



CGMS-52 PLENARY SESSION

June 4–6, 2024
United States



NOAA Agency Update

Presented to CGMS-52 Plenary Session, agenda item 3 CGMS-52-NOAA-WP01

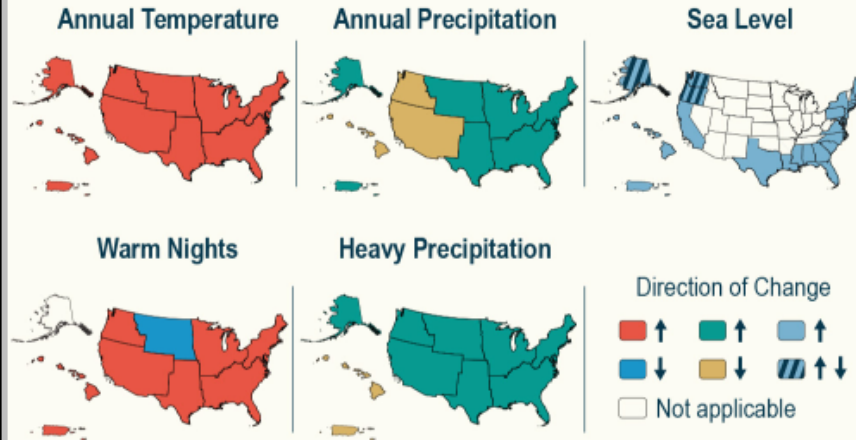


USGCRP Fifth National Climate Assessment – NCA5 Highlights the Urgency of Our Mission

Key Takeaways from NCA5

1. The United States must continue to take action on climate change.
2. People in the United States are experiencing increased risks from extreme events.
3. Climate change highlights & exacerbates social inequities
4. Available mitigation strategies can deliver substantial emissions reductions, but additional options are needed to reach net zero
5. Climate action is an opportunity to create a more resilient and just nation and world.

Climate change is happening now in all regions of the US

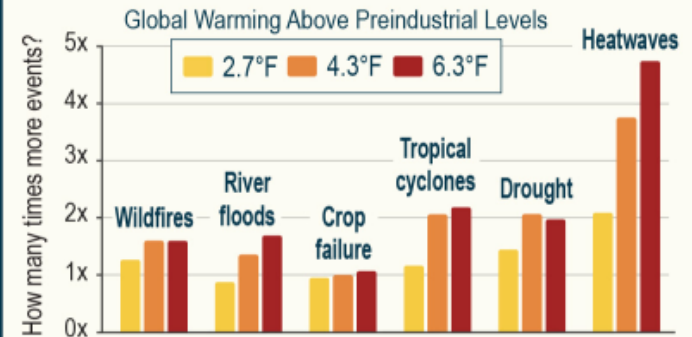


Each additional increment of warming leads to greater risks

- Water supply
- Food security
- Infrastructure
- Health and well-being
- Ecosystems
- Economy
- Livelihoods and heritage

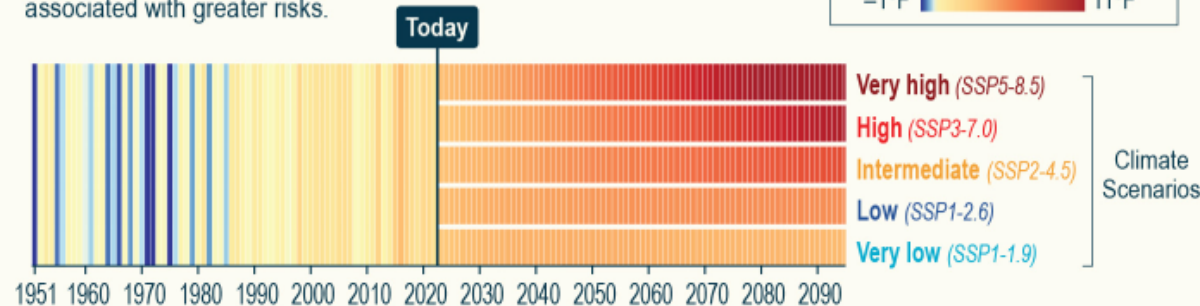
Without deeper cuts in global net emissions, climate risks to the US will continue to grow

▶ A person born in North America in 2020 will experience more climate hazards during their lifetime, on average, than a person born in 1965.



How much more the US warms depends on choices made today

▶ Future global greenhouse gas emissions from human activities determine whether and how quickly the US reaches warming levels associated with greater risks.

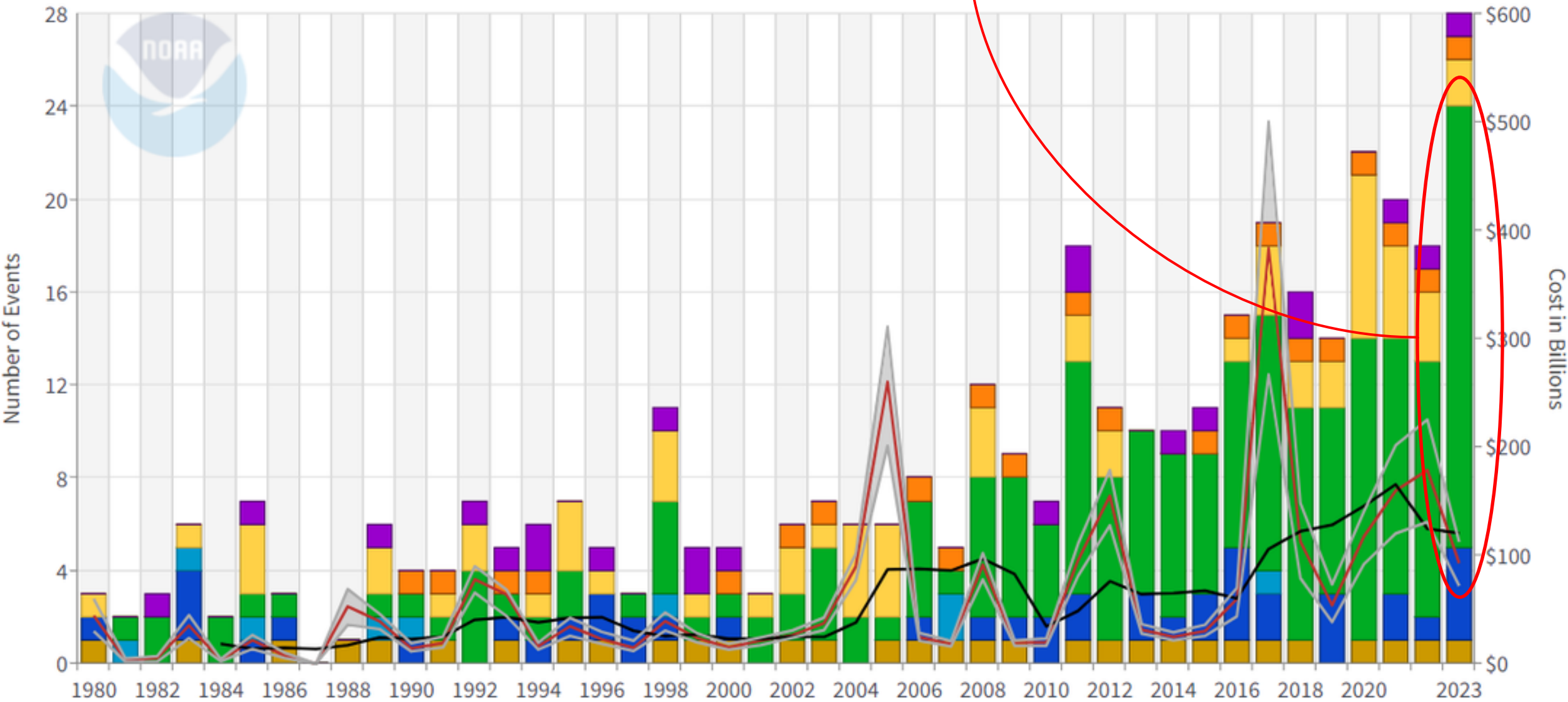


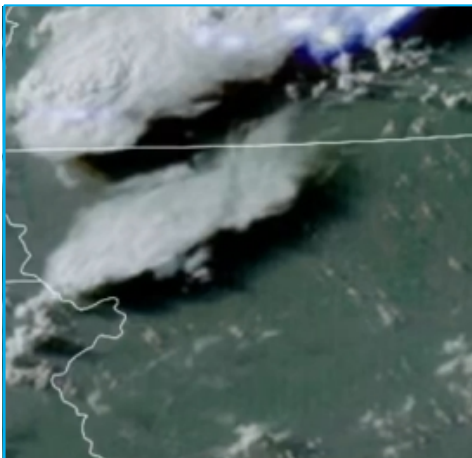
Action to limit future warming and reduce risks can have near-term benefits and opportunities

Low-carbon energy jobs	Improved air quality	Health benefits	Economic benefits
Reduced risks to ecosystems	Reduced risks to biodiversity	More options for adaptation	Social benefits

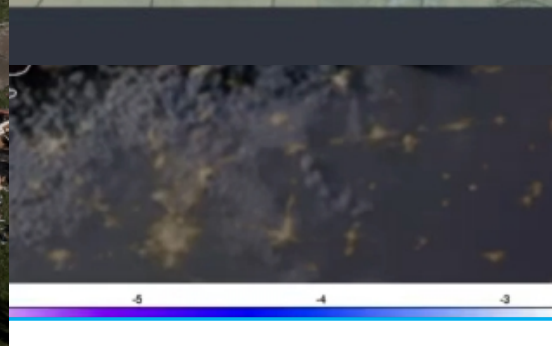
United States Billion-Dollar Disaster Events 1980-2023 (CPI-Adjusted)

- Drought Count
- Flooding Count
- Freeze Count
- Severe Storm Count
- Tropical Cyclone Count
- Wildfire Count
- Winter Storm Count
- Combined Disaster Cost
- Costs 95% CI
- 5-Year Avg Costs





Damage Surveys for May 26, 2024 Event



NOAA's Next-Gen Earth Observation Strategy

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

LEO

Maintain critical global observations and partnerships yielding high accuracy long-range forecasts, including storms, floods and fires. New systems will utilize next-generation instruments launched on single payload satellites, embracing agile, "new space" commercial processes.

GEO

Continuous real-time observations supporting warnings and watches of severe weather and hour-by-hour changes. Monitoring of oceans, atmosphere, and climate to improve productivity and health outcomes.

SWO

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 a Common Cloud Framework, providing new and better products and services.

OSPO - Operations

24-Hour Operations for GEO, LEO, & Space Weather satellite systems. 24-Hour Support for Severe Weather and Environmental Forecasting Near-Real-Time Products For the User

STAR – Applied Research

Operations-focused research, development, validation, and maintenance of products and applications based on end user needs. **Develops** the science to make raw satellite data useful. **Improves** data quality, products, and services. **Supports** development of next-generation NOAA satellites and missions.

NCEI – Archives & Services

National archive of environmental data. Produces monthly and annual climate reference data reports. Produces National Climate Assessments, Billion Dollar Disaster, and other reports. Provide information services for multiple u



NOAA Satellite Missions



DSCOVR
Operational July 27, 2016



SWFO
SWFO-L1 - Launches fiscal year 2025



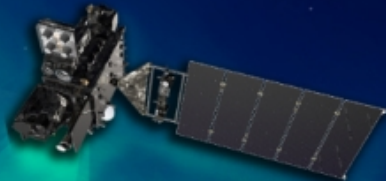
SW NEXT



COSMIC-2
Operational Feb. 25, 2020



JASON-3
Operational July 1, 2016



GOES-R SERIES
GOES-16 - Operational Dec. 18, 2017
GOES-17 - Operational Feb. 12, 2019
GOES-18 - Operational Jan. 4, 2023
GOES-U - June 25, 2024



GeoXO



SENTINEL-6 Michael Freilich
Operational Nov. 22, 2021



JPSS SERIES
Suomi-NPP - Operational May 1, 2014
NOAA-20 - Operational May 30, 2018
NOAA-21 - Operational Nov. 8, 2023
JPSS-3 - Launches fiscal year 2033
JPSS-4 - Launches fiscal year 2028



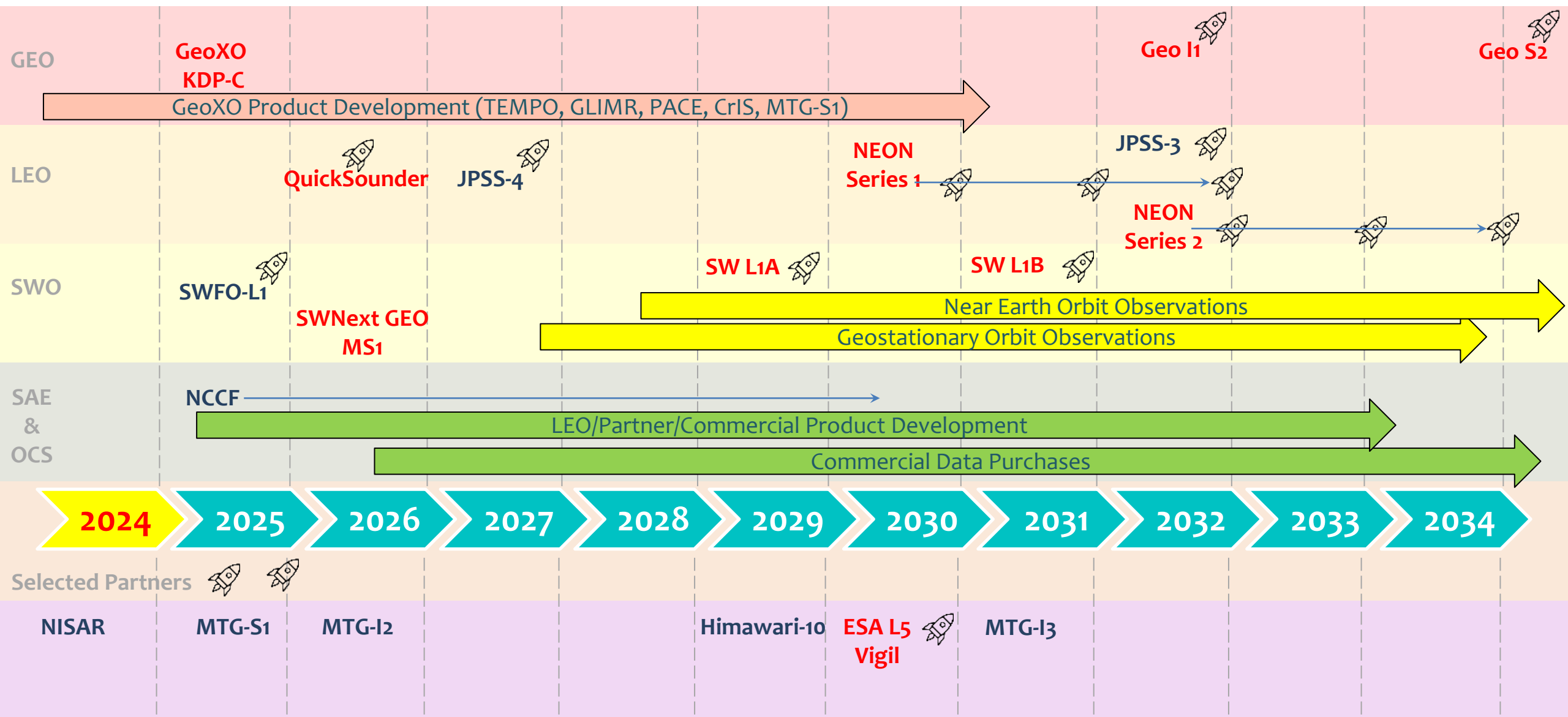
NEON



QuickSounder
Launches fiscal year 2026

The Next 10 Years for NESDIS: 2024-2034

In RED are the new missions for NESDIS





LMX
Lightning Mapper

- Thunderstorm / tornado warning
- Wildfire ignitions
- Precipitation forecasts
- Tropical storm diagnosis



GXS
Hyperspectral IR Sounder

- Numerical weather prediction
- Hurricane track / intensity
- Now-casting
- Warn-on-Forecast
- Air quality monitoring



ACX
Atmospheric Composition Instrument

- Air quality forecasting
- Air quality monitoring
- Atmospheric rivers, flooding
- Emissions monitoring



GXI
Vis/IR Imager

- Hurricane location / track
- Severe storms, rain, wind, hail
- Atmospheric rivers, flooding
- Winter storms, ice cover
- Wildfire, smoke, volcanic ash
- Methane plume monitoring
- Aviation hazards, turbulence



OCX
Ocean Color Instrument

- Harmful algal blooms
- Water quality
- Oil spill tracking
- Plankton classification
- Refined fisheries yield
- Habitat / species protection
- Naval forecasting

Climate Monitoring

Weather Preparedness

Resilient Coasts

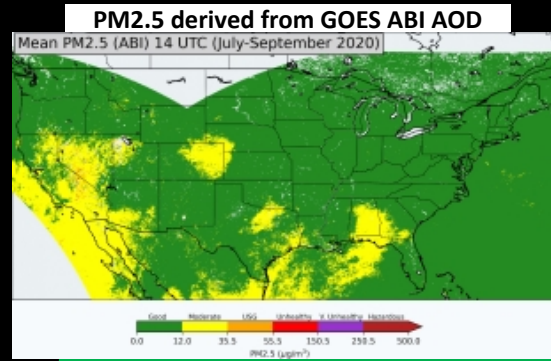
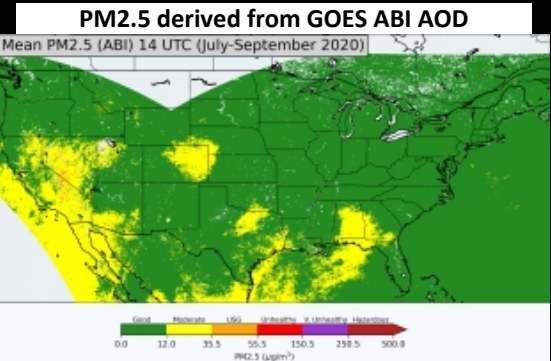
Healthy Oceans



Note:
OCX represented by GLIMR
LMX represented by GLM
ACX represented by TEMPO

GeoXO's Multi-Instrument Synergy for Atmospheric Composition Observations

GeoXO Constellation



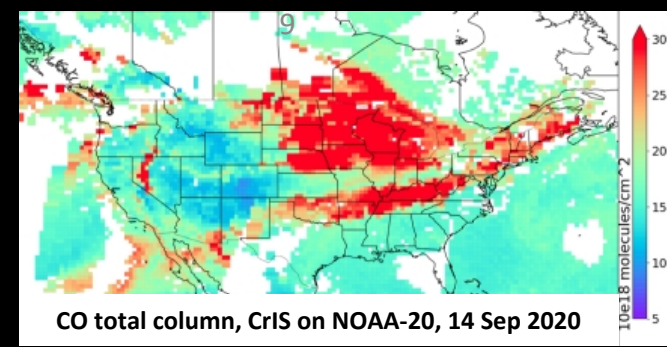
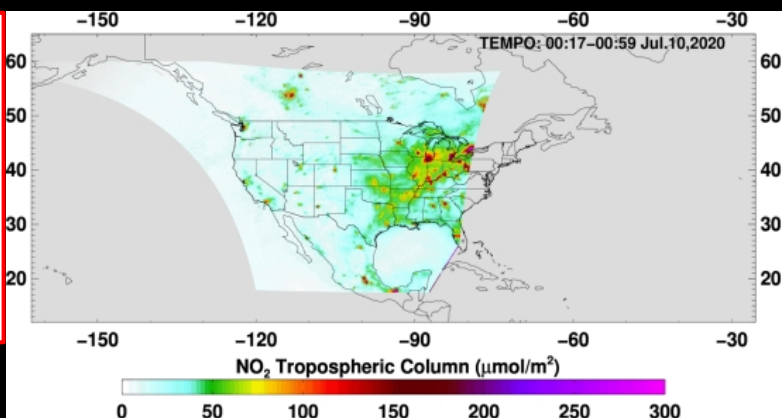
- Vis/IR Imager (GXI)**
- Fire detection
 - Fire radiative power
 - Aerosol type
 - Aerosol optical depth
 - Aerosol concentration

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- UV/Vis Spectrometer (ACX)**
- Ozone
 - Nitrogen dioxide
 - Sulfur dioxide
 - Formaldehyde
 - Aerosol layer height

- IR Sounder (GXS)**
- Ozone
 - Carbon monoxide
 - Carbon dioxide
 - Ammonia



New GHG Capability with ABI

Researchers at Harvard demonstrated that they could detect a major methane leak with GOES-R ABI.

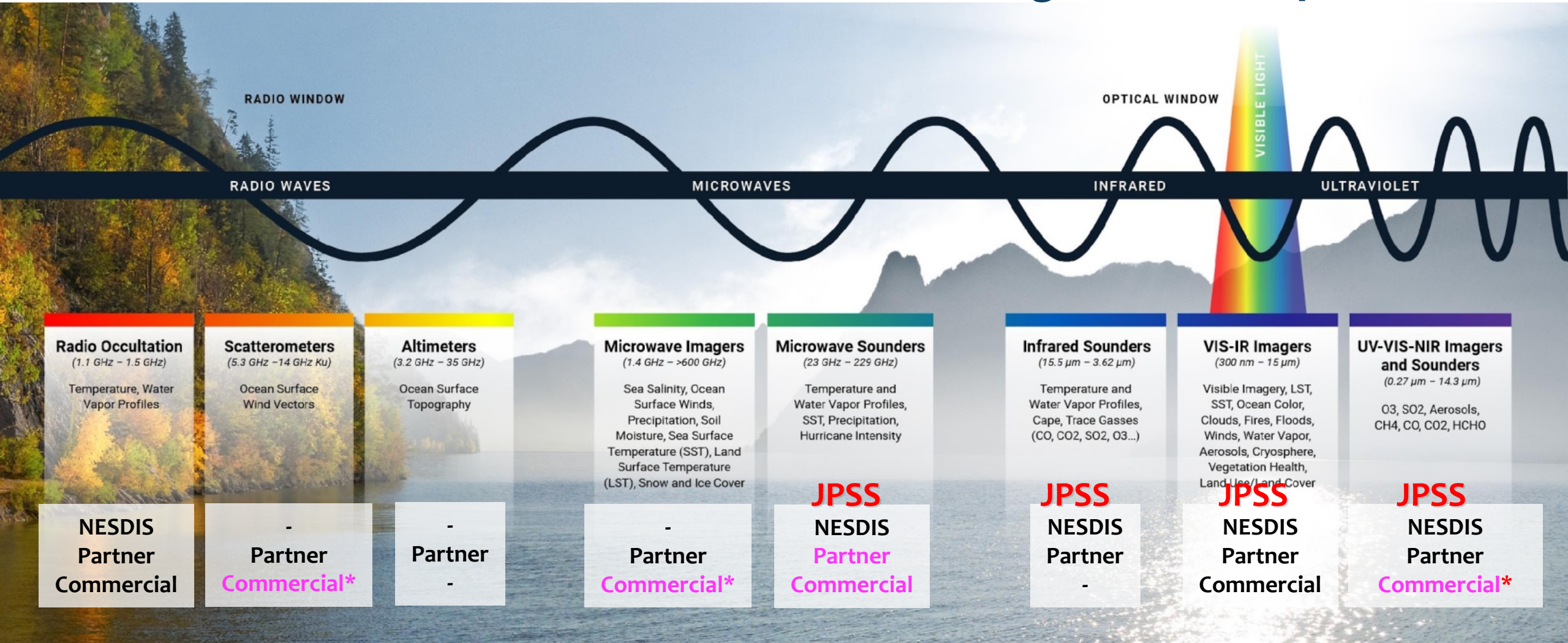
The methane sensitivity comes from the 2.25 μ m channel. ABI has a small level of methane absorption.

In the future, combining ABI (and GXI) with high resolution LEO satellites like MethaneSAT or GHGSat could be part of a GHG constellation



Daniel Varon (Harvard University)

NEON Measurements Cover All Usable Regions of EM Spectrum



Current Systems

Potential Future Systems

* indicates current studies

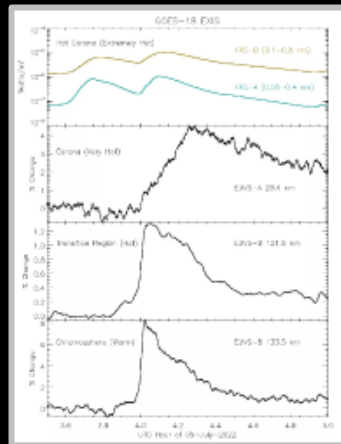


SWO – Building on a Research Satellite Legacy

SWFO sustains NOAA's foundational set of space-based space weather observations and measurements to ensure continuity of critical data.



GOES-16 SUVI



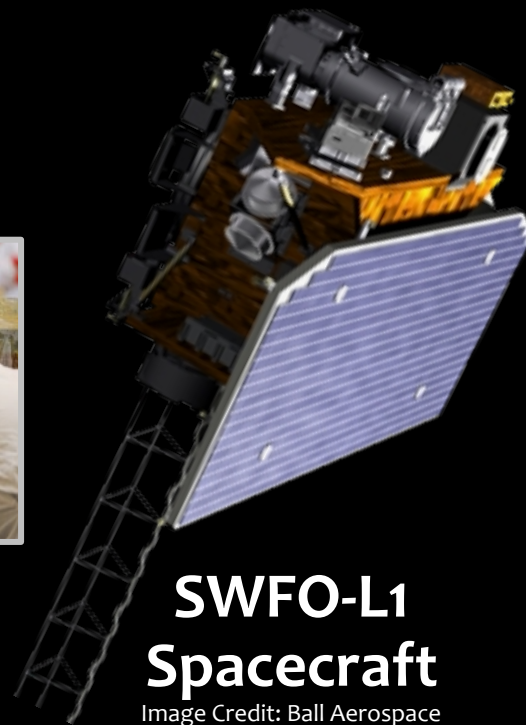
GOES-18 EXIS

CCOR-1 integration onto GOES-U

Image Credit: Lockheed Martin



CCOR-2 on SWFO-L1 Together with: Solar Wind Plasma Ion Sensor Magnetometer



SWFO-L1 Spacecraft

Image Credit: Ball Aerospace

Reaching L1 riding with
NASA's IMAP mission

Space Weather Next Program

- Planning for continuity and observations from:
 - L1 extended continuity
 - L5 Orbits – ESA Partner
 - Geostationary Orbit - TBD
 - Low Earth Orbit - TBD
- Development of Space Weather Ground Support Networks
- **SWNext L1 Series DOC MS2 gate review summer 2024**

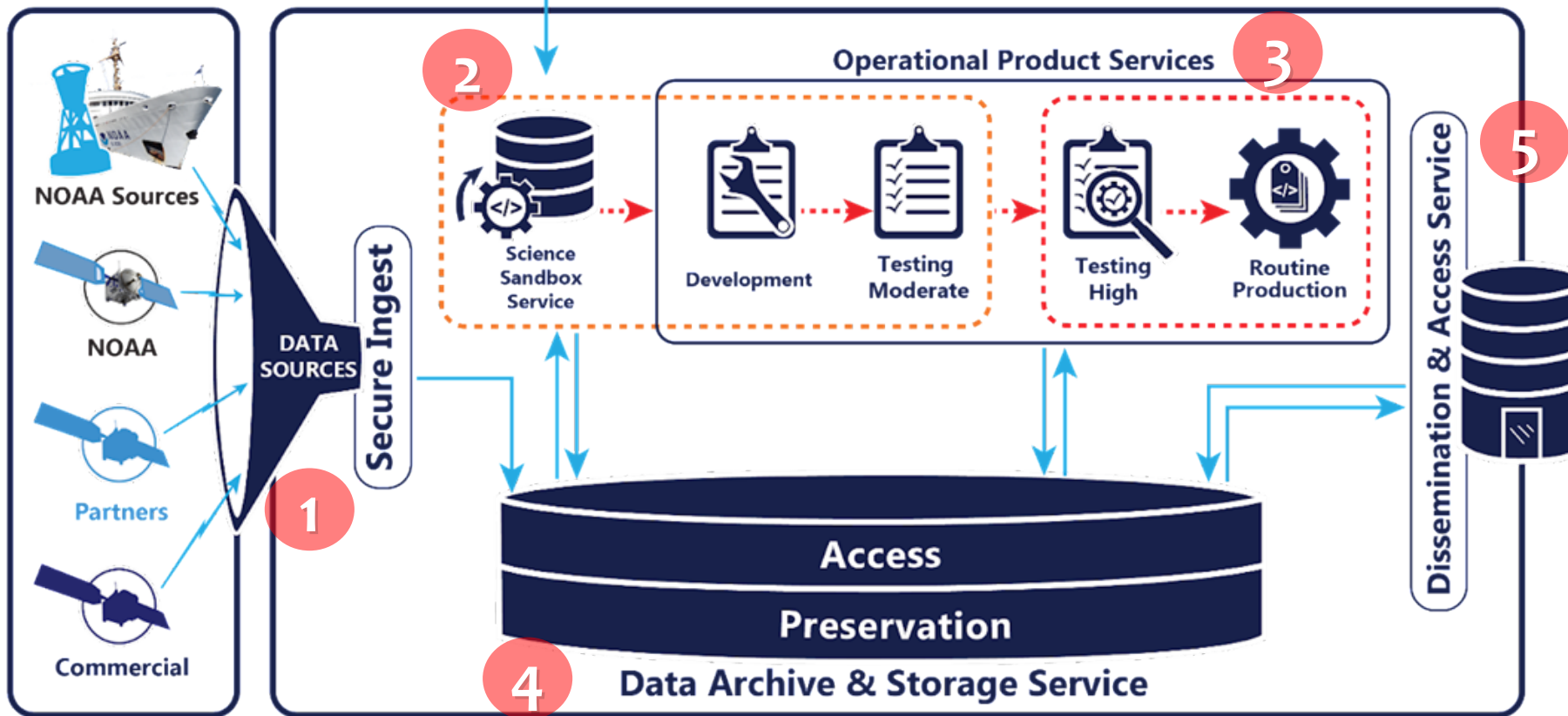


NESDIS Common Cloud Framework: Ground Enterprise Strategy

Interactive science, development and stewardship use



NESDIS Common Cloud Framework (NCCF)



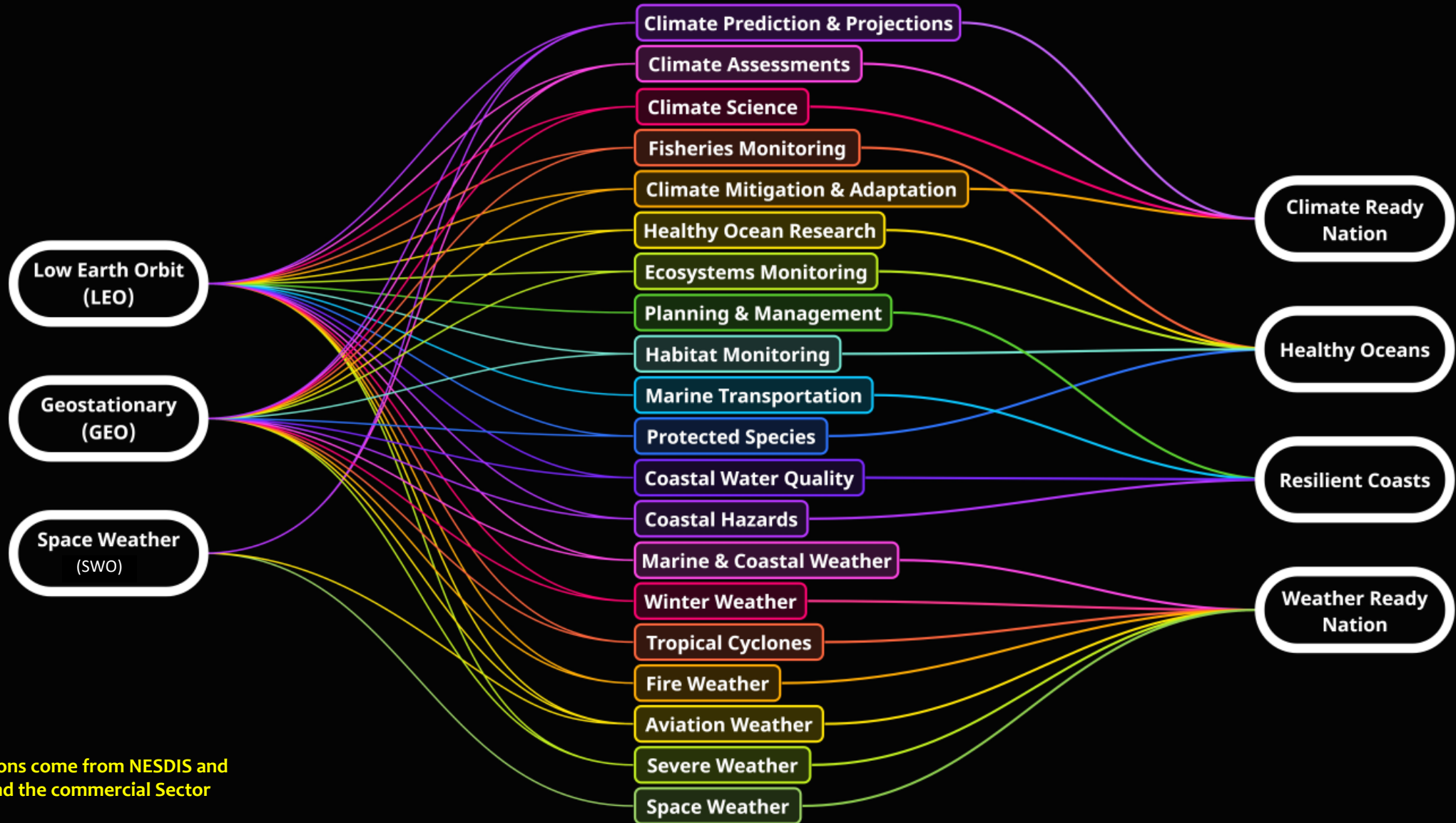
Five Basic Services:

- 1 Secure Ingest
- 2 Science Sandbox
- 3 Operational product processing
- 4 Data archive & Storage
- 5 Dissemination & Access

Data Ingest from Sources
 Data Flow
 Automated Code Deployment
 Moderate FISMA
 High FISMA



Satellite Observations Advance the Full Spectrum of Climate Resilience, Ecosystem Awareness, and Adaptation



Input observations come from NESDIS and our Partners, and the commercial Sector





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Thank you. Questions?

