CISESS

Cooperative Institute for Satellite Earth System Studies

Fernando Miralles-Wilhelm
Executive Director

Image Courtesy NOAA

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

UNIVERSITY OF MARYLAND

NC STATE UNIVERSITY

CISESS Science Meeting 2019

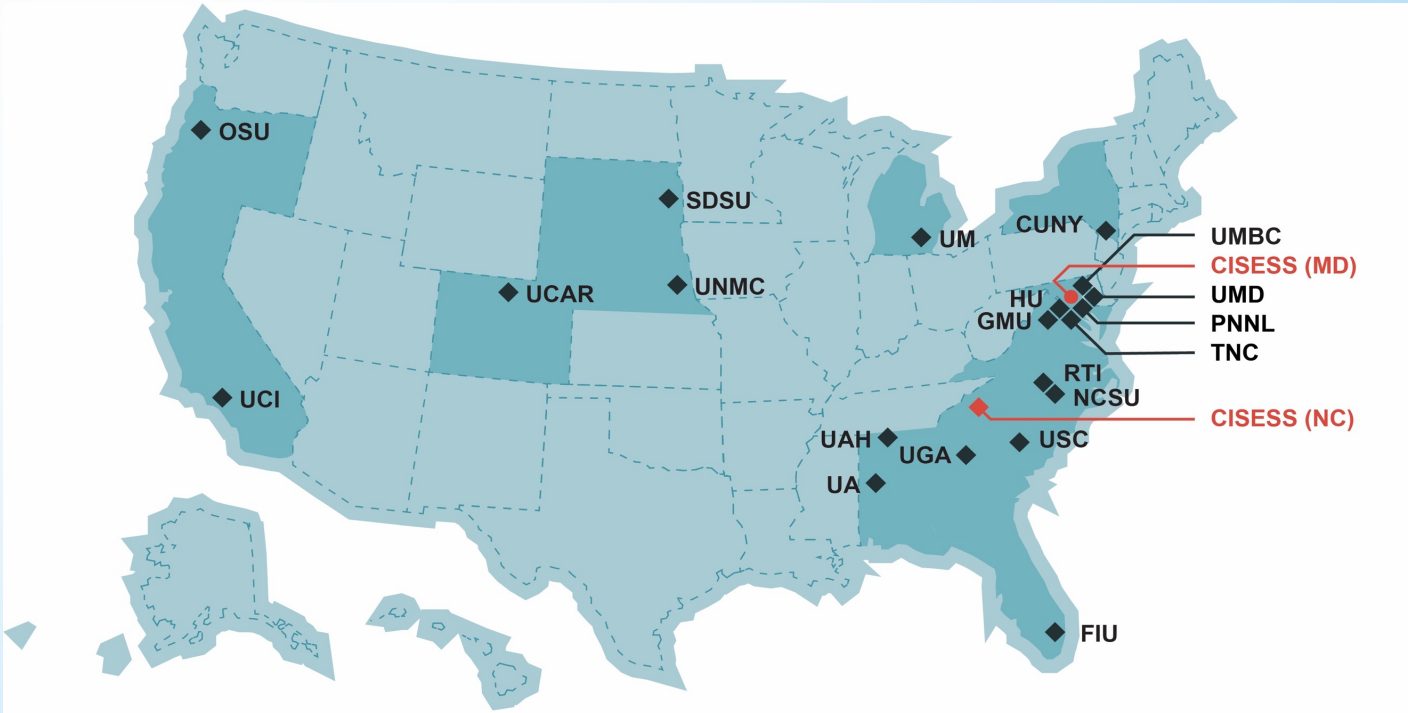
The CISESS Consortium

"To advance NOAA's ability to generate data and information from the constellation of global observing platforms …

… in order to understand and predict the different components of the Earth System …

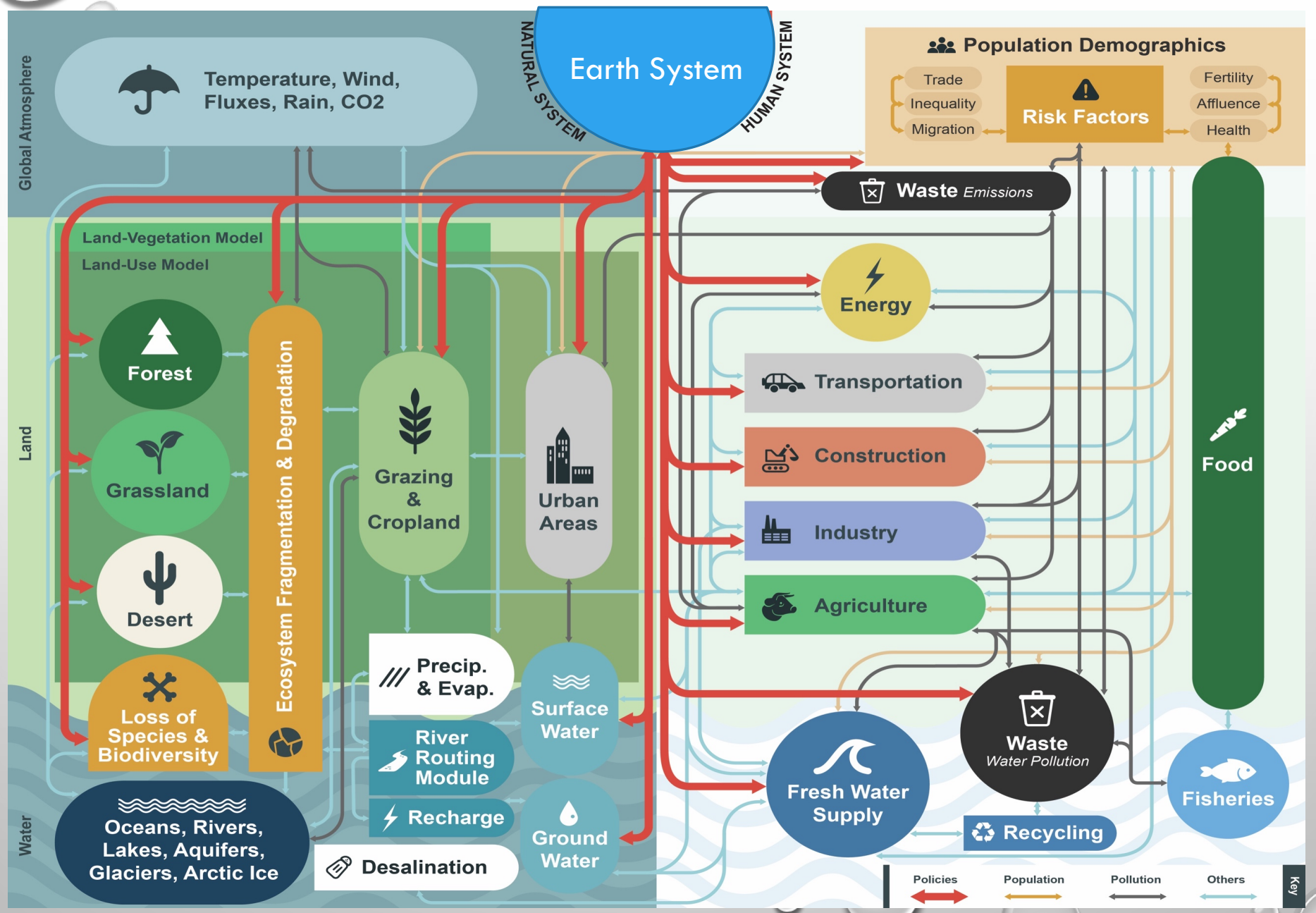
…through collaborative and transformative research…

… and to transition this research into operational applications that produce societal benefits."

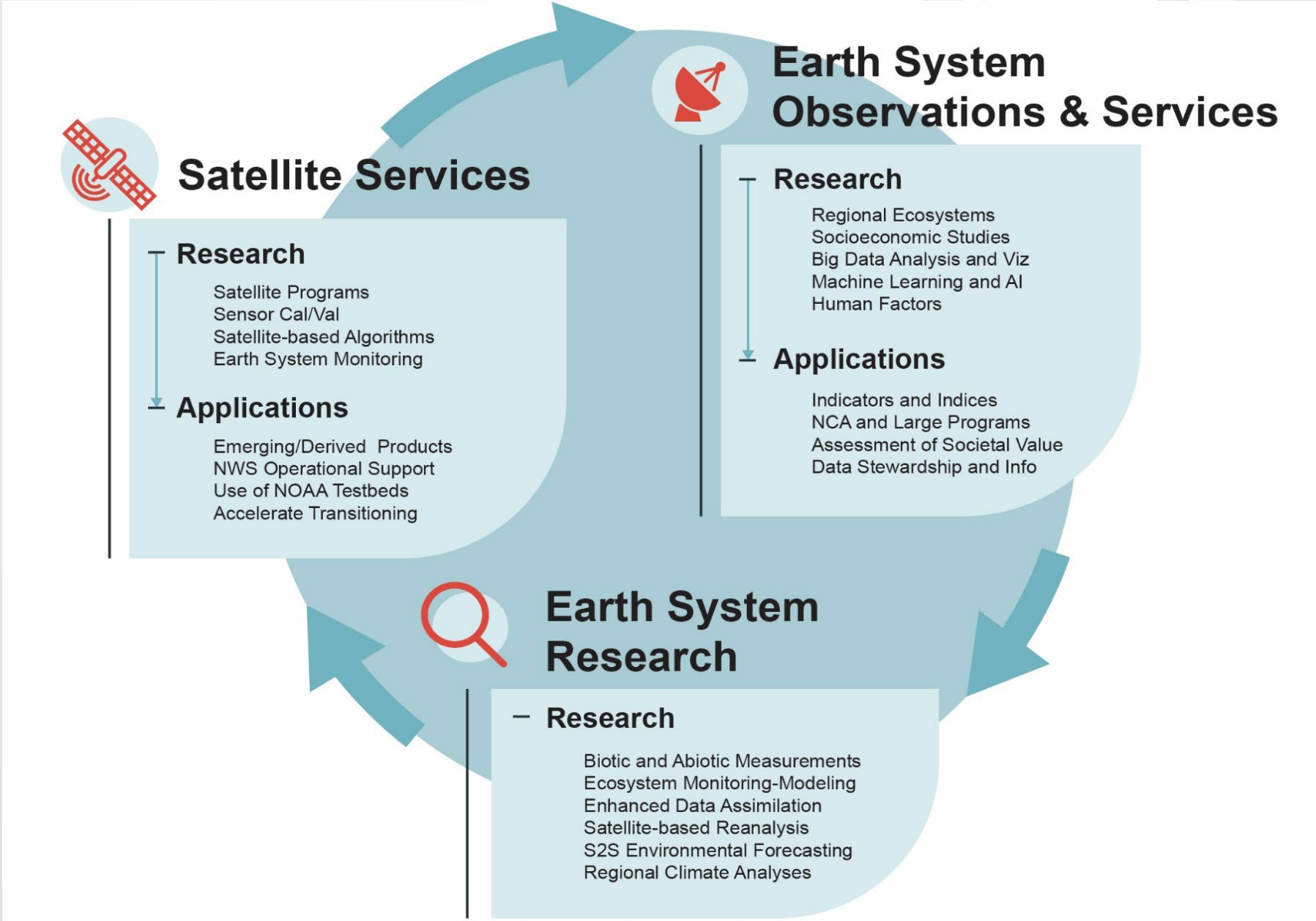


INSTITUTIONAL & GEOGRAPHIC DIVERSITY

CISESS-MD *(College Park MD)*
CISESS-NC *(Asheville NC)*
CUNY City University of New York *(New York NY)*
FIU Florida International University *(Miami FL)*
GMU George Mason University *(Fairfax VA)*
HU Howard University *(Washington DC)*
NCSU North Carolina State University *(Raleigh NC)*
OSU Oregon State University *(Corvallis OR)*
PNNL Pacific Northwest National Laboratory *(College Park MD)*
UA University of Alabama *(Tuscaloosa AL)*
UAH University of Alabama Huntsville *(Huntsville AL)*
UCAR University Corporation for Atmospheric Research *(Boulder CO)*
UCI University of California Irvine *(Irvine CA)*
UGA University of Georgia *(Athens GA)*
UM University of Michigan *(Ann Arbor MI)*
UMBC University of Maryland Baltimore County *(Baltimore MD)*
UMD University of Maryland College Park *(College Park MD)*
UNMC University of Nebraska Medical Center *(Omaha NE)*
USC University of South Carolina *(Columbia SC)*
RTI Research Triangle Institute *(Research Triangle Park NC)*
SDSU South Dakota State University *(Brookings SD)*
TNC The Nature Conservancy *(Arlington VA)*


Earth System
NATURAL SYSTEM
HUMAN SYSTEM
Global Atmosphere
Temperature, Wind, Fluxes, Rain, CO2
Land
Land-Vegetation Model
Land-Use Model
Forest
Grassland
Desert
Loss of Species & Biodiversity
Ecosystem Fragmentation & Degradation
Grazing & Cropland
Urban Areas
Water
Oceans, Rivers, Lakes, Aquifers, Glaciers, Arctic Ice
Precip. & Evap.
River Routing Module
Recharge
Desalination
Surface Water
Ground Water
Population Demographics
Trade
Inequality
Migration
Risk Factors
Fertility
Affluence
Health
Waste Emissions
Energy
Transportation
Construction
Industry
Agriculture
Food
Fresh Water Supply
Waste Water Pollution
Recycling
Fisheries
Policies
Population
Pollution
Others
Key

Research Themes and Representative Activities

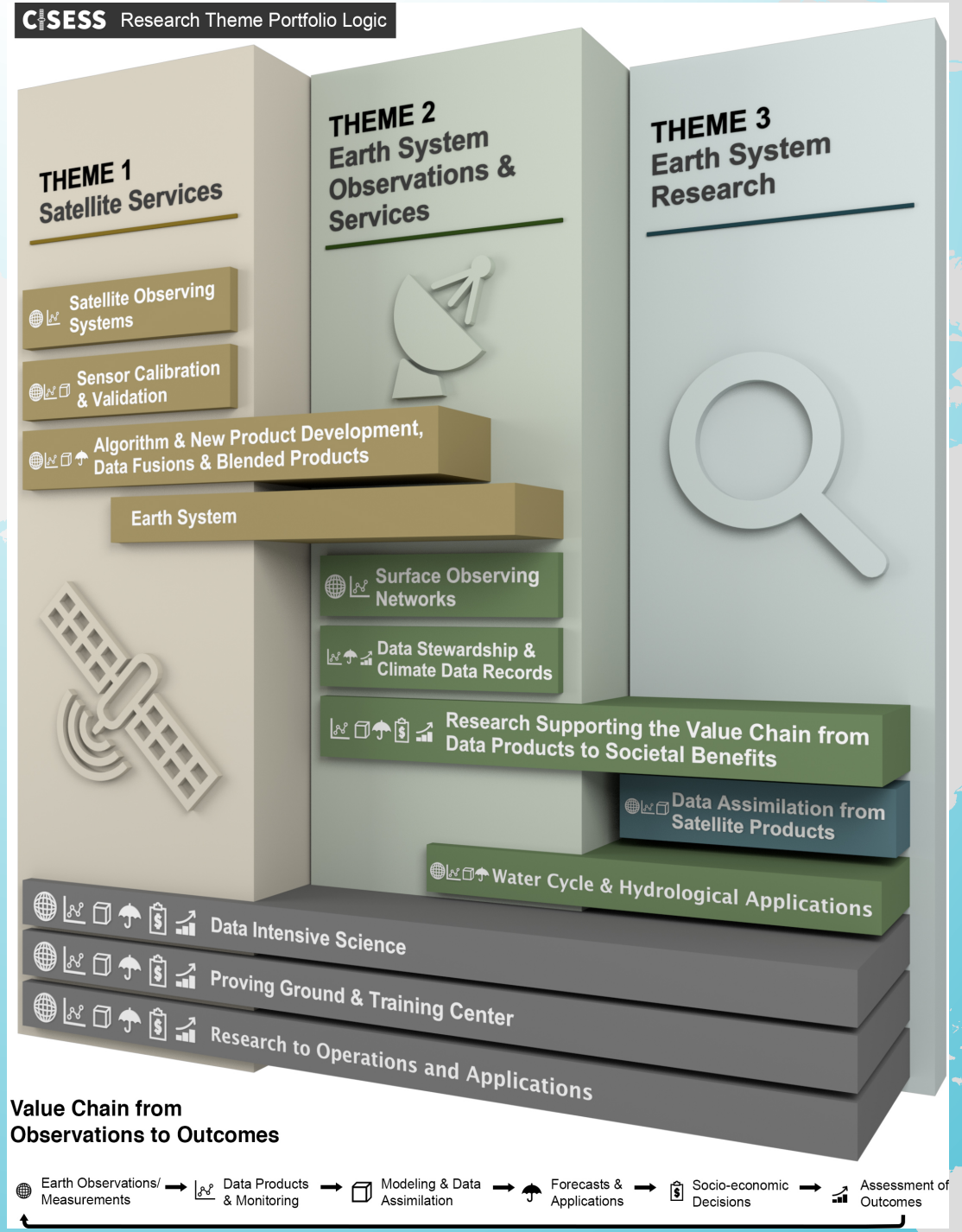


CISESS
FROM OBSERVATIONS TO OUTCOMES

Theme 1
Satellite Services

Theme 2
Earth System
Observations and
Services

Theme 3
Earth System
Research



North Carolina Institute for Climate Studies

Inspire. Advance. Engage.

NC STATE UNIVERSITY

flickr.com/Ken Lane

OVERVIEW

- The North Carolina Institute for Climate Studies (NCICS)
  - North Carolina State University research institute
  - Also an inter-institutional research institute of the University of North Carolina system
- Primary activity: operating NOAA/CISESS
  - Co-located with NOAA's National Centers for Environmental Information (NCEI) in Asheville, NC
- Approximately 35 staff

NCICS/CISESS TASK STREAMS

Main collaborative activities now organized into 7 streams:

- Administration (Institute internal)
- Access and Services Development
- Assessments
- Information Technology Services
- Science and Services
- Workforce Development
- Other Consortium Projects (external funding)

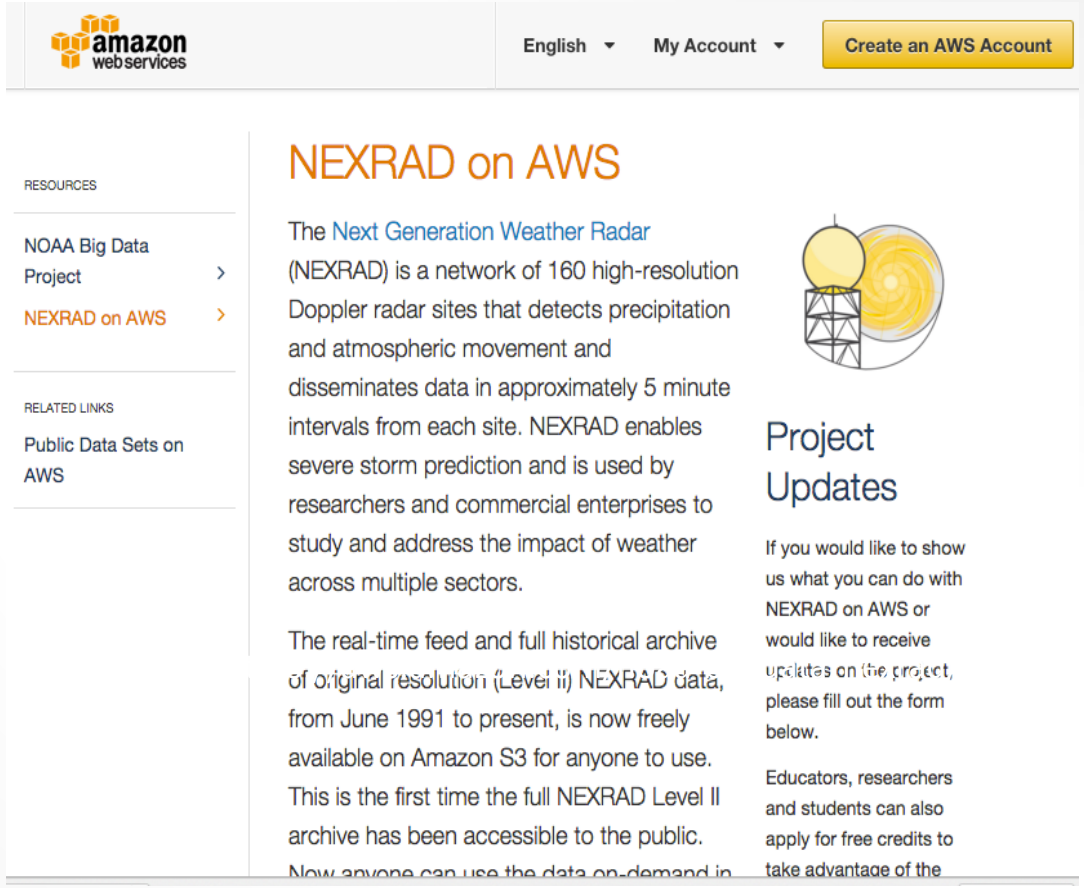
Highlighted are new or revised streams from CICS to CISESS

ACCESS AND SERVICES DEVELOPMENT

Supporting improved access mechanisms for NCEI's data and product holdings

NOAA Big Data Project (BDP)

- CISESS acts as data broker between NOAA and cloud providers (e.g., AWS)
- Transferring ~8TB per day to the cloud (GOES-16/17, NEXRAD, forecast models, etc.)



INFORMATION TECHNOLOGY SERVICES

New task stream focusing on advancing NCEI's IT infrastructure and software engineering capabilities

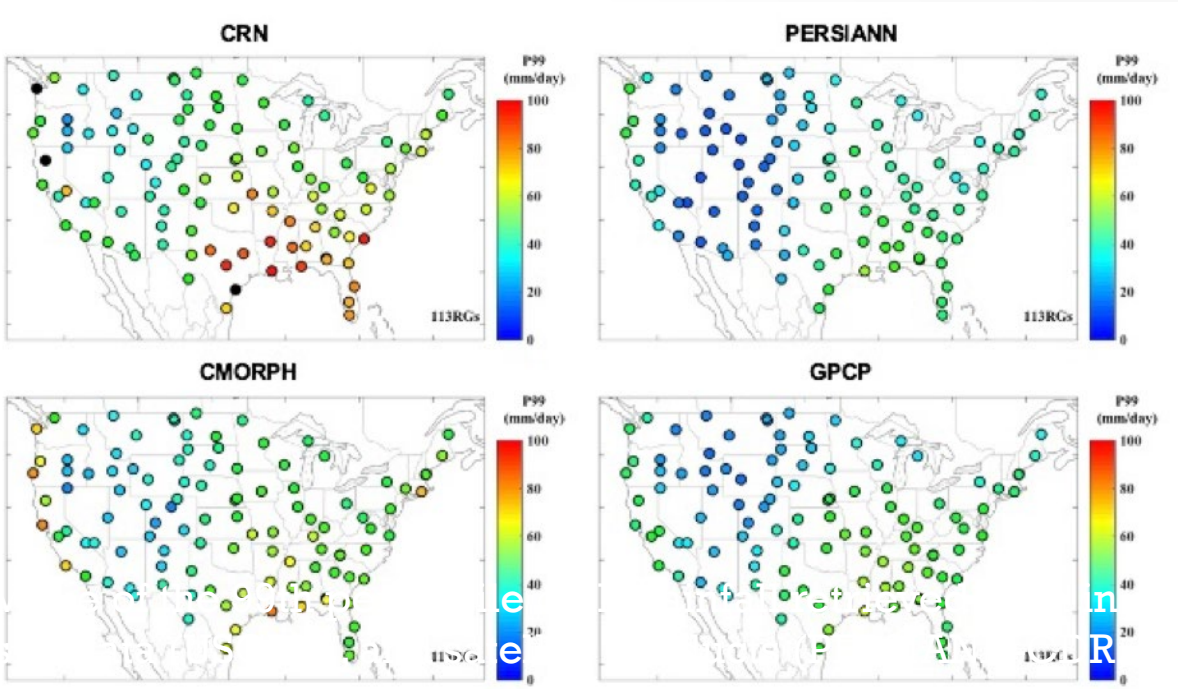
- Enhancing in-house infrastructure
- Expanding use of cloud computing,
  machine learning, and other big data
  techniques
- Adopting IT and software engineering
  best practices for science and stewardship

SCIENCE AND SERVICES

New task stream consolidating research-to-operations activities in climate science, observing systems, and data products.

Climate Data Records

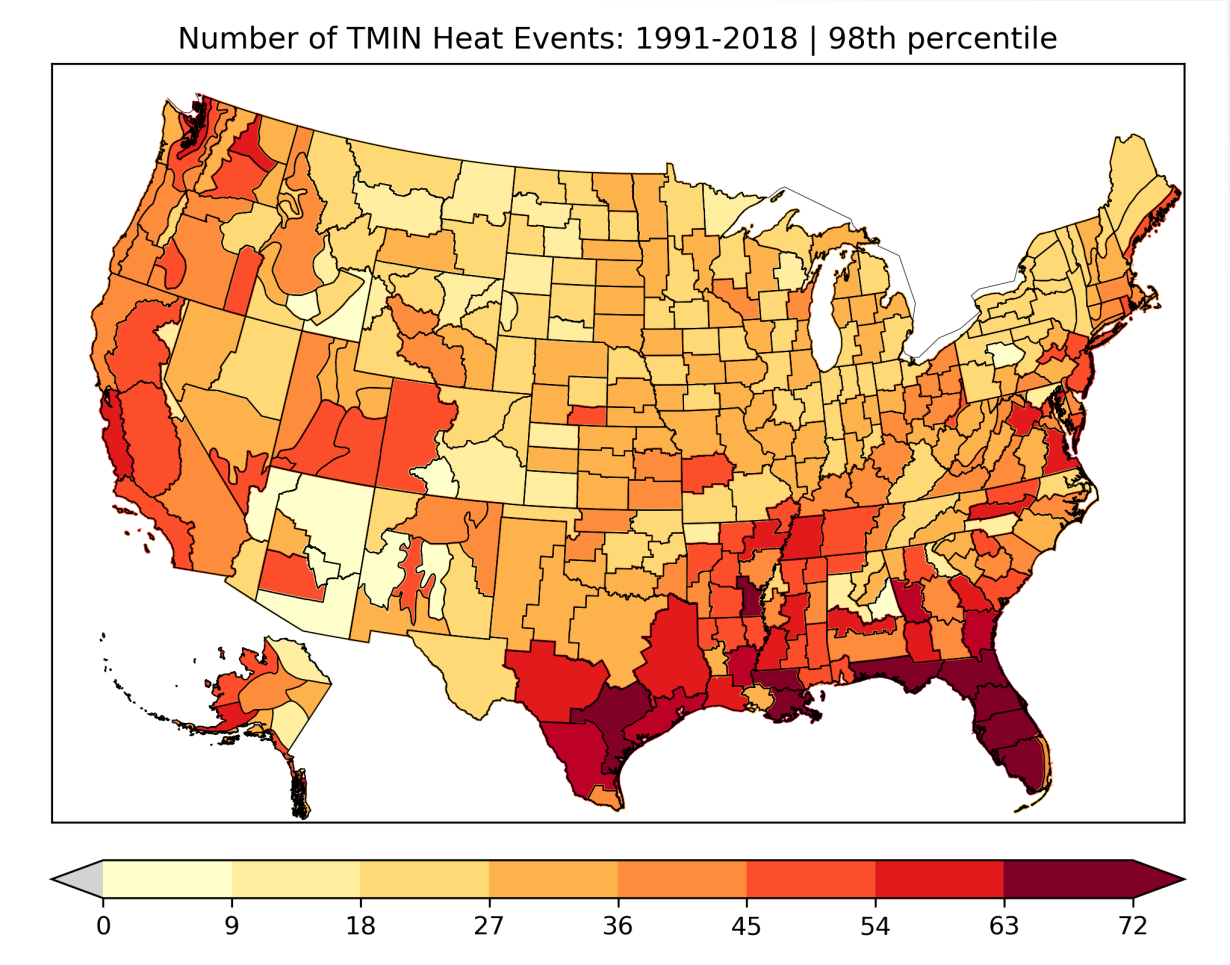
- Homogenous, climate-quality records
  from multiple satellite sources
- Combining expertise in satellites, radar, and in situ observations to develop new products
- Precipitation, solar irradiance, surface albedo, cloud climatology, and more.



SCIENCE AND SERVICES (CONTINUED)

Global Temperature Data

- Enhancing NOAA's global land and ocean temperature datasets
- Developing new products and monitoring tools

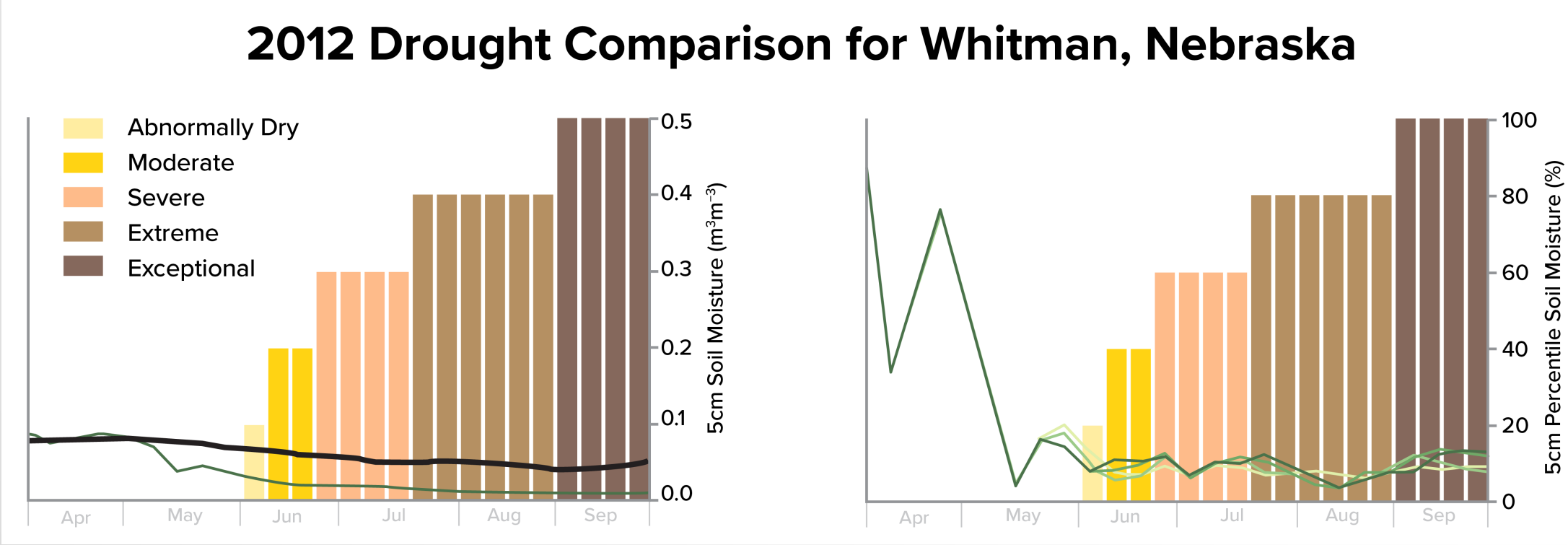


Number of heat events in the United States from 1991–2018 from under-development sub-monthly monitoring tool.

SCIENCE AND SERVICES (CONTINUED)

NOAA's US Climate Reference Network (USCRN)

- Improved precipitation algorithm
- Analyzing impacts of urban encroachment on temperature data
- Developing standardized soil moisture metrics



SCIENCE AND SERVICES (CONTINUED)

Engagement Activities

- NCEI engagement activities
  - User/customer engagement
  - Workshops and town halls
  - Economic impacts analysis
- Public engagement and educational outreach

OTHER PROJECTS

Augmenting Institute capabilities through NCICS consortium member partnerships and collaborative endeavors supported by various other sponsors

Selected Examples

- NSF
  - Urban Resilience to Extremes Sustainability Research Network
- DoD/SERDP
  - Effects of climate change on infrastructure design values
  - Automated front detection in reanalysis/climate model data
- NASA
  - Kelvin waves and easterly waves using CYGNSS data
  - Multiscale convection and the Maritime Continent
  - Seasonal evolution of sea ice cover

2019

- 50 peer-reviewed journal articles, reports, and book chapters
- More than 120 invited presentations and posters
- 22 outreach and engagement presentations/discussions
  - reaching more than 1,500 people in North Carolina