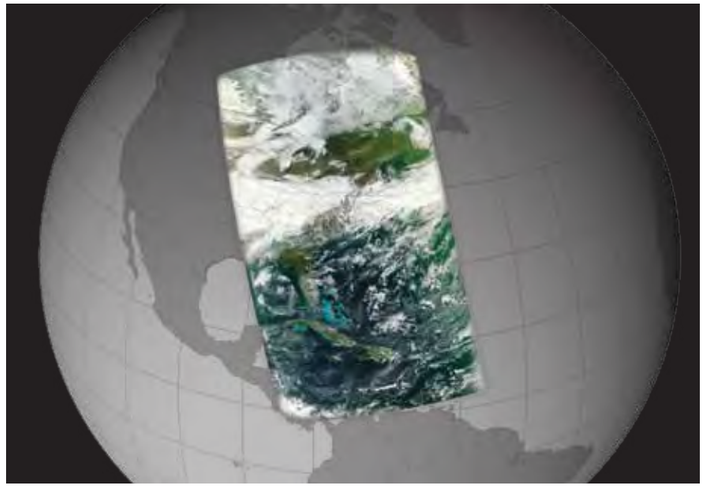
Image in circle on left: Suomi NPP launches on a Delta II rocket from Vandenberg AFB Oct 28, 2011 (Credit: NASA)

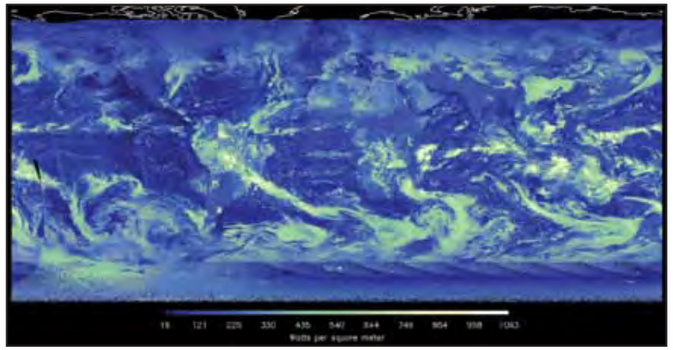
Image on right: Engineers work on the Suomi NPP spacecraft (Credit: NASA)

Building a bridge to a new era of Earth observations









First-light images from the CrIS (top) and ATMOS (bottom) instruments aboard Suomi NPP (Credit: NOAA/NASA)

CIRA Involvement in Suomi NPP

CIRA scientists are involved in several key aspects of the Suomi NPP mission, including critical calibration and validating the imagery from the VIIRS instrument. Additionally, new scientific observations leveraging the unique capabilities of the Suomi NPP instrument suite are being developed by CIRA researchers; among the many techniques being pioneered at CIRA, one will use the new low-light abilities of the day/night band of VIIRS to take a new look at tropical storms using moonlight. Traditional sensors used for tropical storm research utilize either reflected sunlight in the visible spectrum, or emitted infrared energy at nighttime. Emission of infrared energy is closely tied to the temperature of the emitting object; because of the similarity in temperature between low clouds and the ocean surface, it is often difficult to analyze low-level circulations of tropical storms in the infrared, since the low cloud signature in the infrared tends to 'blend in' with the surface signature. For strongly sheared tropical storms, where high clouds are often only present on one side of the storm, finding a center fix for the storm system using infrared sensors alone can prove difficult. The day/night Band sensor aboard VIIRS is capable of distinguishing low cloud from surface signatures, and can function in low light situations where visible sensors cannot.

VIIRS imagery of tropical storms during the day are providing additional information about the structure and properties of tropical storms. Multispectral imagery of Tropical Cyclone Funso, a storm system that formed in the Indian Ocean in January of 2012, provided forecasters with enhanced imagery to better predict storm evolution properties such as eyewall replacement cycles, as well as structural clues to the overall health of the storm system.

Future opportunities to perform valuable scientific research using the Suomi NPP platform could lead to additional advances being made by CIRA scientists. Preparation work for the upcoming JPSS mission using data from the Suomi NPP mission is a key area for CIRA researchers to continue development of next-generation retrieval and forecast techniques. Currently, six such proposals by the CIRA RAMMB team have been submitted during the JPSS Proving Ground and Risk Reduction proposal round; aside from valuable research resources, these proposals have the potential to showcase CIRA researchers on a global stage.

VIIRS image (Center) of Tropical Cyclone Funso off the coast of Mozambique on January 24, 2012 (Credit: NOAA/NASA)

First-light image of the VIIRS instrument (Top Rt.) aboard Suomi NPP (Credit: NOAA/NASA)

First light image from the CERES instrument (Bottom Rt.) aboard Suomi NPP. (Credit: NOAA/NASA)

Providing the weather infrastructure for the next generation of our national airspace

NextGen

and the Future of Air Traffic Control

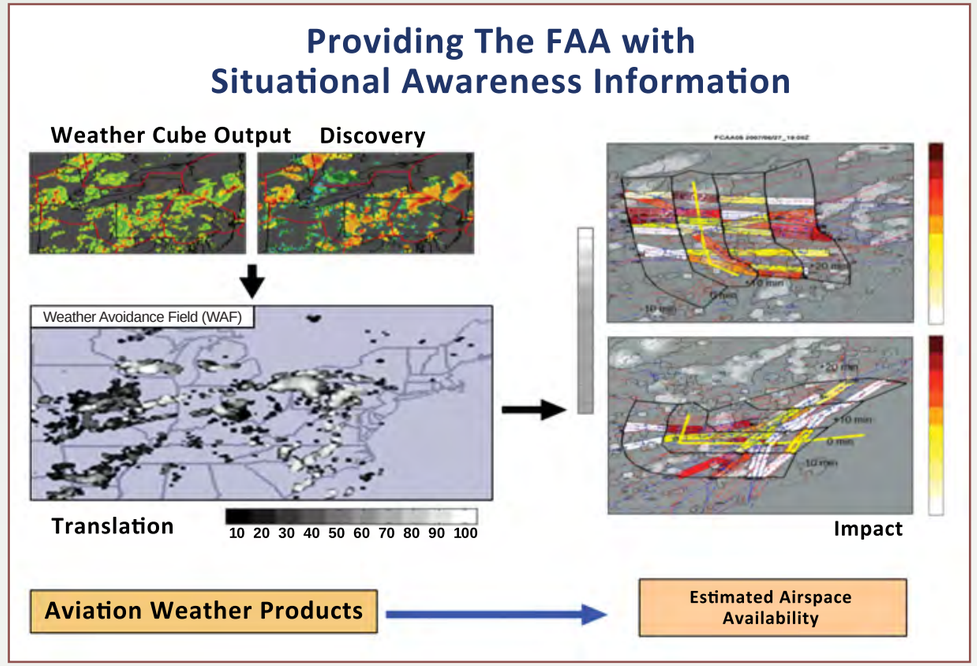
By Sher Schranz
CIRA

As the aviation industry continues to grow in importance and economic impact, increasing the efficiency and safety of our national airspace system has become an important goal for the U.S. government. Currently, aircraft flying in U.S. airspace are routed through a complex network of air traffic controllers guiding planes through defined routes (like highways in the sky) using ground-based radars and other sensors to stay in contact with the growing amount of air traffic. As more and more aircraft take to the skies, the effects of congestion and weather-related delays begin to have a negative impact on both the safety and the economic bottom line of the aviation industry, as well as increasing the workload for the nation's network of air traffic controllers.

The FAA Next Generation Air Transportation System (NextGen) system is a combined initiative to modernize the technology supporting the transformation of the National Airspace System (NAS). At the core of NextGen is a revamping of the air traffic control system using satellites and advanced networking technologies to open up the skies to more efficient routing of air traffic and to provide a weather and traffic "common operating picture" to controllers and pilots in a convenient, easy-to-use way. Benefits of this approach mean that aircraft can be routed on more efficient and direct flight paths, and approaches to airports can follow smoother descent and approach patterns, saving fuel, CO_2 emissions, and ground noise around airports.

At the core of the NextGen program is the nation's weather which accounts for 70% of flight delays. The FAA's NextGen Network Enabled Weather (NNEW) program seeks to create a four-dimensional 'Weather Cube' consisting of up-to-date weather information for any location, altitude, and point in time. Pilots and air traffic controllers will have access to the Weather Cube in almost any configuration, including continuous points along a flight path. Partnering in the NNEW program are the Research Applications Laboratory of the National Center for Atmospheric Research (NCAR-RAL), the Lincoln Laboratory of MIT, and NOAA, including researchers from GSD and CIRA.

Delivering weather data to the Weather Cube is a complex and technologically demanding process – the data has to be authoritative and up to date, requiring the aggregation of weather observations and forecast data. To prevent large upgrade and development expenses to the aviation community, the data from the Weather Cube must be in a format that is easily translatable to the various ingest systems of aviation customers. To that end, CIRA researchers have created a research and development test environment for NOAA GSD which consists of an instantiation of all the web services that make up the core of the 4D Weather Cube for the NextGen Services era. These web services include the Web Coverage Service Reference Implementation (WCS RI), Web Feature Service Reference Implementation (WFS RI), Web Mapping Service (ncWMS), a Registry/Repository and a Publish/Subscribe service. These services are built using Open Geospatial Consortium Standards, which are approved by an international standards body to ensure a common data transmission and retrieval format. The Services are populated with a full suite of NOAA weather observations, forecasts and verification data.



NextGen 4D weather cube information is integrated into air traffic control operations to provide a forecast of the impacts of weather on the National Airspace. (CIRA, NOAA/ESRL)

As with all things in the federal budget, the future of NextGen and NNEW were recently 'up in the air' as Congress battled over the details of the long-term FAA funding bill. The upgrade of the national airspace system, while offering considerable technological and economic advantages, will come with a considerable cost in development and implementation. Issues external to the NextGen program led to considerable debate within Congress over the future of FAA funding and programs. Fortunately, the passing of a long-term FAA budget in early February 2012 continues support for the NextGen program. As a result, continued CIRA contributions to the NNEW program will help to create a cutting-edge weather information system for what will be the world's most sophisticated and efficient airspace system.

Education & Outreach at CIRA

By Matt Rogers CIRA

Bringing CIRA research to the public while cultivating the next generation of scientists

The historical benefits of scientific research to society are widely understood, as is the positive role that scientists play in the larger community. Most people would respond, if asked, that science indeed is beneficial for society, and that scientific research on the whole is worth pursuing and supporting. When asked about specific science projects, however, or when asked what specifically a scientist *does* during the day, many people admit that they're not sure exactly what scientists do, or why they're doing it. This disconnect between the understood value of scientific research and the lack of understanding of what scientific research entails is often the source of a great deal of miscommunication and misunderstanding of the role of science and science policy; to address this issue is the role of education and outreach in the scientific community.

The potential for misunderstanding is particularly acute in the atmospheric sciences; scientific research into already complex phenomena as climate change become intertwined with economic and social impacts that can feed back through science policy to potentially directly affect the manner in which scientific research is performed in the first place. Furthermore, the complicated physical mechanisms of the atmosphere, coupled with the challenges of accurately observing and modeling the earth-atmosphere system, result in scientific discourse that is often quite technical and impenetrable for the public. Finding a way to communicate the essential aspects of scientific research of the atmosphere is therefore a complex and demanding task for the education and outreach specialist.

To address these issues, additional information about the nature of how people learn and understand science and scientific research is needed. Understanding different audiences and the context for which science is relevant to those audiences is one of the primary focuses of education and outreach; with that background information at hand, it becomes possible to 'break down' the complex and technical aspects of atmospheric research to a coherent and relevant description for the target audience. CIRA is fortunate to have a dedicated team of researchers and professionals who engage in this critical, often behind-the-scenes work, increasing the visibility and relevance of CIRA research to the public at large.

The education and outreach mission of CIRA has recently been re-organized to follow a tiered structure, composed of four tiers. The first of these tiers represents the basic public relations duties for the institute – answering public questions, relations with the media regarding inquiries and press releases, and representing CIRA at public functions such as the CSU Open House and Math and Science Technology Day. The second tier seeks to go further and actively identify target audiences for whom CIRA research has special importance. For these second-tier projects, some component of CIRA research (for example, a long-term data record, or a satellite product) is put into a relevant context for a specific audience (for example, a school teacher teaching earth science, or a fire specialist tasked with identifying areas at risk for wildfire). Depending on the needs of the audience, education opportunities including workshops and in-classroom visits from CIRA researchers can then be performed, finishing with assessment of the utility of the training and viability of continued cooperation.

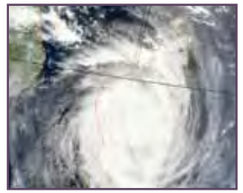
Third-tier activities at CIRA will include successful second-tier projects that have competed for and obtained external funding. Several second-tier projects are currently underway at CIRA, and the opportunity to develop these projects into self-funded ongoing collaborations proves promising. Finally, fourth-tier projects are envisioned as a major undertaking involving perhaps two or three full-time personnel focused entirely on a specific education and outreach need – for example, providing full-time education and outreach support for a NASA Earth Science mission, or running a nationally-known severe weather training program for emergency managers. Opportunities for these fourth-tier projects are actively being sought; the unique science capabilities of CIRA research should provide options to introduce CIRA into the realm of first-line education and outreach nationally.

At the core of the CIRA education and outreach effort, however, is the scientific research being done every day by CIRA researchers. By leveraging this valuable and unique resource into the field of education and outreach, CIRA has the ability to not only affect current scientific thought and understanding, but also to increase the awareness and interest in a field that has increasing scientific, social, and economic impact in our world.

Tropical Cyclone Giovanna as seen from the VIIRS instrument aboard Suomi NPP (false color) and the MODIS instrument aboard Terra (true color) off the coast of Madagascar, February 14, 2012. (Credit: CIRA RAMMB, NASA)

By Matt Rogers
CIRA

Tropical Cyclone Giovanna



Seeing destructive storms with new instruments

Powerful tropical cyclones are perhaps the most compelling, and deadliest, storm systems on Earth. Studying these storms is of paramount importance to researchers, especially when storms make landfall over developing nations where the impact of the storm is greater than for developed nations. Tropical Cyclone Giovanna, a powerful tropical cyclone in the south Indian Ocean, recently made landfall near Tanatava, Madagascar on the 13th of February, 2012. At the time of this article, 18 fatalities were reported, and damage estimates for the country, which is the largest producer of vanilla in the world, were still being estimated.

Massive flooding associated with the storm destroyed large swaths of homes and farms, and the damage done to the country, one of the poorest in the world, will require years of rebuilding effort. But despite the terrible damage inflicted by the storm, it could have been worse; as the storm approached the island nation off the east coast of the African mainland, it was undergoing what scientists call an 'eyewall replacement cycle' during which the convection near the inner core of the storm reorganizes, providing a brief drop in the windspeed of the storm; prior to this, Cyclone Giovanna had estimated sustained wind speeds in excess of 145 mph, and was briefly a Category 4 storm on the Saffir-Simpson hurricane scale. Because of the eyewall replacement cycle, Cyclone Giovanna came onshore as a weaker tropical storm, with sustained winds in Tanatava of around 50 mph.

In studying these storms, the CIRA RAMMB team processes data from multiple satellite platforms, including high-resolution data from the new VIIRS instrument aboard the Suomi NPP satellite. Using this data, researchers can see cloud structures more clearly; according to researcher John Knaff, VIIRS has "already proved useful in observing the multiple eyewall replacement cycles associated with Super Cyclones Funso and Giovanna that occurred in the South Indian Ocean."

Addressing the economic impacts of tropical storms on developing nations will take continued effort on the part of the international community. Having the ability to make accurate forecasts of intensity and storm track could prove especially valuable for storms making landfall over these poorer nations, and next-generation observation systems, such as those demonstrated on the Suomi NPP mission, help make those forecasts easier and more accurate.

Communiqué

Dr. Kummerow named Fellow of the AMS

CIRA Director, Dr. Christian Kummerow, was named a Fellow of the American Meteorological Society (AMS). The focus of Dr. Kummerow's research is global and regional climate change through the use of satellite data. As his colleague in the Department of Atmospheric Science, Dr. Richard Johnson, stated in the nomination document: "Chris has achieved international recognition for his research in atmospheric radiative transfer and remote sensing of precipitation. He is probably the world's leader right now in passive microwave remote sensing of precipitation." The AMS chooses Fellows via nomination by a current member, and the honor belongs to an elite group of researchers who strive for excellence and the pursuit of knowledge and practice in the atmospheric sciences. "I feel deeply honored that the AMS was willing to recognize my work in atmospheric science," Kummerow said. "It is in fact quite humbling when you see some of the really great scientists in the field before me."

CIRA Research & Service Initiative Award Winners 2011

This past fall, CIRA staff welcomed three of their Camp Springs colleagues to the home office in Fort Collins to accept the prestigious CIRA Research and Service Initiative Award. Each of these individuals began their careers with our organization as postdoctoral fellows. Their assignments are based in the NESDIS Camp Springs, Maryland office to work as collaborators with our federal colleagues at NOAA/NESDIS. As is evident from the summaries below, all are working with satellite imagery and aim to improve global monitoring of sea surface temperatures from space. These measurements are important in understanding global climate trends. Below is a short statement about each of our winner's contributions to this effort. And sincerest congratulations to all on their well-deserved honor!

Wei Shi
…for innovative use of shortwave infrared (SWIR) bands on NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) sensor for the purpose of deriving more accurate ocean color data products in the challenging coastal zones, as well as demonstrating the many practical applications of these improved ocean color products. Dr. Shi came to CIRA and presented a seminar on his work on July 19.

Prasanjit Dash
…together with Dr. Xingming Liang, for development of the SST Quality Monitor (SQUAM) near-real time monitoring system, which complements Dr. Liang's Monitoring of IR Clear-sky Radiances over Oceans for SST (MICROS) monitoring system and provides online access of these important analysis tools for the research community. Dr. Dash flew out to CIRA and presented a seminar on his work on September 8.

Xingming Liang
…together with Dr. Prasanjit Dash, for development of the Monitoring of IR Clear-sky Radiances over Oceans for SST (MICROS) near-real time monitoring system, which complements Dr. Dash's SST Quality Monitor (SQUAM) monitoring system and provides online access of these important analysis tools for the research community. Dr. Liang visited CIRA and presented a seminar on his work on November 21.

GSD's Employee of the Month for March 2012

Sher Schranz

Sher Schranz, Project Manager for the Technology Outreach Branch, received recognition as GSD's Employee of the Month for March 2012, for outstanding contributions to GSD and TOB projects throughout the year. Particular achievements include: 1) Managing NWS tasks during a very difficult budget environment. Sher has been able, through continued communication with NWS technical staff, to highlight the importance of this work. 2) Serving as deputy program manager for the FAA/NNEW and NWS/NextGen programs. In this capacity she is responsible for developing new IT task proposals, and tracking the tasking, budgeting and deliverables for these cross-branch programs. 3) Supervising CIRA employees within TOB, other GSD branches, and even beyond Boulder. This is a very important and time-consuming activity that Sher handles with talent and efficiency. 4) Participating with university and federal colleagues in developing proposals to non-NOAA agencies in search of additional funding to expand the science and research.

CIRA welcomes the following new employees who have joined us in the last few months. We recognize them with brief introductions to the work they'll be doing at CIRA.

Marouan Bouali

Dr. Bouali is a Postdoctoral Fellow who began to work for CIRA at NOAA STAR in Camp Springs, Maryland in October 2011. Marouan received his Ph.D. in Signal and Image Processing in 2011 from the Telecom ParisTech, University Paris, France. In 2006 he received his M.S. degree in Automation and Signal Processing from ENSPS, University Louis Pasteur, Strasbourg. Marouan works on the Joint Polar Satellite System (JPSS) SST Project, where he focuses upon the development of destriping algorithms and testing them with MODIS data. With VIIRS launched onboard Suomi NPP on 28 October 2011, these techniques will be applied to analyze data of this sensor which is largely a MODIS-like design. He also offered to explore his image processing skills to improve cloud mask for SST. His Technical Advisor is Alexander Ignatov and his Supervisor is Steve Miller.

Michael Barber

Michael is Student Hourly employee (Research Assistant) who began to work for CIRA in Fort Collins in June 2011. He is a CSU Computer Science graduate student and he works for the NOAA RAMM Branch developing new data processing software for the tropical RAMSDIS workstation used in the daily weather discussions. Michael has a diverse background in software development, including work for Hewlett Packard prior to his return to graduate school. Michael's work at CIRA involves collaboration with Debra Molenar and John Knaff (NOAA/NESDIS/RAMM). His supervisor is Bernie Connell.

Lindsey Harkabus

Lindsey is a Student Hourly employee (Student Scientist) who joined CIRA in Fort Collins in July 2011. She is a doctoral candidate in the psychology department at CSU, and plans to finish her PhD in Social Psychology in the spring of 2012. As a part of CIRA's new social science initiative, Lindsey works with John Weaver on a nationwide demographic study of emergency managers, and on a separate study concerning public attitudes on climate change. The demographic study is part of an effort to help NOAA improve communications between the agency and its diverse customer base. Her supervisor is Steven Miller.

Jung-Eun Kim

Jung-Eun (Esther) is a Postdoctoral Fellow who joined CIRA in Boulder in July 2011. As a member of the ESRL/GSD Nonhydrostatic Icosahedral Model (NIM) development team, she participates in NIM model development and verification. Jung-Eun's research efforts include: 1) implementing, testing, and modifying various physics packages (including the Yonsei University cumulus parameterization ensemble) for global multiscale modeling; 2) designing and running NIM for aqua-planet simulations on multiple GPU/CPU clusters and analyzing the equatorial wave dispersion curves to assess the impact of cloud parameterizations on tropical convective cloud systems; and 3) preparing, running, and verifying NIM real data forecasts and case studies. Her supervisor is Cliff Matsumoto and her NOAA technical advisor is Jin-Luen Lee.

Matthew Mauch

Matthew is a Non-Student Hourly employee (RAMM Intern) who began to work for CIRA in Fort Collins in August 2011. Having graduated from Rocky Mountain High School, he is enrolled in his second year at the University of Colorado in Boulder, Colorado with an interest in Meteorology. His supervisor is Louie Grasso.

Donald Reinke

Donald is a Senior Research Associate who re-joined CIRA in Fort Collins in January 2012. A familiar face at CIRA, Don returns in a part time capacity to continue his work in the CloudSat Data Processing Center. He assists all manner of operations for the ongoing CloudSat mission, which is conducting daytime operations at this time and plans to re-join the A-Train later this year. Steve Miller is his supervisor.

Benjamin Schwedler

Ben is a Research Associate III who joined CIRA at the NOAA Aviation Weather Center (AWC) in Kansas City, Missouri in January 2012. He coordinates and conducts aviation weather science and technology research on the NOAA NextGen program. At the AWC he works with the NWS NextGen Program Office and the NWS Aviation Services Branch to propose, develop and evaluate aviation weather forecast processes that are operationally viable. He received his Masters Degree in Atmospheric Science from Purdue University in December 2011. His Supervisor is Sherri Schranz.

Curtis Seaman

Dr. Seaman is a Postdoctoral Fellow who joined CIRA in Fort Collins in January 2012. He assists CIRA's efforts in cal/val activities for the NPP satellite and focuses upon imagery and cloud base height verification. Steve Miller is his Technical Advisor and Supervisor.

SeungHyun Son

Dr. Son is a Research Scientist II who joined CIRA at NOAA/NESDIS/STAR in Camp Springs, Maryland in December 2011. With extensive experience in satellite and biological oceanography, he focuses upon validation and evaluation of satellite ocean color data from various ocean color sensors such as MODIS, VIIRS, GOCI, etc. In addition, he develops bio-optical and biogeochemical algorithms for remote sensing of the turbid coastal waters, as well as various satellite ocean color applications. His technical advisor is Menghua Wang and his supervisor is Steve Miller.

Michael Trudeau

Dr. Trudeau is a Research Scientist II who joined CIRA in Boulder in July 2011 in collaboration with the Global Monitoring Division at NOAA/ESRL. He works with NOAA personnel to add new carbon flux and transport models into the CarbonTracker software, and performs the annual CarbonTracker CO2 product releases. His supervisor is David Baker and his technical advisor is Andy Jacobson (NOAA/GMD).

Sirish Uprety

Mr. Sirish Uprety is a Research Associate II who joined CIRA at NOAA/NESDIS/STAR in College Park, Maryland in November 2011. Specializing in satellite instrument calibration, Sirish is a member of the NOAA calibration support team. Previously he had approximately 3 years of industry experience supporting NOAA/NESDIS/STAR with expertise in the characterization of vicarious calibration sites, and intercomparison of satellite radiometer measurements. He has extensive experience in the analysis of calibration sites including the Antarctica Dome C and desert sites, as well as satellite intercomparison using the Simultaneous Nadir Overpass (SNO) technique involving a number of satellite instruments including AVHRR, MODIS, SeaWiFS, AATSR, MERIS, Landsats 1-5, NPP/VIIRS and hyper-spectral sensors such as EO-1 Hyperion and HJ-1A HSI. His broad experience with satellite radiometer calibration is a great asset to the operational support of satellite instrument calibration at NOAA. He received his MS degree in Electrical Engineering from South Dakota State University (SDSU) in 2009 and has published a number of papers with the vicarious calibration of satellite instruments. Steve Miller is his supervisor and Changyong Cao is his technical advisor.

Daniel Welsh

Daniel is a Non-Student Hourly employee (Research Assistant) who joined CIRA in Fort Collins in August 2011. He is a senior undergraduate student in Meteorology at the University of Northern Colorado and he works for the NOAA RAMM Branch providing data ingest and processing support. Prior to coming to CIRA, Dan worked as an intern for MetLogic in Fort Collins. Dan's work at CIRA involves collaboration with Debra Molenar (NOAA/NESDIS/RAMM) and with Hiro Gosden, Dave Watson and Kevin Micke (CIRA). His supervisor is Jack Dostalek.

CIRA is pleased to recognize the following individuals for their recent promotions:

Steve Albers

Steve was promoted to Senior Research Associate in August 2011. He has been with CIRA for 22 years collaborating with the Forecast Applications Branch of the Global Systems Division in the development of the Local Analysis and Prediction System (LAPS). As the Project Manager for LAPS, Steve is responsible for leading the LAPS research team in conducting research and development in support of enhancements to LAPS, including the development and incorporation of 3-D variational analysis schemes such as the Space-Time Multi-scale Analysis System. A significant new responsibility for Steve will involve leading research investigations in newly developing areas such as renewable energy modeling in collaboration with other divisions at the Earth System Research Lab.

Mike Biere

Mike was promoted to Senior Research Associate in August 2011. He joined CIRA in March 2000 as part of the development team created to design and implement the novel and innovative concept of displaying NOAA's global scientific data via a spherical screen—now widely known as Science on a Sphere (SOS). Mike has assumed the key position of Project Technical Lead with responsibility for leading the technical team of software engineers, establishing timelines and meeting development deadlines, and interacting with the Program Manager and the GSD Branch management to prioritize all planned activities. SOS is now installed at over 70 locations, including 25 international sites.

Leigh Cheatwood-Harris

Leigh was promoted to Research Associate III in August 2011. An integral member of the Geo-Targeted Alerting System (GTAS) team in the Global Systems Division (GSD) Leigh provides essential training methods, materials and techniques for the GTAS WFO and State/Local Emergency Operations Centers. She led all developing and testing efforts for the GIS portion of the GTAS project, which involved not only creating/automating updates for the GTAS GIS database, but also creating user interfaces for GIS users to add their information.

Patrick Hildreth

Patrick was promoted to Research Associate III in August 2011. He began work for CIRA February 1, 2004 in the Global Systems Division of the Earth System Research Laboratory. In addition to his role in the GSD Data Systems Group, he supports the NOAA NextGen and FAA NNEW programs by researching, developing and testing web service capabilities that will help NOAA meet requirements for implementing an initial version of the NextGen 4-D Weather Data Cube for delivering data to the FAA's Next Generation Air Traffic Management System.

Thomas Kent

Tom was promoted to Research Associate IV in August 2011. He provides Technical Lead duties in the multi-million dollar Meteorological Assimilation Data Ingest System (MADIS) NWS program. Instrumental in the successful transition of MADIS from research to operations, Tom was a main player in critical decision making, planning, and implementation strategies for deployment of specialized software to help NOAA and the National Weather Service meet their mission of saving lives. Tom is responsible for all aspects of the Mobile Platform Environmental Data (MoPED) and the National MESONET (NM) projects. These responsibilities include working with the private sector and NWS to design, develop, and eventually transition to operations MoPED and NM. Because of Tom's experience and expertise, he is instrumental not only in solving problems with AWIPS I and II, but also in trouble-shooting problems for users of the MADIS system at NWS, NCEP and the private sector.

Joanne Wade

Joanne was promoted to Senior Research Associate in August 2011. She has been with CIRA for 16 years as a key member of the AWIPS development team. As the senior Project Manager for one of the AWIPS II Extended projects known as the Data Delivery Paradigm, Joanne is now responsible for the overall management and technical leadership for three major areas of software development—data discovery, data ingest and storage, and client web services. She will be leading a team of software developers for all aspects of this key project—from designing, creating, and adding innovative enhancements, to testing and coordinating the implementation with contractors.

Missy Petty

Missy was promoted to Research Associate IV in August 2011. She joined CIRA in August 2005 as a member of the Real-Time Verification System in GSD's Aviation Branch. As the new Deputy Program Manager for the Forecast Impact Quality Assessment Section, key new responsibilities will include planning and management of projects within FIQAS which broadly encompass tasks such as assessments supporting the transition of aviation weather products into operations, research efforts in the application and development of verification techniques, and the development of Network-Enabled Verification Service and its transition to NWS. She will be the Project Lead for NEVS—a key NextGen innovative technology that will form the bridge between weather forecasts and the integration of those forecasts into FAA operations.

CIRA and Department of Atmospheric Sciences earn coveted University honor

We can trace the roots of CIRA to the early autumn of 1976. It was then that a group of CSU Atmospheric Science faculty agreed that it would be fruitful to collaborate on research of mutual interest to NOAA and other federal agencies via an institute established specifically for this purpose. In fact, the model was already in place at CU, Boulder where a similar institute, CIRES, had been running successfully for several years already. This background serves to illustrate that indeed CIRA would never have come to be without the support and collaboration of the Department of Atmospheric Science. This long history of cooperation continues today and together, both units have just achieved an important milestone at CSU.

The Programs of Research and Scholarly Excellence were launched by Colorado State University in 1991. According to the sponsor, the Office of the Vice President for Research, "Programs are awarded this designation because they have achieved great distinction and set a standard for excellence that may serve as a model for programs throughout the institution." Every four years a request for proposals is released and late in 2011, CIRA joined forces with the Department to submit a joint proposal. In spite of very intense competition, we learned that CIRA and ATS were among those selected with this high honor.

Beyond the prestige of a PRSE designation, the award also comes with some funding to support a graduate student fellowship. CIRA and ATS look forward to welcoming a student in the coming months under the sponsorship of this award. As CIRA Director Kummerow stated, this fellowship will serve to strengthen the ties between our two departments.

Dr. V. "Chandra" Chandrasekar

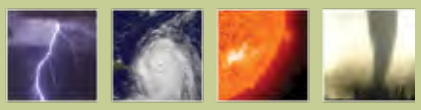
CIRA Fellow Dr. V. "Chandra" Chandrasekar was recently honored for his work in radar-based storm detection. Honoring Prof. Chandrasekar was CSU Ventures, a private, non-profit division of the University which specializes in the transfer and development of research from the University to the marketplace. Through their work they are keenly aware of the breadth of innovation that emerges from the University's best and brightest faculty.

They chose to honor Prof. Chandrasekar with an Award for Innovative Excellence for his work creating a series of small radars that could "revolutionize the way meteorologists detect storms." "Professor Chandra is a dedicated faculty member whose work in the area of weather prediction and emergency preparedness is already making a difference with emergency services personnel," said president Todd Headley. "We are proud to honor him for his innovation."

Prof. Chandrasekar's work has focused on developing a national network of radar systems to improve severe storm prediction. In collaboration with the University-affiliated CASA (NSF Engineering Research Center for Collaborative Adaptive Sensing of the Atmosphere) the first radar network focused on Oklahoma's infamous tornado alley where the residents see as many as 22 tornadoes each year. The CASA system is a low power, highly reliable and inexpensive system and has markedly improved tornado detection.

Coming in the next issue of the CIRA Magazine…

Dr. Glen Liston, CIRA's resident "snow man" was recently recognized with an Antarctic Glacier named in his honor! Be sure to stay tuned for further details and more extensive coverage in the Fall issue of *CIRA Magazine*.



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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Colorado State University