

U.S. Group on Earth Observations

AGU 2019 Fall Meeting | Town Hall TH13N

December 9, 2019

Erik Noble, OSTP

Lawrence Friedl, NASA

Karen St Germain, NOAA

Peter Doucette, USGS



USGEO Town Hall

USGEO

**What we
represent**

New & News

GEO

**International
Context**

GEO Plenary XVI

Town Hall

**What's in it
for you**

Your voice

Got Comments? Got Questions?

Raise a hand and ask directly



Write down on paper



Text them to: 202.997.4812



Town Hall

**What's in it
for you**

Your Voice

USGEO

- Subcommittee of the White House National Science and Technology Council – Committee on the Environment
- Purpose
 - Plan, coordinate federal Earth observations, research, and activities
 - Foster improved Earth system data management and interoperability
 - Identify high-priority user needs for Earth observations data
 - Coordinate US positions for and coordinate participation in GEO



Smithsonian



USGS
science for a changing world





2019 NATIONAL PLAN FOR CIVIL EARTH OBSERVATIONS

A Report by the
U.S. Group on Earth Observations Subcommittee
Committee on the Environment

of the
NATIONAL SCIENCE & TECHNOLOGY COUNCIL

December 2019

National Plan for Civil Earth Observations

Released today #NSTC



THE PLAN – AN OVERVIEW

- 3 Goals; 11 Objectives; 32 action
- Recognizes the Earth Observations Enterprise
- Endorses the changing landscape of the provisioning of Earth Observations
- Designates USGEO as interagency forum for coordination of new missions, existing systems, decommissioning instruments, and continuity planning for multiple agencies' missions.
- Encourages the greater use of Cloud Computing and Artificial Intelligence
- Supports the Administration's Management Agenda – Data a strategic asset
- Pushes for the articulation of the impact of Earth Observations on our daily lives
- Supports the U.S. engagement in GEO
- Supports development of a skilled workforce



NATIONAL PLAN: CHANGING LANDSCAPE OF EARTH OBSERVATIONS

Goal 1: Support and Balance the Portfolio of Earth Observations

- Provisioning and availability for Earth observations collected by the public, academic, and private sectors

Goal 2: Engage the Earth Observations Enterprise

- Long-term engagement with all sectors to accelerate the uptake and use of Earth observations

Goal 3: Improve the Impact of Earth Observations

- Increasing the impact through innovative and multi-use applications; systematic methods of understanding value; international collaboration and workforce.

Fostering coordination, collaboration, and robust dialog broadly across the Earth Observations Enterprise



AN ENTERPRISE IS RECOGNIZED

United States Earth Observations Enterprise components:

- Federal, State, Local, Tribal and Territorial governments
- World-leading colleges and universities
- Private Industries
- Non-profit organizations
- Federal and National Laboratories

“America is now entering a Second Bold Era of its Endless Frontier in Science and Technology. The Second Bold Era is one in which we must take an enterprise-wide view; understand and leverage the powerfully unique, mutually beneficial and collaborative roles to be played by each sector.”

Dr. Kelvin Droegemeier,
*Director of the White House Office of
Science and Technology Policy*



INNOVATIVE ACQUISITION STRATEGIES

- Data as a Business – what does that mean?
- Growing Demand for Earth Observations
- Growing commercial sector that provides Earth Observations data and analytics
- Two ends of the value chain
 - Emerging interests in sale of observations
 - Value added services that have relied on public and accessible government data
- Explore a market-based clearinghouse approach for Earth Observations

A conversation on how the government and the Earth Observations Enterprise shapes the future has begun and needs to accelerate



APPLYING AI TO EARTH OBSERVATIONS

Volume, speed of data accumulation, and variety of Earth observation data can overwhelm traditional approaches of supporting decision making

Finds patterns and extracts insights in an efficient manner

Applications:

- Quicker advanced warnings for extreme weather events and natural disasters
- Better understanding of the rates and resilience of ecosystems undergoing change by natural or anthropogenic processes, such as extreme weather events and/or wildfire



CLOUD COMPUTING

USGEO has facilitated a series of interagency exchanges regarding implementation of commercial cloud services across the Federal Civil Government

Cloud-migration lessons learned shared across agencies

- Culture shift prep: rethinking how the workforce interacts with cloud and big data.
 - Perception concerns: jobs, training, costs, security, vendor lock-in, vendor transitions
- Resources required to support a virtual data center (cloud) should be viewed no differently than for an on-prem data center.
- First consider using tools, services, and policies “born in the cloud” vs. lift and shift.
- Many smaller migrations is more efficient to manage system dependencies.
- Need strategy to comply with anti-deficiency act when managing data egress costs for established “no-cost-to-user” data access policies.
- Embrace agile DevOps mindset – to some degree, infrastructure will become code.
- Promote big EO data and open source “environments” in the cloud for facilitating collaborative geoscience, e.g., “Pangeo.”



IMPACT OF EARTH OBSERVATIONS

- Often hidden in decision making and business so they go unnoticed
- Varied methods of determining impact
- Methods to accelerate the impact of the uptake of Earth Observations
 - Accelerators, incubators, national prize efforts focused on Earth Observations
- Plan looks to expand economic analysis efforts
 - NASA – Resources for the Future – VALUABLES consortium
 - USGS, NOAA – lead community of practice within GEO
- Plan calls for the development of a catalog of methods for quantifying the social and economic value of Earth observations



DEVELOPING THE SKILLED WORK FORCE

Success will depend on attracting a work force that has skills in many areas from computer science to engineering; from economics to law; and from social scientist to communicators

Capitalize on existing programs with additional focus on the needs of the Earth Observation community

- NSF: internships that exchange personnel between universities and industry; students working with Federal agencies; interdisciplinary university-industry teams
- NSF Research Experience for Undergraduates Program: 8 week summer research programs that engage undergraduates in authentic research on cutting-edge topics
- NASA: Applied Remote Sensing Training (ARSET) program, no cost training in use of satellite data applied to topics such as disaster risk assessment, synthetic aperture radar, conservation, and geostationary satellite remote sensing

Plan supports and builds upon the NSTC's Committee on STEM Education, which recently released its 5-Year STEM Education Strategic Plan.



USGEO

Satellite Needs Working Group



Identify and communicate to NASA federal-civilian agency requests for specific satellite-based Earth observation data and information products.

NASA assesses which it can serve with current missions, future plans, and/or with new funds. NASA notifies OMB/OSTP and gives feedback to agencies.

- *First time in 2016-2017*

- *Second time in 2018-2019*

NASA's process included 5 phases:

Phase 1: Assess & verify the degree to which satellite data need is being satisfied either by Program Of Record (POR) or other means

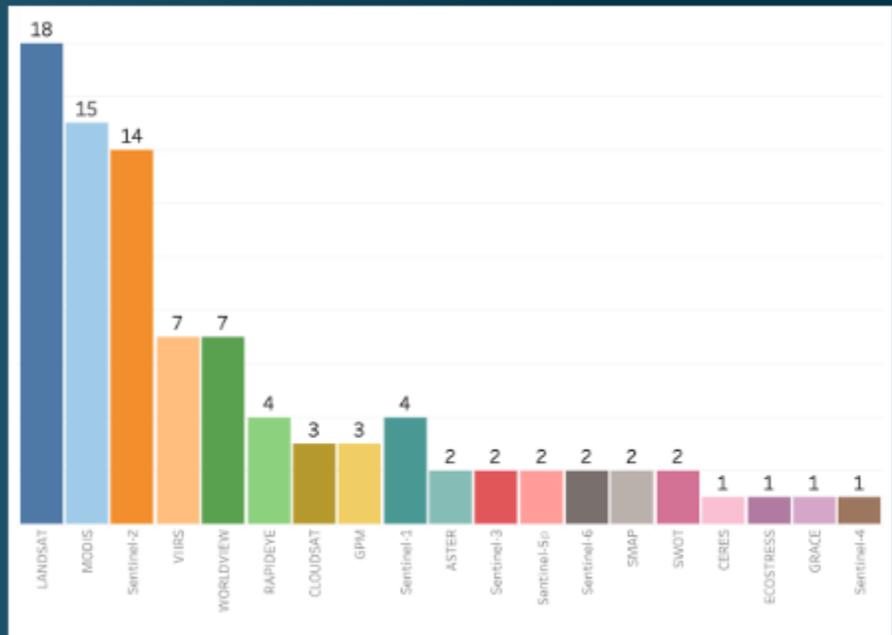
Phase 2: Explore options and submit a preliminary report on each individual need & response that has the potential to satisfy the department/agency. Examined Level of Satisfaction & Level of Effort to determine needs to fulfill.

Phase 3 & 4: Consolidate technical and financial review of needs and potential responses

Phase 5: Present the results of the analysis for review by ESD leadership

(3b)

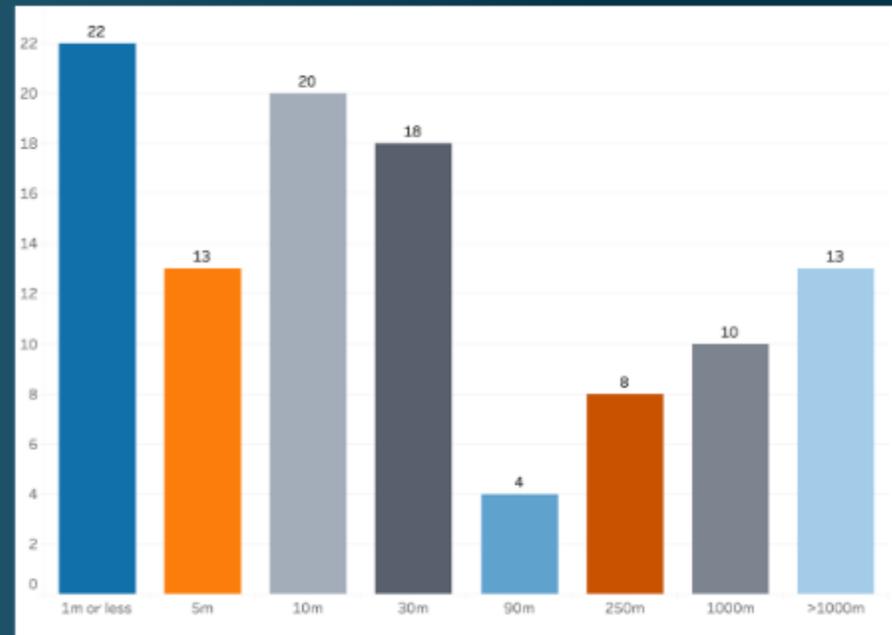
What is the name of the satellite mission, sensor, or data product that is currently or could be used to satisfy your needs?



Note: Number of counts - all 79 survey forms

(3g-1)

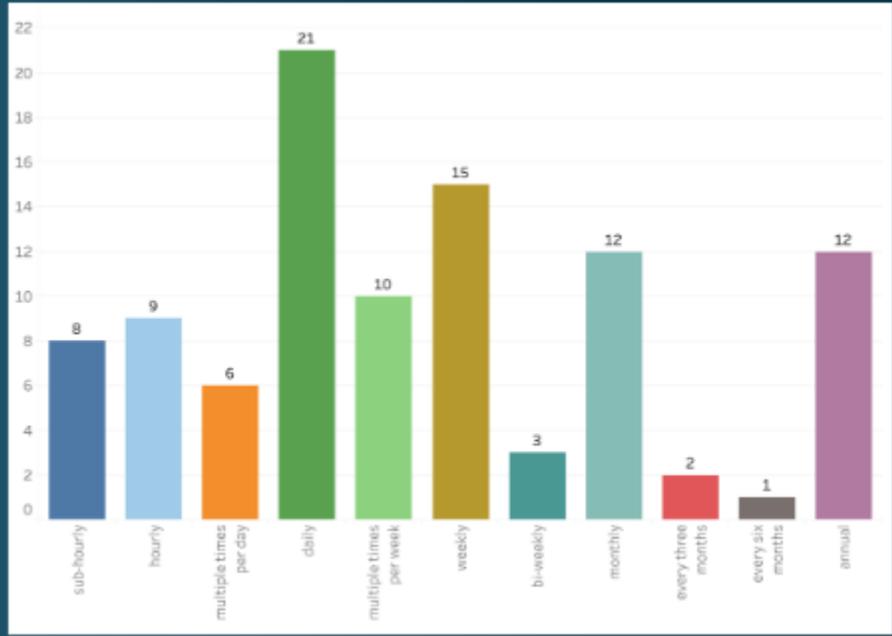
What is the optimal spatial resolution to meet your need?



Note: Number of counts - all 79 survey forms

(3h-1)

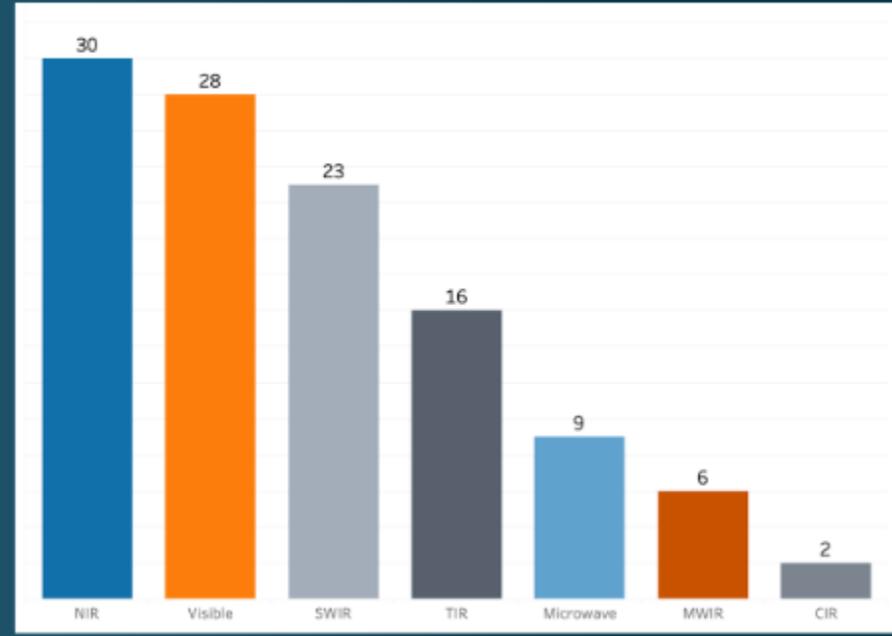
What is the optimal measurement or data product temporal frequency?



Note: Number of counts - all 79 survey forms

(3-2)

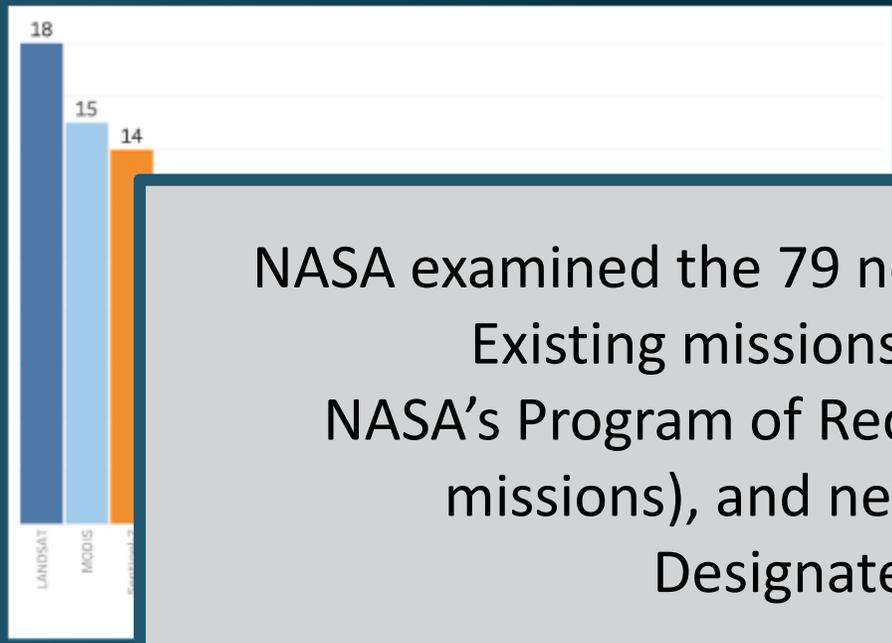
What spectral resolution or spectral bands would best meet your need?



Note: Number of counts - 56 survey forms

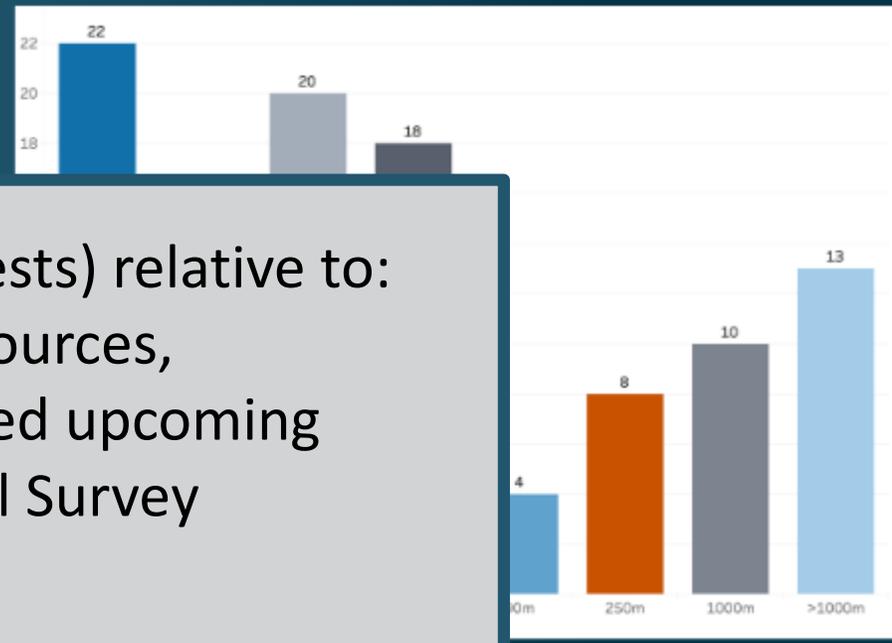
(3b)

What is the name of the satellite mission, sensor, or data product that is currently or could be used to satisfy your needs?



Note: Number of counts - all 79 survey forms

(3g-1)



NASA examined the 79 needs (250 requests) relative to:
 Existing missions, Commercial Sources,
 NASA's Program of Record (i.e., planned upcoming missions), and new Earth Decadal Survey Designated Observables.

NASA assessed the Level of Effort and expected Level of Satisfaction, focusing on opportunities where both:
 Level of Effort was Minimal to Moderate
 Level of Satisfaction was 80-100%

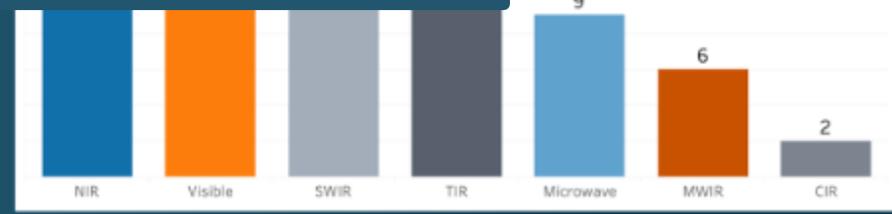
(3h-1)

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2016 SATELLITE NEEDS: ACTIVITIES TAKEN

1. The Airborne Data Management Group established to support faster access to data from airborne campaigns.
2. Provisional Harmonized Landsat-Sentinel Imagery over North America publicly available
3. Support to the user community for National Geospatial-Intelligence Agency (NGA) products, including the user services (i.e. vetting users to ensure they meet the NGA EULA) and distributing products.
4. Supporting users requesting archived data as well as new acquisitions provided through NGA's NextView license.
5. NISAR Quad Pol 40 MHz
6. New downlink station with 9 TB/day of downlink capacity enabling the collection of high-resolution (8 m x 6 m) imagery over North America in quasi-quad-pol mode.
7. The Data Curation for Discovery (DCD) project assists other other agencies in incorporating NASA Earth observation data into their workflows.



2018 SATELLITE NEEDS – NEEDS IDENTIFIED

1. Production of a NISAR global 200m **Soil Moisture** product.
2. Produce a sub-weekly, global **Surface Water Extent** product from optical + radar imagery; 8satellite harmonized product, Landsat-Sentinel-2-Sentinel-1+NISAR and SWOT
3. Support ingest of Level 1b Ocean and Land Color Instrument data available through the Sentinel Gateway, perform data processing, archiving and distribution of data
4. Produce a **Land Surface Change** detection product on a sub-weekly scale at 10 m to 30m: Landsat, Sentinel 2, radar from Sentinel 1 and NISAR
5. Produce a North America **Land Surface Deformation** detection product/time series on a sub-weekly scale: Sentinel 1 + NISAR
6. Increased spatial & temporal resolution of **Radiation & Clouds** products at SatCORPS
7. Conduct GEOS-5 simulations that assimilates satellite and ground base **Aerosol and Trace gas** concentrations (2008-2018) by June 2020
8. Low latency freeboard & ice thickness over the Great Lakes from IceSat-2
9. Animal Tracking: Advance ICARUS tag miniaturization and study the potential for CubeSat/Small Satellite deployment of an ICARUS-type system





Promote and Leverage International Collaboration: GEO-XVI Week, Plenary, and Ministerial Summit

GEO-XVI Activities: Nov. 4-8, 2019

- Plenary & Ministerial Summit
- Side Events
- Industry Track
- 12th Asia Oceana (AOGEO) Symposium
- Hackathon
- Pacific Island Programme

Over 1500 representatives from 57 countries.

13 Ministers and Deputy Ministers and
15 Ambassadors from countries, such as
Ethiopia, Georgia, Iran, Uganda and others



Key Highlights

- > **First-ever GEO Industry Track.** >50 reps from companies, including Planet, Google, Amazon Web Services, Esri, Maxar and e-GEOS
- > **Earth Science Data Operational Readiness Levels to Empower Disaster Responders.** ESIP announced Operational Readiness Levels to improve data-driven decision making during disaster response and recovery.
- > **EO Worth \$2T by 2030.** The Asia-Pacific Economic Cooperation (APEC) released a new report highlighting that Earth and marine observing technologies will be worth \$2 trillion by 2030. Australia highlighted the current and future economic value of EO to the Asia-Pacific region.
- > **Digital Earth Africa:** DE Africa is enabling African nations to track changes across the continent in unprecedented detail by making EO data more easily accessible. As part of the Amazon Sustainability Data Initiative, Amazon Web Services (AWS) announced it will be supporting Digital Earth Africa.

GEO-XVI: 3 Notable Announcements

“Japan will provide free and open access to the wide-swathe observation data from the L-band radar satellites, such as ALOS (ALOS/AVINIR-2, PALSAR) and ALOS-2 (ALOS-2/ScanSAR).”

Ms. SASAKI Sayaka
Parliamentary Vice-Minister of Education, Culture,
Sports, Science and Technology of Japan

- Up to 25 licenses for Google Earth Engine, accessible to any GEO Member State and Participating Organisation, with a value of US\$ 3 million over the next two years.
- Working with GEO to develop a allocation process

Helping to operationalize their work, helping to bridge the gap between science and application, in order to produce tangible products that engage with end users and decision makers

China has developed an open data policy for Gaofen satellites which allows free and open data access by the global community. Registered users around the world, without restrictions as long as they cite the source of the data, can freely discover and download the WFV data from the data platform CNSA-GEO, hosted by Huawei Cloud.

<https://youtu.be/SvbbCGInWqc>

“For the first time, China will share global data with 16-meter resolution from Gaofen-1 and Gaofen-6 satellites. We will share three types of such data with coverage outside China: historical records, daily updated Wide-Field-of-View images and global coverage data.

As a contribution from China, we just started the journey of open data. We really appreciate your feedback to help us improve this platform constantly. “This has been an expectation of the global community. ... Now it comes true as a direct result of Dr. Gilberto Camara, [GEO Secretariat Director’s] visit to CNSA in April this year.

Ms. Wenbo Zhao
Deputy Director of Earth Observation System and Data Centre,
China National Space Administration

FY21 ADMINISTRATION R&D PRIORITIES

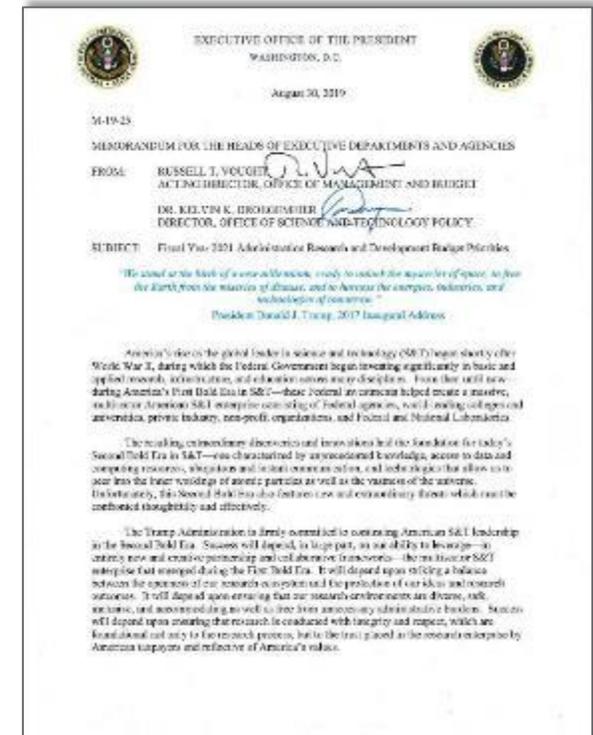
OMB/OSTP Guidance to Agencies (August 2019)

R&D BUDGETARY PRIORITIES

- American Security
- American Leadership in Industries of the Future
- American Energy and Environmental Leadership
 - energy, oceans, Earth system predictability
- American Health & Bioeconomic Innovation
- American Space Exploration and Commercialization
 - Moon's surface by 2024 as proving-ground for human mission to Mars

PRIORITY CROSSCUTTING ACTIONS

- Build and Leverage a Diverse, Highly Skilled American Workforce
- Create and Support Research Environments that Reflect American Values
- Support Transformative Research of High Risk and Potentially High Reward
- Leverage the Power of Data
- Build, Strengthen, and Expand Strategic Multisector Partnerships



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Erik Noble, OSTP,
USGEO, and National Plan

Lawrence Friedl,
USGEO, GEO Work
Programme, and NASA

Karen St Germain,
USGEO and NOAA

Peter Doucette
Cloud Computing, USGS

The Plan calls for the analysis of Earth Observations in support of economic sectors, such as agriculture, energy, transportation, or retail.

What are three key ways and venues USGEO could pursue to fulfill this action?

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Questions

Comments

Discussion

As commercial services both data and analytics become more available – what are key items we should think about when setting up a market-driven clearing house?

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Questions

Comments

Discussion

In what areas do you anticipate under-investment by the private sector over the next 10 years?

In what areas do you recommend the Federal government invest in over the next 5 years?

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Questions

Comments

Discussion

We are looking for successful programs that advance the uptake and use of Earth observations, e.g. accelerators, incubators, and industry clusters

What is your feedback on current government programs?

Are there successful programs we should model?

Town Hall

Questions

Comments

Discussion

Action: Work with commercial data providers and analytics companies to develop a set of best practices for commercial data buys.

How do you recommend we approach this?

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Questions

Comments

Discussion

Plan calls for an engagement plan with the Earth Observations Enterprise.

What are the best ways we can engage you and your organization in this Enterprise approach?

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Questions

Comments

Discussion

We are seeking feedback on the formulation of significant new observing systems.

What venues work best to solicit your feedback?

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Questions

Comments

Discussion

What models might the US government prioritize to increase the uptake of Earth observations?

- A. Funding Opportunities
- B. Incubators
- C. CRADA
- D. SBIR
- E. Other?

Town Hall

Questions

Comments

Discussion

Is your organization concerned about a potential shortage in workers trained on Earth observations and geospatial info?

If so, what efforts are you taking to alleviate this shortage?

Town Hall

Questions

Comments

Discussion

GEO-XVI Week, Plenary, and Ministerial Summit

Small Island Development States

- Dedicated attention on island states
- EO to address sustainability, economic advancement, disaster risk reduction, and climate change
- Tonga first Small Island State to be a GEO Member Country



Ministerial Declaration

- Earth observations in an inclusive digital economy that promotes sustainable economic and social development.
- Make Earth observations collected from space ready for analysis and easier to use through artificial intelligence, data analytics and visualization technologies.
- Welcome the creation of the Regional Groups
- Recognize the critical role ... in-situ data play
- Partnerships with the private sector, and welcome the creation of the GEO Associate category
- Support earth observations for SDG, Sendai DRR, and climate change

Indigenous Communities

- Dedicated events on inclusive dialogue with Indigenous communities to discuss how Earth observations can better support communities to respond to challenges they face.
- Initiatives including the EO for Indigenous Communities Side Event brought global voices to GEO Week, particularly from the Americas, Africa and Australia.



- GEO Indigenous Alliance, which was formed at this event, delivered a statement on behalf of the, to call for continued, effective, respectful, and reciprocal relationship with GEO.

United States Exhibit at GEO: US Jazz Observatory

- Conveyed the importance of the Earth Observations Enterprise components like the fusion of instruments, chords, and riffs in making music
- Partnerships and Impacts of Earth Observations
- Unique venue to convey importance of Earth Observations
- Going Forward
 - Want to bring the Jazz Observatory to events near you
 - Seeking your stories on the impact of Earth Observations

