

## Center for Geosciences / Atmospheric Research

The **Center for Geosciences / Atmospheric Research (CG/AR)**, a Department of Defense-sponsored Center represents the third phase of this research activity. CG/AR is a multi-million dollar program whose five main research themes include:

**Hydrometeorology** - Emphasis in soil moisture remote sensing, advanced hydrological stream and over lands flow models, and quantitative precipitation analysis and forecasting.

**Cloud Structure, Dynamics, and Climatology** - Explores advanced concepts in cloud analysis and classification including neural network analysis, multi-spectral clustering, and high-resolution cloud drift wind analysis. Two major research field programs are supported: one explores the very stable nocturnal boundary layer in conjunction with the CASES-99 field program, and the other is the CLEX-4 field experiment. This Cloud Layer Experiment will investigate mid-level non-precipitating clouds which are particularly relevant to military operations and radiative properties of the atmosphere.



*Microwave image from the NOAA 15 satellite.*

**Remote Sensing of Battlespace Parameters** - Explores improved microwave and infrared retrievals to allow remote sensing of surface moisture, temperature, and atmospheric water vapor.

**N-Dimensional Data Assimilation and Fusion** - Explores advanced concepts in data assimilation such as adjoint modeling and direct radiance ingest into atmospheric mesoscale models. This research promises to improve forecast model use of satellite data and to provide improved dispersion modeling for aerosol distribution.

**Chemistry, Aerosols, and Visibility** - Focuses on the detection of aerosols and their chemistry and radiative characteristics as measured by satellite sensors. Project goal is to develop an ability to measure visibility from space.

## 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
- Using image display techniques to visually interpret and quantify changes in scene appearance
- Detailing chemical composition, mixing, scattering, and absorption properties of aerosols
- Developing 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 source apportionment techniques.

## Flash Flood Laboratory

The Flash Flood Laboratory was created to conduct and foster problem-focused interdisciplinary physical and social science research to reduce the disastrous impacts on people, property, and communities caused by flash floods across the nation. It brings together physical scientists, social scientists, and engineers from



CIRA and across the University to address the physical and social problems of flash flooding disasters. Research collaboration with other universities, agencies, and the private sector is strongly encouraged.

The laboratory provides the opportunity for a wide range of academic disciplines including atmospheric science, hydrology, geology, geography, sociology, public administration, economics, and natural resources to develop and test prototype solutions for reducing the losses of life and property from flash floods through applied interdisciplinary research. Research is usually conducted in partnership with local, state, and federal officials who have flash flood related responsibilities. Research topics of the laboratory include:

- Individual and community response to flash floods and flash flood warnings
- Effective use of warning technology and integrated warning systems
- Technological advancements in remote rainfall and stream flow monitoring
- Hydrological and meteorological applications of geographic information systems
- Interaction of weather and seasonal to interannual climate variations with topography
- Flash flood occurrence frequencies
- Innovations in complex coupled geophysical systems modeling
- Application of scientific research to community preparedness, mitigation, and emergency response.

## The GLOBE Program

The Global Learning and Observations to Benefit the Environment (GLOBE) Program is an international science and education partnership joining students, educators, and scientists from around the world. Students make environmental observations in the areas of atmosphere, hydrology, soil, land cover, and biology. GLOBE data and educational materials are shared world wide through the Internet.

CIRA /CSU supports the GLOBE Program through maintenance of the central GLOBE Web server and the GLOBE real-time data acquisition system. The CIRA/CSU GLOBE team also plays a critical role in the development and support of the first GLOBE mirror Web server in Germany. Hourly data replication between the two servers ensures that all data records exist in the German as well as in the Boulder database. New GLOBE Web products are continuously developed to support new GLOBE measurement protocols and new student/teacher interaction tools. The team also supports the education and science activities of GLOBE.

The GLOBE Program, initially conceived by Vice President Gore,



became operational in April 1995 with about 40 schools in the US. Today there are nearly 6000 GLOBE schools from 80 countries. The success of the international GLOBE Program is due in large part to the outstanding contributions by the CIRA/CSU GLOBE Team.

## Fellowships in Atmospheric Science and Related Research

CIRA offers a number of Associate Fellowships to scientists with research interests in several atmospheric science areas. The program is open to scientists from all countries. Applications are due October 31 for positions starting about January of each year. Awards may be made to senior scientists, including those on sabbatical leave, or recent Ph.D. recipients. Contact CIRA or visit the CIRA Web site to obtain an announcement and more information.

## Workshops and Seminars

CIRA-sponsored workshops and seminars for the scientific community are scheduled throughout the year. CIRA's annual Research Retreat has become a very popular event at CSU's Pingree Park Campus. At the retreat, CIRA researchers, students, and guests present research results and conduct discussions on scientific and technical topics.

## International Programs

Since its beginning, CIRA has invited researchers and students from foreign countries to participate in CIRA programs.

Scientists with the NOAA/NESDIS/RAMM Team interact directly with researchers at the World Meteorological Organization (WMO) sponsored Regional Meteorological Training Centers (RMTCs) in Costa Rica and Barbados to facilitate specialized training in the use of satellite imagery and applications in weather and forecasting. The training at the RMTCs reach participants from WMO Region III and IV countries in Central and South America and the Caribbean. A new CIRA project funded by NOAA aims to widely distribute satellite imagery and products to Region III and IV countries via PCs and the Internet.

Under a continuing bilateral research agreement, visiting scientists from the People's Republic of China collaborate with NOAA/NESDIS/RAMM Team personnel on computer display applications for satellite imagery.



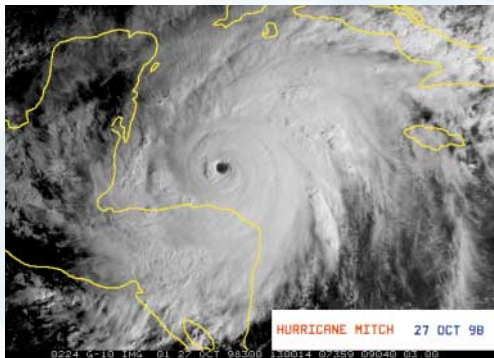
## New 1999 GOES Data Collection Technology at CIRA

With the advancement of Microsoft's Windows NT operating system and inexpensive Intel personal computer (PC) hardware, CIRA's engineering staff has developed an entirely new GOES data collection system.

The new Windows NT data collection platform is state-of-the-art offering real-time full-resolution McIDAS and JPEG products to researchers within minutes after they are received from the satellite. The new system incorporates a new single chip hardware pre-processor, high speed direct memory data transfer, intelligent graphical ingest and sectorizer software, automatic logging for historical summaries, and automatic monitoring for minimal staff intervention. This new technology will easily last CIRA throughout the lifespan of the GOES GVAR series scheduled to end in 2005 and will provide a solid foundation for the next generation of satellites.

## NOAA-NESDIS Regional and Mesoscale Meteorology Team

**NOAA-NESDIS Regional and Mesoscale Meteorology Team (RAMMT)** has been an important part of CIRA since its inception in 1980. The RAMMT's major focus is to develop new applications of meteorological satellite data to further the science of forecasting severe and/or convective weather events. Other areas of high priority research include: 1) The innovative uses of computer technology in assimilating and utilizing satellite observations supplemented with radar, wind profiler, numerical model, and other meteorological information to more rapidly assess the state of the mesoscale environment; 2) Developing tropical cyclone forecasting criteria for determining formation, intensity, structure and track; 3) Contributing to the evolution of satellite sensor technology; and 4) Providing training to National Weather Service and other forecasters worldwide in the applications of satellite data to all elements of weather analysis.

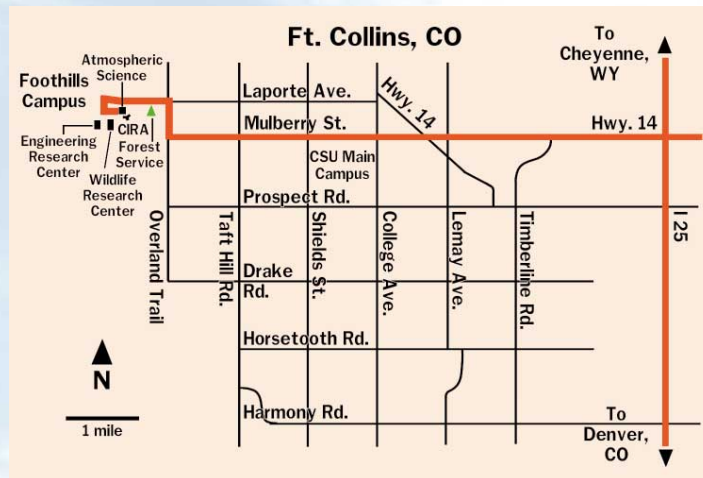


GOES image of Hurricane Mitch just north of the coast of Honduras. At this time the maximum 1-minute average surface winds were 155 knots (178 mph).

## The Location of CIRA

CIRA is located in the Foothills Campus of Colorado State University, Fort Collins, Colorado. Just 70 miles north of Denver, CIRA is surrounded by atmospheric research and training organizations all along the Colorado Front Range.

From I-25, take Exit 269 B (Highway 14 / Mulberry Street). Go west on Highway 14. At the railroad tracks Highway 14 heads north, stay west on Mulberry Street until it dead ends at Overland Trail. Head north (right) on Overland Trail one half mile to Laporte Avenue [flashing overhead yellow light at this intersection]; go west on Laporte Avenue about 3/4 of a mile. The CIRA building is located next to the Atmospheric Science Building which is a four-story building on the south side of Laporte Avenue. Several large satellite antennas can be seen on the north side of CIRA.



### For more information contact:

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# Cooperative Institute for Research in the Atmosphere



## The Cooperative Institute for Research in the Atmosphere

CIRA was established in 1980 to increase the effectiveness of atmospheric research in areas of mutual interest among the National Oceanic and Atmospheric Administration (NOAA), Colorado State University and other groups.

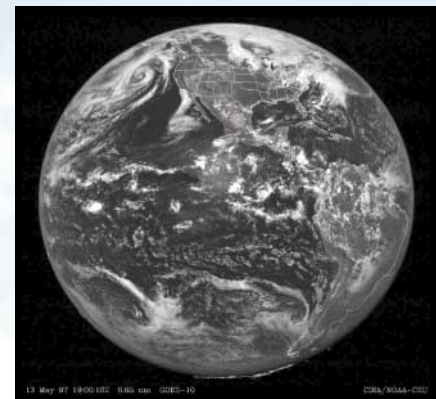
CIRA is a center for international cooperation in research and training, covering virtually all physical, economic and societal aspects of weather and climate. CIRA's principal interests include: applications of meteorological satellite remote sensing and imagery, air quality, visibility, mesoscale studies, forecasting, agricultural meteorology, cloud physics, and atmospheric model evaluation.

## CIRA Infrastructure

CIRA operates a high-technology infrastructure to support meteorological research. The infrastructure consists of a satellite earthstation, geophysical data holdings, meteorological models, field equipment, and a fiber-optic computer network. CIRA's high-speed network offers access to real-time satellite data, e-mail, Internet, and local area network services hosted by several servers and desktop workstations.

## Satellite Earthstation

CIRA has operated a Geostationary Operational Environmental Satellite (GOES) earthstation since 1980. Today our GOES collection capability handles three simultaneous GOES transmissions. CIRA plays an important role in each new GOES GVAR satellite as one of the primary test sites for initial transmissions and sensor verification. CIRA successfully collected the first GOES-8, GOES-9, and GOES-10 images and plans to continue this legacy by assisting with the checkout of GOES-11.



First visible image transmitted by GOES-10 as received by the CIRA earthstation.