Cooperative Institute for Climate and Satellites-Maryland

cics-md
Cooperative Institute for Climate & Satellites
UNIVERSITY OF MARYLAND

Circular June 2016

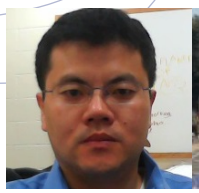
DIRECTOR'S MESSAGE

I just returned from the Third Annual STAR Awards Ceremony, where STAR recognizes the accomplishments of individuals, or teams for development, proof or application of novel approaches, methods, or devices that solve technical or organizational challenges and realize gains previously not feasible.

I am proud to announce that four CICS-MD scientists received awards at this ceremony. Dr. Xi Shao, whose work is also featured on the other side of this circular, was recognized "For innovative research and publication of a related journal paper." Dr. Yong Chen's citation reads: "For developing a state-of-the-art system for processing, calibrating and validating Cross-track Infrared Sounder (CrIS) full spectral resolution data for weather and climate applications." Dr. Alejandro Egido was honored as a member of a team for inventing and demonstrating a new analytic technique, Fully Focused SAR Altimetry, which dramatically improves the along-track resolution of next generation Synthetic Aperture Radar. The team that includes Mr. Manik Bali was commended for outstanding service to WMO's Global Satellite Inter Calibration System (GSICS) community and Leadership of the NOAA GSICS Coordination Center.

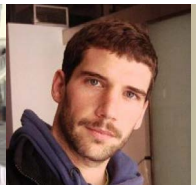
These four exemplify the dedication to quality work that makes CICS-MD a valuable partner for NESDIS. Compliments to them, and to all other CICS-MD scientists who quietly keep contributing to NOAA's research goals.

Hugo Berbery, CICS-MD Director

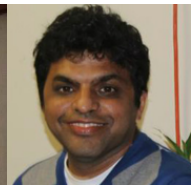


Dr. Xi Shao

Dr. Yong Chen



Dr. Alejandro Egido



Manik Bali

CICS-MD BACKGROUND

CICS is a partnership led by the Earth System Science Interdisciplinary Center of the University of Maryland at College Park engaged in collaborative research with several NOAA Centers and Laboratories. CICS comprises two main research centers, CICS-MD at the University of Maryland, and CICS-NC in Asheville, NC, which is administered by North Carolina State University. The CICS Consortium includes another 15 institutions as partners, including academic, non-governmental, and private research enterprises.

CICS-MD consists of about 60 scientists that implement the Institute's mission of supporting NOAA's ability to use satellite observations and Earth System models to advance the national climate mission.

RESEARCH TOPICS

CICS-MD research strengths focus in the following topic areas:

Data Fusion and Algorithm Development. This is research focused on the use of satellite and complementary observations to create geophysical data sets related to various aspects of the global climate system.

Calibration/Validation. This area of research is aimed at calibration and validation of satellite radiance data as well as products of algorithms that derive geophysical parameters to best represent the state of the Earth System.

Future Satellite Programs. Activities under this topic are directed at developing and implementing new NOAA meteorological satellite systems, particularly GOES-R and JPSS.

Climate Research, Data Assimilation and Modeling. This research topic aims at improving the understanding of the physics of climate through integration of information by data assimilation, particularly satellite-derived data sets, with models of the Earth System and its components.

Land and Hydrology. The focus of this topic area is on the enhancement, refinement and validation of algorithms that derive land surface products from satellite observations with the purpose of improving global land-atmosphere feedback mechanisms that impact all living forms on the planet.

Earth System Monitoring from Satellites. Research in this topic area focuses on the derivation and curation of data sets that describe crucial aspects of the Earth System (Atmosphere, Land, Ocean, Cryosphere) and the application of those data sets in the detection and monitoring of significant climate events.

Decision Support Science. Activities include mentoring of undergraduate and graduate students on themes of relevance for NOAA, increasing awareness of climate science and changes in the climate system, and raising the understanding of how climate data is collected, observed, analyzed, and used in research purposes.

NOAA SPONSORS

- Center for Satellite Applications and Research (STAR)/National Environmental Satellite, Data and Information Service (NESDIS)
- Climate Prediction Center/National Centers for Environmental Prediction/National Weather Service
- National Centers for Environmental Information/NESDIS (NCEI)
- Air Resources Laboratory/Office of Oceanic and Atmospheric Research

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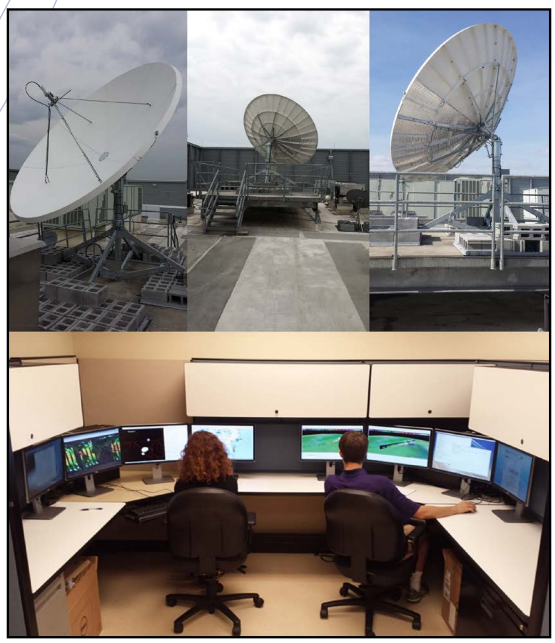
Developing Satellite Proving Ground Capabilities at CICS-MD

(Contributed by Dr. Scott Rudlosky)

CICS-MD has established a Proving Ground and Training Center (PGTC), with support from the Joint Polar Satellite System (JPSS) and the Geostationary Operational Environmental Satellite - R Series (GOES-R) programs. The PGTC will promote direct interactions between CICS-MD scientists and National Weather Service (NWS) forecasters, leading to more timely and impactful implementation of operational forecasting products developed by researchers at CICS-MD.

Infrastructure is being built to promote sustained interaction between JPSS/GOES-R algorithm developers and end users for training, product evaluation, and solicitation of user feedback. The initial demonstration products include satellite-derived snowfall rate estimates, aerosol and fire products, and convective weather diagnostics.

These product demonstrations also require the development of satellite education and training materials including e-learning modules, seminars, weather event simulations, and special case studies. The PGTC is broadening the influence of CICS-MD within the satellite proving grounds, and bringing operational meteorology into the classroom. The implementation of operational NWS software at CICS-MD coincides with the development of similar capabilities just 2.5 miles away at the UMD Department of Atmospheric and Oceanic Science (AOSC). Student interns cross-populate these efforts, greatly benefiting both parties and providing valuable educational and training opportunities for UMD students. The result will be graduates with remote sensing experience ready to staff future NESDIS activities as support contractors and civil servants.



Top: Antenna atop the M-Square building that receives National Weather Service (NWS) data feeds via the NOAAPORT Satellite Broadcast Network. Bottom: Two multi-panel workstations that simulate operational NWS environments, providing real-time visualization of weather, water, and environment information.

Support for the GOES-R Near Surface Unmanned Aircraft System Feasibility Demonstration Study

(contributed by Dr. Xi Shao)

Given the recent technological advance of low-cost commercially available Unmanned Aerial Vehicles (UAV) and compact sensors a great opportunity exists to leverage these technologies as a critical part of the GOES-R field campaign activities. Working as part of a dynamic team under the GOES-R program, CICS-MD scientists, Dr. Xi Shao, Dr. Tung-Chang Liu and Jonathan Tsang have provided and continue to support the development of advanced post-launch validation capabilities for the GOES-R field campaign. This study seeks to demonstrate the feasibility of using modular sensors on Unmanned Aircraft Systems (UAS) for post-launch satellite validation and to facilitate its transition from research to operations. CICS-MD scientists have been contributing to the procurement and integration of the UAS sensor payloads and the development of data acquisition and command systems. The results of these activities are planned to be part of the initial test flights to be conducted at the UMD UAS test site in July 2016, which will be followed by environmental testing in the U.S. Southwest later this year. Mission Planner software has been used to plan the path for UAS testing and interfacing with its port. The system also supports route planning displayed on Google Maps. Furthermore, route simulations have also been conducted at typical locations including a desert, a water terrain, UMD UAS test site (see Figure).

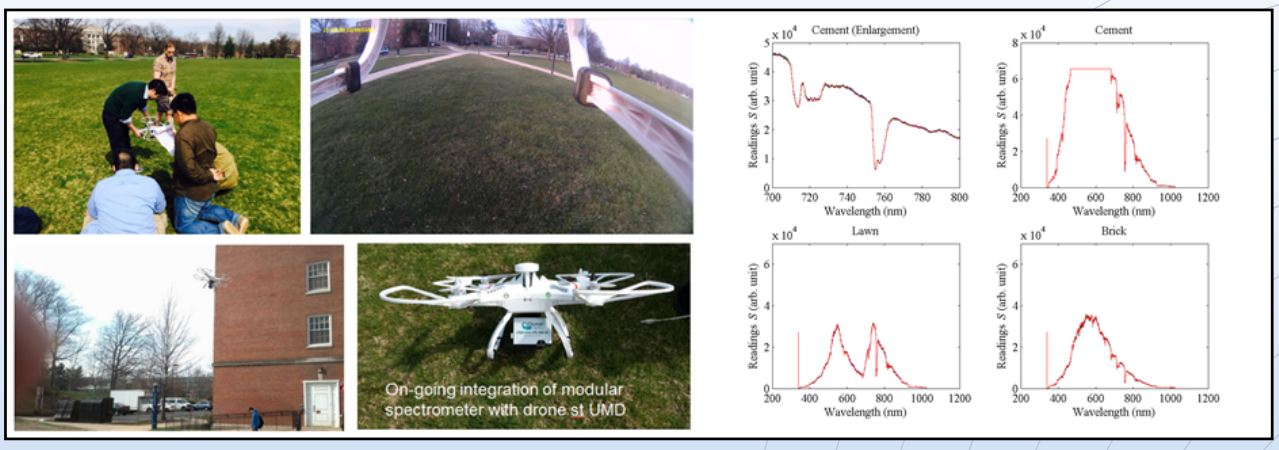


Figure 1: (Left) Testing flight with drone at UMD; (Right) measurement of spectra over different surface types with the integrated modular system consisting of the micro-computer Raspberry Pi and VNIR spectrometer.