



DIRECTOR'S MESSAGE

At CICS-MD we believe that research and education must go hand in hand to serve better our goal of supporting NOAA's Mission. As every summer, in 2015 we welcome a group of students that will spend the summer at ESSIC/CICS-

MD. They will learn to work in a research environment and acquire skills to meet the challenges of future graduate school or, in other cases, of professional jobs. While CICS-MD scientists engage in these outreach activities, they continue to perform their central function of doing research and application. The quality of the research done at CICS-MD is reflected in the recognitions and awards that several members received from professional associations and from NOAA. Ariana Sutton-Grier was named Ecological Society of America Early Career Fellow. Bin Zhang was recognized by the Director of NOS/CO-OPS for his work supporting the Chesapeake Bay Operational Forecast System. Zhanqing Li received the Humboldt Research Award in recognition of his academic record. The complete list is presented in our web site. Congratulations to all!

In this edition of the CICS-MD Circular, Dr. Dongdong Wang and colleagues report on their advances to estimate the global land surface albedo, while Dr. Jichen Liu discusses the development of a soil moisture product that will be ingested into NOAA's Soil Moisture Operational Products (SMOPS).

Hugo Berbery, CICS-MD Director

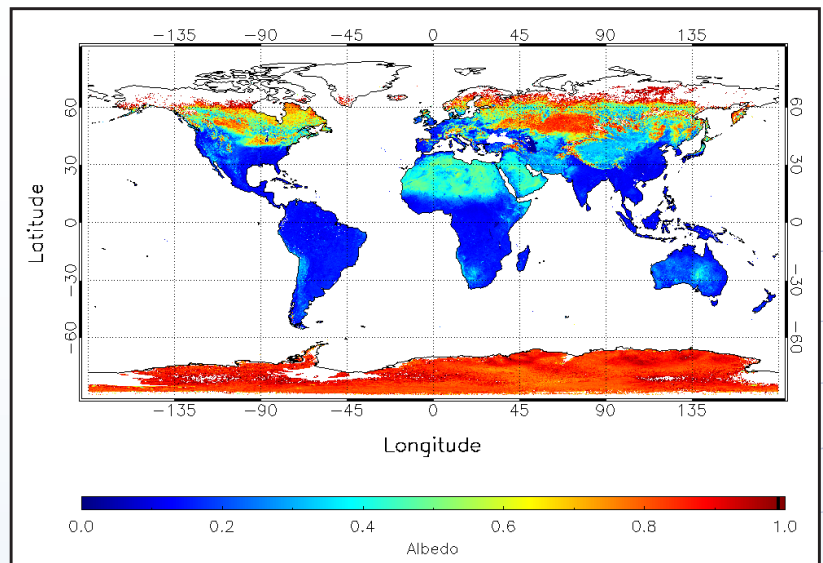


2015 summer interns

Improving Surface Albedo Estimation with VIIRS Data

(Contributed by Dongdong Wang, Shunlin Liang, and Yuan Zhou)

Land surface albedo (LSA) is an important variable that governs shortwave radiation balance at the land surface by determining the amount of incident shortwave flux reflected back to the atmosphere. LSA characterizes the inherent properties of land surfaces with significant spatial and temporal variations, but is also affected by atmospheric conditions. Observations from the Visible Infrared Imaging Radiometer Suite (VIIRS) onboard the Suomi National Polar-orbiting Partnership (Suomi NPP) and future Joint Polar Satellite System (JPSS) missions provide us with a valuable data source to regularly monitor global LSA from space. Funded by NOAA, we improved the direct estimation algorithm to retrieve LSA from VIIRS by considering surface anisotropy, impacts of aerosol type, and land cover type. The refined algorithm addresses the issue of angular dependency and improves the temporal stability of LSA retrievals. Validation demonstrates the improved VIIRS LSA data have comparable or superior quality to existing LSA satellite products. In a recent study, we assessed the method and reliability of estimating daily mean albedo from satellite data. The study tackled the temporal-scaling issue in satellite LSA products. The use of local noon albedo in computing surface radiation budget (SRB) will result in a positive bias. The issue is especially prominent for snow-free vegetated surfaces, where the difference between local noon albedo and daily mean albedo can be as large as 10%. We developed two methods to estimate daily mean albedo, which can reduce the bias of estimating SRB by 3 W/m².



A global map of VIIRS land surface albedo composite from Feb 1-16, 2015

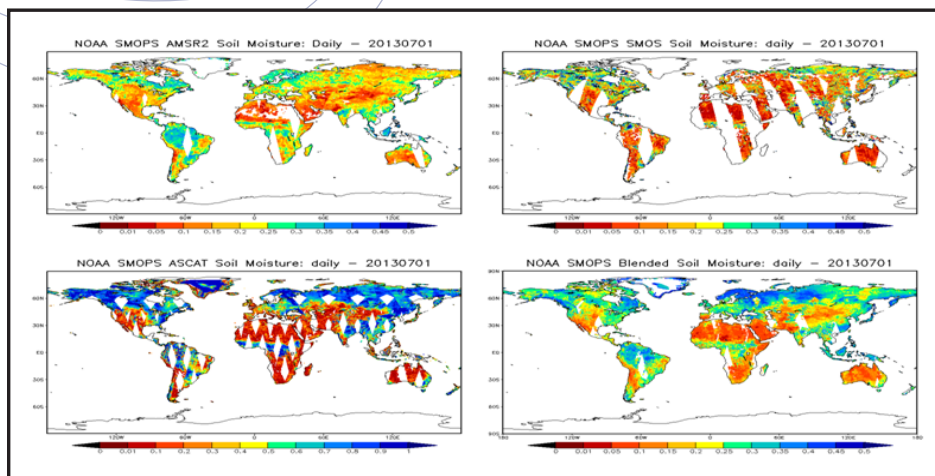
Soil Moisture Product Development Derived from GCOM-W1 AMSR2 and its Contribution to SMOPS

(contributed by Jicheng Liu)

The Global Change Observation Mission-Water (GCOM-W1) satellite, part of the Joint Polar Satellite Program (JPSS), has been in orbit since May 2012. Its Advanced Microwave Scanning Radiometer follow-on (AMSR2) instrument will provide a majority of global water cycle Environmental Data Records (EDR). One set of EDRs are the land-surface parameters (i.e., land surface soil moisture, and land surface type).

CICS-MD scientists are taking technical leadership of the Soil Moisture algorithm development and validation activities. The GCOM-W1 AMSR2 Algorithm System Package is designed to produce all AMSR2 EDR products at NOAA and is now operationally running for all lower level products. The soil moisture EDR algorithm is designed to be a higher level product and will be tested and made operational in this year.

The GCOM-W1 AMSR2 soil moisture product will play a significant role in the NOAA Soil Moisture Operational Product System (SMOPS), a blended product designed to produce “one-stop shopping” for all operational soil moisture products from different satellite sensors.



NOAA Soil Moisture Operational Product System (SMOPS)
with GCOM-W1 AMSR2 soil moisture added.

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.

Climate Science to Support Policy and Outreach. 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 Climatic Data Center/NESDIS
- National Oceanographic Data Center/NESDIS
- Air Resources Laboratory/Office of Oceanic and Atmospheric Research