



Health and Air Quality Applied Sciences Team Meeting

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Launch of GRACE-FO on May 22, 2018, from
VAFB.



Launch of ECOSTRESS on June 29, 2018,
from Cape Canaveral Air Force Station.

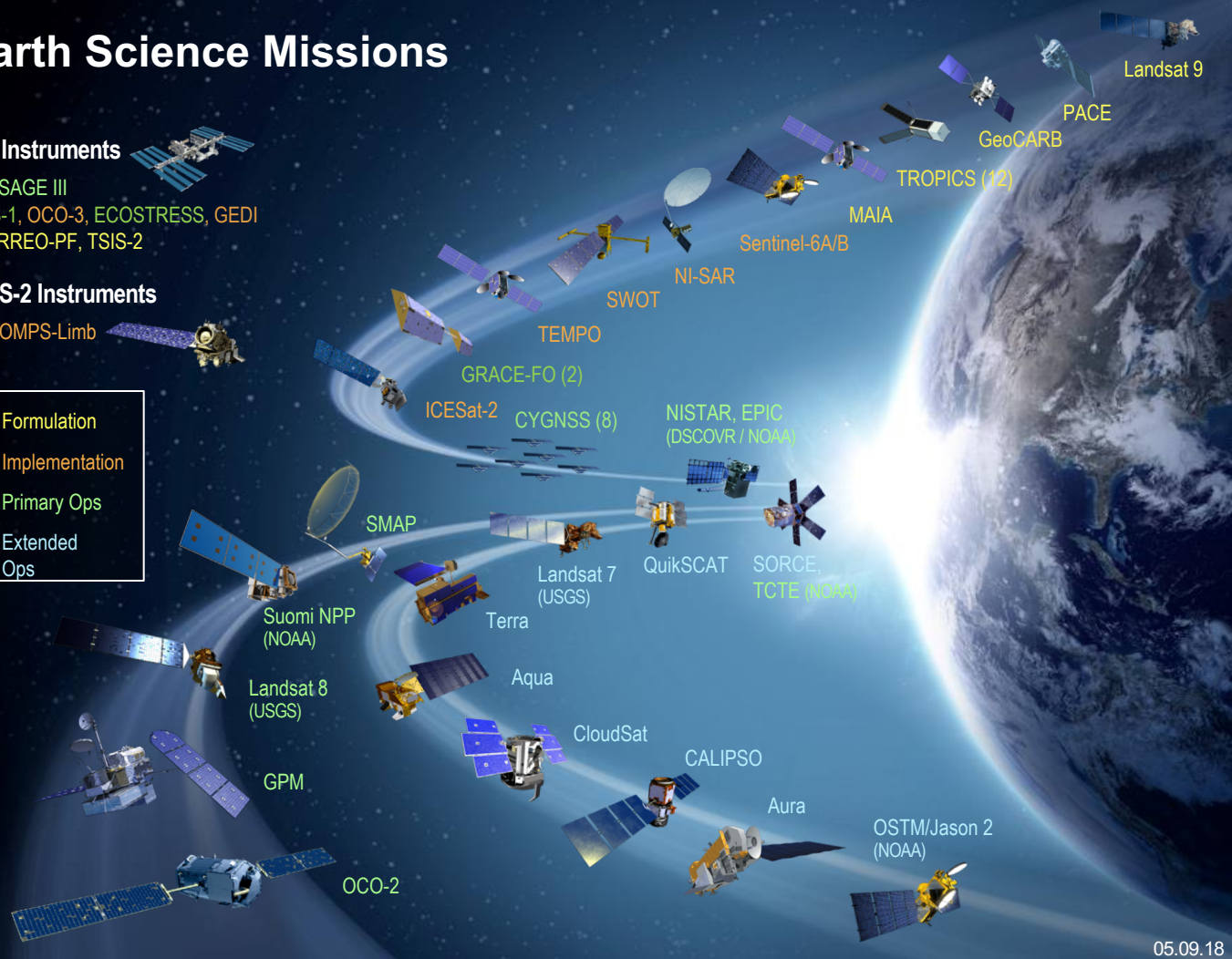
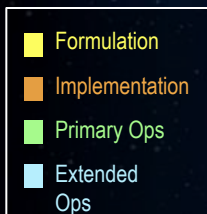
Earth Science Missions

ISS Instruments

LIS, SAGE III
 TSIS-1, OCO-3, ECOSTRESS, GEDI
 CLARREO-PF, TSIS-2

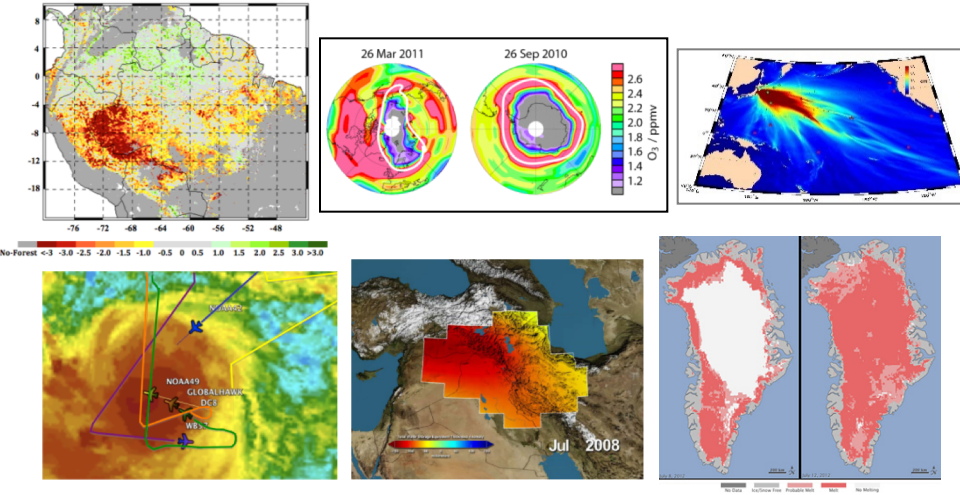
JPSS-2 Instruments

RBI, OMPS-Limb

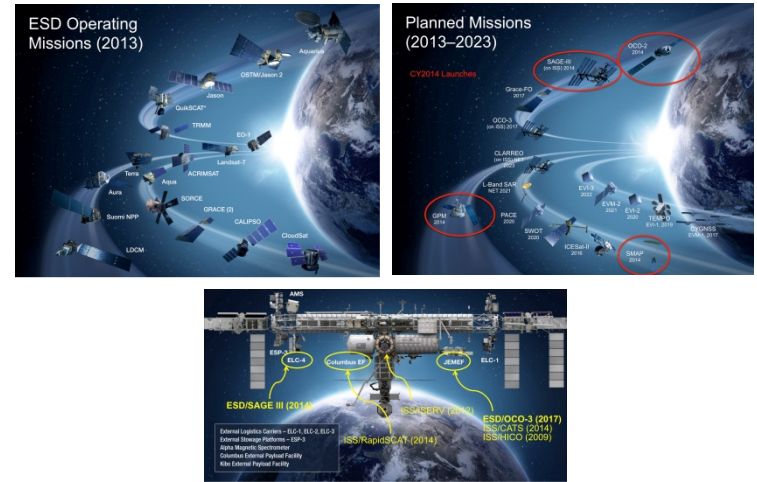


NASA's Earth Science Division

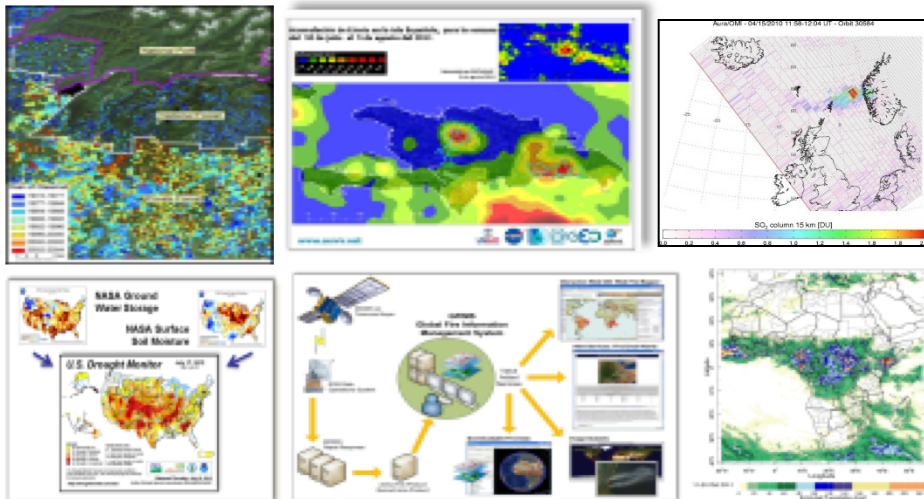
Research



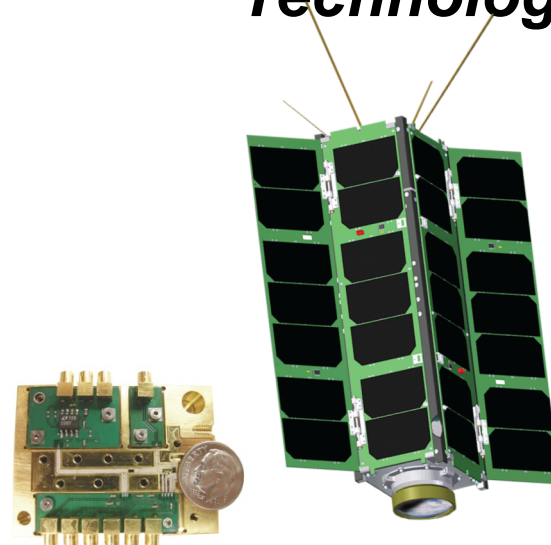
Flight



Applied Sciences



Technology



Discovering and demonstrating innovative and practical uses of Earth observations in organizations' policy, business, and management decisions.



<http://AppliedSciences.NASA.gov>

Applications

Prove-out, develop, and transition applications ideas for sustained uses of Earth obs. in decision making.

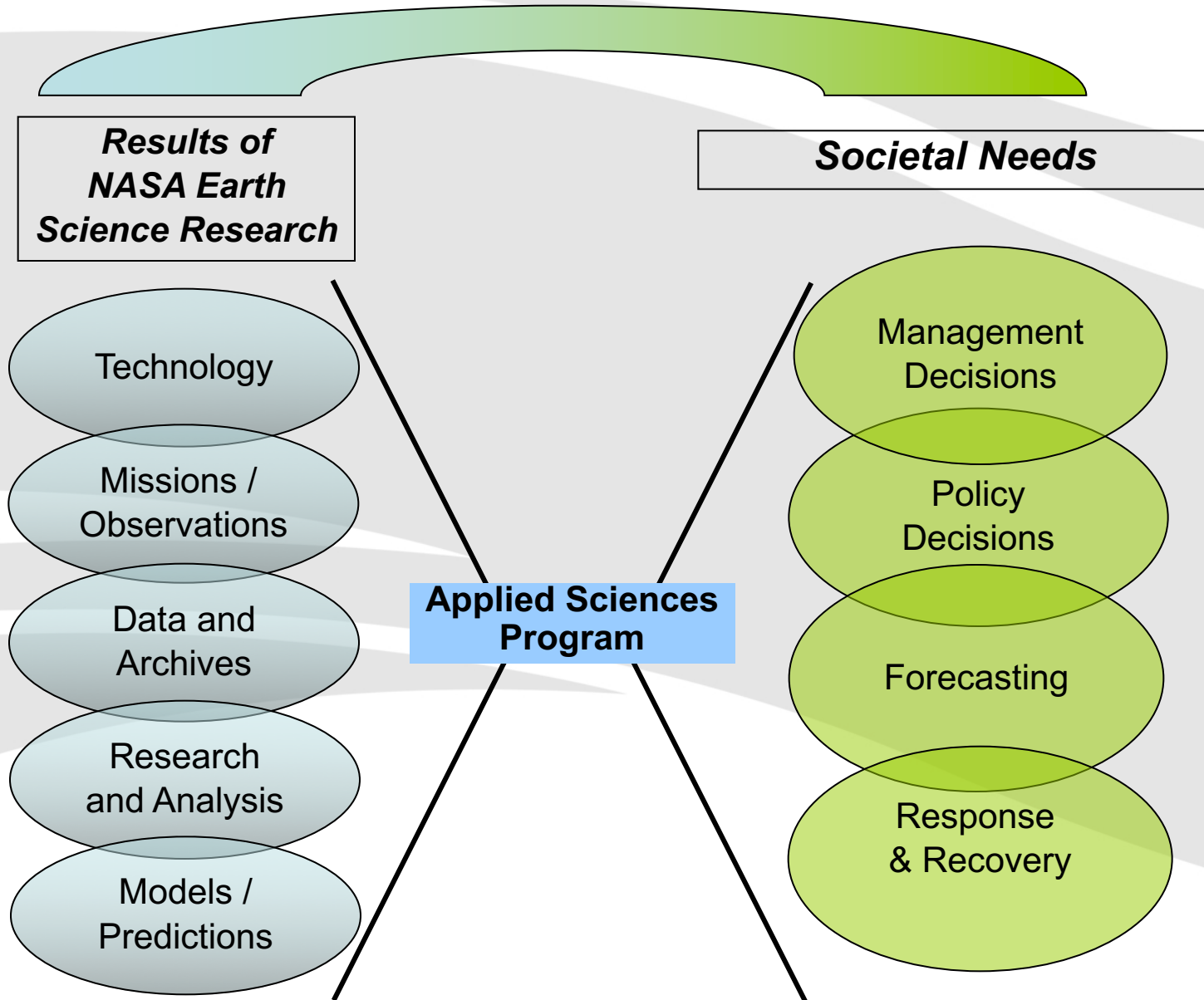
Capacity Building

Build skills and capabilities in US and developing countries to access Earth observations to benefit society.

Mission Planning

Identify applications early in mission lifecycle and integrate end-user needs in mission design and development.

NASA Applied Sciences Architecture





Applications Areas

NASA
Earth Science

Emphasis in Applications Areas

*Support opportunities
in
additional areas*

Health &
Air Quality

Water
Resources

Ecological
Forecasting

Energy

Disasters

Agriculture /
Food Security

Urban
Development

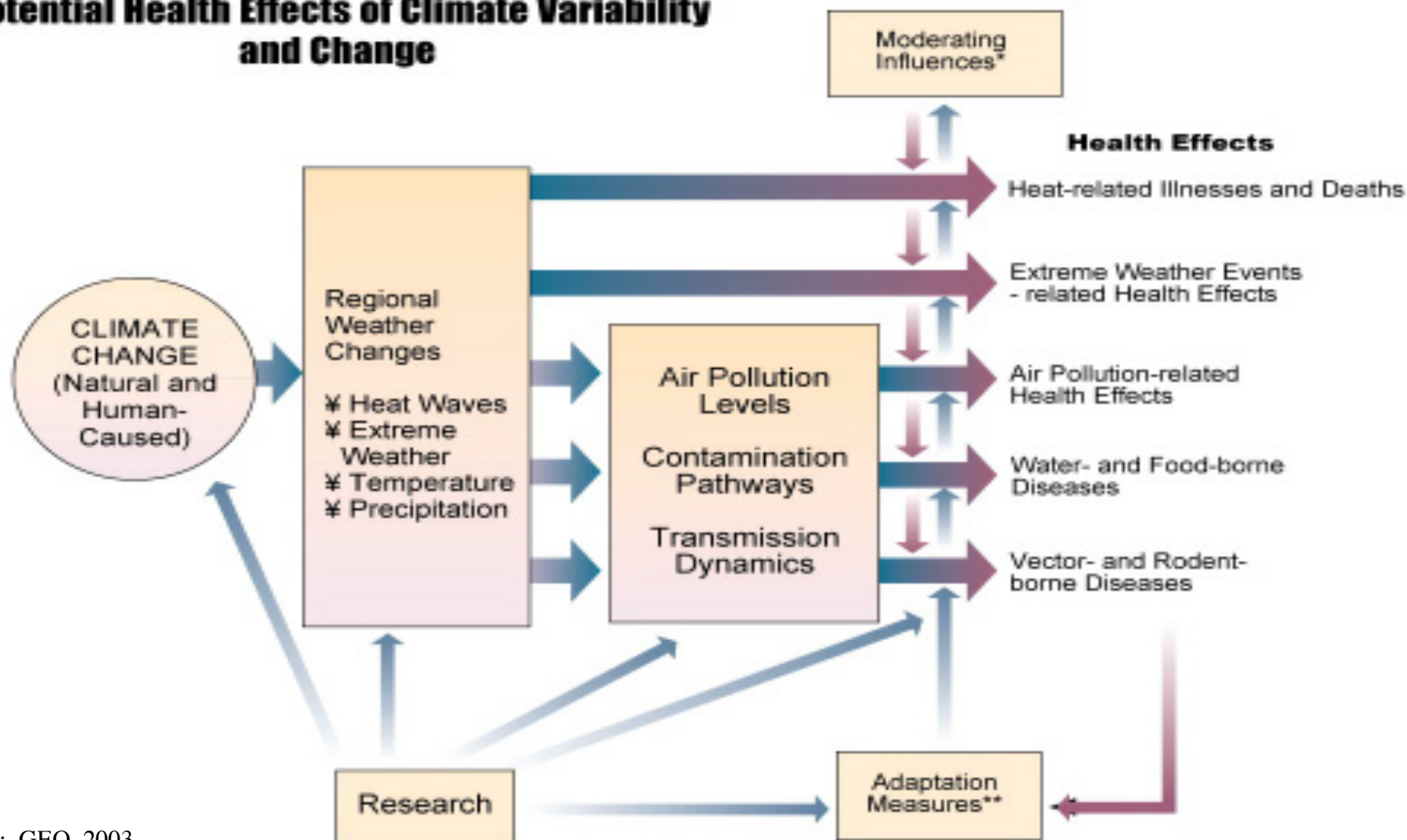
Transportation
/
Infrastructure

Climate & weather cross-cut all areas

Why Health & Air Quality?



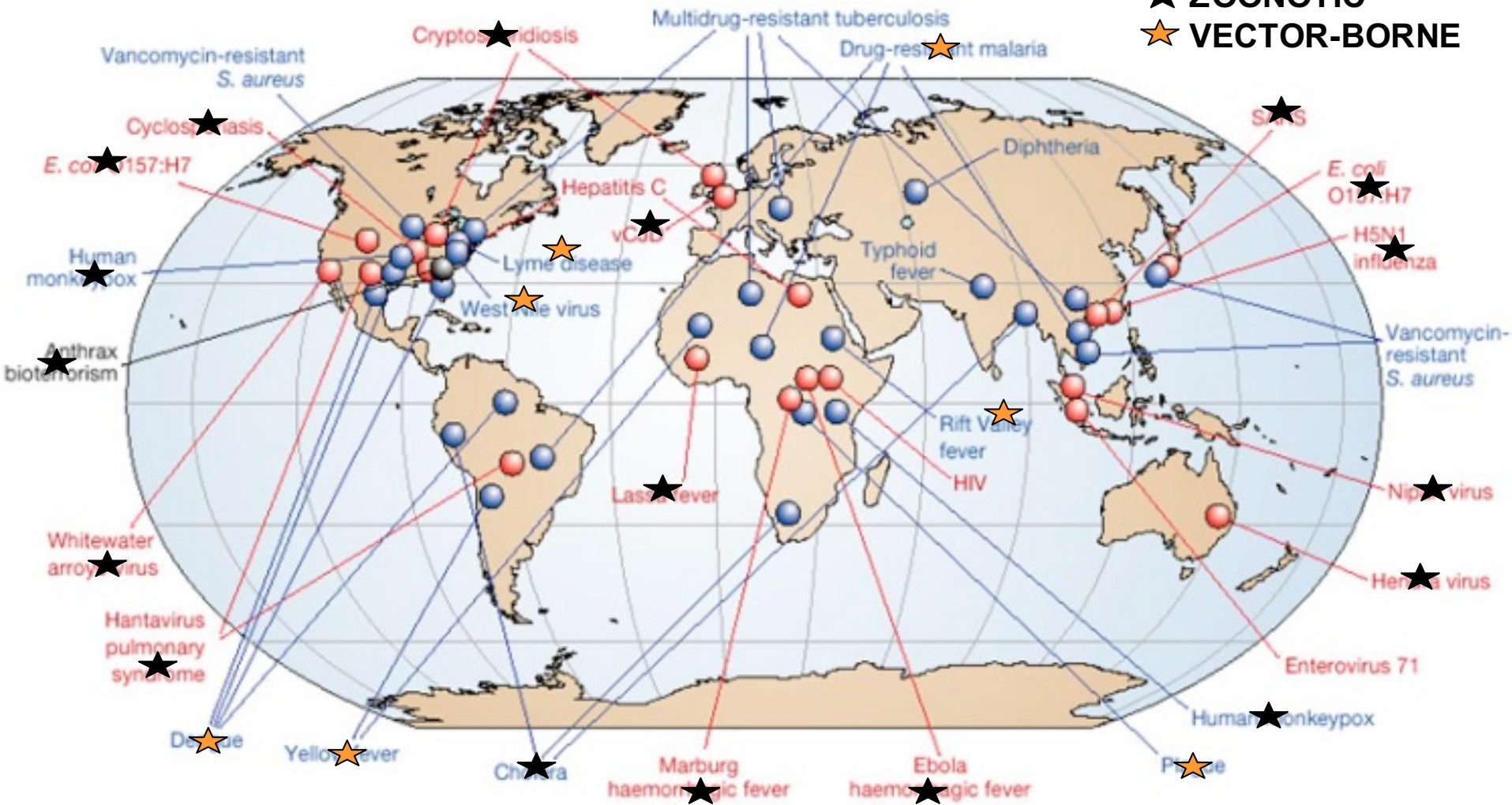
Potential Health Effects of Climate Variability and Change





Global Emerging Diseases*

★ ZOOONOTIC
★ VECTOR-BORNE

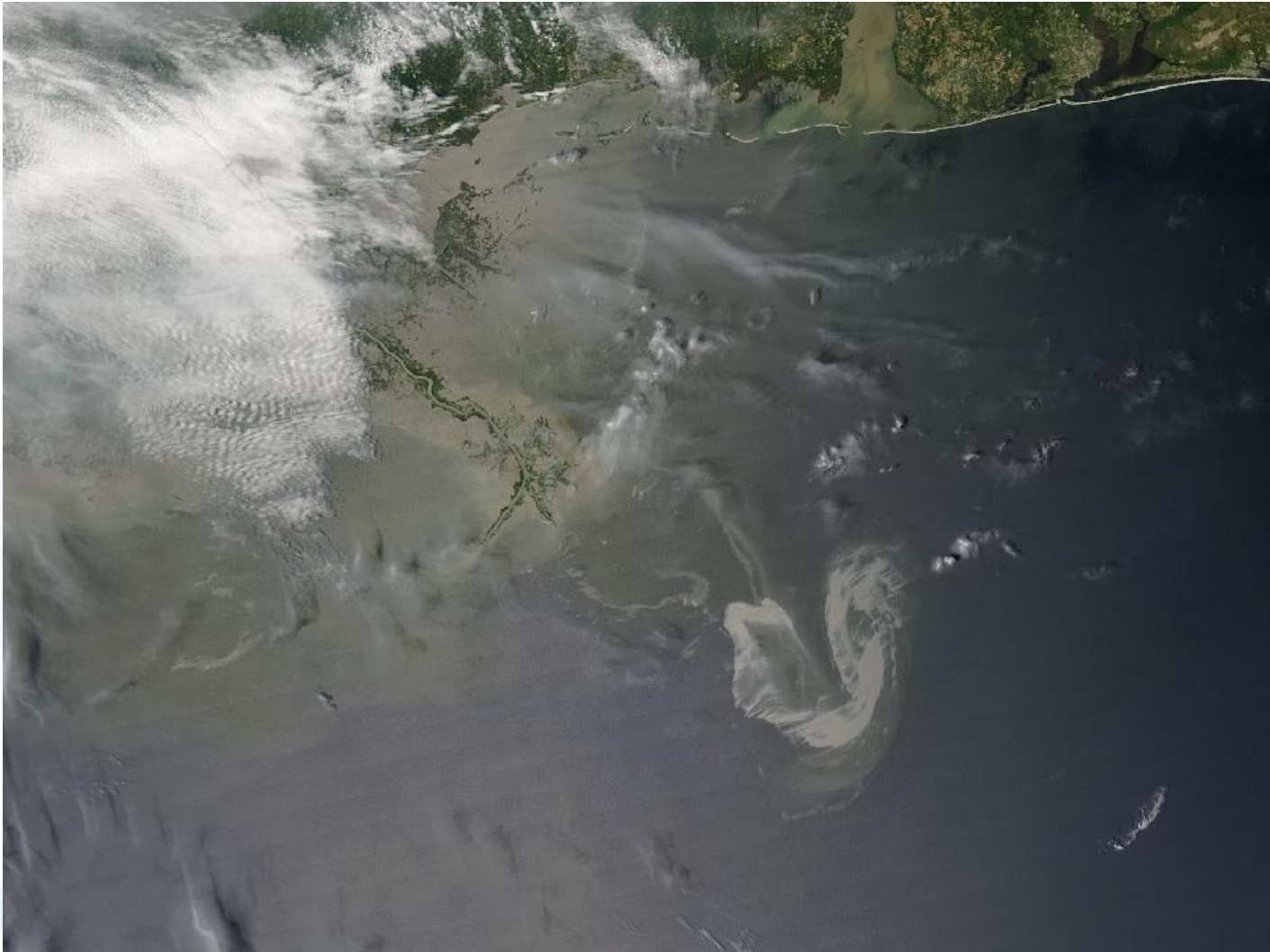


EMERGING
RE-EMERGING

* Modified from Morens et al. 2004 *Nature* 430:242



New Environmental Threats



This visible image of the Gulf oil slick was taken on May 9, 2010, at 19:05 UTC (3:05 p.m. EDT) from MODIS aboard NASA's Aqua satellite. Crude oil brings volatile organic compounds into the air which can react with nitrogen oxides to produce ozone.

Objectives:

- NASA's Health & Air Quality Applications Area supports the use of Earth observations in air quality management and public health, particularly regarding **infectious disease and environmental health** issues.
- The area addresses issues of toxic and pathogenic exposure and health-related hazards and their effects for risk characterization and mitigation.
- The area promotes uses of Earth observing data and models regarding **implementation of air quality standards, policy, and regulations** for economic and human welfare.
- The Health & Air Quality Applications Area also addresses **effects of climate change on public health and air quality** to support managers and policy makers in their planning and preparations.



Technical		Budget/Cost		Schedule		Performance		Overall	
Prev	This	Prev	This	Prev	This	Prev	This	Prev	This
Review	Review	Review	Review	Review	Review	Review	Review	Review	Review
G	G	Y	Y	G	G	G	G	G	G

Technical:

- The portfolio is technically performing very well.

Budget/Cost:

- Portfolio has a relatively high burden of uncoded funds. Associates are working diligently with PIs to uncover issues at their particular institutions. Many times this appears to be an issue of “invoice lag” between NASA and the institution. However, significant progress has been made – FY16 uncoded funds are down ~77% from a year ago.

Schedule:

- Overall the portfolio has a good track record for remaining on schedule, with NCEs approved on a case-by-case basis.

Performance:

- Overall performance of the portfolio meets or exceeds expectations.

Overall:

- The Health and AQ program is performing satisfactorily.

Project Portfolio – 15 Active Projects**

May 2018

ARL 1-3: 2 projects
ARL 4-6: 7 project
ARL 7-9: 4 projects

Mean: ARL 6
Median: ARL 6
Mode: 6

Performance since May 2017:

82% of projects increased by at least 1 ARL. 27% of projects increased by at least 2 ARL.

**13 additional projects are HAQAST, which are not reporting ARLs. Four GEO EO4HEALTH projects have recently started; however, only two have reported ARLs at this time.

1

ARL 9

—

1

ARL 8

—

2

ARL 7

—

6

ARL 6

—

1

ARL 5

—

0

ARL 4

—

2

ARL 3

—

0

ARL 2

—

0

ARL 1

Major News Items in the ESD/ASP

»Jim Bridenstine (Oklahoma) confirmed as NASA Administrator.

»TSIS-1 launch to ISS in December 2017.

»“2017-2027 Decadal Survey for Earth Science and Applications from Space” released by the NAS in January!

»FY18 Appropriation (via an Omnibus) in March.

- NASA ESD funding is at the **FY16/FY17** level (~\$1.92B)
- Continues operations and development of FY17 Program of Record (including DSCOVR EPIC/NISTAR, PACE, CLARREO-PF, OCO-3 [to launch as manifested in late CY2018/early CY2019])
- Endorses SMD/ESD discontinuance of RBI.

»2017 NASA HAQ Applications Annual Report published:

https://appliedsciences.nasa.gov/system/files/docs/Health_Air_Quality_2017_Annual_Summary.pdf

»TEMPO instrument delivery scheduled for Fall 2018; MAIA passes KDP-C in June 2018; GeoCarb KDP-C NET October 2018.

»ROSES 2017 A.39 (Health and AQ Applications) proposals were due on November 17, 2017. Selections will be announced in August.

»Continued ARSET Health Trainings in 2017-18.

»2018 Health and AQ Applications Annual Team Meeting set for September 18-19 in Burlington, VT.

»New Web Features:

- National Public Health Week 2018: <https://science.nasa.gov/earth-science/applied-sciences>
- NASA Helps New Yorkers Cope with Summer Swelter: <https://www.nasa.gov/feature/nasa-helps-new-yorkers-cope-with-summer-swelter>

•Second round of TTs approved! Budget of \$1.6M supports 4 selections – pending ESD SC approval.

•Personnel

•Pamela Bond joins ESD/Applied Sciences as the Communications Manager.

•Vanessa Escobar joins ESD/Applied Sciences as the program manager for Missions & Applications.

•Two Summer Interns join ESD/Applied Sciences from June to August – Gigi Pavur (GA Tech) and Auset Taylor (Princeton).

NASA Health/AQ Sessions at Recent and Upcoming Conferences



- AGU Fall Meeting (Dec 2017)
- AMS Annual Meeting (Jan 2018)
- ASPPH Annual Meeting (March 2018)
- GPM Vector-Borne Disease Workshop (May 2018)
- GLOBE Midwest Student Symposium (May 2018)
- ATS Annual Meeting (May 2018)
- AWMA Annual Meeting (June 2018)
- Upcoming at ISES-ISEE in August!

The 2019 International Conference of the American Thoracic Society will be held May 17-22 in Dallas, Texas, and the planning for the program is underway. We are proposing a 1-hour session for the Conference. We need commitment before **July 31, 2018**.

We have a Session in GeoHealth at AGU in Washington, DC, in December: "Using NASA's Satellite and Suborbital Measurements, and Modelling for Health and Air Quality Applications." We need abstracts submitted by **August 1, 2018**.

Also, we have a session at AMS in Phoenix in January: "[NASA Earth Observation Systems and Applications for Health: Looking at Predicting Extreme Environmental Events and How it Affects Health](#)." This is a joint session between the **10th Conference on Environment and Health**; and the Ninth Conference on Transition of Research to Operations. Abstracts are due by **August 1, 2018**.

For all of the above, please contact Sue Estes at sue.m.estes@nasa.gov.



- Again proposes termination of CLARREO-PF and PACE development, and discontinuance of on-orbit DSCOVR/EO instruments and OCO-3
- Also supports continuation of a balanced ESD portfolio
 - Funding for all remaining elements of the ongoing Flight Program of Record
 - Landsat-9 remains on-track for 12/2020 launch; NASA portion of Sustainable Land Imaging Program funded
 - Venture-Class remains fully funded and on-track for planned solicitations and selections
 - Applied Sciences Program flat-funded (~\$53M in FY19)
 - Earth Science Technology Office program flat-funded, including InVEST CubeSat validation program
 - Small-satellite Constellation Data Buy Pilot funded

FY19 President's Budget Request

NASA
Earth Science



SMD/Earth Science Division - Applied Sciences										
Budget FY14-FY23 (in millions)										
	Enacted					FY19 President's Request				
Applied Sciences Program Budget	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
	\$35.0	\$40.4	\$47.6	\$39.4	\$53.2	\$53.1	\$53.3	\$53.9	\$56.3	\$57.0

Note: NASA Operating Plan change increased FY15 by \$4M to \$40.4M.

Note: FY17 harvested funds to improve costing; rephased in Operating Plans to FY18-20.

Costing

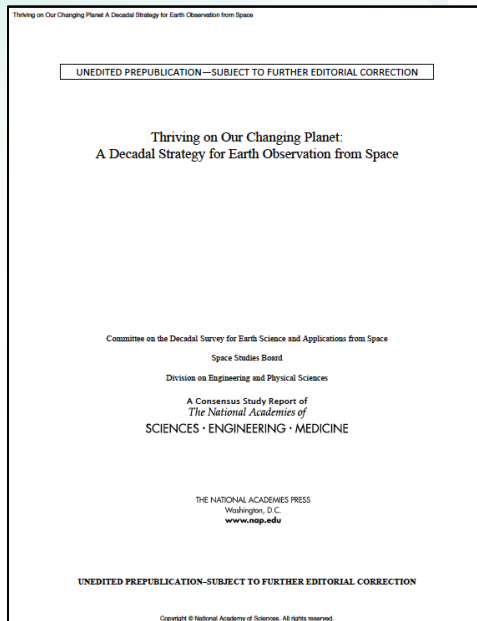
Significant additional attention to financial
billing by grantees – aka, “costing”

Management of costing is supporting expansion
of programmatic content

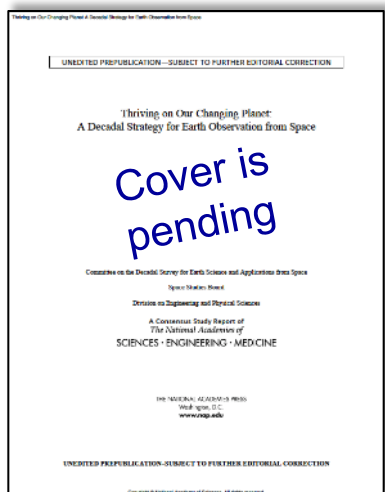
- » Incremental funding
- » Rephase to new fiscal year
- » Commit \$ earlier in Fiscal Year
- » Additional selections
- » Costing language in ROSES

2017 Decadal Survey Snapshot

2017 DECADAL SURVEY



- Recommends “Continuity Measurement” strand (\$150M full mission cost “cap”) as an addition to the existing Venture-class program
- Identifies 5 “Designated” observables for mandatory acquisition (*Aerosols; Clouds, Convection, & Precipitation; Mass Change; Surface Biology & Geology; Surface Deformation & Change*)
- Calls for “cost-capping” essentially all missions
- Introduces a new competed “Explorer” flight line with \$350M cost constraint, 3 observables to be chosen by ESD from among 6 identified
- Calls for “Incubator Program” between Technology, R&A, and Flight to mature specific technologies for important – but presently immature – measurements (preparation for next Decadal)
- ***ESD is conducting focused community forums (for ~18 months) to translate the recommendations into an executable program and, for Flight, a portfolio of specific, realistic, launch-ordered missions and solicitations.***
 - Decadal new mission budget wedge opens only in late FY21.
- Direction was provided on Feb 6 to close out all existing Pre-Formulation studies (ACE, ASCENDS, CLARREO, GEO-CAPE, and HyspIRI) that were developed in response to the 2007 DS.
- Implementing plans for Designated Observable Studies and Earth Venture Continuity – 1 solicitation



NASA Earth Science Decadal Website

<https://science.nasa.gov/earth-science/decadal-surveys>

On the website:

<http://nap.edu/24938>



Earth Science Decadal Inputs

- > Send us your questions about the Decadal
- > Decadal Survey Questions
- > Decadal Survey Community Forums
- > Presentations and Other Materials

<< first forum was May 10th

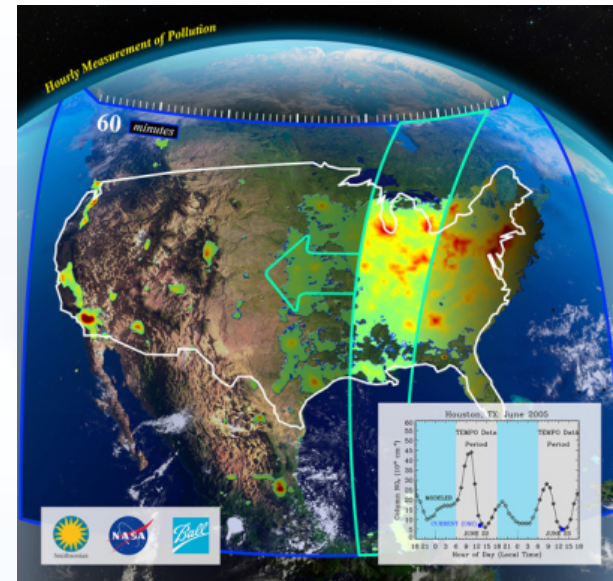
<< has copy of slides shown at May 10th and later forums

Earth Venture Instrument-1:

Tropospheric Emissions: Monitoring of Pollution (TEMPO)



- **TEMPO is a pathfinder to using hosted commercial payloads from GEO**
- Tropospheric pollution observations from Geostationary Orbit
 - Ozone, NO₂, and CH₂O.
- Forms a global Air Quality constellation in GEO with EU Copernicus - Sentinel 4 and Korean GEMS.
- EPA and NOAA are part of the science team.
- Instrument delivery in 2018; Launch NLT 2021



PI: Kelly Chance, Smithsonian Astrophysical Observatory

PE: Betsy Edwards; **PS:** Barry Lefer **PA:** John Haynes

Instrument Development: Ball Aerospace

Project Management: LaRC

RY\$: 93.2M

Orbit requirements: *Geostationary Orbit*. Hosted on a commercial communication satellite

Earth Venture Instrument-3

MAIA

Multi-Angle Imager for Aerosols

Associating airborne particle types with adverse health outcomes

Salient Features:

MAIA is PI-led NASA Earth Ventures Instrument (EVI-3 selection)

Category 3 mission per NPR 7120.5E

Risk Classification C per NPR 8705.4

Cost capped at \$100.1M

Host platform: TBD, to be provided by ESSP Program

Payload delivery: December 2019

Orbit: 370-830 km, 50-130° inclination, sun-synch preferred

Launch: Ready for 2020 launch on TBD launch vehicle

Nominal Mission: 3 yr baseline; 2 yr threshold after 90-day IOC

Principal Investigator: Dr. David Diner (JPL)

Project Manager: Kevin Burke (JPL)

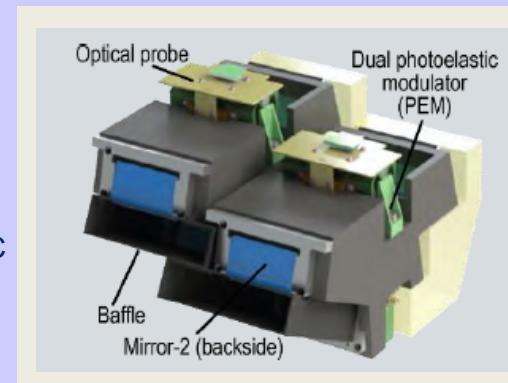
ESSP Program Manager: Greg Stover, Msn Mgr: Diane Hope

JPL Program Manager: Dr. Steven Bard, Deputy: Amit Sen

Program Scientist: Dr. Hal Maring, NASA HQ

Program Executive: Betsy Edwards, NASA HQ

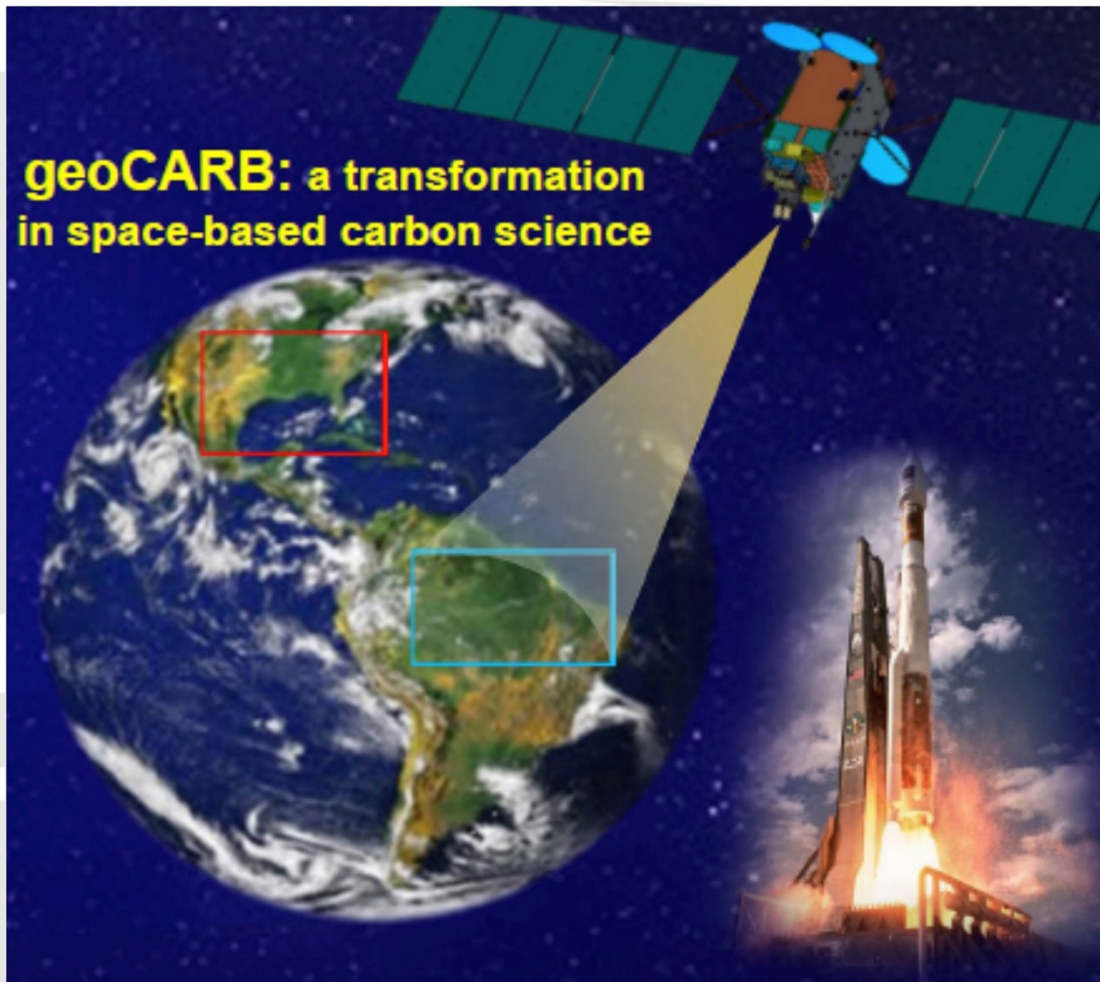
Program Applications: John Haynes, NASA HQ



Mission Objectives: Assess linkages between different airborne particulate matter (PM) types and adverse birth outcomes, cardiovascular and respiratory disease, and premature deaths.

Instrument: Multi-angle spectropolarimetric imaging instrument for operation in a sun-synchronous Earth orbit to measure the particle types, sizes, concentrations, and geolocation of atmospheric aerosols.

GeoCarb -- Earth Venture Mission-2



Berrien Moore, PI
University of Oklahoma

Xingming Xiao,
Applications Coordinator,
University of Oklahoma

- First geostationary measurements of CO₂, CO, CH₄, and Solar Induced Fluorescence; 5-10 km resolution
- Hosted payload on an SES commercial communication satellite (PI-arranged hosting)
- Lockheed Martin Advanced Technology Center (Palo Alto); Colorado State University (Fort Collins); ARC; GSFC; JPL
- Instrument delivery in 2020; Earliest LRD 2022

National Aeronautics and
Space Administration



Questions:

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<http://AppliedSciences.NASA.gov>