NOAA: Current and Future Satellite Systems

12th Asia-Oceania Meteorological Satellite Users Conference (AOMSUC-12)

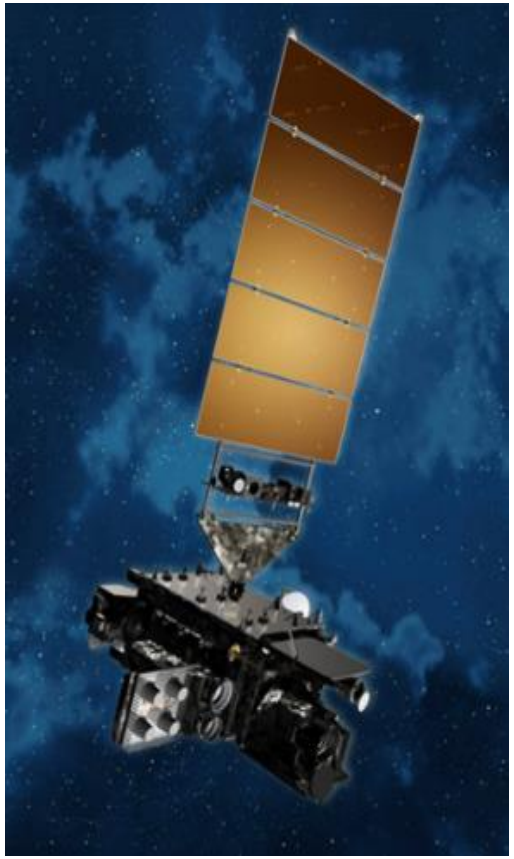
National Environmental Satellite, Data, and Information Service

November 15, 2022

Ms. Irene Parker
Deputy Assistant Administrator Systems
NOAA NESDIS

NOAA's National Environmental Satellite Data and Information Service (NESDIS) -- at a Glance

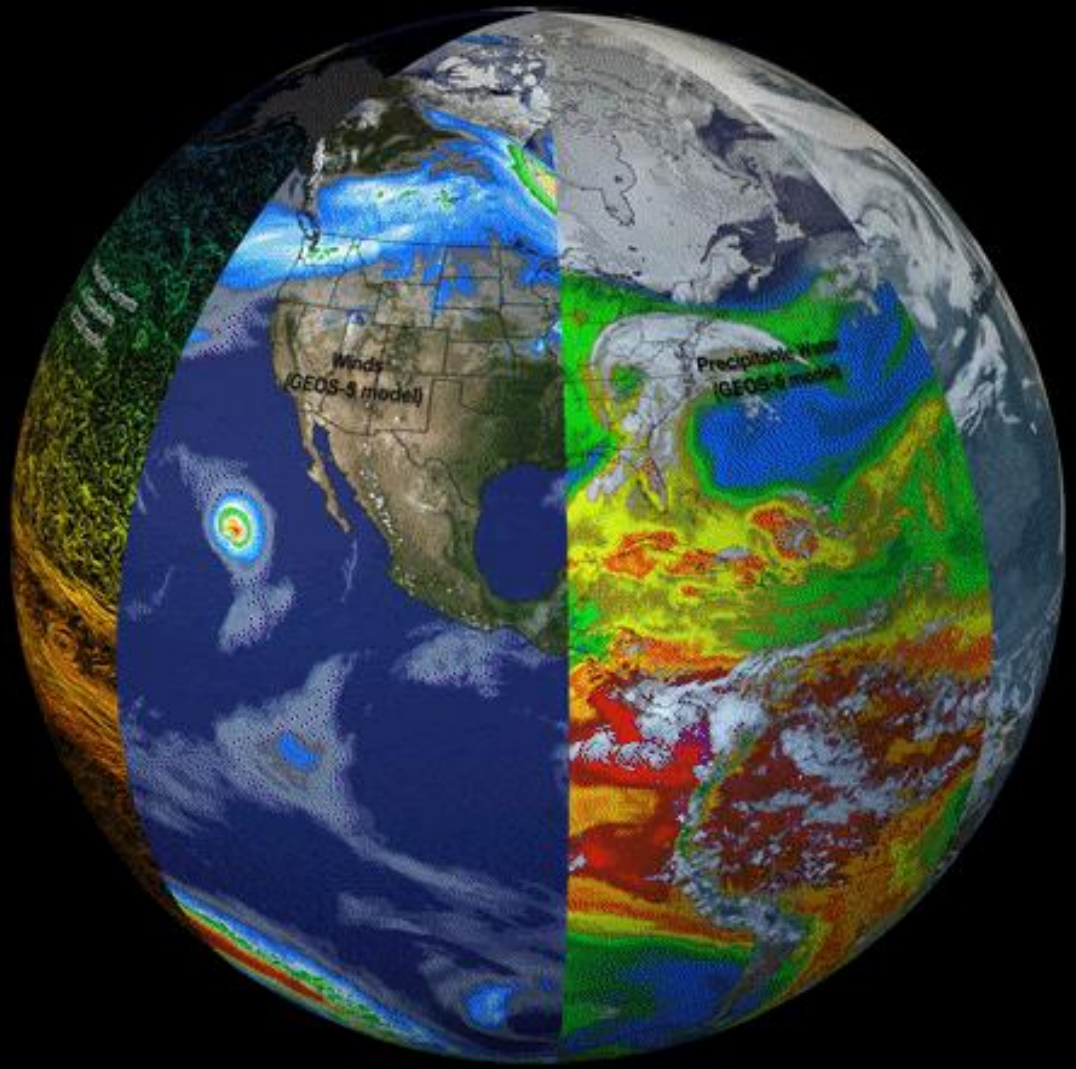
- NESDIS operates the Nation's weather satellites, 24/7
- Acquires next-generation Earth observation satellites
- Provides data and imagery for predictive environmental and atmospheric modeling
- Provides definitive assessments of the U.S. and global climate
- Maintains one of the most significant archives of environmental data on Earth



… With a Global Perspective

NESDIS Mission

Provide a truly integrated digital understanding of our earth environment that can evolve quickly to meet changing user expectations by leveraging our own capabilities and partnerships




SWFO
SWFO L1 - FY 2025
DSCOVR
OPERATIONAL - JULY 27, 2016
COSMIC-2
COSMIC-2 - OPERATIONAL FEB 25, 2020
SWNext
JASON-3
OPERATIONAL - JULY 1, 2016
GOES-R SERIES
GOES-16 - OPERATIONAL DEC 18, 2017
GOES-17 - OPERATIONAL FEB 12, 2019
GOES-18 - LAUNCHED MARCH 1, 2022
GOES-U - FY 2024
GeoXO
SENTINEL-6 Michael Freilich
Sentinel-6 Michael Freilich - OPERATIONAL NOV 22, 2021
JPSS SERIES
NOAA-20 - OPERATIONAL MAY 30, 2018
JPSS-2 - FY 2023
JPSS-3 - FY 2026
JPSS-4 - FY 2031
LEO Satellites

JPSS-2

NOAA's Next-Gen Earth Observation Strategy

Integrated, Adaptable, and Affordable: Orbits, Instruments & Systems

LEO

Miniaturized instruments on small, lower cost, and proliferated satellites and partner data improving forecasts through better and additional data. Better precipitation forecasts, wave height predictions, ocean currents, and more.

GEO

Continuous real-time observations supporting warnings and watches of severe weather and hour-by-hour changes. High-inclination orbits to observe northern latitude & polar regions.

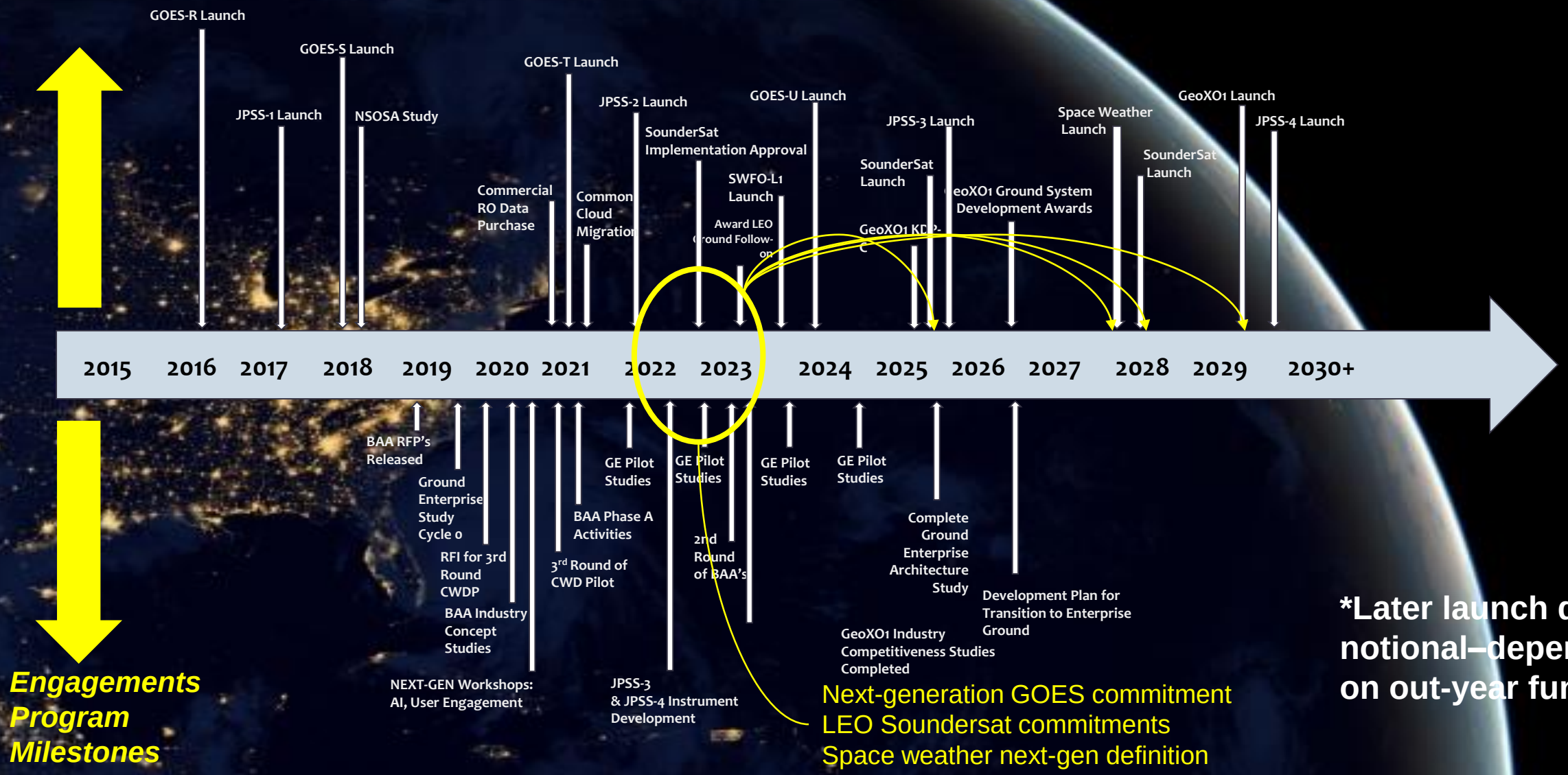
Space Weather

Reliably monitoring coronal mass ejections from L1, GEO, and LEO can protect the nation's valuable, vulnerable infrastructure. New capabilities at L5 and high earth orbit can provide additional insight and improve forecasts.

Common Ground Services

Secure ingest of data in different formats from different partners requires a flexible, scalable platform. Common Services approach integrates cloud, AI, and machine-learning capabilities to verify, calibrate, and fuse data into new and better products and services.

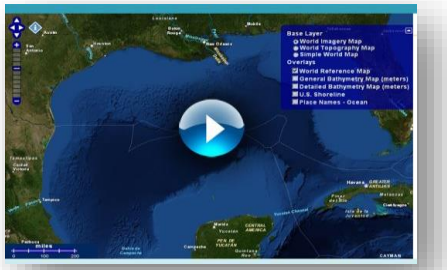
Timeline to Tomorrow: How We Are Developing NOAA's Next-Gen Systems



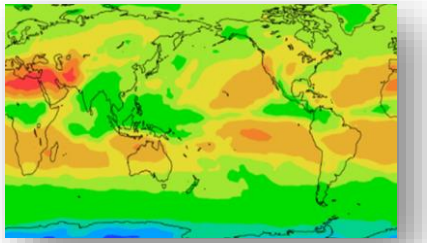
*Later launch dates notional–dependent on out-year funding

NOAA Satellite Data is Freely & Openly Available

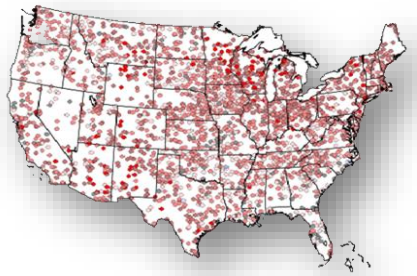
- NOAA satellite data are available on a FULL and OPEN Basis
- National Centers for Environmental Information (NCEI)
- From the ocean floor to the surface of the sun
- Trusted, reliable, unique
- Real-world relevance
- Critical to millions of customers
- Continually updated



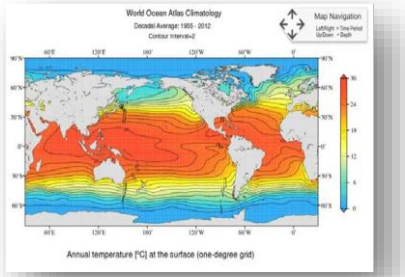
Gulf of Mexico Data



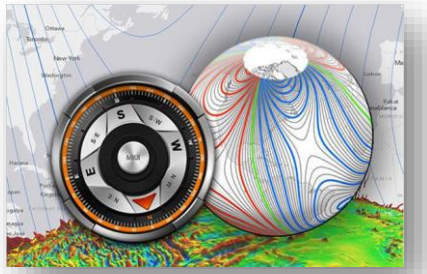
Reference Environmental Data Records



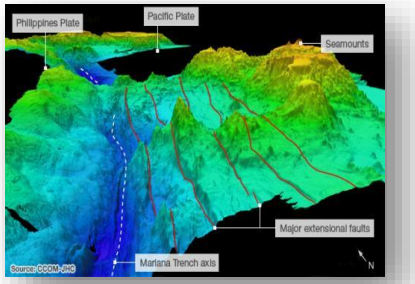
Climate Normals



World Ocean Atlas



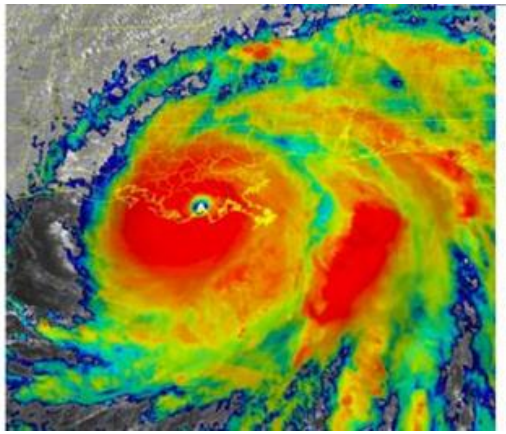
Earth's Magnetic Field



Coastal/Ocean Depths

Data Systems Societal Impact



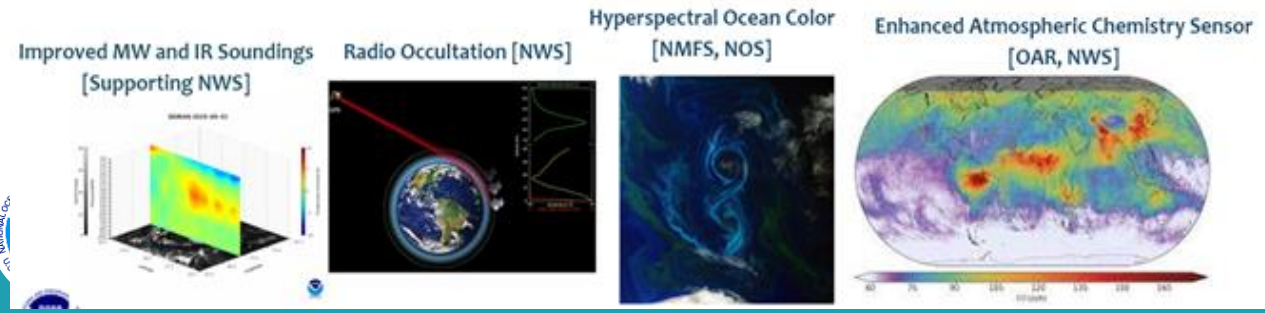

NESDIS data, products and services are foundational to NOAA's mission. The delivery of timely, accurate, precise, accessible, and useable information drives public response, understanding, and preparedness.

NESDIS data touches people's lives every day.

Growing User Needs

LEO: Users expect NOAA provide improved observations and forecasts:

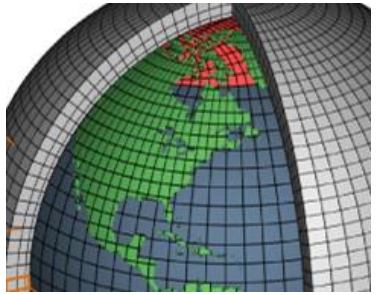
- **Higher resolution forecasts for short term and long term weather prediction -** improved microwave, infrared and RO soundings. More frequent observations with improved spatial and vertical resolution to measure the atmosphere closer to Earth's surface
- **The Blue Economy and coastal communities requires improved information on phytoplankton and harmful algal blooms -** hyperspectral ocean color imagery at improved spatial resolution
- **Timely and accurate forecasts of air quality hazards require enhanced atmospheric chemistry sensors** for monitoring gases such as sulphur dioxide that cause smog. Improved measurements of ozone and trace gasses such as nitrogen dioxide, methane and formaldehyde are need to assess climate change.



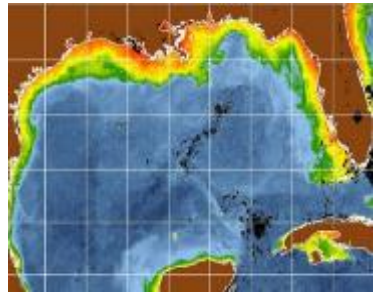
GEO: Users expect NOAA to meet new requirements with new observations

- **Improved numerical weather prediction and local nowcasting -** delivered by Hyperspectral IR Sounder
- **Monitoring dynamic coastal/ocean features, ecosystem change, water quality, and hazards** - delivered by Ocean Color Instrument
- **Monitoring air quality and linkages with weather and climate -** delivered by Atmospheric Composition Instrument

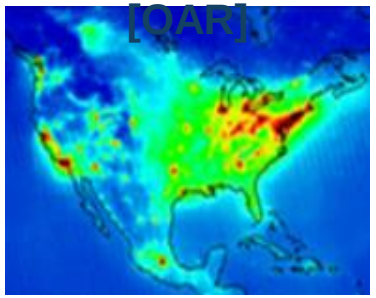
IR Sounding [NWS]



Ocean Color [NOS, NMFS]



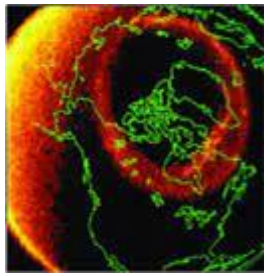
Atmo. Composition [OAR]

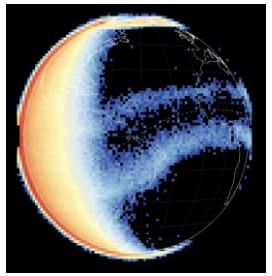


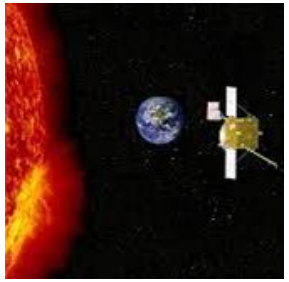
Growing User Needs

Space Weather: Users expect NOAA to meet new requirements with new observations:

- **Longer-lead time** and **more accurate solar storm warnings** require operational off-Sun-Earth-axis (L5) observations.
- **Aviation, energy,** and **defense** require forecast the location of the auroral oval and probability.
- **Aviation, space commerce, energy, defense** would use thermosphere imagery and in situ observations for upper atmospheric weather and satellite drag forecasting**.**



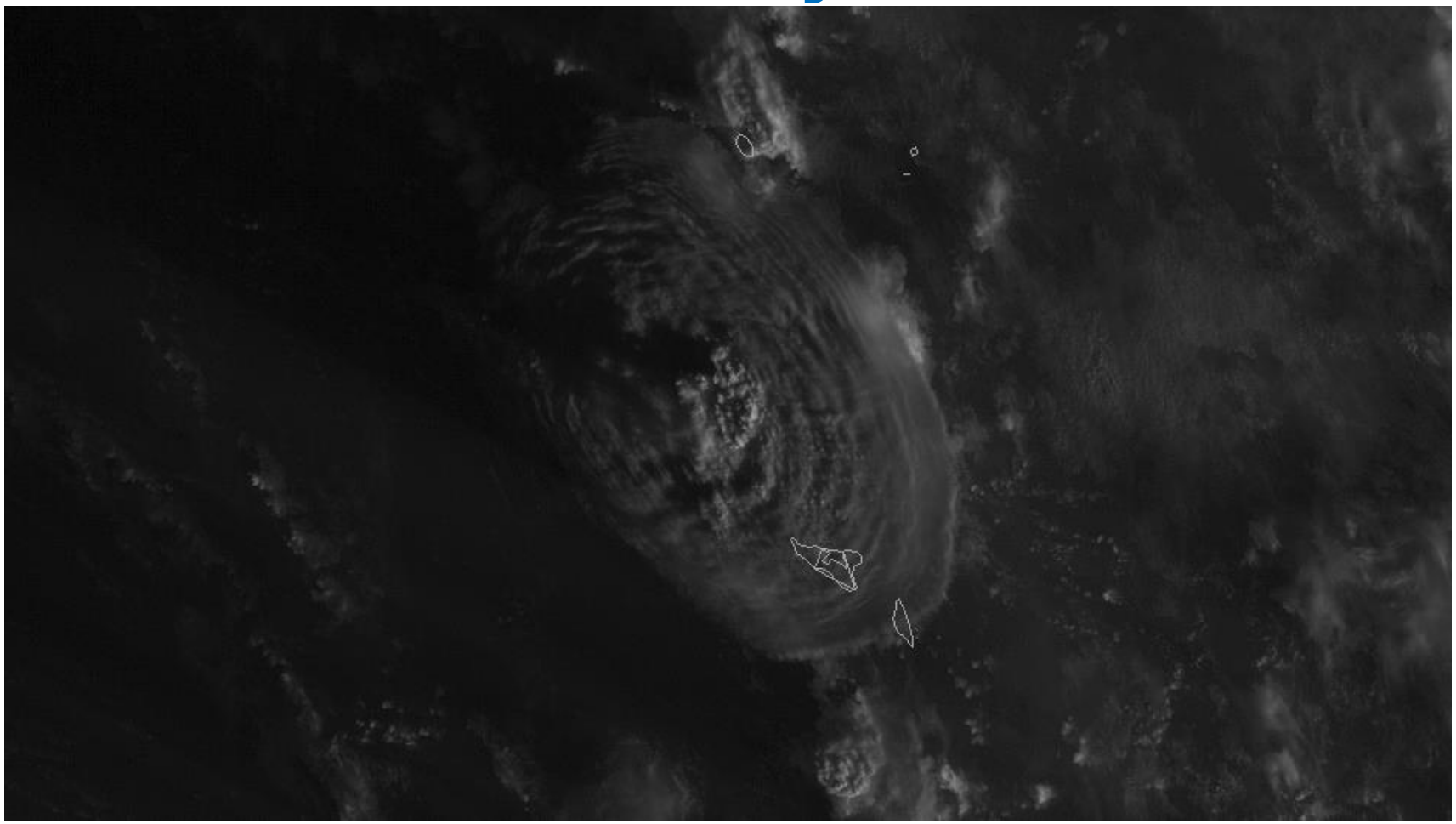




Climate Products & Services: Users expect NOAA to meet new requirements with new climate product and services.

- **Increase focus on fire weather products**
  - Long and short-term fire products that address critical gaps in the fire product lifecycle and improves understanding of long-term trends in fire activity, emissions, and land surface properties
  - Ensure coordination with fire community, NOAA line offices (esp OAR/NWS), underserved communities, and Fire Weather Testbed research and applications development
- **Ocean, coastal, and Arctic/Antarctic products**
  - Will improve ability to understand and assess environmental change, enable development of new climate applications, and amplify climate services to address the needs of underserved communities
  - Provides products to NOAA; the public; and commercial, academic, and international users
- **Improving local, state, and regional climate services and private sector development for the emerging Climate Enterprise**
  - Supports place-based climate services and information products to inform decision making relevant to region-specific economic activity, hazards, and vulnerability
  - Invigorating the State Climate partnership, train local forecast offices on NOAA's climate assets, and strengthen regional and state partnerships.
  - Provides baseline essential climate information, enabling a capable, expansive commercial Climate Enterprise to develop

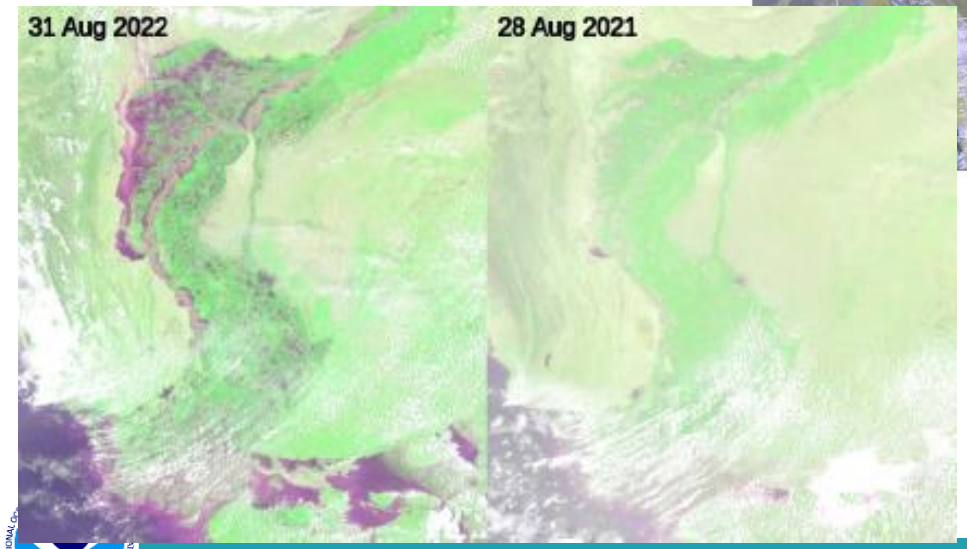
Application: Tonga Volcano Eruption – January 2022

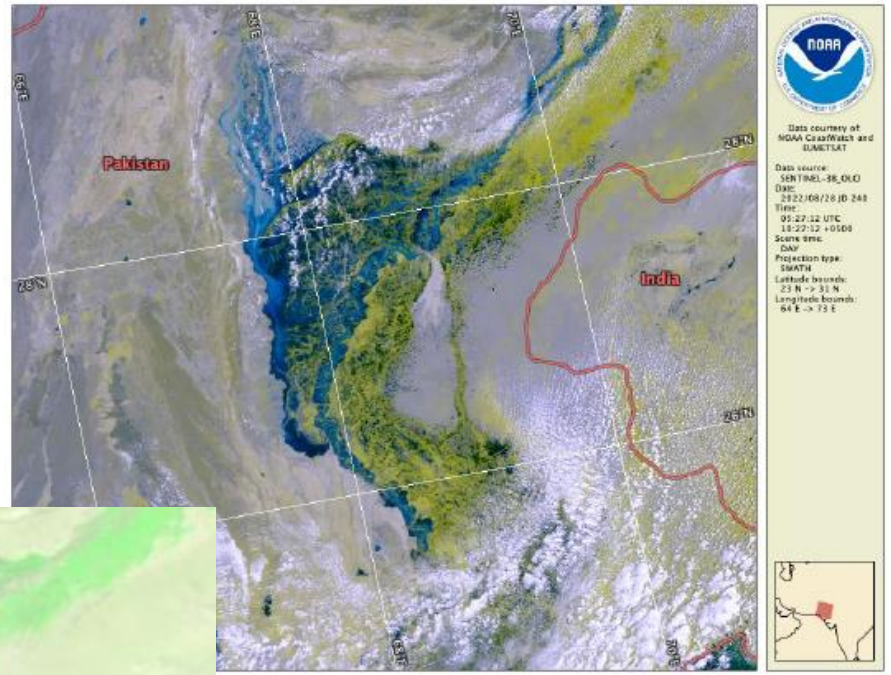


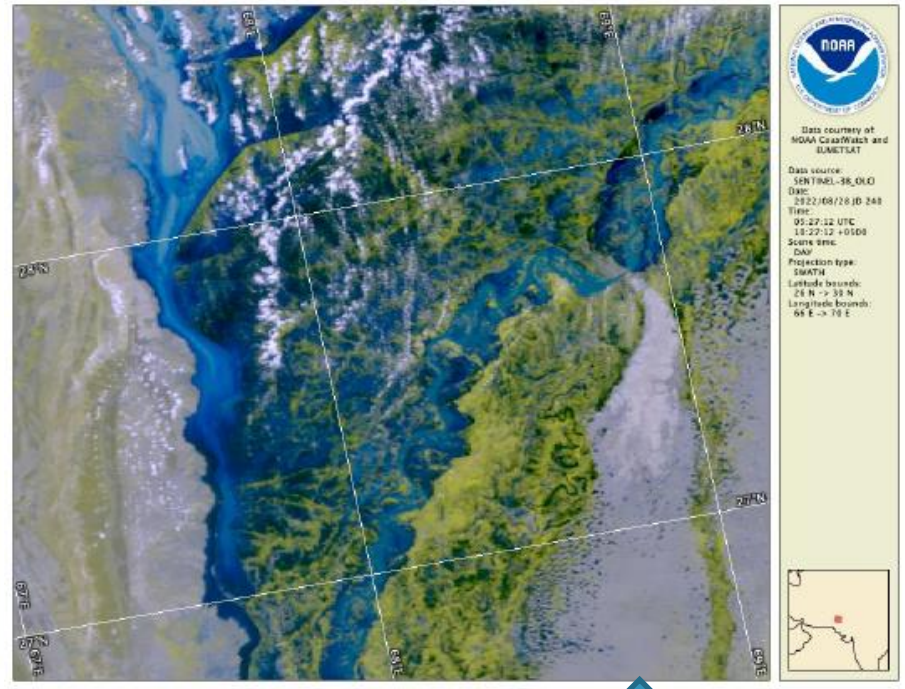
Application: NOAA CoastWatch Supporting Pakistan Flooding Information

Ocean Color Team Monitoring of Severe Flooding in Pakistan Using VIIRS False Color Images

Routine daily monitoring



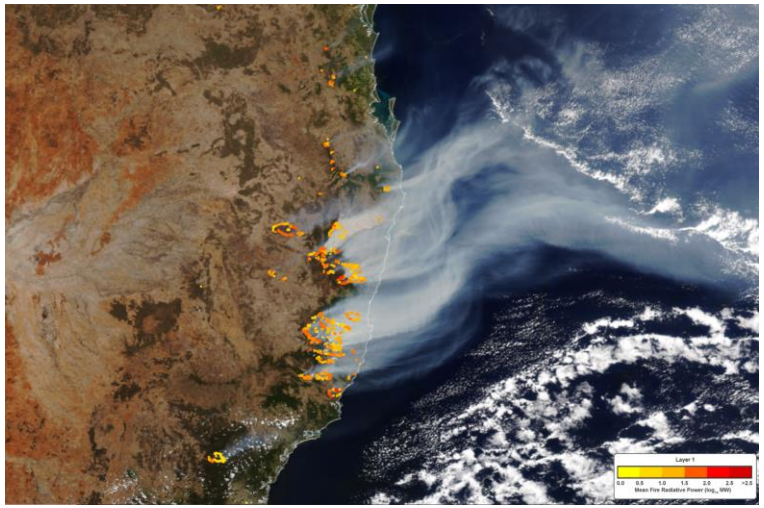




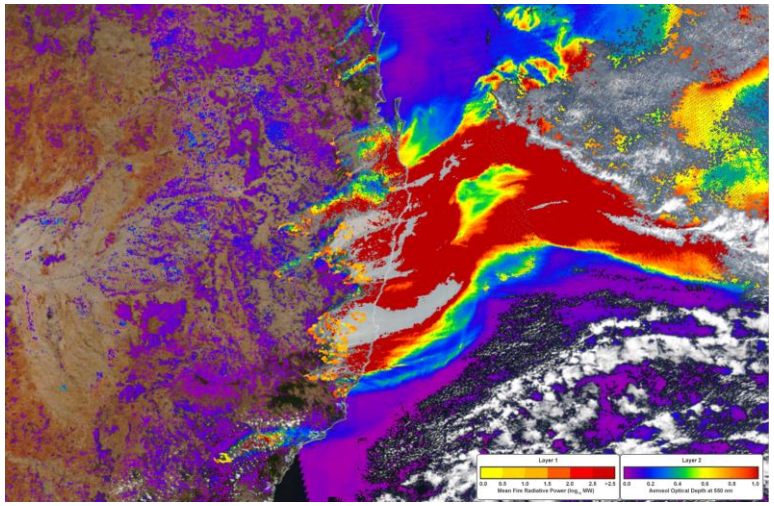
Higher resolution data from OLCI (Ocean and Land Colour Instrument) aboard Sentinel 3

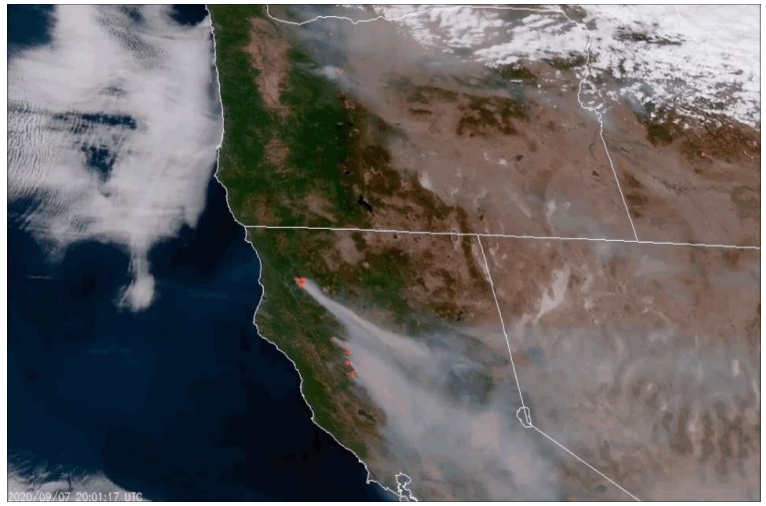
Application: Fire Monitoring

Images from NOAA-20 VIIRS. November 2019

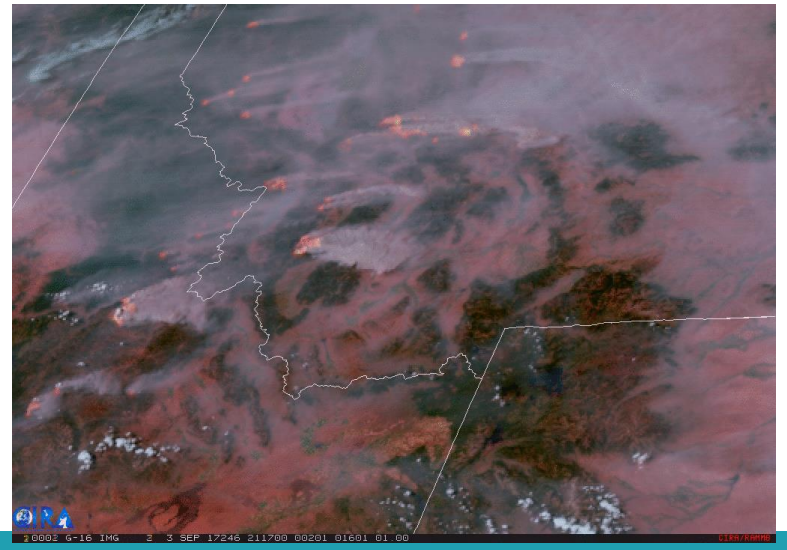


Eastern Australia



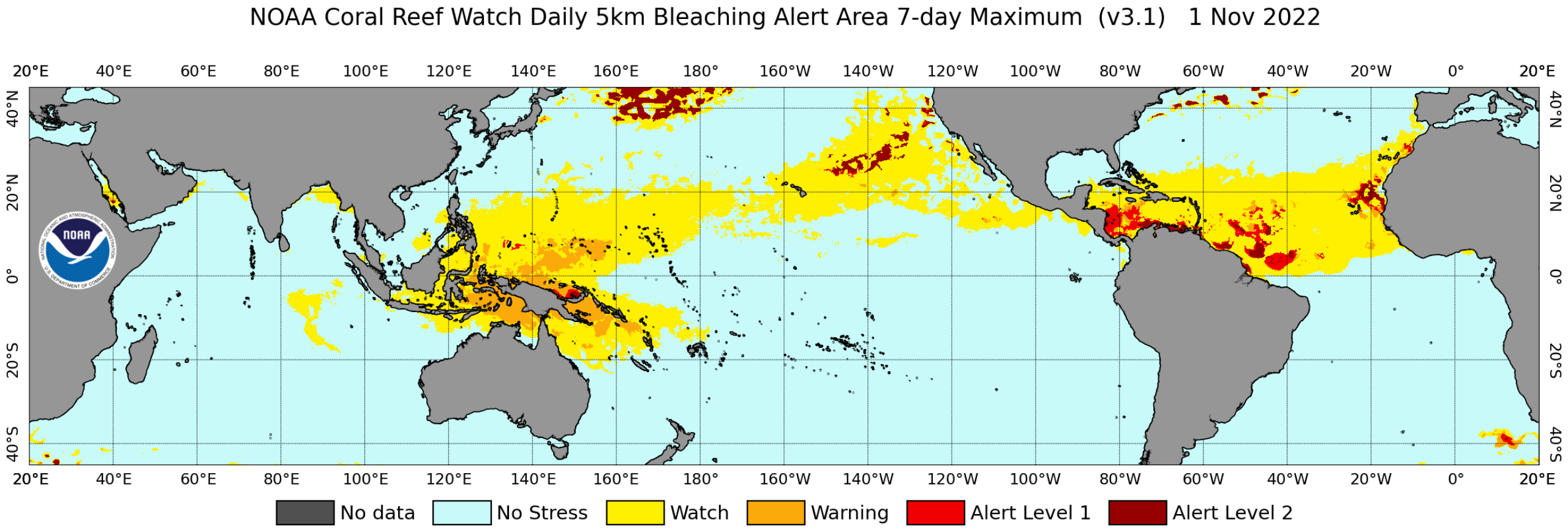


NOAA-20 captures plumes of smoke from the Camp Fire in Northern California, September 2020



GOES-R provides nearly continuous observations of fires

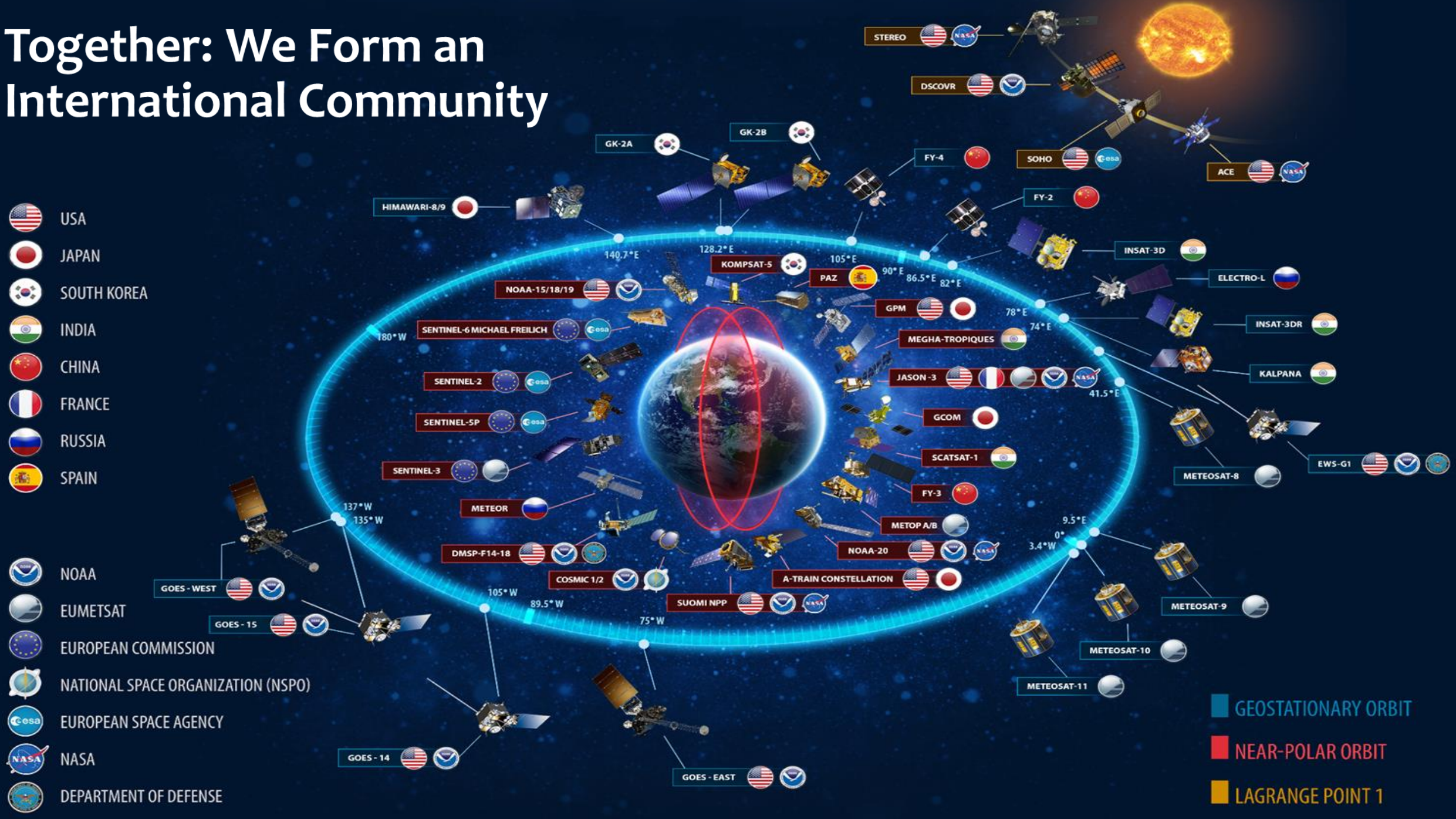
Application: Coral Reef Watch Bleaching Alert



coralreefwatch.noaa.gov/

Alone: NOAA Operates 16 Satellites

Together: We Form an International Community

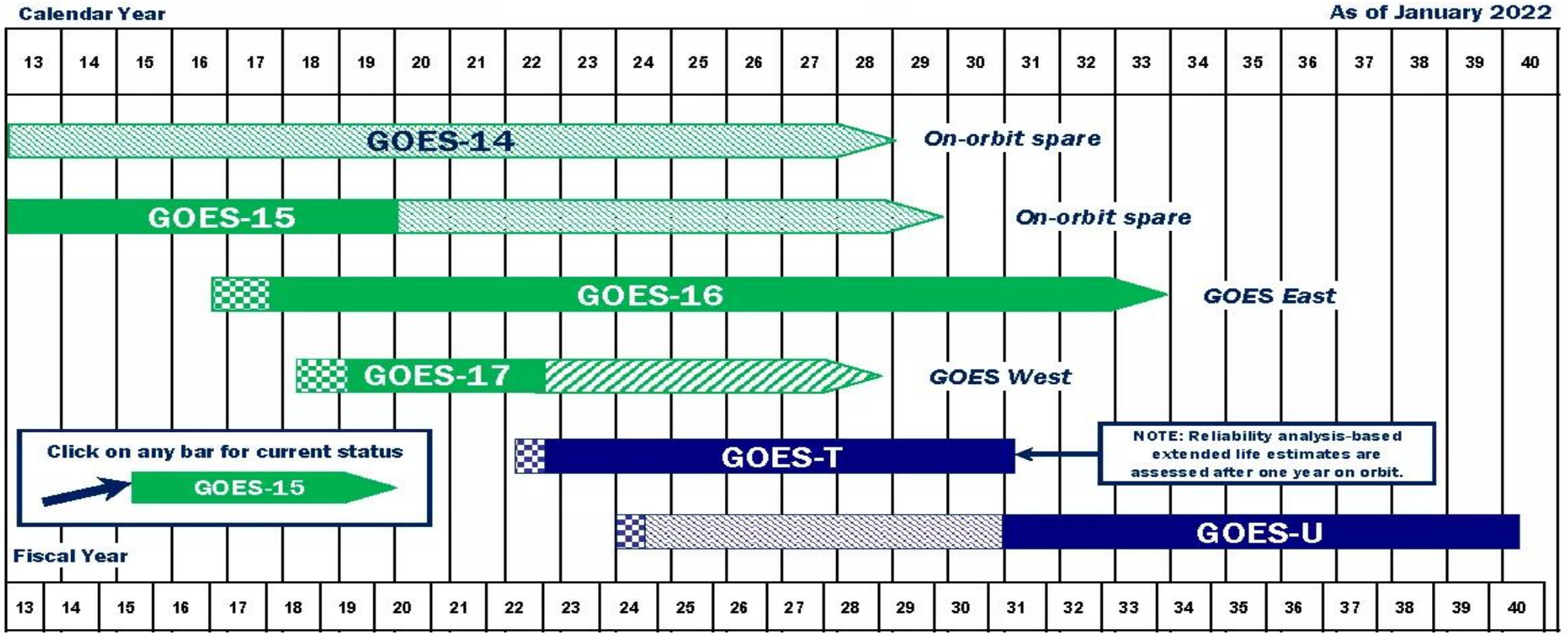


9 Feb 2020: Himawari-8, GOES-17, GOES-16, Meteosat-11

(image credit: CIMSS/SSEC)

Back-up Slides

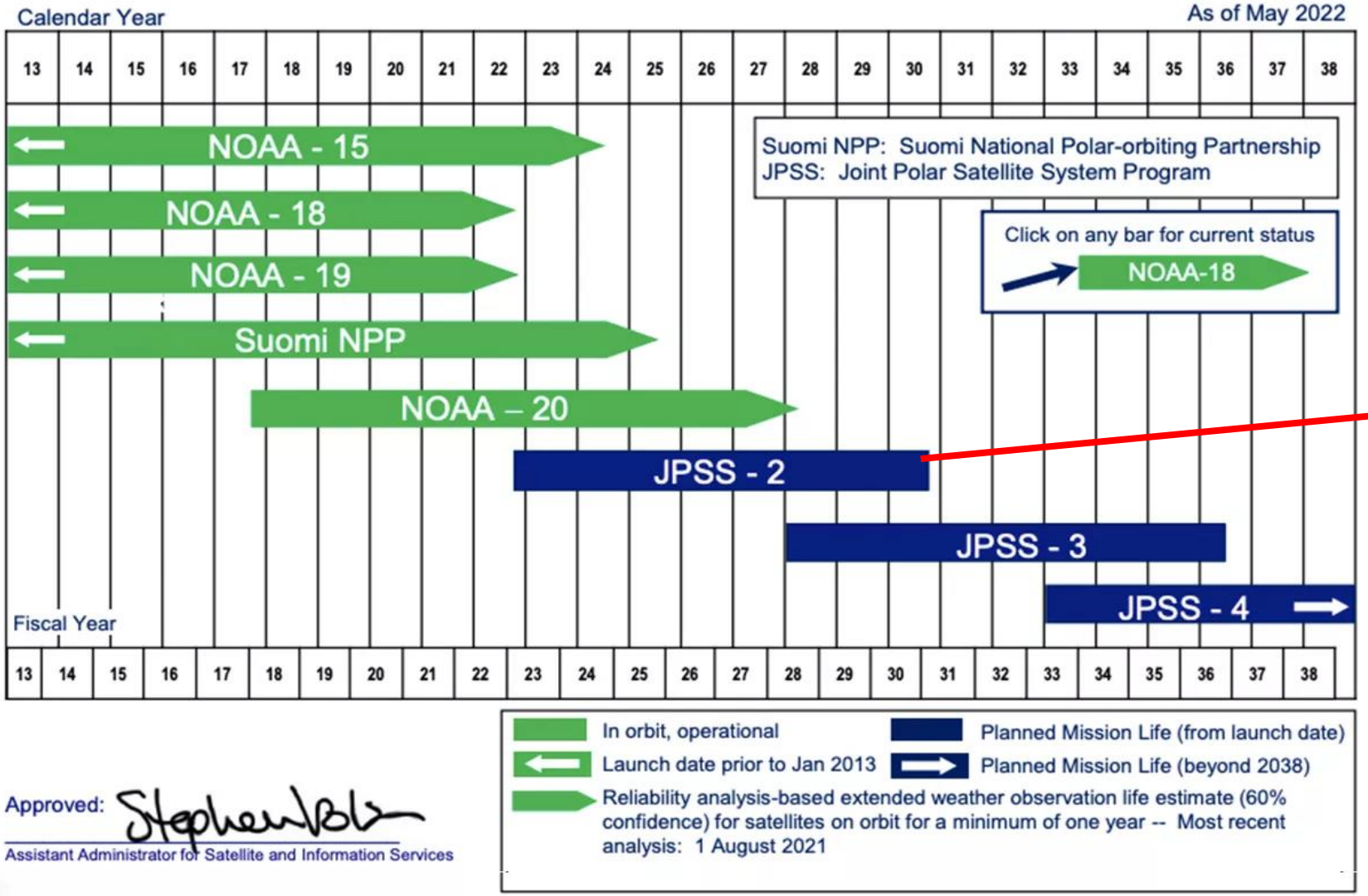
NOAA Geostationary Satellite Programs
Continuity of Weather Observations



Approved: Stephen Volz
Assistant Administrator for Satellite and Information Services

In orbit, operational
In orbit, storage
In orbit, active storage
In orbit, checkout
Planned in-orbit Storage
Planned in-orbit Checkout
Planned Mission Life
Reliability analysis-based extended weather observation life estimate (60% confidence) for satellites on orbit for a minimum of one year – Most recent analysis: 1 August 2021

NOAA Polar Satellite Programs
Continuity of Weather Observations



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