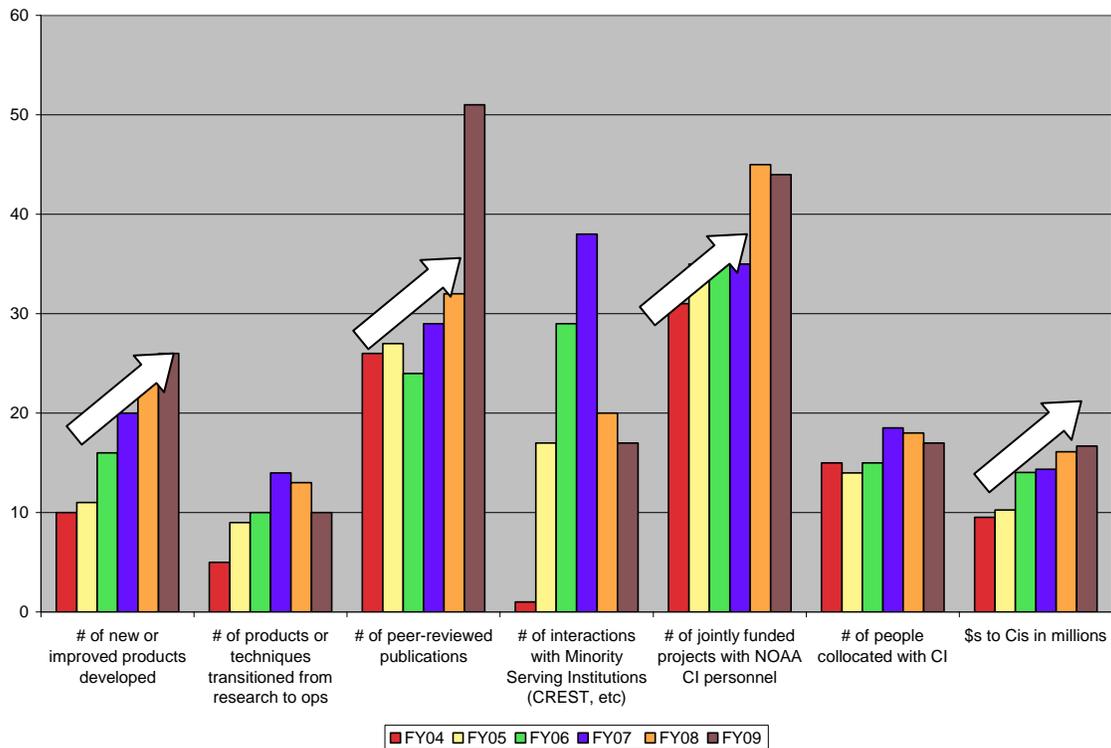


## NESDIS COOPERATIVE RESEARCH PROGRAM

The unique Cooperative Research Programs division in STAR consists of three federal branches collocated with universities that have been selected as NOAA Cooperative Institutes. No other line office in NOAA embeds federal branches within universities. The federal personnel participate in all STAR activities from research to operations but have an emphasis on bringing new research and techniques from academia into the federal sector and vice versa; the other divisions in STAR have an emphasis on bringing research and techniques into operations. Several statistics have been tracked to gauge the health of the program since 2004. In particular, the trends indicate a relatively stable program with a clear increase in the number of new products/techniques developed and related items.



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**Cooperative Institute for Oceanographic Satellite Studies**

The Cooperative Institute for Oceanographic Satellite Studies (CIOSS) was established in December 2003. CIOSS provides collaborative work that will enhance and improve the use of satellite remote sensing for oceanographic research, operational applications, and education/outreach between the Oregon State University and NOAA.

The primary purpose of CIOSS is to establish a cooperative (federal-academic) center of excellence for research involving satellite remote sensing of the ocean and the air-sea interface. CIOSS' research themes are: 1) Satellite sensors and techniques, 2) ocean-atmosphere fields and fluxes, 3) ocean-atmosphere models and data assimilation, 4) ocean-atmosphere analyses, and 5) outreach, education and training. These research themes are aligned to achieve four goals:

- Foster and provide a focus for research related to NOAA's mission responsibilities and strategic objectives in the coastal and open ocean, emphasizing those aspects of oceanography and air-sea interaction that utilize satellite data, along with models of oceanic and atmospheric circulation.
- Collaborate with NOAA research scientists in using satellite ocean remote sensing through: evaluation, validation, and improvement of data products from existing and planned instruments; development of new multi-sensor products, models, and assimilation techniques; and investigation and creation of new approaches for satellite data production, distribution, and management;
- Improve the effectiveness of graduate-level education and expand the scientific training and research experiences available to graduate students, postdoctoral fellows and scientists from NOAA and other governmental laboratories and facilities; and
- Educate and train research scientists, students, policy makers and the public to use, and appreciate the use of, satellite data in research that improves our understanding of the ocean and overlying atmosphere.

CIOSS research supports NOAA's Mission Goals in the following areas:

1) Ecosystems: Protect, restore, and manage the use of coastal and ocean resources through an ecosystem approach to management, 2) Weather and water: Serve Society's needs for weather and water information, 3) Climate: Understand climate variability and change to enhance society's ability to plan and respond, 4) Commerce and Transportation: Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation, and 5) Mission support: Provide critical support for NOAA's mission.

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**Cooperative Institute for Climate and Satellites**

The Cooperative Institute for Climate and Satellites (CICS) was established in July 2009. CICS is formed through a national consortium of academic, non-profit and community organizations with leadership from the University of Maryland, College Park (UMCP) and the University of North Carolina (UNC) System through North Carolina State University (NCSU). This partnership includes Minority Serving Institutions as well as others with strong faculties who will enhance CICS' capability to contribute to NOAA's mission and goals.

CICS activities are carried out at two centers, each a partnership between a host university and a major unit within a NOAA Line Office. The first joins the UMCP with the Center for Satellite Applications and Research in the National Environmental Satellite, Data, and Information Service (NESDIS) and with the Climate Prediction Center in the National Weather Service (NWS). The second center joins NCSU in Raleigh, NC, with the National Climatic Data Center in Asheville, NC. Other partners include the University of California-Irvine, Colorado State University, Howard University, the University of Miami, Duke University, the University of North Carolina-Chapel Hill, Princeton University, City University of New York, Columbia University, Oregon State University, and Remote Sensing Systems, in Santa Rosa, California.

CICS conducts its research under three themes: (1) Climate and Satellite Research and Applications - Development of new observing systems, or new climate observables from current systems; (2) Climate and Satellite Observations and Monitoring - Development and improvement of climate observables from current systems; and (3) Climate Research and Modeling - Research component that brings together climate observables, modeling and validation in a comprehensive integrated whole.

CICS' research activities assist NOAA in three of its Mission Goals: 1) Understand climate variability and change to enhance society's ability to plan and respond, 2) Provide Critical Support for NOAA's Mission, and 3) Protect, Restore, and Manage the Use of Coastal and Ocean Resources through an Ecosystem Approach to Management.

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**Cooperative Institute for Meteorological Satellite Studies**

The National Oceanic and Atmospheric Administration (NOAA) and the University of Wisconsin-Madison (UW) have collaborated for more than three decades in satellite meteorological research. The relationship between NOAA and the UW, from which the Cooperative Institute for Meteorological Satellite Studies (CIMSS) was founded, furthers the missions of both organizations. A Memorandum of Understanding between NOAA and the UW established CIMSS in 1980 to formalize their partnership in meteorological research using satellite technology and to provide a firm basis for cooperative research efforts. Sponsorship and membership of the Institute was expanded to include the National Aeronautics and Space Administration (NASA) in 1989. The CIMSS mission is to:

- Foster effective collaboration between NOAA and UW in atmospheric and Earth science exploiting satellite technology;
- Serve as a center of excellence where government and university scientists and engineers work together on projects of mutual interest involving remote sensing of the Earth; and
- Stimulate training of scientists and engineers in disciplines involved in the atmospheric and Earth sciences.
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The CIMSS research program includes five research themes and one outreach theme. These themes are: Weather Nowcasting and Forecasting, Clouds and Radiation, Global Hydrological Cycle, Environmental Trends, Climate and Educating and Informing our Citizens. As the major scientific themes of CIMSS are broad, their evolution occurs at the research project level. Numerous programs that track one or more themes have emerged and evolved throughout CIMSS history. These projects evolve to meet NOAA needs, improve scientific understanding, and foster the new capabilities required with advanced satellite observations.

The Advanced Satellite Products Branch (ASPB), within the Office of Satellite Technology and Research (STAR) in the National Environmental Satellite, Data, and Information Service (NESDIS), is physically collocated with CIMSS on the University of Wisconsin-Madison campus. The ASPB conducts research and development activities in collaboration with university scientists within CIMSS on the broad theme of meteorological satellite studies related to weather and climate. This relationship between the university and ASPB enables NOAA to adopt demonstrated research techniques for deriving atmospheric information from remote sensing data for broader distribution to the science community.

In particular, CIMSS collaborates with NOAA in the specification, testing, and evaluation of new satellite instruments; in the development of techniques to derive and apply meteorological parameters from the available satellite measurements; and in the assessment of the impact of new remote sensing data and products on weather analyses and forecasts and as long-term climate data records. The University of Wisconsin, the scientific community and the nation benefit from this arrangement through the training of students and the support of research in atmospheric and Earth science.

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**Cooperative Institute for Research in the Atmosphere**

The Cooperative Institute for Research in the Atmosphere (CIRA) was established in 1980 at Colorado State University (CSU). CIRA serves as a mechanism to promote synergisms between University scientists and those in the National Oceanic and Atmospheric Administration (NOAA). Since its inception, CIRA has expanded and diversified its mission to coordinate with other Federal agencies, including the National Aeronautics and Space Administration (NASA), the National Park Service (NPS), the U.S. Forest Service, and the Department of Defense (DoD). CIRA is a multi-disciplinary research institute and encompasses several cooperative agreements, as well as a substantial number of individual grants and contracts.

The Institute's research for NOAA is concentrated in 7 theme areas (2 of which are cross-cutting research areas): (1) Satellite Algorithm Development, Training and Education - Research associated with development of satellite-based algorithms for weather forecasting, with emphasis on regional and mesoscale meteorological phenomenon. Also under this theme, satellite and related training material will be developed and delivered to a wide variety of users, with emphasis on operational forecasters. (2) Regional to Global Scale Modeling Systems - Research associated with the improvement of weather/climate models (minutes to months) that simulate and predict changes in the Earth system. Topics include atmospheric and ocean dynamics, radiative forcing, clouds and moist convection, land surface modeling, hydrology, and coupled modeling of the earth system. (3) Data Assimilation - Research to develop and improve techniques to assimilate environmental observations, including satellite, terrestrial, oceanic, and biological observations, to produce the best estimate of the environmental state at the time of the observations for use in analysis, modeling, and prediction activities associated with weather/climate predications (minutes to months) and analysis. (4) Climate-Weather Processes - Research focusing on using numerical models and environmental data, including satellite observations, to understand processes that are important to creating environmental changes on weather and short-term climate timescales (minutes to months) and the two-way interactions between weather systems and regional climate. (5) Data Distribution - Research focusing on identifying effective and efficient methods of quickly distributing and displaying very large sets of environmental and model data using data networks, using web map services, data compression algorithms, and other techniques, (6) Cross-Cutting Area 1: Assessing the Value of NOAA Research via Societal/Economic Impact Studies Consideration for the direct and indirect impacts of weather and climate on society and infrastructure. (7) Cross-Cutting Area 2: Promoting Education and Outreach on Behalf of NOAA and the University. Engaging the University and its Industry partners, K-12 and the general public locally, regionally, nationally and internationally to promote both awareness and informed views on important topics in environmental science.

Annually, CIRA scientists produce over 200 scientific publications, of which 30% appear in peer-reviewed publications. Among the important research being performed at CIRA is its support of NESDIS' next-generation satellite programs: GOES-R and NPOESS. CIRA research is building prototype products and developing training, based on the new sensor technology, to assure maximum exploitation of these data when the sensors are launched.

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**Cooperative Remote Sensing Science and Technology Center**

The Cooperative Remote Sensing Science and Technology Center (CREST), a multidisciplinary center, is led by the City College of the City University of New York (CUNY). CUNY is the lead institutions that brings together Lehman College and Bronx Community College, New York City Tech College; of CUNY and partner institutions like Hampton University, University of Puerto Rico at Mayaguez, Bowie State University, University of Maryland Baltimore County, and Columbia University. These institutions form a broad-based research team in remote sensing applied to earth, atmospheric, environmental, and marine sciences.

The Center's research and training focuses on all aspects of remote sensing including: sensor development, satellite remote sensing, ground-based field measurements, data processing and analysis, modeling, and forecasting. CREST is an outstanding example of collaboration among institutions to educate and train students in the field of environmental remote sensing by conducting research consistent with NOAA's Science Goals and Missions. The recruitment and training focuses on mentoring undergraduate, masters and doctoral students into scientific and engineering disciplines in which they can specialize in remote sensing. The program includes seminars, summer internships with NOAA, and with industrial partners, and school-year research assistantships.

The research and trainings focuses on three main thrust areas; Remote Sensing Application in Climate and Air Quality; Remote Sensing of Coastal Waters; and Precipitation and Water Resources. CREST research supports three of the four NOAA's Missions: Climate; Weather and Water; and Ecosystems.