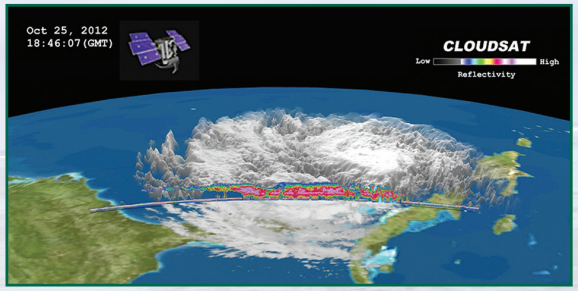
CloudSat Data Processing Center

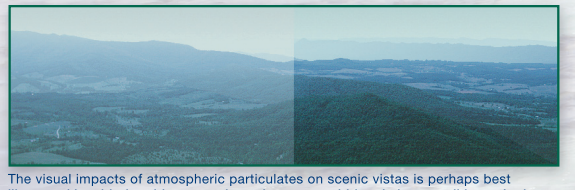
The NASA CloudSat mission uses a geosynchronous satellite to measure the vertical structure of clouds from space. Operational since June 2006, the spacecraft's 94 GHz (3 mm wavelength) Cloud Profiling Radar (CPR) produces detailed images of cloud structures which contribute to a better understanding of clouds and their complex roles in climate. CIRA hosts the CloudSat Data Processing Center on behalf of NASA's Jet Propulsion Laboratory. CIRA is solely responsible for processing and distributing CPR data and products to the science community. These products include cloud mask, cloud liquid water and cloud ice analysis. Please visit the following website for current data from CloudSat.
www.cloudsat.cira.colostate.edu



CloudSat cross-section of Hurricane Sandy off the coast of Florida, Oct 25 2012.
Credit: CloudSat/JPL/NASA

National Park Service Air Resources Division

The National Park Service Air Resources Division and CIRA collaborate in a research program that centers on air quality and atmospheric visibility in National Parks and Wilderness areas.


The visual impacts of atmospheric particulates on scenic vistas is perhaps best illustrated by side-by-side comparisons between turbid and clear conditions. In the example above, a scenic view across the Shenandoah is compromised by the presence of sunlight-scattering particulates. Credit: NPS/CIRA

Research focuses on:

- Assessing the visual impact of particulates on scenic vistas and regional haze
- Using image display techniques to visually interpret and quantify changes in scene appearance
- Detailing chemical composition, mixing, scattering, and absorption properties of aerosols
- Developing simulation and statistical models to understand the response of air quality parameters to air quality regulations, changing population demographics, and to examine trends
- Developing state-of-the-art measuring techniques
- Developing simulation and statistical models to understand the causes of poor visibility and air quality and the response of air quality parameters to changes in emissions
- Examining spatial and temporal trends in air quality parameters

Cooperative Research with NOAA Laboratories and Weather Centers

Nearly half of the CIRA research staff are integrated into various collaborative NOAA research efforts, primarily within the Global Systems Division (GSD) and the Global Monitoring Division (GMD) at the NOAA Earth System Research Lab in Boulder. These activities generally fall under the following five emphasis areas:

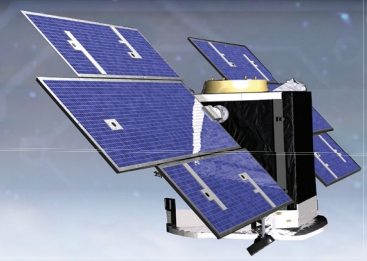
- Developing state-of-the-art regional and global-scale modeling systems
- Performing data assimilation and observing system impact assessment
- Performing data integration and information for display and automated decision support tools
- Performing high performance computing and system support
- Performing data access, management, and distribution of extremely large and varied sources of meteorological data

CIRA scientists and researchers also help lead several joint software application efforts with the National Weather Service at the Aviation Weather Center in Kansas City and the Meteorological Development Laboratory. These activities involve the application of advanced technology to develop, test, and evaluate new and emerging scientific techniques, products, and services in support of NWS, the FAA Aviation Weather Research Program and the NextGen weather initiative in building a 4-D Weather Data Cube. The emphasis is on transitioning promising research results to NWS operations.

College of Engineering Foothills Campus
Colorado State University
1375 Campus Delivery
Fort Collins, CO 80523-1375
Phone (970) 491-8448
Fax (970) 491-8241

www.cira.colostate.edu

Colorado State University



CIRA

The Cooperative Institute for Research in the Atmosphere is an interdisciplinary research department within the Colorado State University College of Engineering

Overarching Vision

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 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.

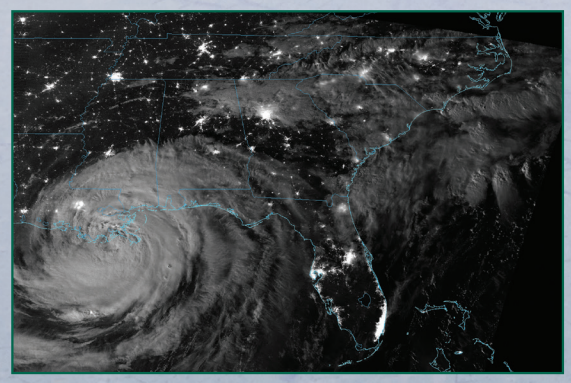

Groundbreaking of Founder's Wing addition to CIRA building. Credit: Bill Cotton/CSU

Our Mission

To serve as a nexus for multi-disciplinary cooperation among CIRA and NOAA research scientists, University faculty, staff and students in the context of NOAA-specified research theme areas. Important elements of this mission are to foster collaboration with other national and international agencies developing related capabilities, to help transition fundamental research conducted at the University to bear on NOAA's operational needs and to communicate the research findings to the broader scientific community. These objectives are coupled with continued dedication to 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.

CIRA's Cooperative Agreement with the National Oceanic and Atmospheric Administration

CIRA was established in 1980 through a cooperative agreement between NOAA and Colorado State University. Currently, CIRA receives approximately $13 million in funding per year from NOAA and more than $5 million from other agencies in support of its efforts and collaborations in specific research areas.



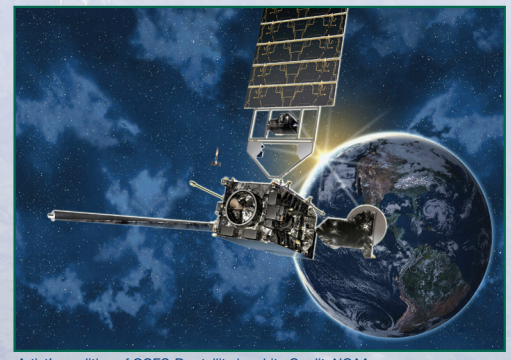
Hurricane Isaac approaching landfall near New Orleans as seen by the Day-Night Band sensor aboard the Suomi NPP mission. Credit: RAMMB/CIRA

Our research is focused on the following thematic areas

- Developing satellite algorithms and training users of satellite data
- Supporting development of regional-to-global-scale modeling systems
- Data assimilation—the science of getting observations into models
- Linkages between weather and climate processes
- Developing tools for data distribution, analysis, and display
- Assessing the societal/economic impacts of atmospheric research
- Promoting education and outreach in our disciplines of research

Infrastructure

CIRA operates a high-technology infrastructure to support research in our major theme areas. The infrastructure contains over 300 workstations/servers, a satellite Earth Station with online archive, several high performance modeling clusters, and a high speed network. With its expertise in data fusion, CIRA is developing systems and tools that will simplify the acquisition and manipulation of satellite and model data for scientific research.



Artist's rendition of GOES-R satellite in orbit. Credit: NOAA

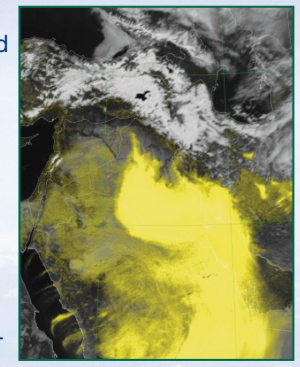
Satellite Earth Station

With NOAA support, CIRA has operated a Geostationary Operational Environmental Satellite (GOES) Earth Station since 1980. Today our collection capability handles three simultaneous GOES transmissions, NOAA polar data and European MSG. CIRA also plays an important role in each new GOES GVAR satellite as one of the primary test sites for initial transmissions and sensor verification.

Department of Defense Research

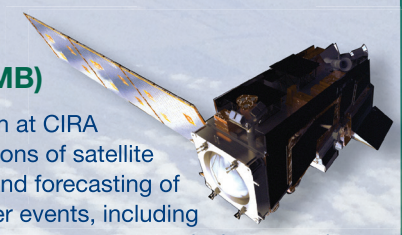
CIRA has a long history of successful interactions with the DoD, dating back to the formation in 1986 of the Center for Geosciences and Atmospheric Research (CG/AR) program and extending today to multiple research projects in satellite applications, environmental process studies, data assimilation, and planning for the next generation of operational DoD environmental satellite assets. In terms of DoD program categories, our research spans the spectrum from 6.1 (basic), to 6.2 (applied), to 6.4 (transitional).

Many agencies share a common need for improved weather observation and forecasting capabilities in support of their diverse missions. In the case of DoD-specific needs for situational awareness in data-sparse or data-denied theaters of operation, CIRA's multi-disciplinary and applied research experience in satellite algorithm development and training, cloud/aerosol remote sensing, hydrometeorology, data distribution, environmental modeling and data assimilation is a particularly valuable resource. Linking resident expertise in these areas with faculty and students in Colorado State University's College of Engineering, including the nationally ranked Department of Atmospheric Science, CIRA provides an effective research-to-operations bridge between the DoD and academia.



Meteosat-9 highlights a massive dust storm (yellow) over the Arabian Peninsula. Credit: NRL/CIRA

NOAA-NESDIS Regional and Mesoscale Meteorology Branch (RAMMB)



The RAMM Branch at CIRA develops applications of satellite data for analysis and forecasting of mesoscale weather events, including tropical cyclones, severe storms and winter weather. Studies also include detection of hazards such as wildfires, volcanic ash, and fog. The emphasis is on applied research that leads to implementation of new products at operational forecast centers. For example, several RAMMB tropical cyclone products have been transitioned to the National Hurricane Center and Joint Typhoon Warning Center. Research involves current satellite data and preparation for future operational satellites using proxy observations from research satellites and synthetic satellite data based on model simulations.
RAMMB is also actively involved in national and international training to improve the utilization of satellite data and products.

Colorado State University

Background Photographs by Mark Efaw