



NASA Water Resources Program

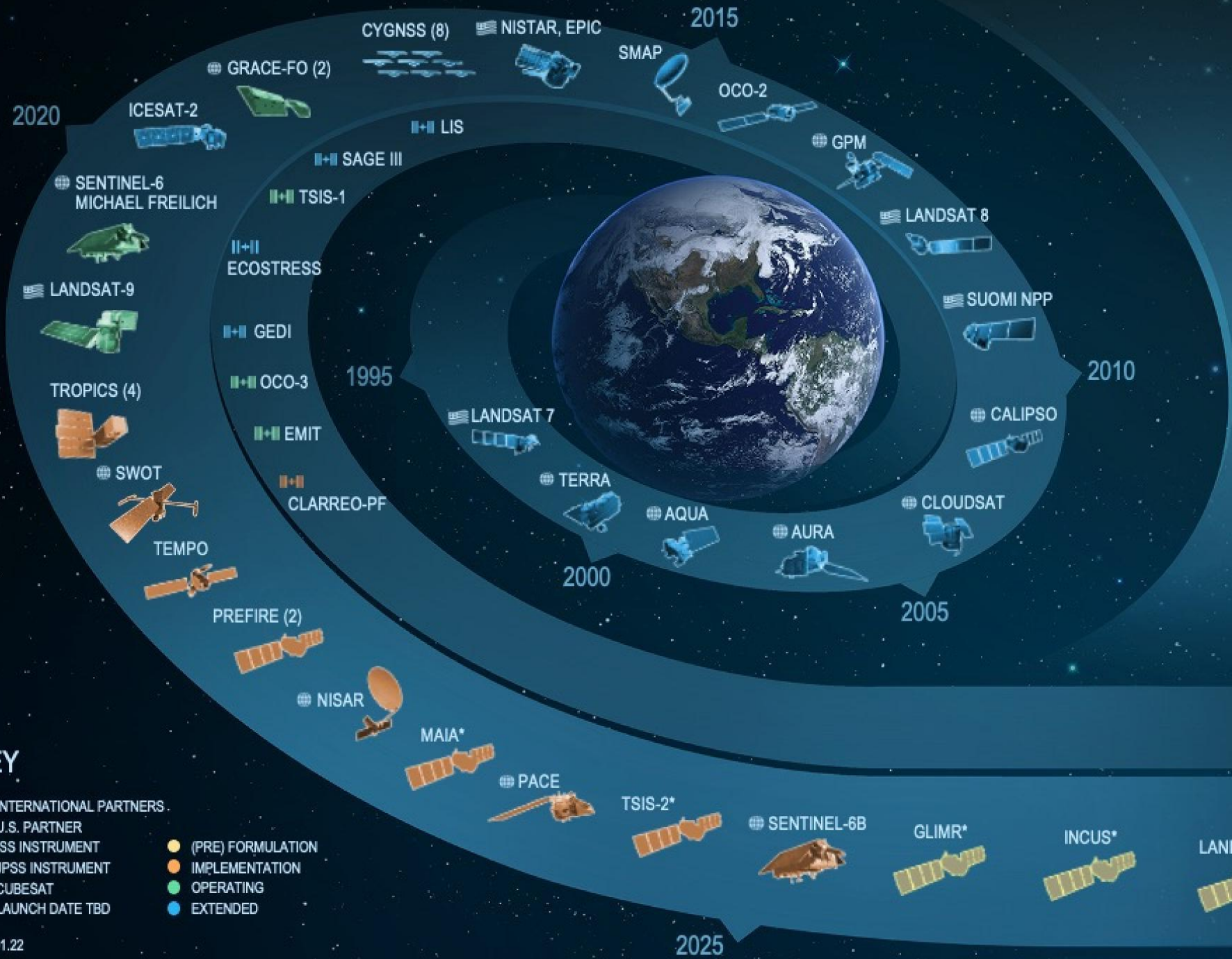
Christopher Hain, NASA HQ/Marshall Space Flight Center



WATER
RESOURCES



EARTH FLEET



INVEST/CUBESATS

- CIRIS 2023
- NACHOS 2022
- CTIM 2022
- NACHOS-2 2022
- SNOOPI* 2022
- MURI-FO* 2022
- HYTI* 2023

JPSS INSTRUMENTS

- OMPS-LIMB 2022
- LIBERA 2027
- OMPS-LIMB 2027
- OMPS-LIMB 2032

ISS INSTRUMENTS

MISSIONS

KEY

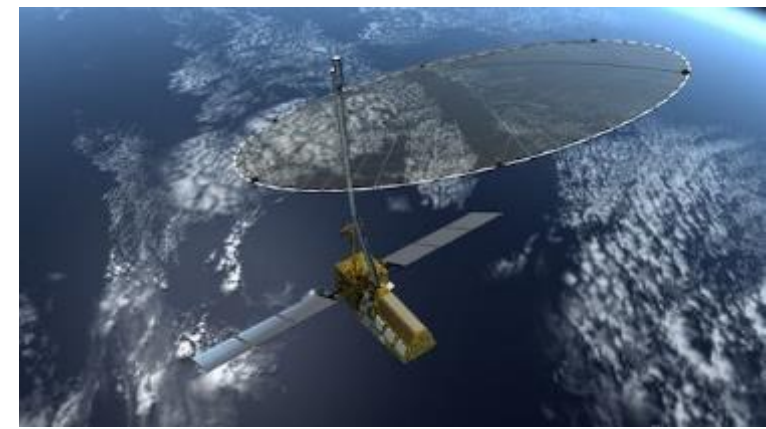
- INTERNATIONAL PARTNERS
- U.S. PARTNER
- ISS INSTRUMENT
- JPSS INSTRUMENT
- CUBESAT
- LAUNCH DATE TBD
- (PRE) FORMULATION
- IMPLEMENTATION
- OPERATING
- EXTENDED

**IN THE NEXT DECADE
NASA IS LEADING AN
OUTPOURING OF
FRESHWATER
INFORMATION FROM
SPACE**



**NASA-ISRO SAR
(NISAR)**

**Launch Target Date
–2024**

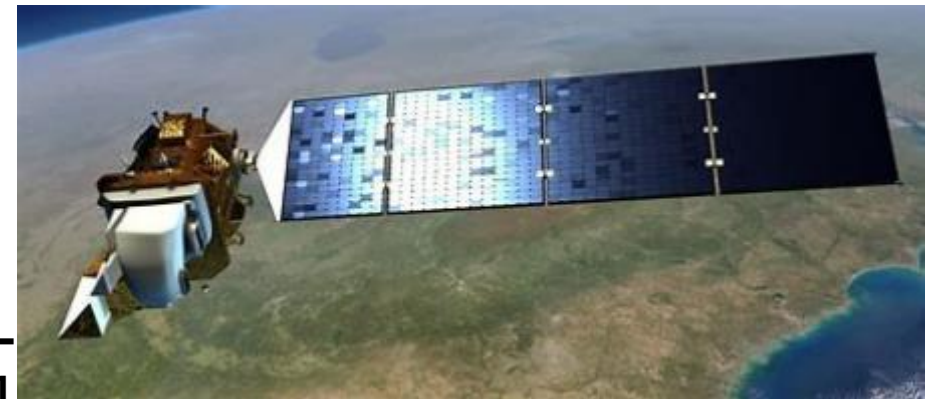


**Surface Water and
Ocean Topography
(SWOT)**

Launched 2023

Landsat 9

**Launched –
Sept 2021**



HOW?

- Exploring technology and capabilities
- Connecting the science to the decision makers
- Increasing access to information

THE PILLARS OF THE NASA APPLIED SCIENCES WATER RESOURCES PROGRAM

Portfolio of Applied Research Projects

- Support individual applied research that may include capacity building and transfer of technology or information to decision-making entities

Western Water Applications Office (WWAO)

- Stakeholder engagement
 - Basin assessments
 - Private company engagement
- Transfer of technology

Program Activities

- Contribute to Interagency and International Working Groups
- Engage with private and public entities to amplify benefits of EO

Mapping Capabilities to Needs: NASA's role



01

AVAILABILITY

Indicators: Water presence / absence, rainfall, snow-water equivalent, reservoir altimetry

Sources:

- [GRACE-FO](#)
- [GPM-IMERG](#)
- [Airborne Snow Observatory](#)
- ICESat-2
- [SMAP](#)

02

QUALITY

Indicators: Algal blooms, ocean color, turbidity

Sources:

- Landsat / Sentinel
- MODIS
- [CyAN](#)
- [Freshwater Health Index](#)
- [SeaDAS](#)

“

All the water on Earth already exists. We can't make more. We can only track it, predict it and protect it as it cycles around our world. ”

Bradley Doorn

03

SUSTAINABILITY

Indicators: Soil moisture, drought, evapotranspiration, forecasts

Sources:

- SMAP
- [US Drought Monitor](#)
- [ECOSTRESS](#)
- LIS

04

ACCESSIBILITY

Indicators: Socioeconomics, water infrastructure

Sources:

- Open Data Initiatives
- [SEDAC](#)
- OpenStreetMaps

05

RESILIENCY

Indicators: Sea-levels, flood extent, altimetry, hazard modeling

Sources:

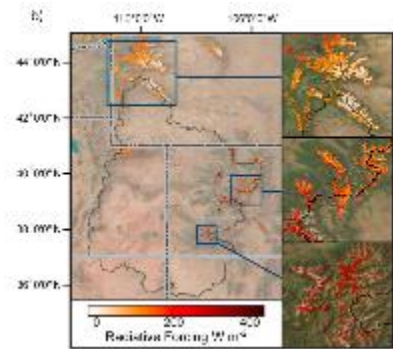
- ICESat-2
- Sentinel-6 MF
- Landsat

Identify gaps and opportunities

Harness Earth observations

Work with partners for sustainable impact

Improving Snowmelt Estimates

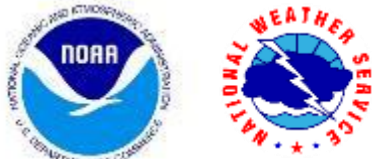
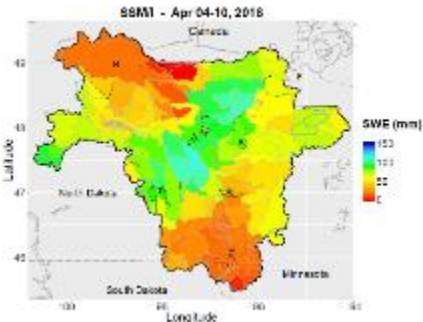


Colorado River Basin
Forecast Center

Detecting Algae Blooms



Information on Flood Risks



North Central River
Forecast Center

Search



Select Year
2019

Variable
ET

Raster View

Field View

New Here? Take a Tour!

☐ Cities

Create Custom Data
(Coming Soon)

mm ☒ in

47 in

Cumulative Ensemble Evapotranspiration (in)

0 in

2020 ET: 40 in

Crop: Alfalfa



5

+

Earth Information System (EIS)

EIS integrates **NASA's Earth Science observations and modeling capabilities** to produce new science and support decision making. EIS currently comprises four multi-disciplinary topic areas:



Fire



Freshwater



Sea Level Rise



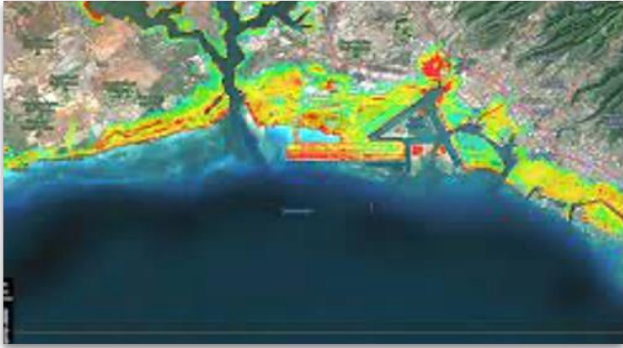
Greenhouse Gases

Goals:

- Address complex Earth Science Decadal Survey questions using state-of-the-science models and observations from NASA and partners
- Demonstrate innovative and integrative science and applications enabled through VEDA unified cloud infrastructure and collaborative environment
- Deliver timely and accurate actionable information through early and consistent stakeholder engagement and co-production

EIS – Freshwater Focus Areas and Collaborators

Goal: Combining NASA capabilities in an open science manner that enables broader collaboration to optimize freshwater management.



Inland and coastal flooding risks

NASA Disasters, EIS-Sea Level, CASI-2, Delta-X, USGCRP, NOAA, FEMA

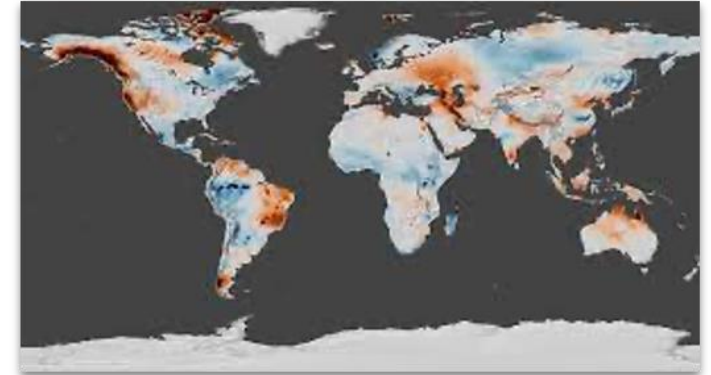


Water security assessments

EPA, FEMA, CWC of India, Bangladesh WDB, Global Water Security Center, TNC/NRCS

NASA Centers

GSFC, MSFC, ARC, GISS, JPL



Global water cycle shifts to 2100

CASI-2, HiMAT, AIST, WMO HydroSOS, GISS AgMIP, National Geographic



Fire-hydrology impacts

EIS-Fire, NASA Wildfires, USDA, IPAM Brazil, UMD GLAD, USFS



Science translation with AI via VEDA

FEMA, USDA, SETI, Frontier Development Lab, NASA STEM