CICS-MD Science Highlights

Hugo Berbery

cicsmd.umd.edu

CICS Science Meeting

Nov 6, 2017

Cooperative Institute for Climate and Satellites

CICS VISION

To perform collaborative research aimed at enhancing NOAA's ability to use satellite observations and earth system models to advance the national climate mission…

…including understanding, monitoring, predicting and communicating information on climate variability and change.

CICS STRUCTURE

Multiple components that work together with NOAA to conduct collaborative research related to the CICS Themes on satellite information and its use for weather and climate applications

- CICS-MD
- CICS-NC
- Consortium Members → CUNY/CREST among them
- SCSB

NOAA Federal Presence at CICS-MD

Satellite Climate Studies Branch (SCSB)
Ralph Ferraro, Chief

To exploit the capabilities of Earth-observing satellites to study the climate variations of the atmosphere, the land

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SCSB @ CICS

- Promotes closer scientific engagement
- Leverages expertise of both groups
- Facilitates multidisciplinary problem solving
- Helps promote outreach
- Shapes NOAA's next generation of scientists

Satellite Climate Studies Branch (SCSB)

NOAA Federal Employees

Ralph Ferraro

Satellite Hydrology

Chris Brown

Ecological Modeling

Huan Meng

Snowfall/JPSS

Scott Rudlosky

Lightning/GOES-R

Tom Smith

Climate/Time Series

Ama Ba

NOAA/NWS

NRAP (1-year – completed 9/1/17)
CICS Proving Ground

CICS-MD Research Topics

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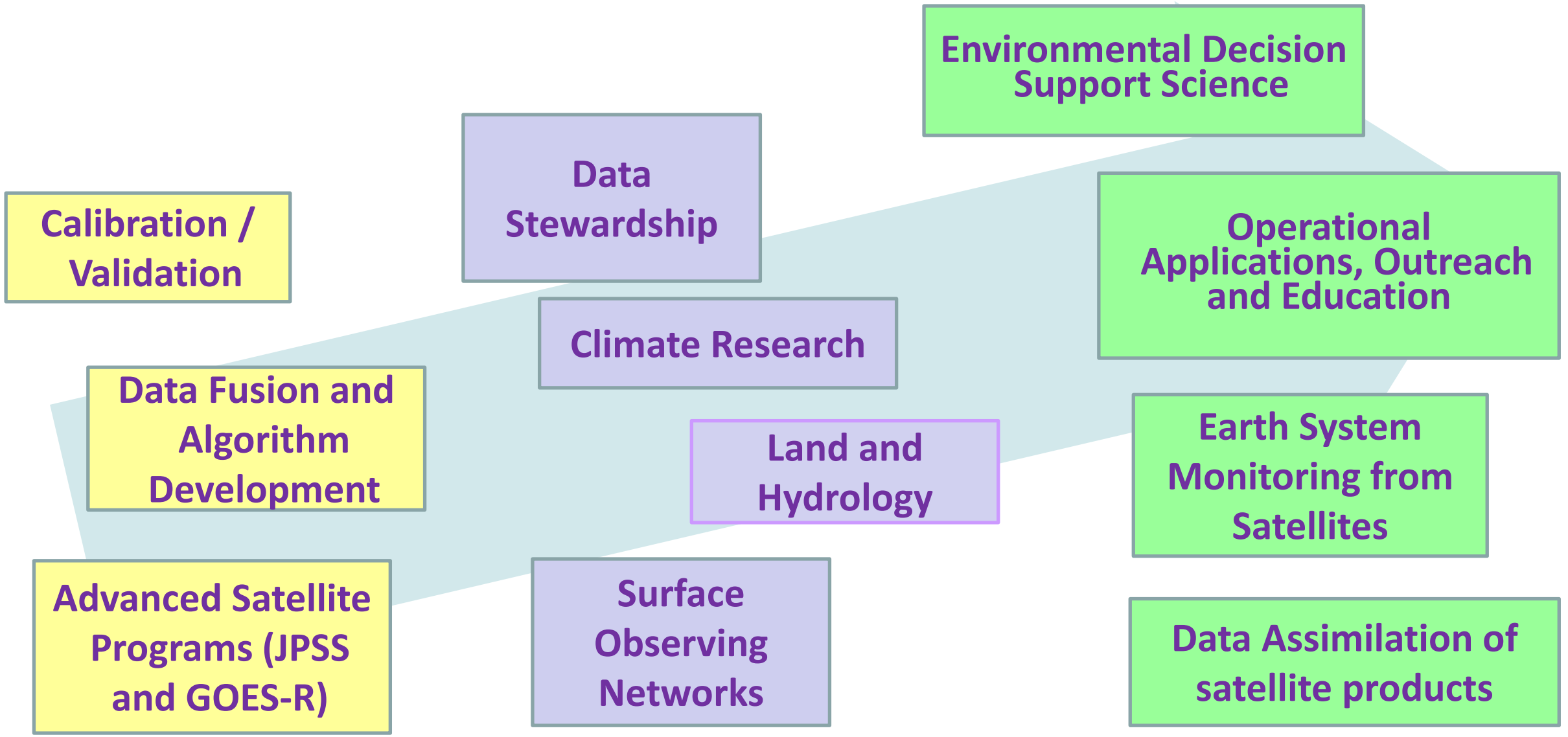
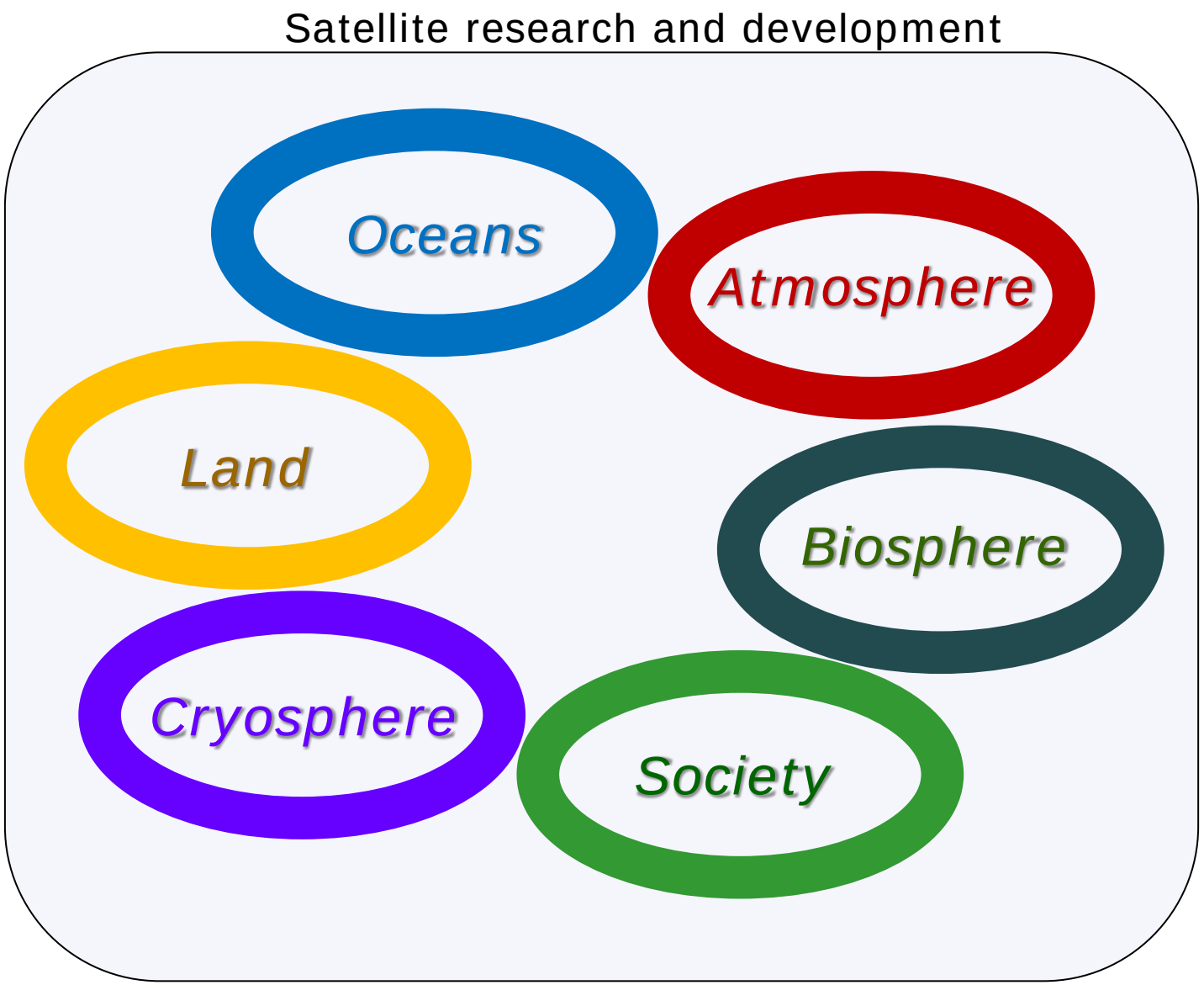


CICS-MD contributions to Earth System Science



Land (Mon pm)

Soil moisture, evapotranspiration, snowfall rate …

Oceans (Mon pm; Tue am)

Climate shifts, ocean heat content, salinity

Atmosphere (Tue pm; Wed am)

Climate variability and prediction; Data fusion; Cal/Val; Data assimilation of satellite products

Biosphere (Tue lunch; posters)

Vegetation health, fires

Cryosphere (Tue am)

Snow depth in the Arctic Sea

Society (Tue am)

Ecosystems; Ecological modeling; Environmental decision support systems, heat indices, storm damages

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Advanced Satellite Programs

GOES-R (GOES-16): Geostationary Operational Environmental Satellite-R series

JPSS: Joint Polar Satellite System

A First Look at the New Generation of Lightning Mapping with GOES-16

Michael Peterson

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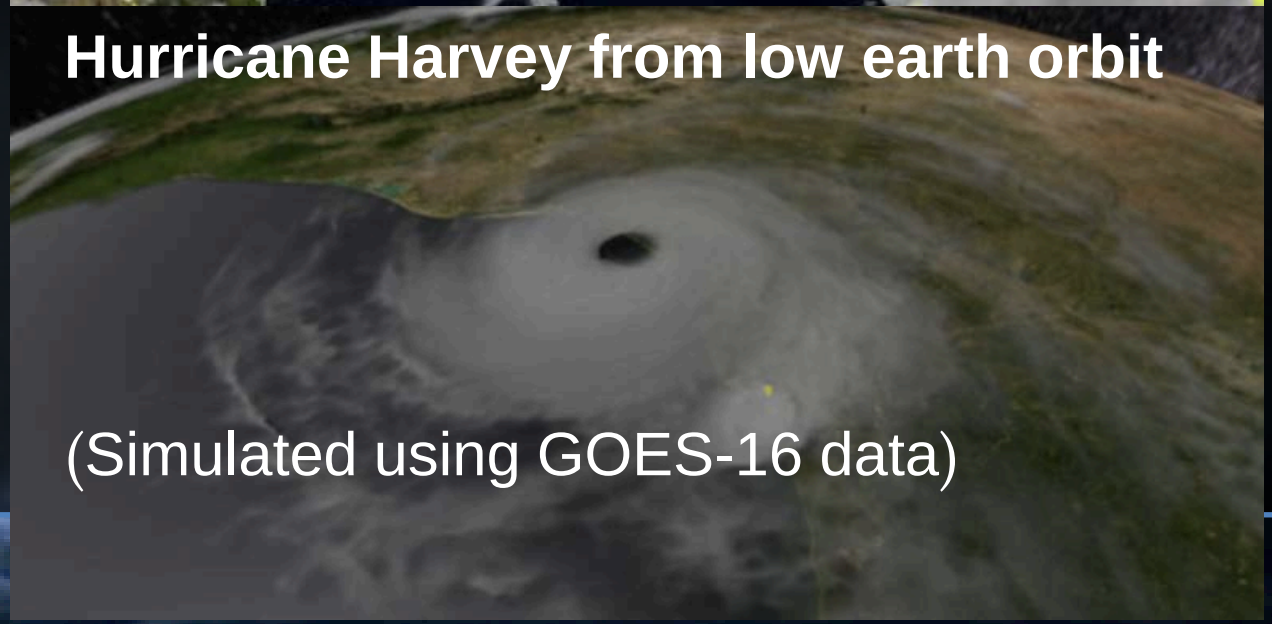
- GOES-16 is the first geostationary satellite with a lightning sensor
- GOES-16 Geostationary Lightning Imager (GLM) measurements add insights into convection and associated hazards
- Hemispheric lightning data every 20 seconds compared to 15 minute ABI full disk image



A First Look at the New Generation of Lightning Mapping with GOES-16

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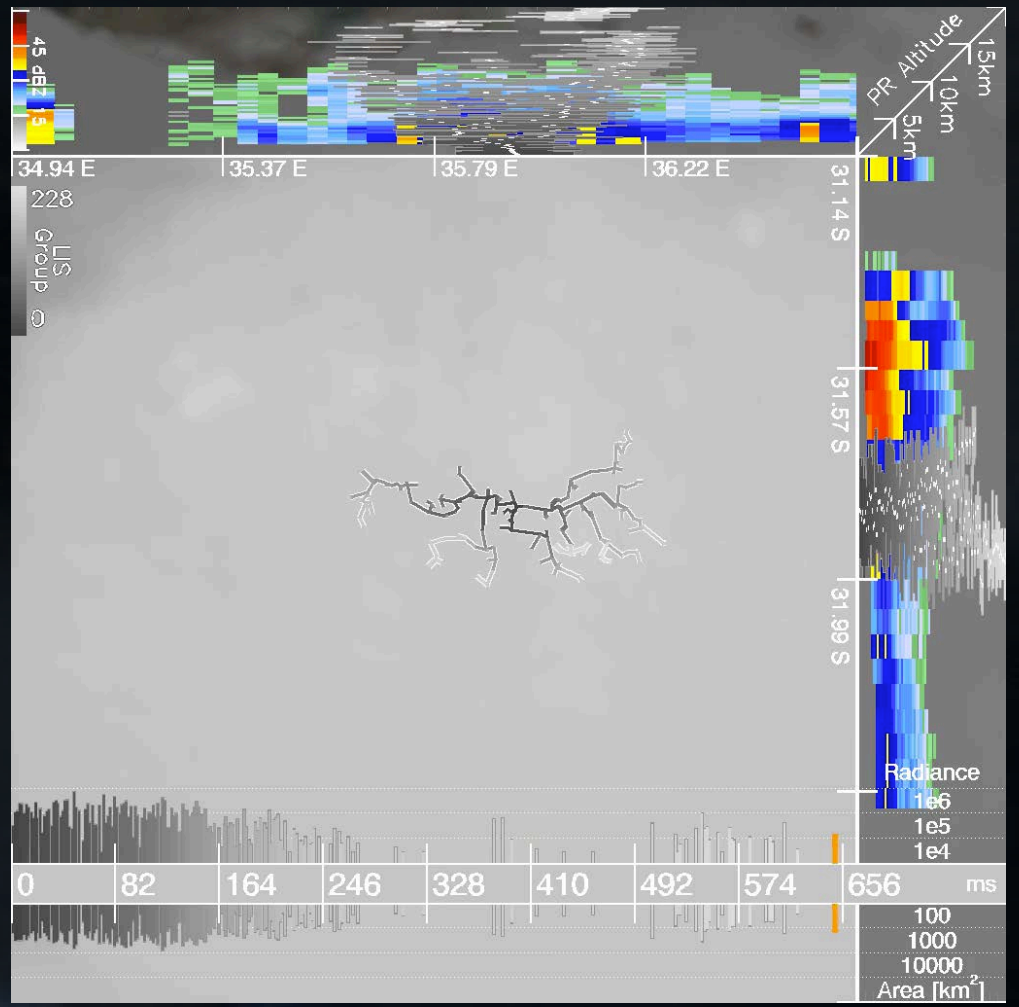
- GLM measures more than just flash rates
  - GLM records lightning videos at 500 frames/second
  - Optical signals can be used to document flash evolution and structure
- We present a first look at GLM data and its full range of applications



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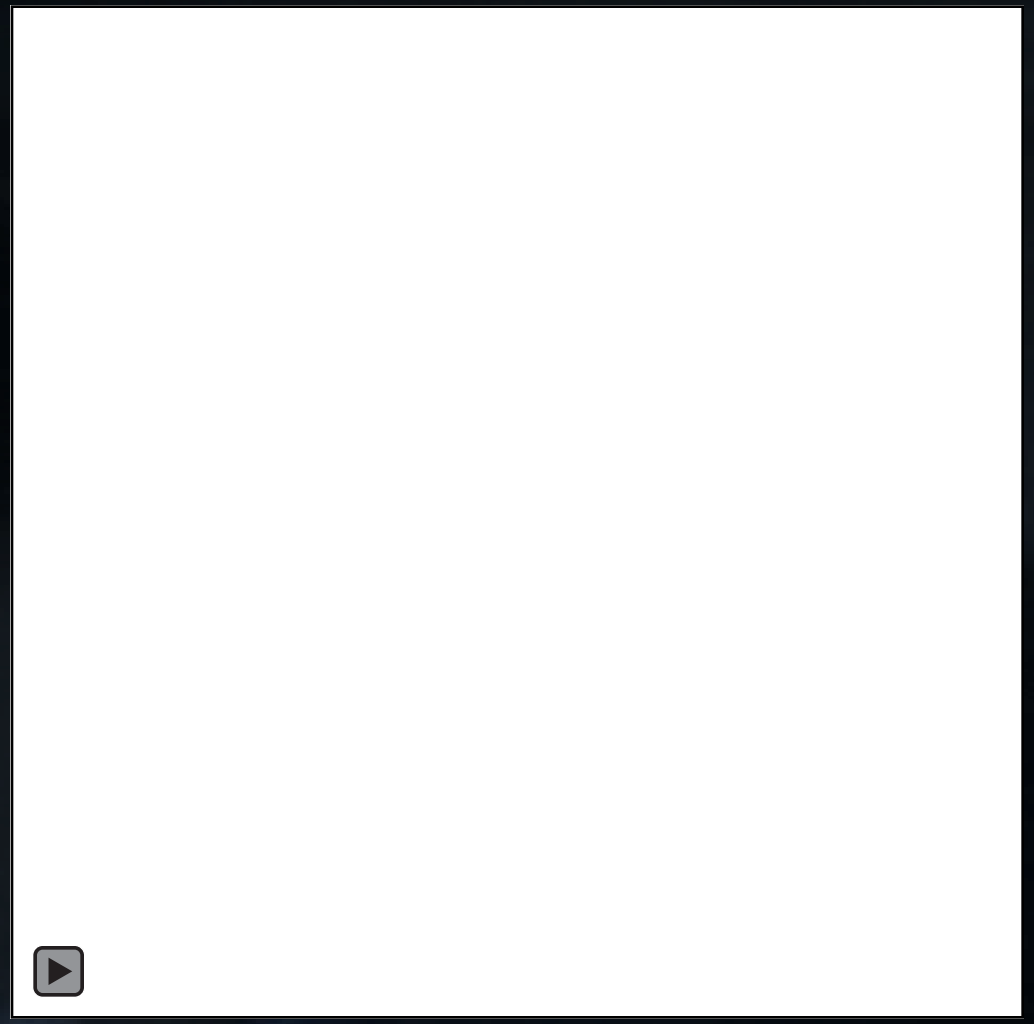


GEO/LEO Data Fusion – Hurricane Irma
Pat Meyers

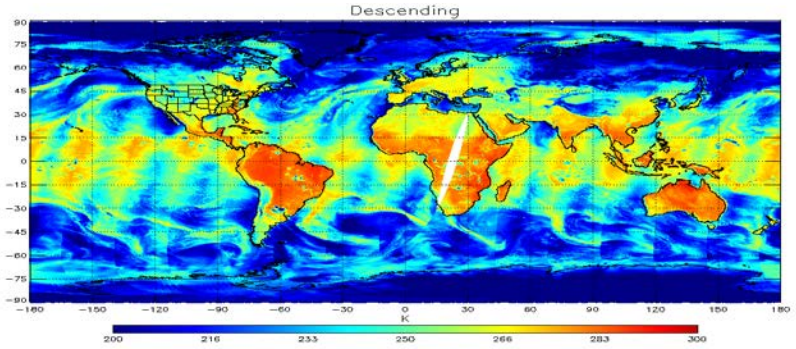
- Leveraging observations from geostationary and low earth orbit

- Clouds – GOES-16/ABI
- Lightning – GOES/GLM
- Rain – GPM/AMSR2

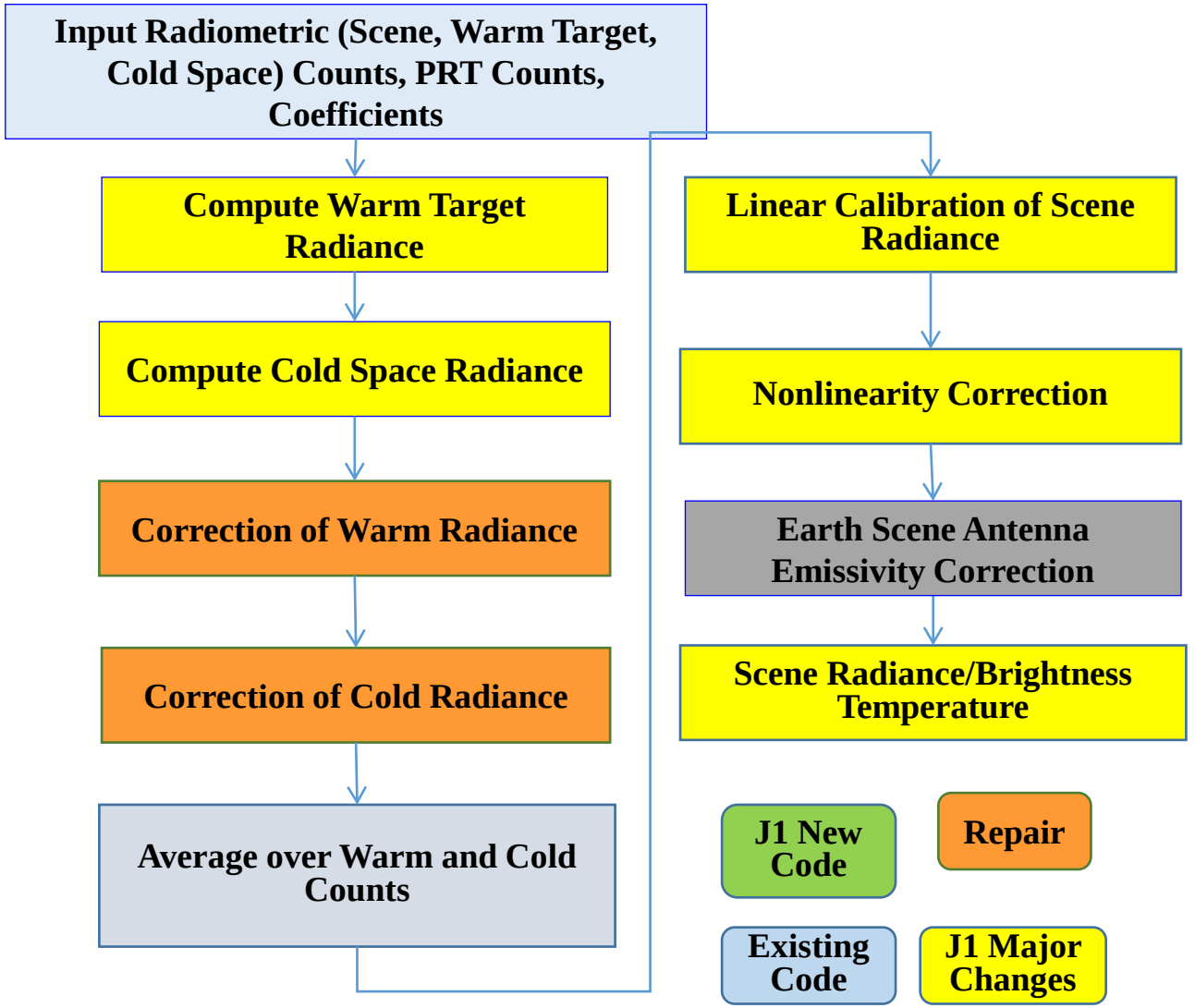
Advanced Science Support for NPP/JPSS Satellite Program

Hu (Tiger) Yang

- Provide technical support for pre and post-launch NPP/JPSS ATMS cal/val
- Perform advance study for microwave radiance calibration
- Develop high accuracy geometric calibration/validation algorithm
- Build up high performance preprocessing system software
- Transfer mature research algorithm to operational application
- Reprocess SNPP ATMS TDR datasets with advanced calibration algorithm



Reprocessed ATMS TDR Datasets in CICS



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Climate Research

Subseasonal to Seasonal (S2S) Predictability

S2S Predictability of Winter Storm Tracks and Related Weather in the NCEP CFS

Katherine Lukens and Hugo Berbery

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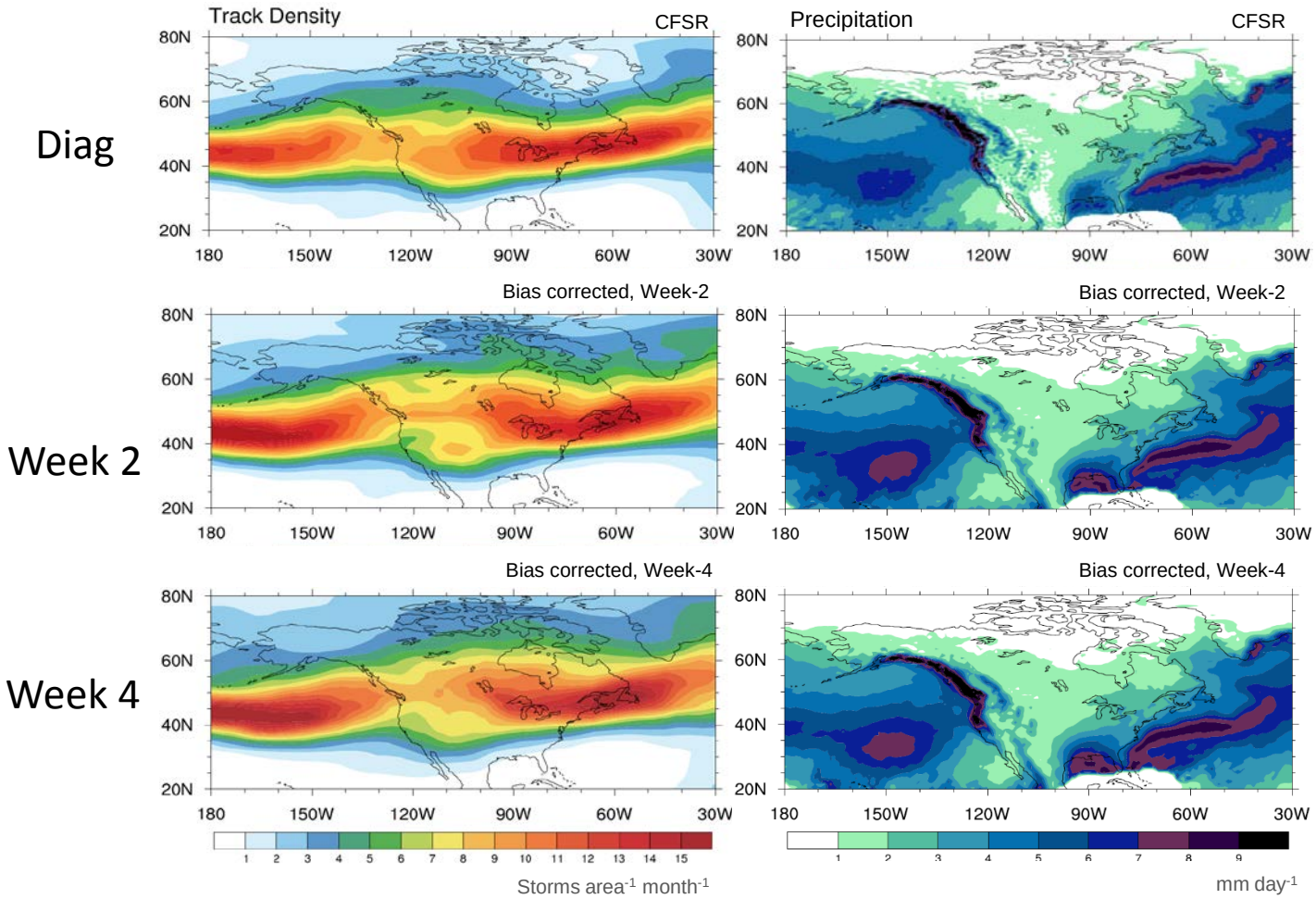
Objectives

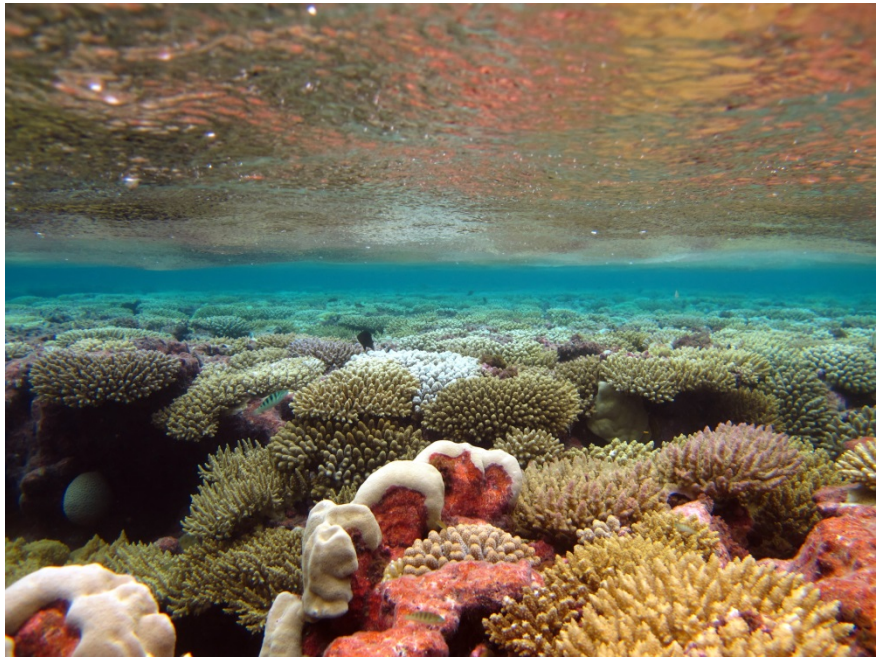
- To assess **the subseasonal-to-seasonal (S2S) winter weather predictability** in North America.
  - How well do the weeks 2-4 CFS Reforecasts represent observed storm track behavior and related weather in North America?

Key Points

- Bias corrections improve weeks 2-4 reforecasts of:
  - **Track density and mean intensity** statistics in the mid-latitude storm track regions over North America.
  - **Storm-related precipitation** in the mid-latitudes, particularly over the oceans.



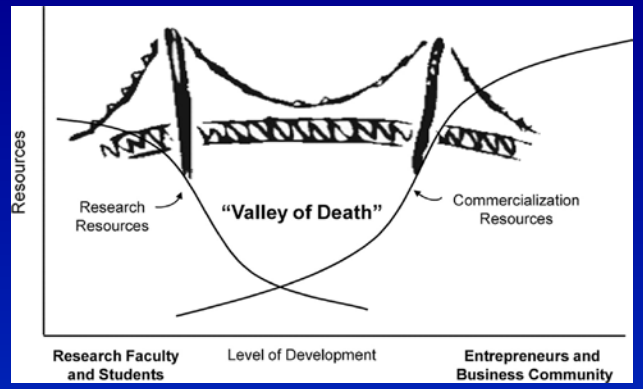
Support for NCEI and the NOAA Coral Program
Brian Beck



Accomplishments

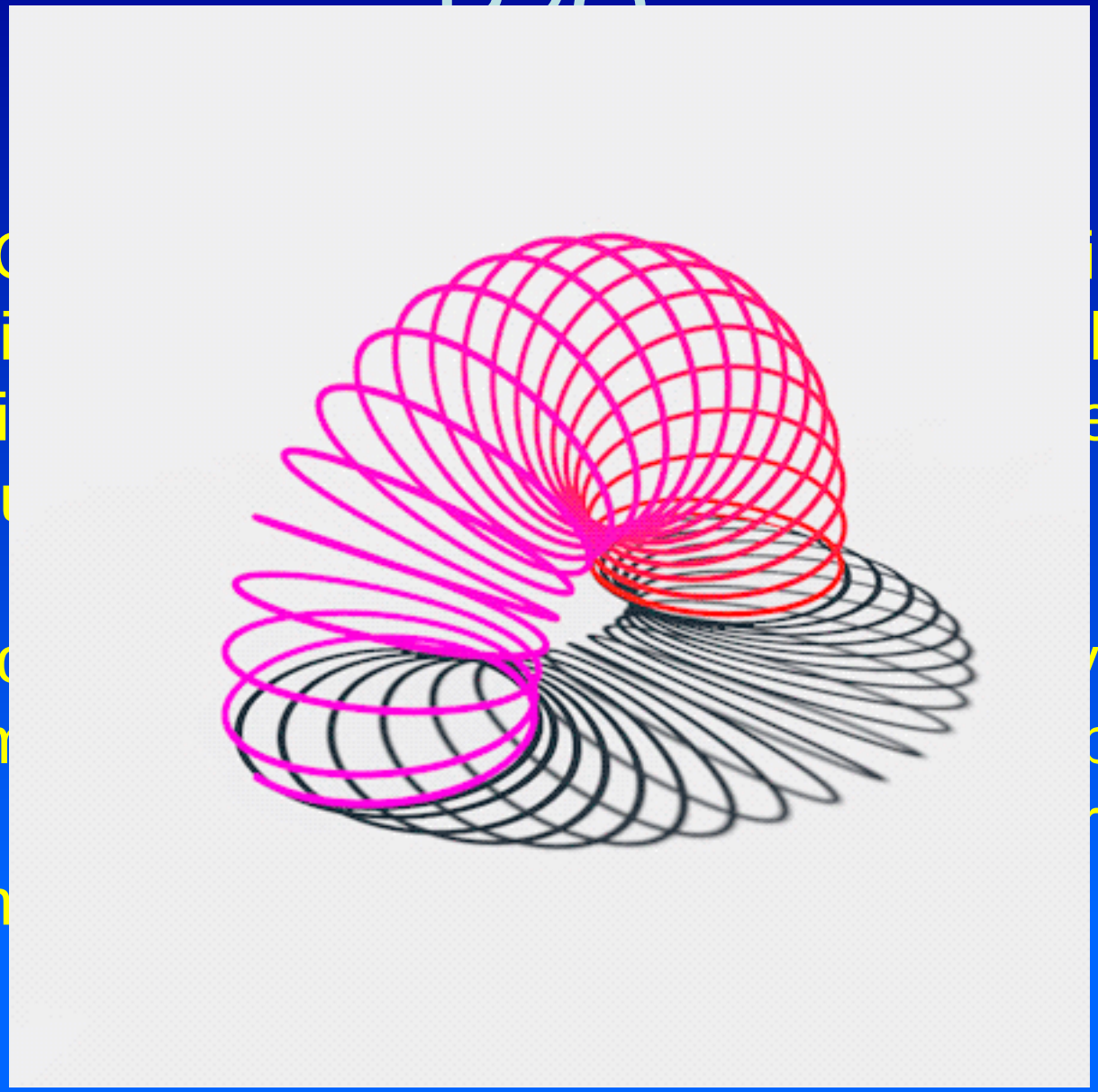
- Facilitated the largest release of NOAA coral reef monitoring data to date
- Release of NOAA's Coral Project Database version 2.0
- Presented federal data management requirements at the International Coral Reef Symposium
- Secured funding to develop a next level of web services for NOAA coral reef monitoring data

- Represent NESDIS on the Strategic Evaluation and Assessment Team of the NOAA Coral Program, the NOAA Caribbean strategy and executive secretariat for the NOAA Ocean and Coastal Council
- Represent NOAA Coral Program on the *Acropora* Recovery Team
- Help coordinate between coral reef stakeholders in American Samoa and the US Virgin Islands and the NOAA Coral Program



Courtesy of Steve Ackerman, CIMSS

R2O



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R2O - GOES Evapotranspiration (ET) and Drought Product System (GET-D)

Mitchell Schull, Christopher Hain, Li Fang, Xiwu Zhan

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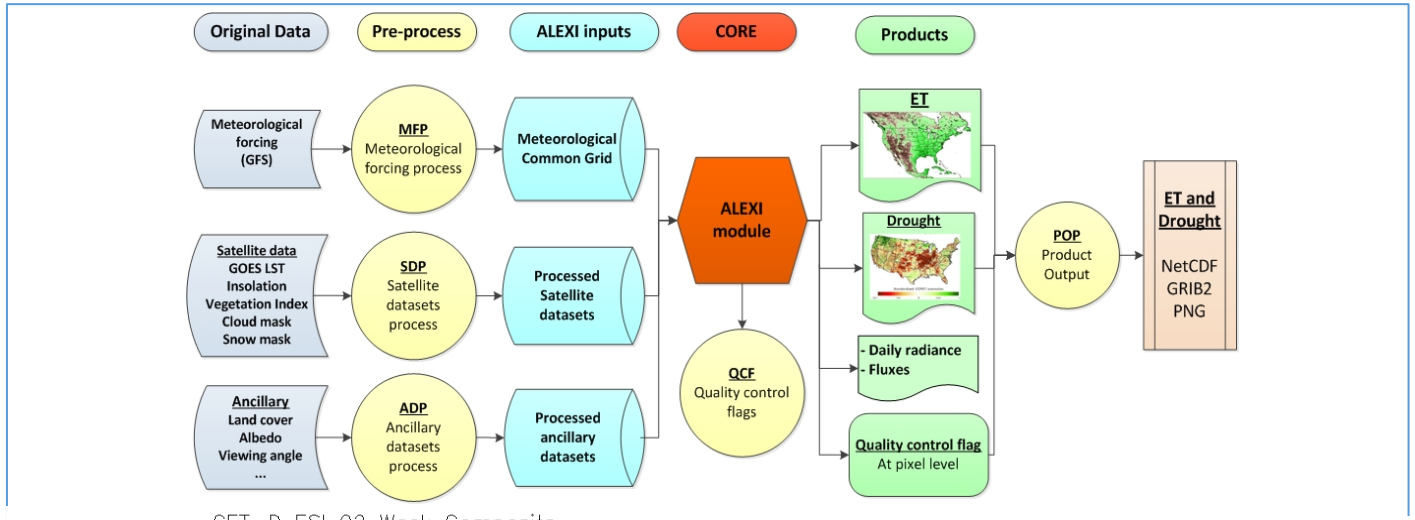
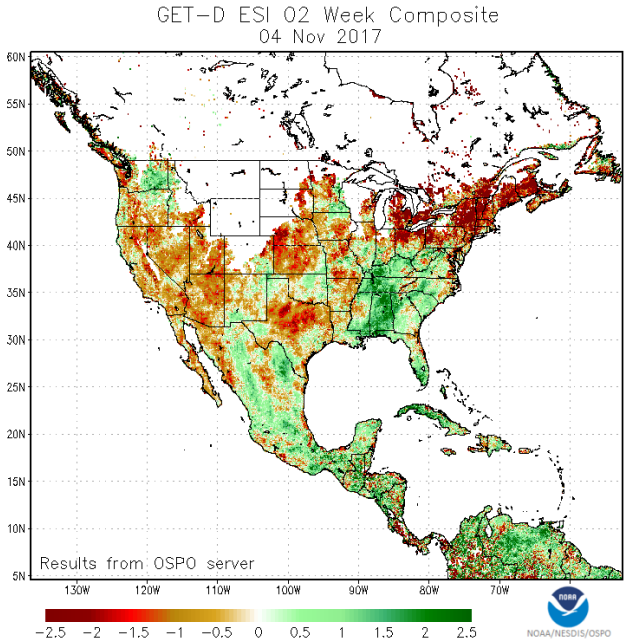
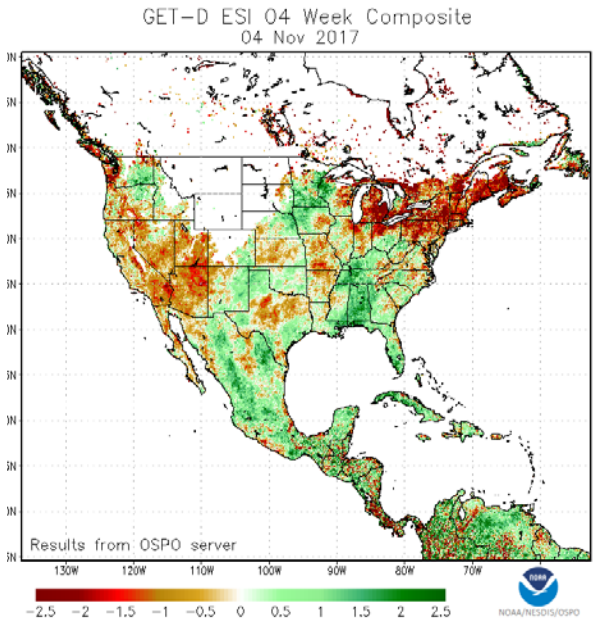
Objectives: This project aims to build the GOES ET and drought product system (GET-D) to operationally generate ET and drought monitoring products at the NOAA Office of Satellite and Product Operations (OSPO)



- Developed GOES ET and drought product system *(Figure 1: GET-D system design)*
- Accomplished the system test, system readiness review, operational readiness review and SPSRB briefing *(Figure 2 ESI: composites on Nov 4th, 2017)*





R2O - NESDIS Operational Soil Moisture Products

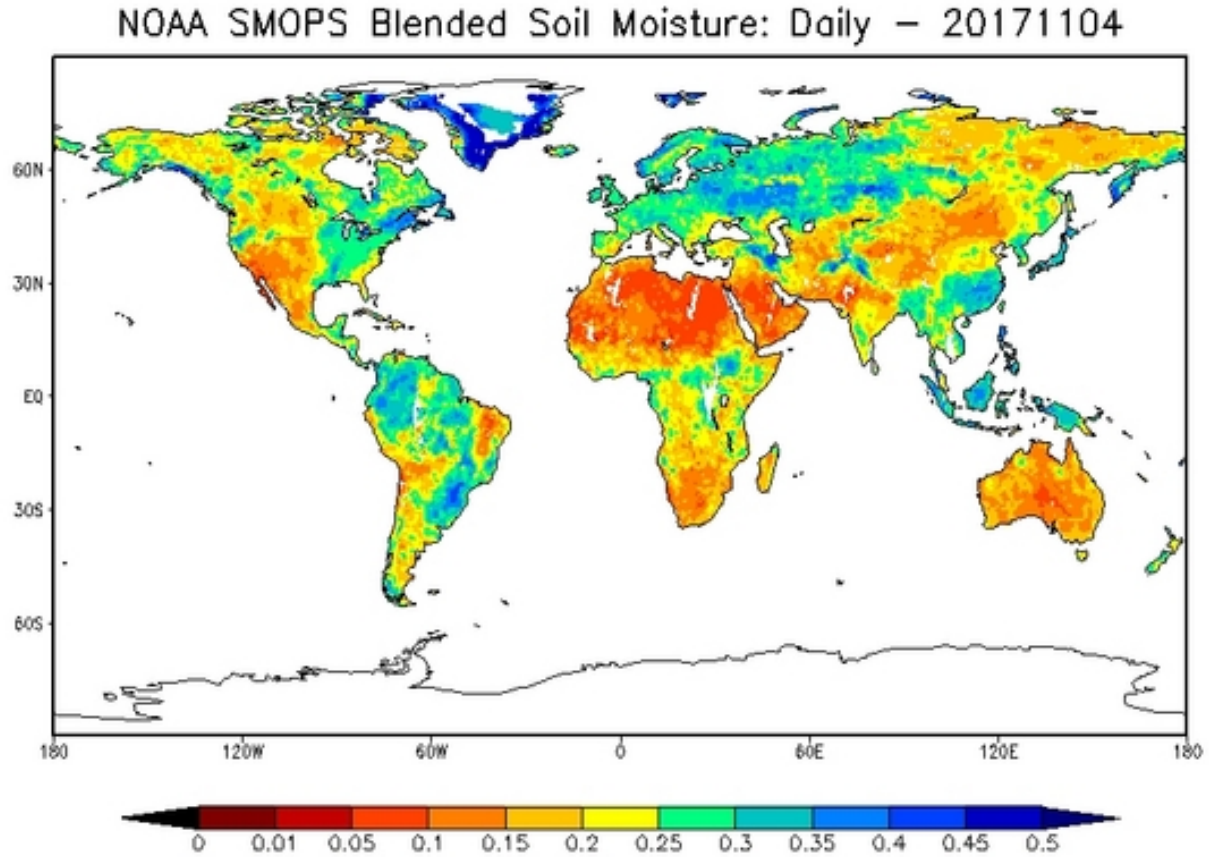
Jicheng Liu and Xiwu Zhan

Goals

The Soil Moisture Operational Products System (SMOPS) combines soil moisture retrievals from multi-satellites/sensors to provide a global soil moisture map with more spatial and temporal coverage.

The global soil moisture maps are generated in 6-hourly and daily intervals with the latest 6 and 24 hours worth of soil moisture retrievals from multi-satellites/algorithms, and mapped with a cylindrical projection on 0.25 x 0.25 degree grids.

Already implemented at the NOAA Office of Satellite and Product Operations (OSPO)



CICS Proving Ground and Training Center

The PGTC is fully functioning with a Satellite Broadcast Network (SBN) data feed and the Advanced Weather Interactive Processing System (AWIPS) software.

This combination is nearly identical to the setup at operational NWS forecast offices, allowing students to learn NWS tools while they are still in school.

CICS in house capability provides STAR the ability to engage NWS centers – WPC, OPC, NWC*

Value added tools are required to optimize multi-sensor data and minimize bandwidth impacts

Future plans for the CICS PGTC include obtaining and implementing software for creating forecaster training modules

**OPC: Ocean Prediction Center; WPC: Weather Prediction Center; NWC: National Water Center*

Thanks

http://cicsmd.umd.edu

http://lightning.umd.edu