

National Aeronautics and
Space Administration



EXPLORE EARTH

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Earth Action Program
Earth Science Division
NASA Headquarters

HAQAST Utah: The NASA Health
and Air Quality Applications
Program

October 19, 2023

Final TROPICS Launch (May 26, 2023 at 3:46 PM NZST)





EARTH FLEET

INVEST/CUBESATS

- NACHOS 2022
- CTIM 2022
- NACHOS-2 2022
- MURI-FD 2023
- SNOOPI* 2024
- HYTI* 2024
- ARGOS* 2024

JPSS INSTRUMENTS

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

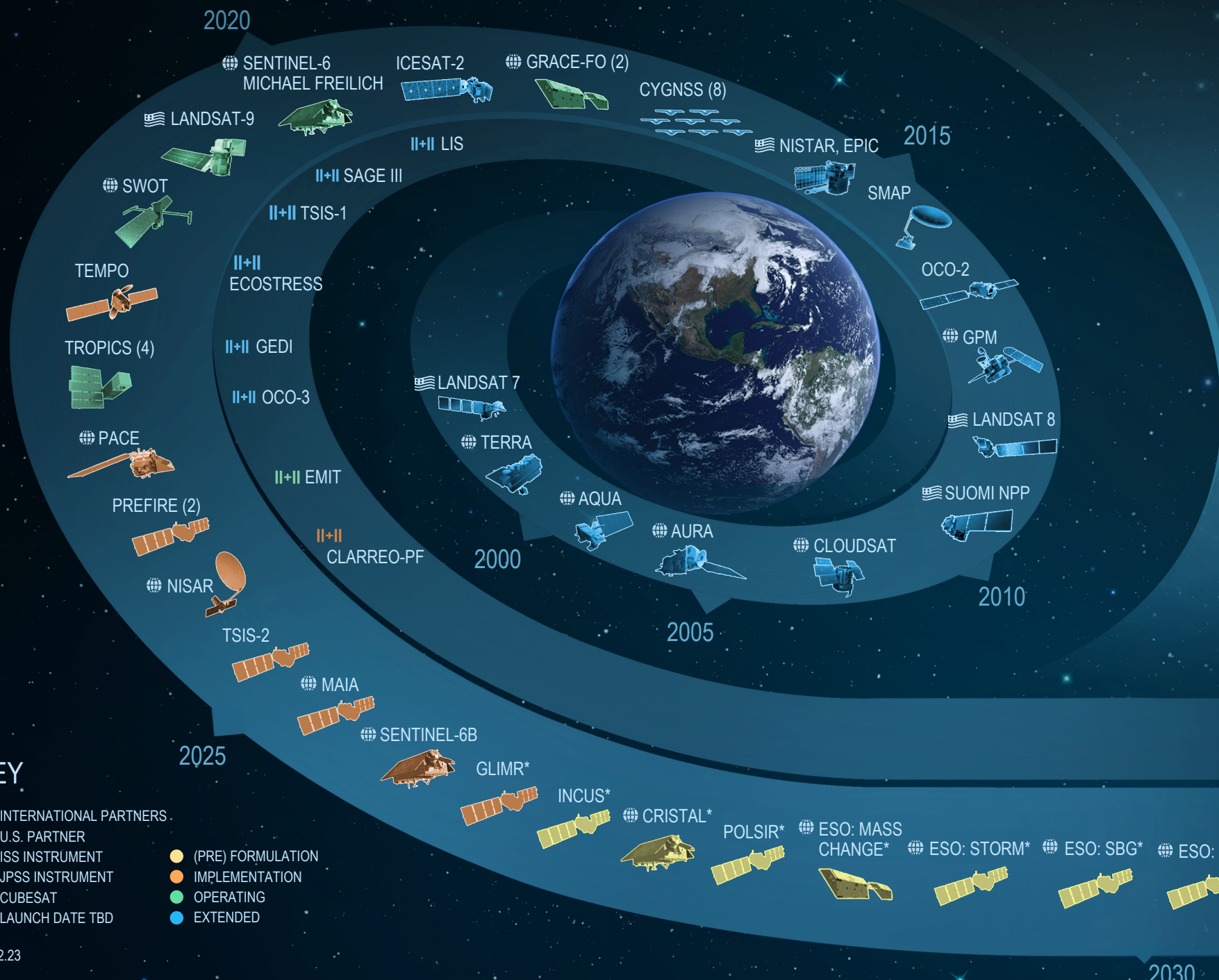
ISS INSTRUMENTS

MISSIONS

KEY

- INTERNATIONAL PARTNERS
- U.S. PARTNER
- ISS INSTRUMENT
- JPSS INSTRUMENT
- CUBESAT
- LAUNCH DATE TBD

- (PRE) FORMULATION
- IMPLEMENTATION
- OPERATING
- EXTENDED



Earth Science to Action Strategy

Earth Science to Action



Public Understanding & Exchange

We engage broader audiences and data users to:

- Put more scientific understanding into public sphere
- Deliver applied science to users
- Participate in multi-way info exchange
- Use input to inform subsequent work



EARTH ACTION PROGRAM

Mission

Enable people & organizations to apply insights from Earth science to benefit the economy, health, quality of life, and environment.

What We Do

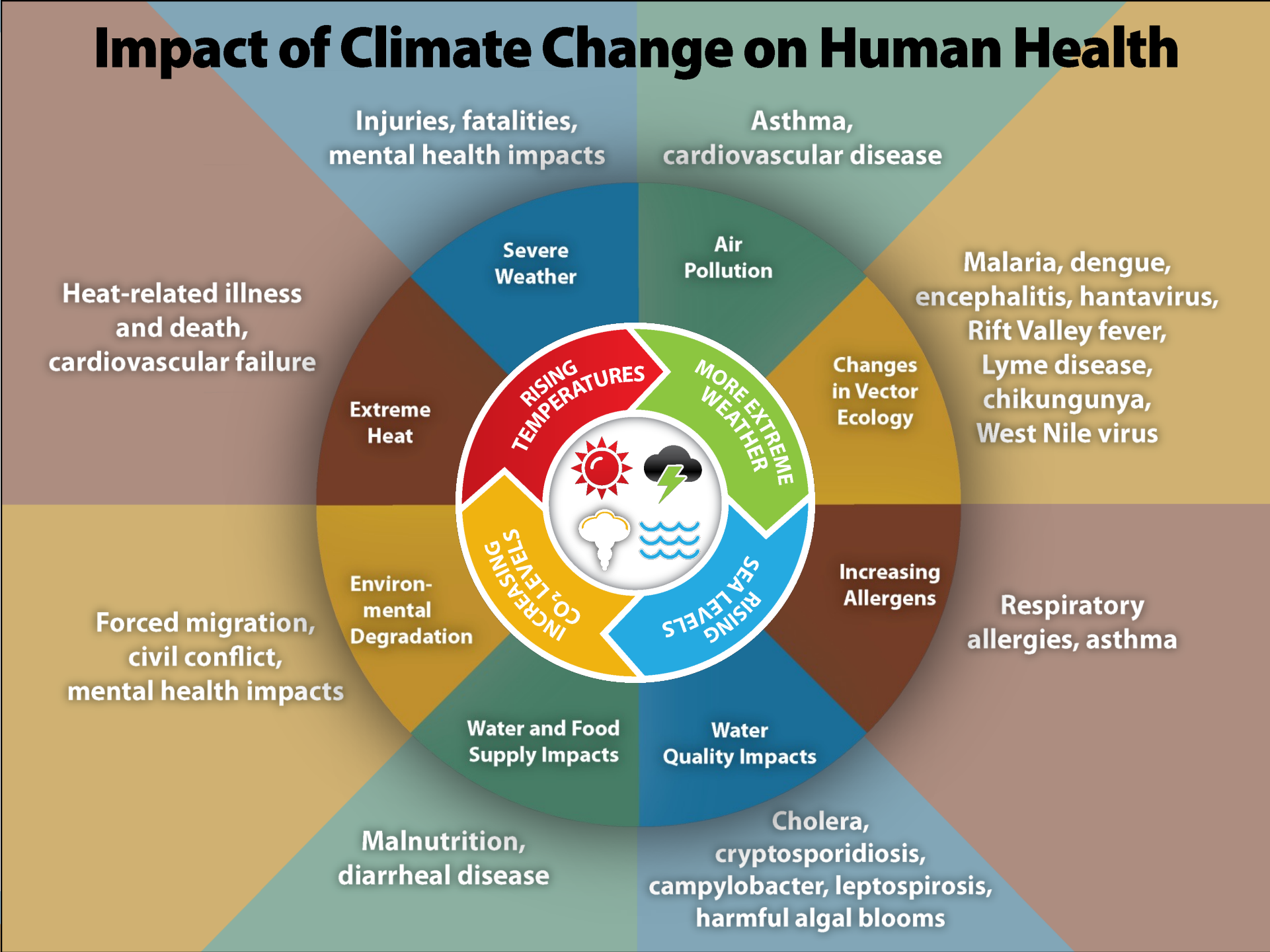
We make financial and programmatic investments to generate creative solutions and lower the technical and institutional barriers to using Earth science information

- Work with organizations to improve their decisions and actions
- Draw on our connections with users to bring their feedback and inquiries back to ESD



*Scalability
Building Bridges
User-centric projects*

Impact of Climate Change on Human Health



NASA Health & Air Quality Applications Objectives:

We support the use of Earth observations in air quality management and public health, particularly regarding...

- **Infectious disease and environmental health**
- **Toxic and pathogenic exposure and health-related hazards**
- **Implementation of air quality standards, policy, and regulations**
- **Effects of climate change on public health and air quality**



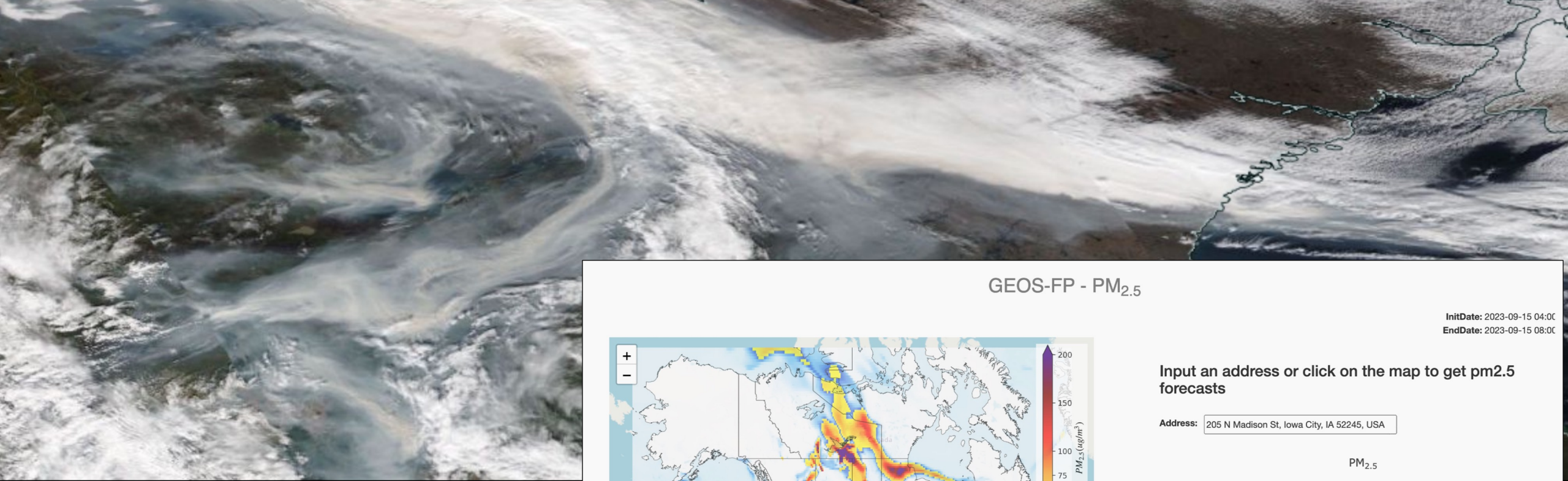
Major Partners include International (e.g., GEO, WHO, UNICEF, PAHO), Federal (e.g., CDC, EPA, NIH, NOAA), State (e.g., South Dakota, California, Texas), and Private sectors (e.g., AER, Inc., Moore Foundation).



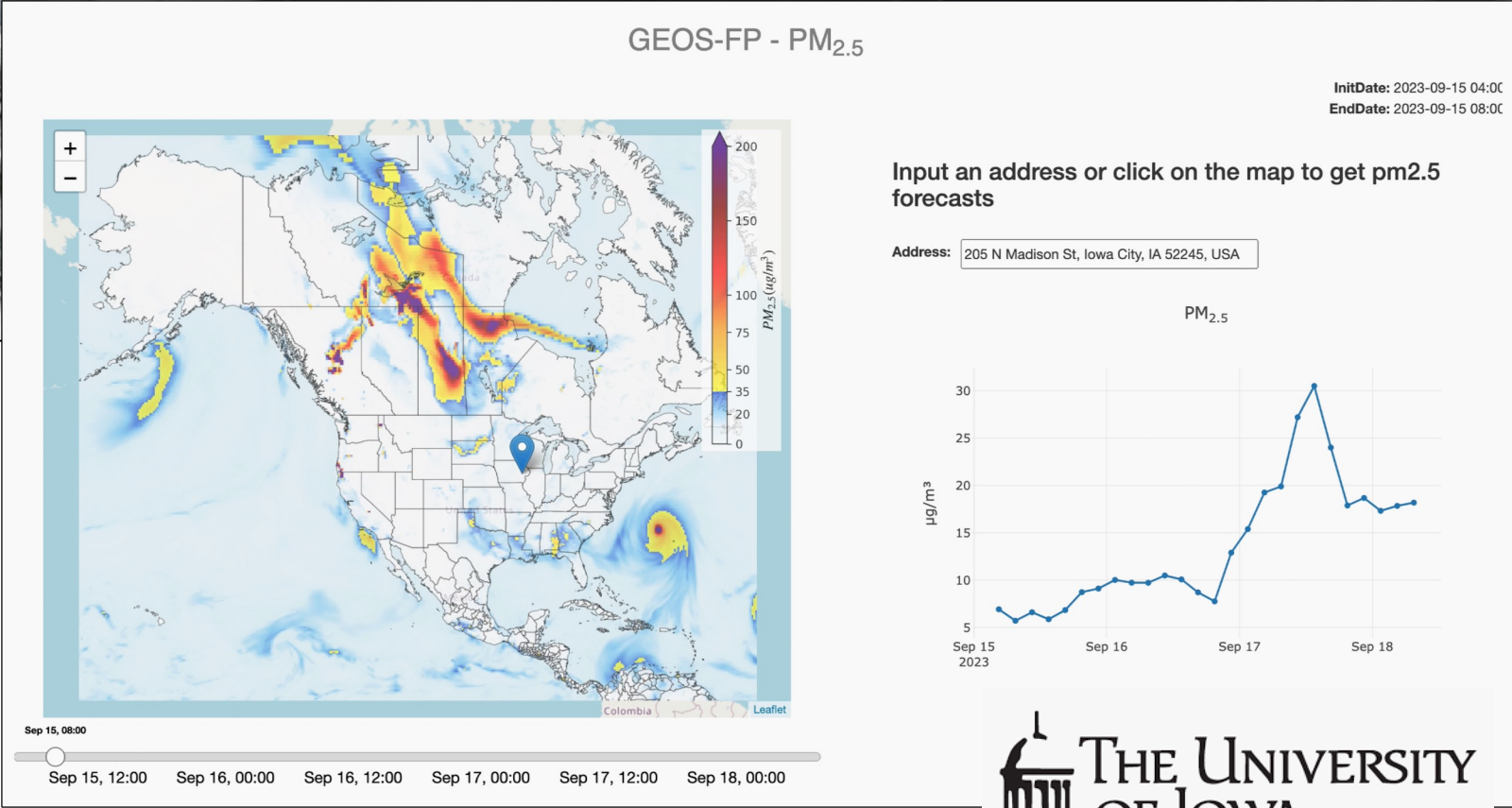
Simulating air pollution along urban/coastal boundaries, like Lake Michigan, is challenging due to complex meteorology (e.g., lake breezes).

NASA high resolution satellite data help improve models used to demonstrate air pollutant attainment strategies required by the Clean Air Act





NASA satellite data and models are key during weekly briefings on wildfire air quality impacts to 21 stakeholder organizations in state and federal air quality management.



HEALTH & AIR QUALITY



<http://fireaq.uiowa.edu/>

Other Items of Note

- Tom Wagner announced as new AD for NASA Earth Action.
 - Slow response from NSSC on placing grants/augmentations.
 - Remember your Annual Reports are due 60 days **prior** to your anniversary date.
 - Five new HAQAST Tiger Teams announced in July.
 - Funding available for HAQAST Rapid Response.
 - Continuing Resolution in effect until November 17.
-
- 2023 NASA Earth Science Senior Review complete. Report link: <https://science.nasa.gov/earth-science/operating-missions/>
 - First physical space for the NASA Earth Information Center opened at NASA HQ in June.
 - ARSET Training: Satellite Data for Air Quality Environmental Justice and Equity Applications in August.
 - Recent sessions at ATS, AWMA, and AmeriGEO week – along with presentations at NASA Earth Day events, the World Medical Association, UNEP Int'l Day of Clean Air for Blue Skies, and various universities.
 - APHA in Atlanta, GA – November 12-15.
 - AGU in San Francisco, CA – December 11-15.
 - AMS in Baltimore, MD – January 28 – February 1.
 - AMCA in Dallas, TX – March 4-8.

Transform to Open Science (TOPS)

TOPS is a 5-year NASA SMD initiative to foster adoption of Open Science practices across the scientific community.



Strategic Objectives:

- Increase understanding & adoption of open science
- Accelerate major scientific discoveries
- Broaden participation by historically underrepresented communities

Improving Health Decision-Making Using Environmental Observations

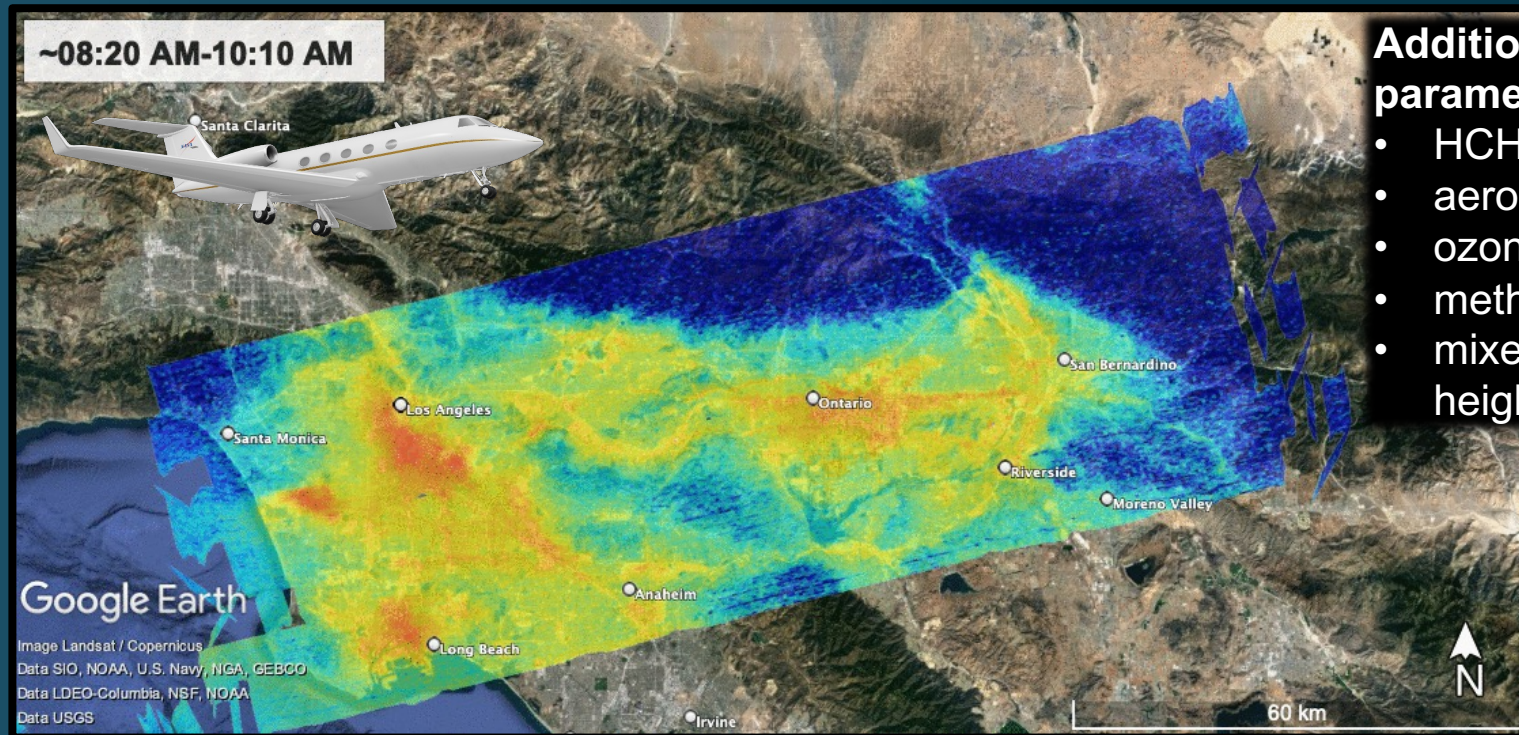
Global network of governments, organizations, and observers, who seek to use Earth observation data to improve health decision-making at the international, regional, country, and district levels

Bi-Weekly Teleconferences
AGU Fall Meeting (USA)
GEO Symposium
AmeriGEO Week

Work Groups

- ☐ Heat-related Health Risks
- ☐ Infectious Diseases
- ☐ Air Quality, Wildfires, and Respiratory Health
- ☐ Food Security and Safety
- ☐ Health Care Infrastructure

Synergistic TEMPO Air Quality Science



Preliminary NO₂ slant columns from August 23, 2023 collected from GCAS (airborne TEMPO proxy) on the LaRC GIII in LA.

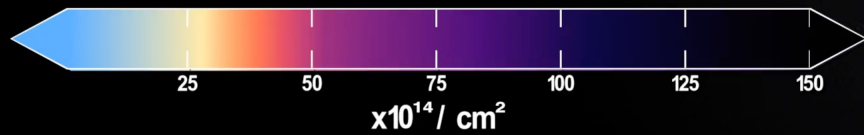


TEMPO First Light

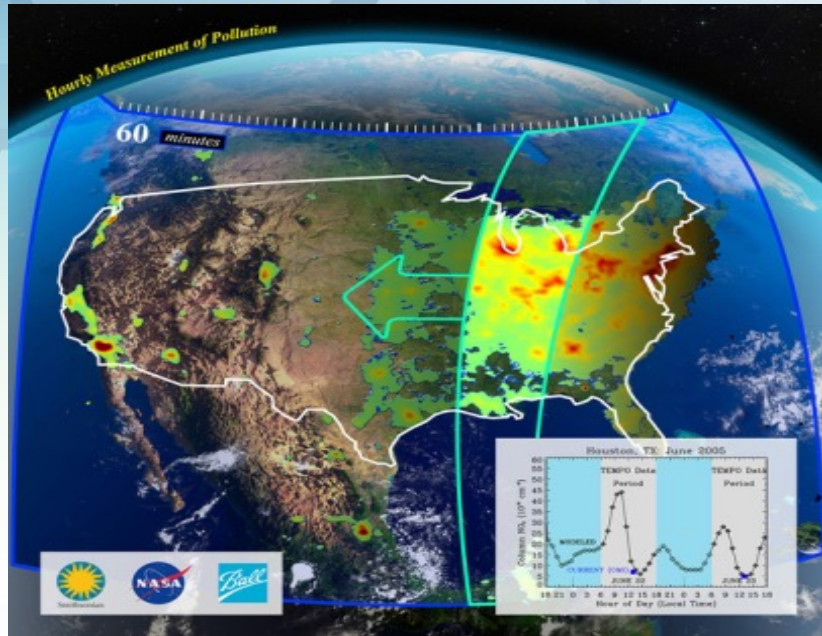
August 2, 2023

02 Aug 2023 11:11 EDT

Nitrogen Dioxide Tropospheric Column Density



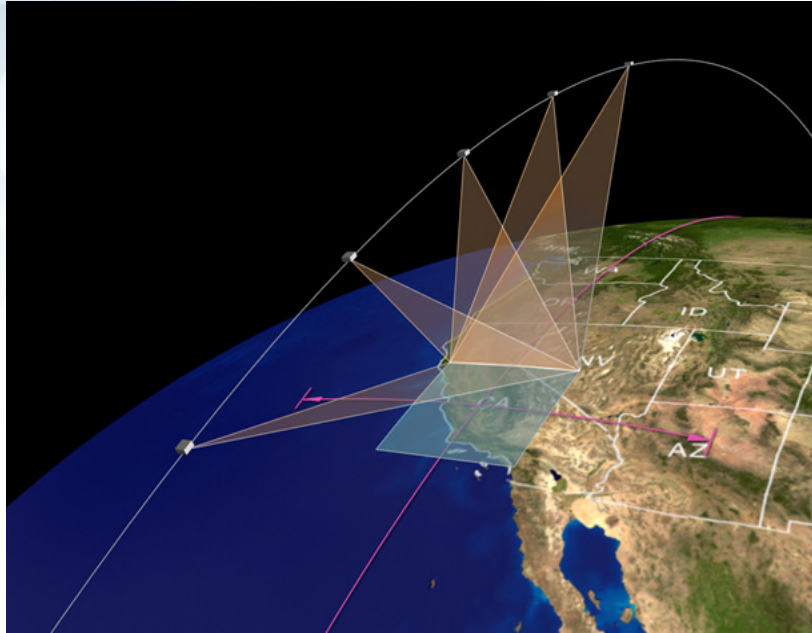
Earth Venture Instrument-1: Tropospheric Emissions: Monitoring of Pollution (TEMPO)



“Monitoring the air we breathe, hour by hour”
Credits: TEMPO website

- ❖ **TEMPO is a pathfinder to using hosted commercial payloads from GEO.**
- ❖ Collects tropospheric pollution observations from geostationary orbit: Ozone, NO_2 , CH_2O .
- ❖ Forms a global air quality constellation in GEO with Copernicus Sentinel 4 and Korean GEMS.
- ❖ Instrument delivered in 2018; Launched April 2023; First Light released August 24.

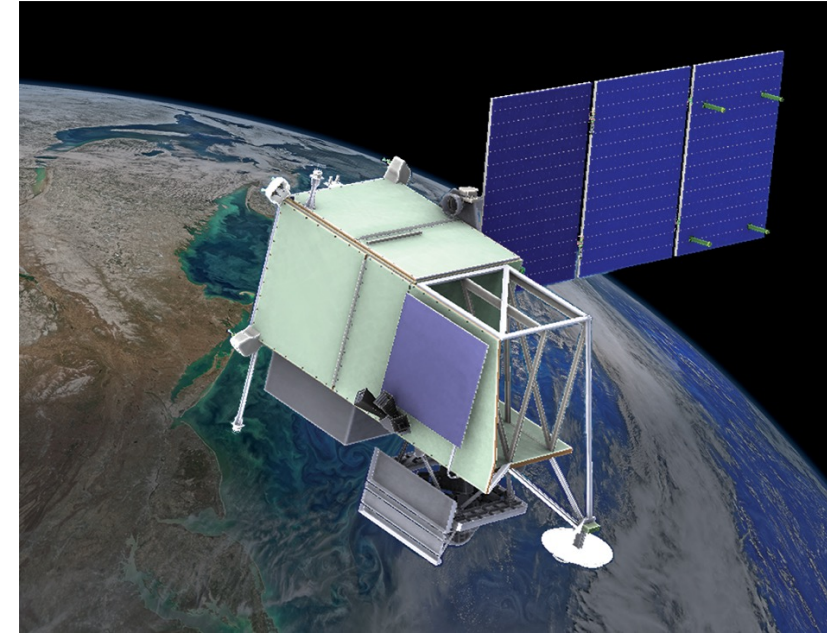
Earth Venture Instrument-3: Multi-Angle Imager for Aerosols (MAIA)



Credits: MAIA website

- ❖ **MAIA represents a sentinel partnership between NASA and epidemiologists/health organizations on a satellite mission.**
- ❖ Assesses linkages between different airborne PM types and adverse birth outcomes, cardiovascular and respiratory disease, and premature deaths.
- ❖ Will measure particle types, sizes, concentrations, and geolocation of atmospheric aerosols.
- ❖ Launch expected 2025.

Plankton, Aerosol, Cloud, ocean Ecosystem (PACE)



Credits: PACE website

- ❖ **PACE's Ocean Color instrument will be the most advanced for observing ocean color in NASA's history.**
- ❖ Assesses ocean color, aerosol, and cloud data records for Earth system and climate studies.
- ❖ Multi-angle polarimeter to measure the particle sizes and compositions of atmospheric aerosols and ocean color.
- ❖ Launch expected January 2024.

EARTH SYSTEM OBSERVATORY

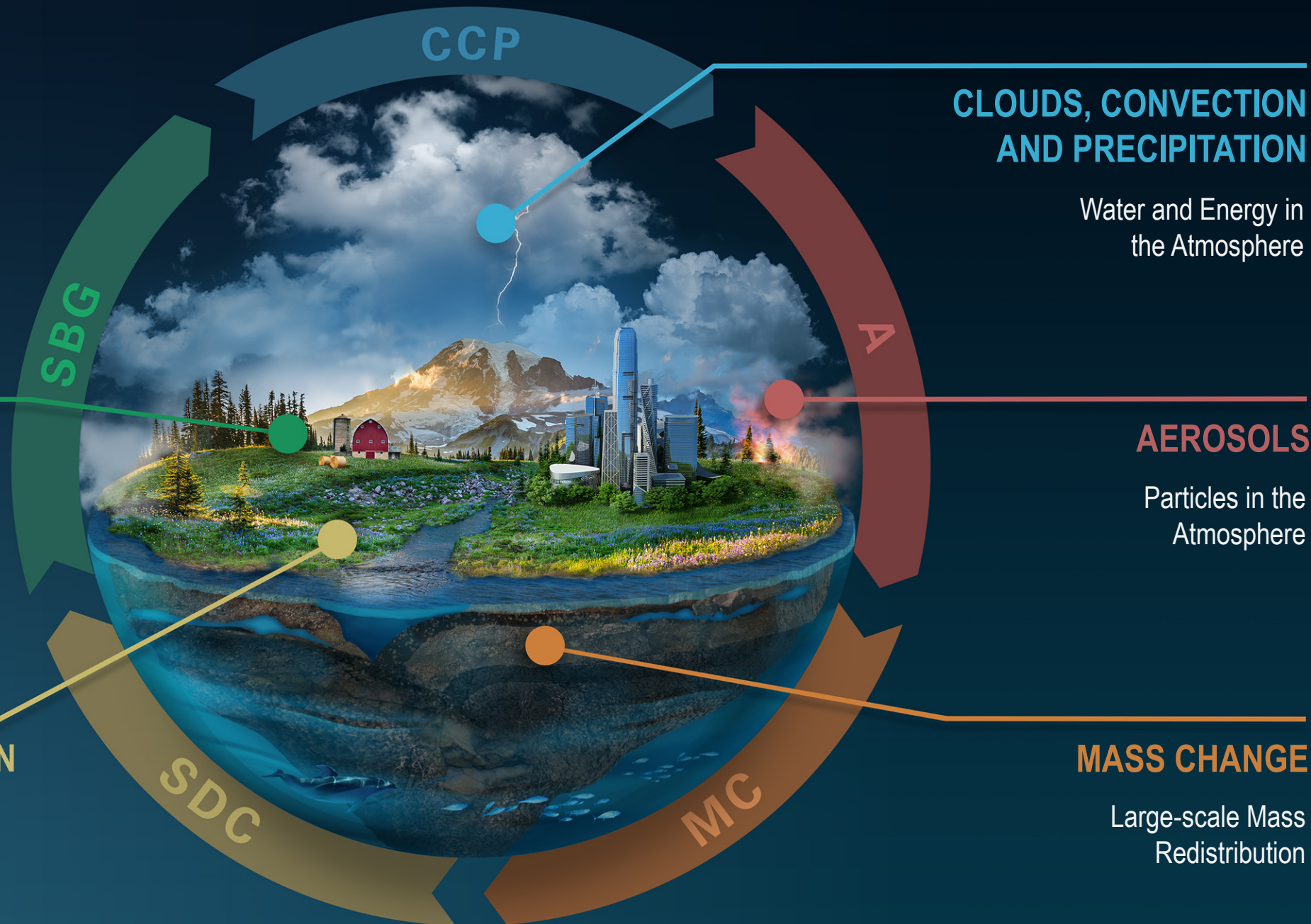
INTERCONNECTED
CORE MISSIONS

SURFACE BIOLOGY AND GEOLOGY

Earth Surface &
Ecosystems

SURFACE DEFORMATION AND CHANGE

Earth Surface Dynamics





National Aeronautics and
Space Administration



Questions:

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<http://AppliedSciences.NASA.gov>

