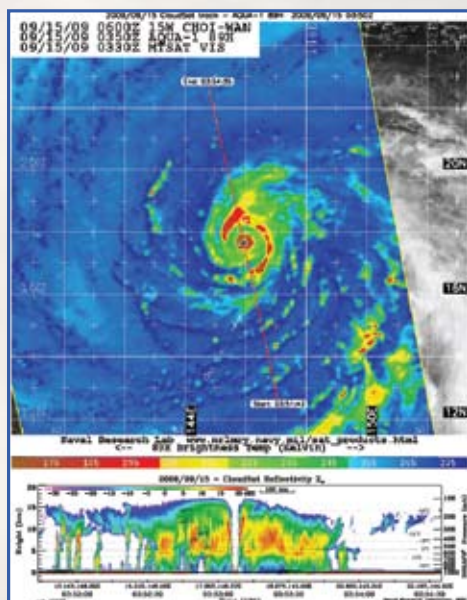


## CloudSat Data Processing Center

The NASA CloudSat mission, coordinated by Principal Investigator and CIRA Director Graeme Stephens, uses a 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 for NASA. 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](http://www.cloudsat.cira.colostate.edu)



Top: Eye overpass image of Typhoon Choi-Wan showing CloudSat path, 9-15-2009  
Bottom: A chart plotting reflectivity against height

Storm Front Cloud photograph by Carlye Calvin

## 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.

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



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

## CIRA Collaborative Research in Boulder with NOAA Laboratory and Data Center

Nearly half of the CIRA research staff are integrated into various collaborative research efforts within the Global Systems Division (GSD) and the Chemical Sciences Division (CSD) at the NOAA Earth System Research Lab in Boulder. All



CIRA Boulder Staff

of these activities fall directly under one or more of CIRA's research themes. Several CIRA researchers collaborate with the NESDIS National Geophysical Data Center and the Space Weather Prediction Center in the development of science algorithms and research-grade software for the space environment sensors on NPOESS. CIRA computer scientists also help lead several joint software application efforts with the National Weather Service / Meteorological Development Laboratory and the U.S. Geological Survey involving the application of advanced technology in developing the next generation of forecaster workstations as well as flash flood and debris flow forecasting applications.

## Cooperative Institute for Research in the Atmosphere



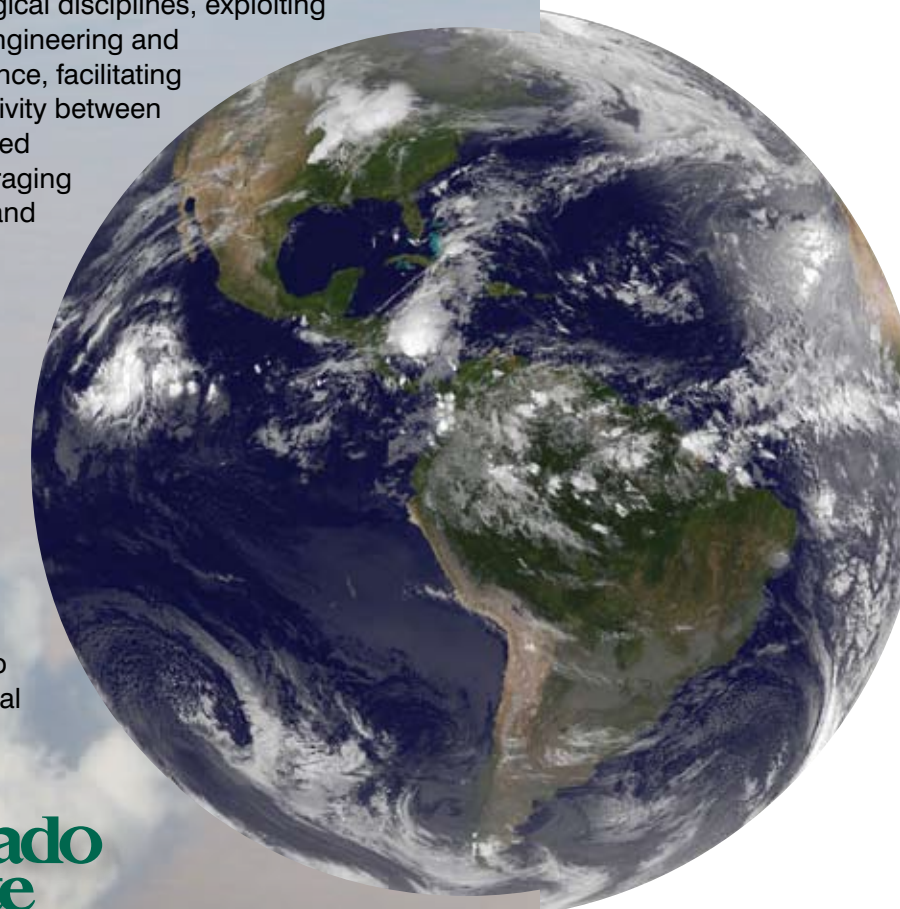
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# CIRA

The Cooperative Institute for Research in the Atmosphere (CIRA) is an interdisciplinary research Department within the Colorado State University College of Engineering.

## 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 CIRA 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 CIRA 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.



CIRA processes and distributes the first-of-its kind NASA CloudSat data to researchers around the world. CIRA Director Graeme Stephens is the CloudSat Principal Investigator.

CloudSat Image courtesy of NASA



CIRA Fort Collins Staff

## CIRA's Cooperative Agreement with the National Oceanic and Atmospheric Administration (NOAA)

CIRA was established in 1980 through a cooperative agreement between NOAA and Colorado State University. Currently, CIRA receives approximately \$10 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.

## CIRA's 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

## CIRA Infrastructure

CIRA operates a high-technology infrastructure to support research in our major theme areas. The infrastructure contains over 200 workstations, a satellite Earth Station with DVD archive, meteorological modeling clusters, and a high speed computer network.

## 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.



A U.S. Marine Corps CH-53D Sea Stallion helicopter lands to deliver supplies at Patrol Base Jaker, Afghanistan, on July 28, 2009. Photographer: LCPL Purschwitz Property of Department of Defense

A GOES-N series spacecraft, the latest in the long line of Geostationary Operational Environmental Satellites.



## DoD Center for Geosciences/Atmospheric Research (CG/AR)

CSU has hosted the DoD-funded Center for Geosciences/Atmospheric Research (CG/AR) since September 1986. Primary administration of this Congressionally supported program is coordinated at CIRA and the multi-disciplinary research is conducted under the leadership of Thomas H. Vonder Haar, Principal Investigator (and CIRA Director Emeritus). In addition to the main research themes listed below, Technology Transition and Interactions with participating DoD service labs remains an integral focus of CG/AR.

## Research Themes under CG/AR:

- Hydrometeorology
- Clouds, Icing, and Aerosols Effects
- Environmental Modeling and Assimilation
- Urban and Boundary Layer Environment
- Remote Sensing of Battlespace Parameters

## NOAA-NESDIS Regional and Mesoscale Meteorology Branch (RAMMB)

The RAMM Branch at CIRA conducts research on the use of current and future satellite data to improve analysis, forecasts, and warnings for regional and mesoscale meteorological events, including tropical cyclone and severe thunderstorm genesis, development, intensification, and prediction. Other projects consider mesoscale forecast and nowcast products based on multi-spectral satellite data integrated with other observations, such as Doppler radar and aircraft reconnaissance data, and numerical prediction models. RAMMB is also actively involved in national and international satellite training, and has a focus on GOES imagery and image interpretation.

Color enhanced infrared (red/yellow = coldest cloud tops) GOES satellite image of Hurricane Ike on 13 September 2008 at 0600 UTC as the system made land-fall near Galveston, Texas.

