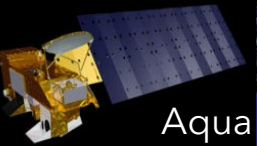


LANCE-UWG Chair Perspective

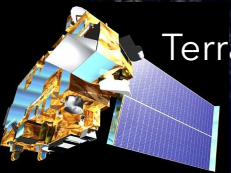


MODIS

Moderate Resolution Imaging Spectrometer



Aqua



Terra

VIIRS

Visible Infrared Imaging Radiometer Suite

Pre-Launch



JPSS-4

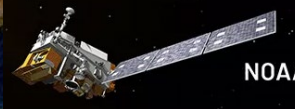
Pre-Launch



JPSS-3



NOAA-21



NOAA-20



SUOMI-NPP



Agenda

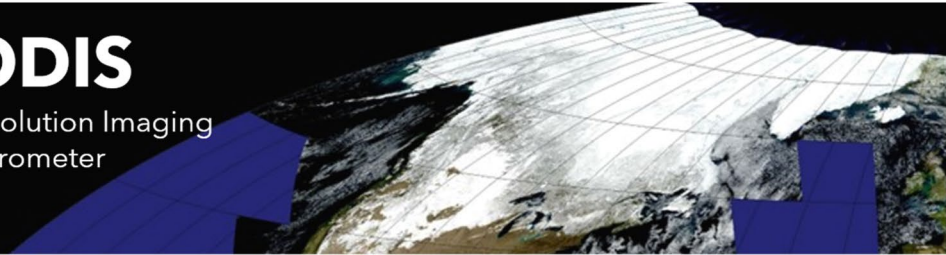
- MODIS/VIIRS Science and Instrument Team Activities
- Terra/Aqua/Aura Mission Updates
 - Algorithm Maintenance Efforts
- Approach to NASA's Earth Science to Action Strategy
- Data Continuity: Capabilities, Needs, and Gaps
- **Discussion Points and Follow-up Actions**



Timely and Accurate Data: MODIS/VIIRS NRT Products Account for >90% of LANCE-NRT Data Volumes

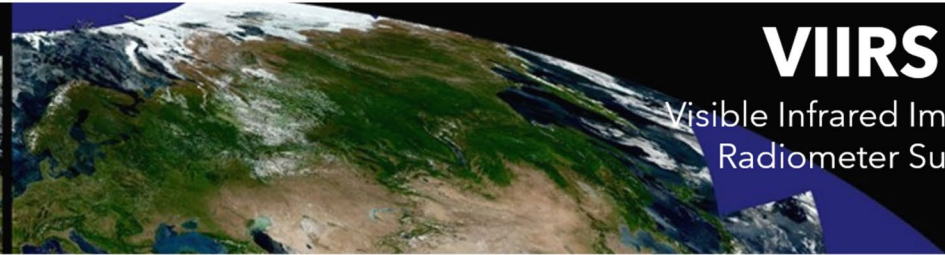
MODIS

Moderate Resolution Imaging
Spectrometer



VIIRS

Visible Infrared Imaging
Radiometer Suite





NASA MODIS/VIIRS Science and Instrument Team Activities

Atmosphere

Land

Ocean

Calibration

NASA MODIS/VIIRS Science and Instrument Teams



Key Personnel:

Miguel Román - Science Team Lead

Jack Xiong - Characterization Support Team Lead

Sadashiva Devadiga - Science Data Support Team Lead

Chris Justice & Miguel Román - Land Discipline Team Leads

Bryan Franz - Ocean Discipline Team Lead

Steve Platnick & Robert Holz - Atmospheres Discipline Leads



https://modis.gsfc.nasa.gov/sci_team/
<https://viirslat.gsfc.nasa.gov/PeopleST.html>

Terra/Aqua/Aura Updates

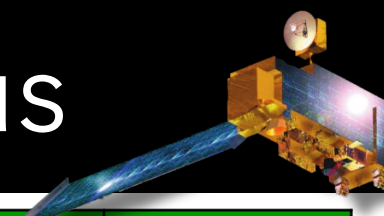


Terra/Aqua Status

	Terra	Aqua	Aura
Constellation Exit	October 2022	N/A*	N/A*
End Science Operations	February 2027	July 2026	July 2025
Spacecraft Passivation	April 2027	September 2026	September 2025

* Aqua and Aura are currently drifting in/near the A-Train Constellation (705km) and will continue drifting there until the end of science data collection; thus, no Constellation Exit date.

Terra Current Status

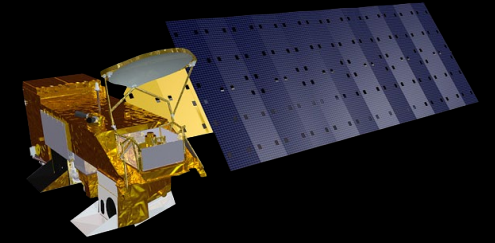


	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>
CDH	Green	Green	Green	Green	Green	Green
COM	Green	Green	Green	Yellow ⁴	Yellow ⁴	Yellow ⁴
EPS ²	Yellow	Yellow	Yellow	Yellow ⁴	Yellow ⁴	Yellow ⁴
FSW	Green	Green	Green	Green	Green	Green
GNC	Green	Green	Green	Green	Green	Green
NAV	Green	Green	Green	Green	Green	Green
TCS	Green	Green	Green	Green	Green	Green
INST ¹	Green	Green	Green	Green	Green	Green
Staffing ³	Green	Green	Green	Green	Green	Green
SSIM	Green	Green	Green	Green	Green	Green

- **Shunt #6 and Shunt #8 stopped transmitting power.**
- **Configured direct broadcast to standby to reduce load.**
- **Another shunt anomaly would need approximately 200 watts of power mitigation**
 - Instrument-safe modes would not provide sufficient power optimization
 - Decided that complete instrument turn-off is not optimal
 - Survival mode is a feasible alternative
- **Action to Instrument Operations Teams**
 - Provide estimated power requirements for instrument survival modes
- **Action to Project Science Team**
 - Terra Project Scientist (Kurt Thome) will prepare a draft load-shedding plan in case of another solar shunt anomaly. The goal is to have a document for ESD's Operating Missions Program (Jamie Wicks) by the end of June that they can comment on, leading to a version that would go through a formal review process, as needed.

INSTRUMENTS	Total Load
MOPITT	191W
ASTER	188W
CERES	101W
MODIS	137W
MISR	82W

Aqua Current Status



- **Spacecraft Status** - GREEN

- **Instrument Status** - GREEN

- AIRS and MODIS: Nominal Operations
- AMSU: Nominal Operations except for Channels 1, 2, 4, 5, and 7
- CERES: Nominal Operations except for CERES-Fore instrument
- AMSR-E: Powered Down 3/3/2016
- HSB: Survival Mode since 2/5/2003

- **Data Capture/L0 Processing Status** - GREEN

- SSR Data Capture May 2024: **99.4664315%**
- SSR Data Capture to 5/31/2024: **99.8114053%**

- **Data Latency** – Excellent

- **Ground Systems:**

- Responding to new security requirements and upgrades to obsolete hardware or COTS systems. Reduced IT Security Patch cadence.

- **Flight Operations: 2 Operations Controller (OCE) Operations**

- 06/24/2022: FOT 2-OCE Operations Concept Review (OCR)
- 06/30/2022: Test Readiness Review (TRR)
- 09/01/2022: Operations Readiness Review (ORR) – Operational on 9/4/2022
- 07/06/2023: Lights-out operations ORR - Operational on 7/7/2023

2023 Earth Science Division Senior Review

TERRA
The Flagship Earth Observing Satellite

2023



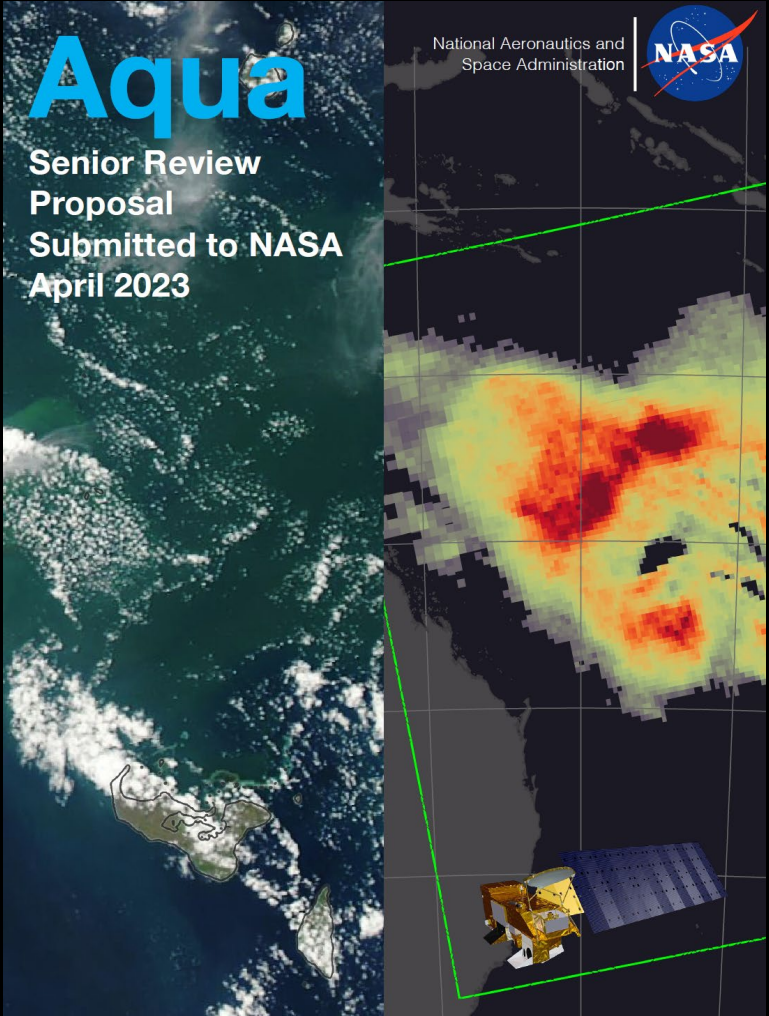
Proposal
Senior Review 2023
of the Mission Operations and Data Analysis
Program for the Earth Science Operating Missions




National Aeronautics and
Space Administration



Aqua
Senior Review
Proposal
Submitted to NASA
April 2023



National Aeronautics and
Space Administration

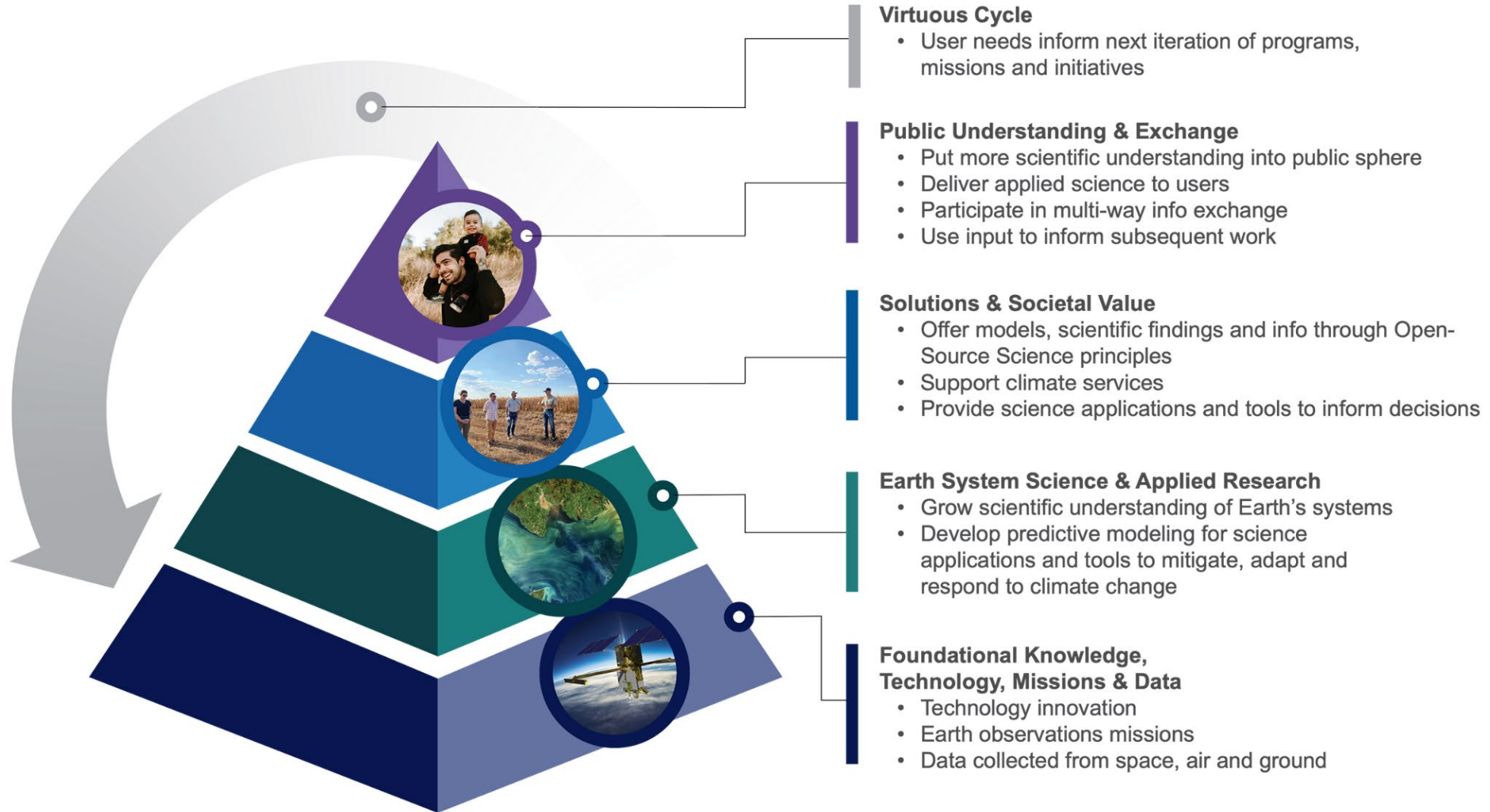


Terra/Aqua Algorithm Maintenance Efforts (AMEs)

Funded by:	Mission	PI	Institution
Terra	Aqua/Terra	Balch/Mitchell	Bigelow/Bigelov
Terra	Aqua/Terra	Jeffrey Czapla-Myers	U. Arizona
Terra	Aqua/Terra	Robert Frouin	Scripps-UCSD
Terra	Aqua/Terra	Louis Giglio	UMD
Terra	Aqua/Terra	Dorothy Hall	UMD
Terra	Aqua/Terra	Crystal Schaaf	UMASS
Aqua/Terra	Aqua/Terra	David Siegel	UCSB
Terra	Aqua/Terra	Eric Vermote	NASA-GSFC
Terra	Terra	Sohlberg/ Carroll	UMD/GSFC
Terra	Aqua/Terra	Simon Hook	JPL
Terra	Aqua/Terra	Glynn Hulley	JPL
Terra	Aqua/Terra	Alexei Lyapustin	NASA-GSFC
Terra	Aqua/Terra	Eva Borbas/Ackerman	UW-Madison
Aqua	Aqua/Terra	Bryan Franz	NASA-GSFC
Aqua	Aqua/Terra	Huilin Gao	Texas A & M
Terra	Aqua/Terra	Christina Hsu	NASA-GSFC
Aqua	Aqua/Terra	Robert Levy	NASA-GSFC
Aqua	Aqua/Terra	Antonio Mannino	NASA-GSFC
Aqua	Aqua/Terra	Peter Minnett	U. Miami
Aqua	Aqua/Terra	Steven Platnick	NASA-GSFC
Terra	Aqua/Terra	Dariusz Stramski	UCSD
Terra	Aqua/Terra	Dongdong Wang	UMCP
Aqua	Aqua/Terra	Jeremy Werdell	NASA-GSFC
Aqua	Aqua	Toby Westberry	Oregon State

- In September 2023, Terra and Aqua received their guidance letters after completing the 2023 Earth Science Senior Review (ESSR2023).
- The guidance letters direct the missions to extend operations through fiscal year 2026 (FY2026) for Aqua and FY2027 for Terra as currently baselined in their respective Senior Review budget targets (“in-guide budgets”).
- The guidance letters also notified that 24 Algorithm Maintenance Efforts (AMEs, **listed here**) were to be supported.
- On the Terra-side AME funding has just been waiting on action from GSFC RA team to get the paperwork to NSSC.

NASA's Earth Science to Action Framework



NASA Earth Action: Knowledge Value Chain



Generate Climate Information:

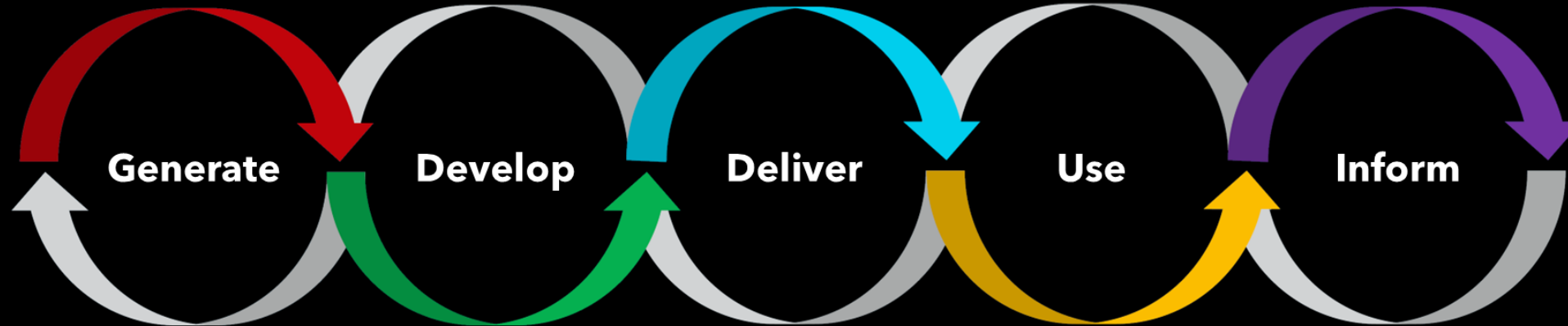
- Climate-Quality Observations
- Fiducial Reference Data
- Modeling/Simulation Studies

Develop Climate Services:

- Mapping and Visualization
- Decision Support Systems
- Simulation-Driven Insights

Deliver Climate Services:

- Sustainable Infrastructure
- Environmental Justice
- Stakeholder Engagement

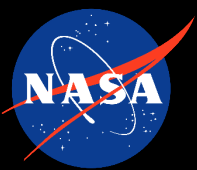


Use Climate Services:

- Data Integration Platforms
- Application Development
- User-Centric Tool Design

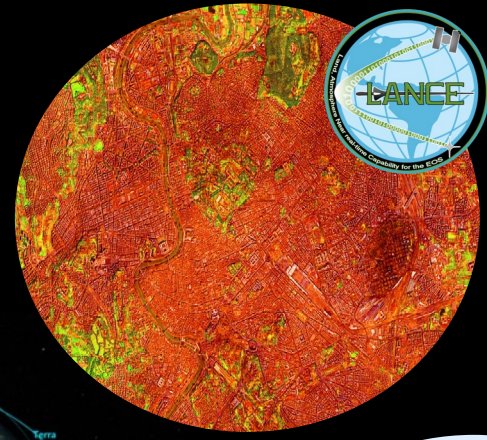
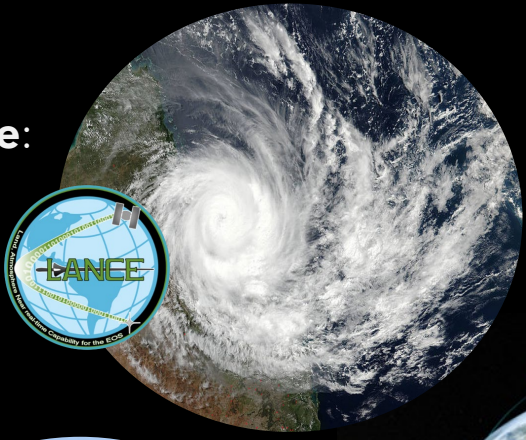
Inform Climate Services:

- Mitigation Efforts
- Adaptation Measures
- Resilience Building



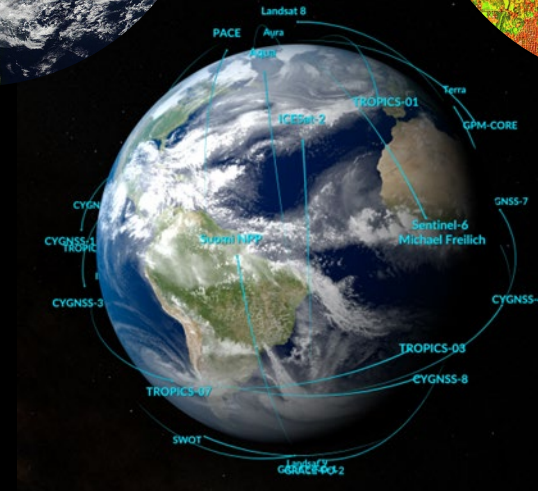
CROSS-CUTTING THEMES - Health, Disasters, & Resiliency

Land Surface Reflectance:
Natural hazard impacts



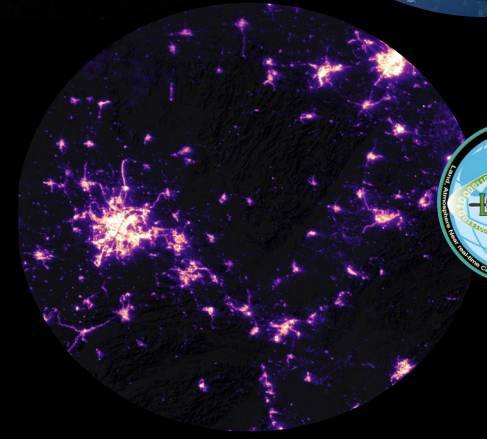
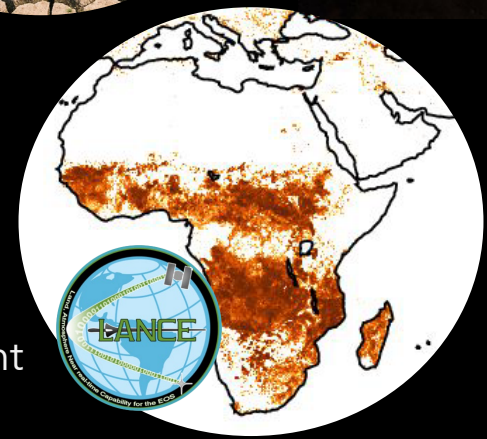
Land Surface Temperature
Urban heat islands & community vulnerability

Surface Radiation
Drought & Heatwaves



Air Quality Planning
Urban Air Pollution (smoke, dust, & smog)

Active Fires & Burned Area
Fire severity & extent

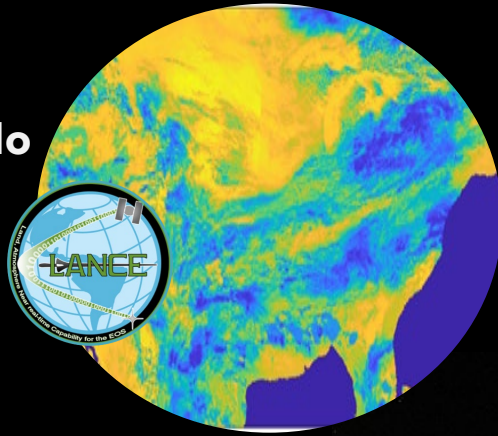


Nighttime Lights
Pandemics & power outages



CROSS-CUTTING THEMES - Energy & Sustainability

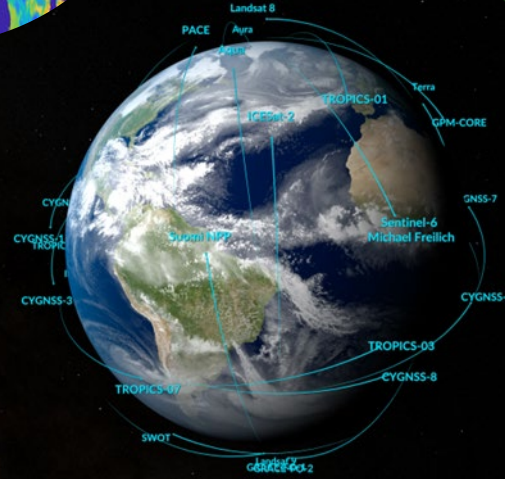
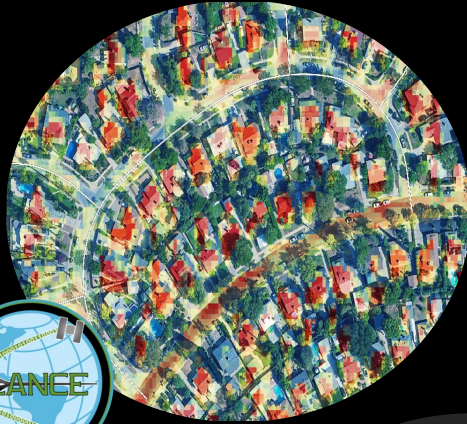
Land Surface Albedo
Radiation budget



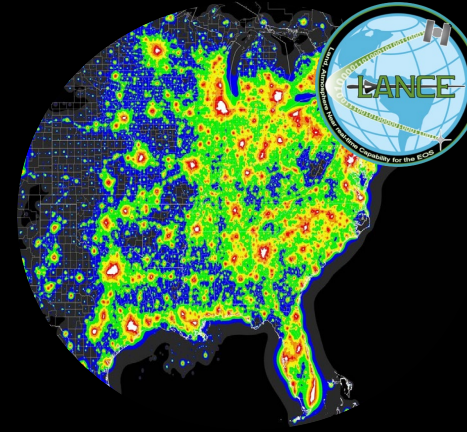
Solar Radiation
Solar energy resource analysis



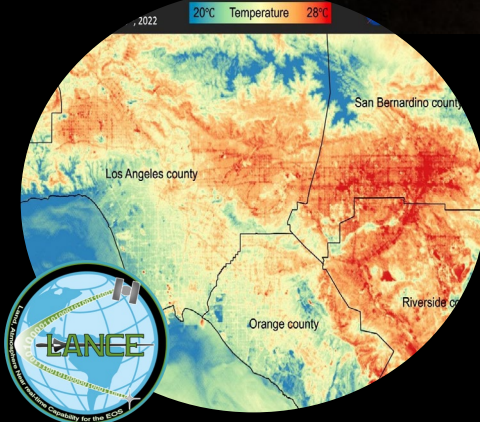
Temperature Anomaly
Quantifying heat mitigation (cool streets)



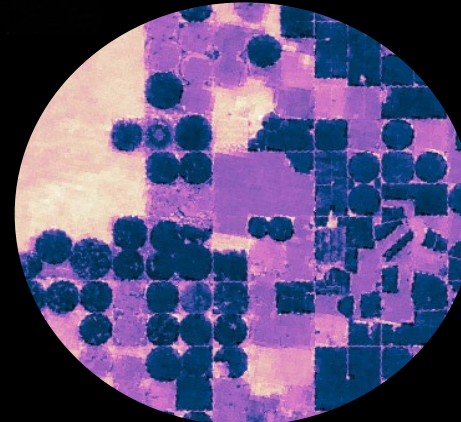
Nighttime Lights
Electrification Tracking



Urban Heat Islands
Urban heatwave monitoring



Solar Radiation & PAR
Energy balance



NASA LANCE
User Working Group

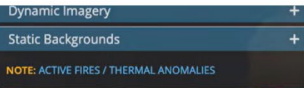


Acres



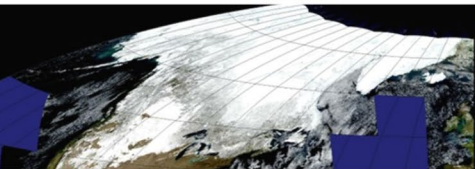
NASA WORLDVIEW

FIRMS Features:
Basic and Advanced Mode



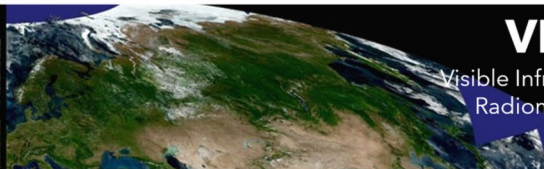
MODIS

Moderate Resolution Imaging Spectrometer



VIIRS

Visible Infrared Imaging Radiometer Suite



Chair's Perspective:

Approach to NASA's Earth Action Strategy



Data Continuity: Capabilities, Needs, and Gaps

The New York Times

What Happens When NASA Loses Eyes on Earth? We're About to Find Out.

Three long-running satellites will soon be switched off, forcing scientists to figure out how to adjust their views of our changing planet.

<https://www.nytimes.com/2024/05/03/climate/nasa-satellites-data.html>



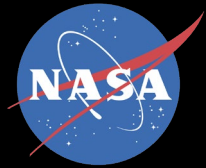
Other FAQs...

- *Will NRT data from other satellites compensate for the loss of Terra/Aqua MODIS Products?*
- *Will they be comparable in quality?*
- *What will be the gaps?*
- *And, what will be the scientific, economic, societal and environmental effects of not having data from these satellites?*

Latest Guidance

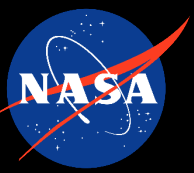
- Following last year's Terra, Aqua, and Aura Data Continuity Workshop, NASA collected inputs and submitted a comprehensive report, which is available online via NSPIRES: <https://nspires.nasaprs.com/external/solicitations/summary!init.do?sold={EC26B6F5-5B02-8932-45F4-EAF5DED2DA14}&path=opensee>
- The report aims to be all-encompassing, incorporating perspectives from all missions (Terra/Aqua/Aura), instruments, and science disciplines (See Executive Summary): <https://nspires.nasaprs.com/external/viewrepositorydocument/cmdocumentid=985174/solicitationId=%7BEC26B6F5-5B02-8932-45F4-EAF5DED2DA14%7D/viewSolicitationDocument=1/Terra-Aqua-Aura-Data-Continuity-Workshop-Executive-Summary.pdf>
- Specific science teams have also provided more detailed insights. For instance, NASA's Land Discipline Team led a review paper (Román et al., 2024, RSE), which focused on continuity between NASA MODIS Collection 6.1 and VIIRS Collection 2: <https://www.sciencedirect.com/science/article/pii/S0034425723005151>





Discussion Points

Discussion Points and Follow-up Actions



1. Terra/Aqua/Aura Mission Extensions and Closeout Planning: Ensuring a smooth transition into Phase F via ongoing calibration, science data support, and algorithm maintenance activities.

2. Transition of Experimental NRT Products: Need to establish a review and approval process for new products.

- VIIRS Fire Light Detection Algorithm (FILDA-2)



- MODIS VIIRS Volcano product

- VIIRS NPP/GPP and Evapotranspiration (ET)



- Near-Real Time AI-based Flood Detection

Discussion Points and Follow-up Actions [cont.]



3. Strategy Alignment: LANCE-NRT products and services enable a broad range of science and applications across core programs:

- Earth Action (HARVEST, ACRES, FireSense, Disasters, Water Resources)
- Responsive Science Initiatives

How can we better align LANCE capabilities with NASA's Earth Science to Action strategy?

Approach to NRT continuity: What does "...provide high-quality ^NRT data..." mean? (CJS, 2014 Authorization Act)

[Action: LANCE-UWG Input Requested]