



UNITED STATES GOVERNMENT
COMMERCIAL EARTH
OBSERVATIONS DATA PURCHASES:
PERSPECTIVES FROM THE EARTH
OBSERVATIONS ENTERPRISE

A Report by the

SUBCOMMITTEE ON U.S. GROUP ON EARTH OBSERVATIONS
COMMITTEE ON THE ENVIRONMENT

of the

NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

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About this Document

This document was developed by the USGEO Subcommittee in response to the 2019 National Plan for Civil Observations and outlines recommendations for the procurement of commercial Earth observation and geospatial data.

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Abbreviations and Acronyms

A&E	Architecture and Engineering
BAA	Broad Agency Announcement
CDP	Commercial Data Program
CSDA	Commercial Small Sat Data Acquisition
CSPO	Commercial Systems Program Office
DaaS	Data-as-a-Service
EULA	End User License Agreement
GEO	Group on Earth Observations
FAR	Federal Acquisition Regulations
FGDC	Federal Geographic Data Committee
FOIA	Freedom of Information Act
FPAC	Farm Production and Conservation
GBON	Global Basic Observing Network
GEOINT	Geospatial Intelligence
GPSC	Geospatial Product and Service Contracts
GSA	General Services Administration
ICAMS	Interagency Council for Advancing Meteorological Services
IDIQ	Indefinite Delivery Indefinite Quantity
IP	Intellectual Property
IQA	Information Quality Act
IOOS	Integrated Ocean Observing System
JACIE	Joint Agency Commercial Imagery Evaluation
MESONET	MESOScale NETwork
NASA	National Aeronautics and Space Administration
NAIP	National Agriculture Imagery Programs
NESDIS	National Environmental Satellite, Data and Information Services
NIH	National Institutes of Health
NGA	National Geospatial-Intelligence Agency
NGTOC	National Geospatial Technical Operations Center
NOAA	National Oceanic and Atmospheric Administration
NRO	National Reconnaissance Office
NSF	National Science Foundation

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NSPD	National Security Presidential Directives
NSTC	National Science and Technology Council
OMB	Office of Management and Budget
OSTP	Office of Science and Technology Policy
QBS	Qualifications Based Solutions
RFI	Request for Information
RFP	Request for Proposal
ROI	Return on Investment
SIN	Special Item Number
UCAR	University Corporation for Atmospheric Research
USC	United States Code
USDA	United States Department of Agriculture
USGEO	United States Group on Earth Observations
USGS	United States Geological Survey
WMO	World Meteorological Organization

Introduction

Purpose

In 2019, the Office of Science and Technology Policy (OSTP) released the 2019 National Plan for Civil Earth Observations (hereinafter “2019 National Plan”). The 2019 National Plan¹ includes the following two actions, and the purpose of this document is to address the actions.

- *“Work with commercial data providers and analytics companies to develop a set of best practices for commercial data buys.”*
- *“Work with commercial providers to understand issues, agency practices, and policies that foster development of small and medium businesses and start-ups.”*

This document is intended to help Federal Departments and Agencies (hereinafter “agencies”), private and academic sectors, non-governmental organizations, and other entities (hereinafter referred to collectively as the “Earth Observations Enterprise” or the “Enterprise”) form a greater understanding of current definitions, views, and practices in these areas. This report is intended to illuminate how the Federal sector can coordinate activities as the private sector continues to transform, while meeting diverse agency missions and providing the best return on investment of public funds for Earth observations expenditures. The report also provides best practices for agencies to consider. This document provides a synopsis of the responses United States Group on Earth Observations (USGEO) received in writing and during the four public dialogue sessions from the Earth Observations Enterprise, labeled “external perspectives.” This is followed by sections that present the “agency perspectives”.

Publication of this document does not alter or supplement any acquisition regulations. This document is focused on the civil agencies, and any references to the Department of Defense and Intelligence Community are noted only as they align with the needs of civil agencies’ commercial environmental and geospatial data needs. This document does not pertain to one or more agencies purchasing infrastructure (sensors, flight, or ground systems) for their own use to collect Earth observations or geospatial data. Furthermore, this document focuses on the purchase of data and does not address software or services contracted for processing, hosting, or serving data. Emerging applications that involve “looking-up” for lunar mapping, trajectory propagation modeling, and satellite tracking are also excluded from this document, which focuses on “looking down”.

Process

USGEO created a Commercial Task Team, comprised of the listed agencies, to address the two actions from the 2019 National Plan. Given that there are different starting points across the agencies on understanding the acquisition of commercial Earth observations and geospatial data, the agencies sought to understand those differences and harmonize practices where possible.

To solicit feedback from non-Federal sectors, USGEO published a Federal Register Notice (86 Fed. Reg. 28078, May 25, 2021) that: (1) solicited input on a series of questions related to the purchase of Earth observations and geospatial data, and (2) announced the opportunity to participate in four public dialogue sessions on 2, 9, 16, and 23 June 2021.

¹ <https://usgeo.gov/uploads/Natl-Plan-for-Civil-Earth-Obs.pdf>.

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While the term “Earth observations” includes all types of observations (i.e., remotely sensed, airborne, shipborne, uncrewed vehicles, *in-situ*), many of the comments received were from vendors of satellite-derived data. However, this document is intended to inform agency actions to streamline the procurement of all types of commercial Earth observations and geospatial data. Appendix A lists the entities that participated in the public dialogues and/or provided written comments in response to the Federal Register Notice.

Themes

1. Standardized Definitions

Common definitions enable the diverse entities of the Earth Observations Enterprise to communicate about common concepts in a consistent manner. Based on external input and discussions within USGEO, the following standardized definitions are proposed for use across the Enterprise.

Commercial Product²:

- (1) A product, other than real property, that—
 - (A) is of a type customarily used by the general public or by nongovernmental entities for purposes other than governmental purposes; and
 - (B) has been sold, leased, or licensed, or offered for sale, lease, or license, to the general public.
- (2) A product that—
 - (A) evolved from a product described in paragraph (1) through advances in technology or performance; and
 - (B) is not yet available in the commercial marketplace but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Federal Government solicitation.
- (3) A product that would satisfy the criteria in paragraph (1) or (2) were it not for—
 - (A) modifications of a type customarily available in the commercial marketplace; or
 - (B) minor modifications made to meet Federal Government requirements.
- (4) Any combination of products meeting the requirements of paragraph (1), (2), or (3) that are of a type customarily combined and sold in combination to the general public.
- (5) A product, or combination of products, referred to in paragraphs (1) through (4), even though the product, or combination of products, is transferred between or among separate divisions, subsidiaries, or affiliates of a contractor.
- (6) A non-developmental item if the procuring agency determines, in accordance with conditions in the Federal Acquisition Regulation, that—
 - (A) the product was developed exclusively at private expense; and
 - (B) has been sold in substantial quantities, on a competitive basis, to multiple State and local governments or to multiple foreign governments.³

² The Federal Acquisition Regulation (FAR) Council issued a [final rule](#) effective December 6, 2021, which replaces the current FAR definition of “commercial item” – which includes commercial services – with separate definitions for the terms “commercial product” and “commercial service.” See 86 Fed. Reg. 61017.

³ [41 U.S.C. § 103](#) as added by the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) § 836(a)(1).

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Commercial Environmental Data: remote sensing imagery, Earth observations, and other types of environmental data that are produced wholly by commercial enterprises⁴ through the designing, building, owning, and/or operating their own observing sensor/platform and associated data analytical systems. These data can be provided by domestic and international entities.

Data License: the specific contractual terms that prescribe the procuring agency's rights to use and, if applicable, disseminate the data to third parties. It further addresses the treatment of value-added and derived products and, if applicable, the rights of third parties to use the provider's data and any value-added and derived products.

Derived Products: work created when a licensed user exploits licensed material in a manner that irreversibly modifies and uncouples the work from its source, such that extraction of the principal features and characteristics of the source licensed material is impracticable.

Earth Observations: measurements of the physical, chemical, geological, and biological characteristics of Earth that are obtained from space-based, aircraft-borne, ship-borne, ocean, or land-based sensors. It includes *in-situ* measurements as well as surveys and reference systems, such as the Global Positioning System.⁵

End User License Agreement (EULA): an agreement between the licensor of a licensed product and the licensee. EULAs detail the conditions for the licensee's use of licensed material, such as distribution and third-party use rights.

Geospatial Data: information tied to a location on Earth that identifies the geographic location and relational characteristics of natural and/or constructed features and boundaries on Earth. It is generally represented in vector datasets by points, lines, polygons, or other complex geographic features or phenomena. Geospatial data may be derived from, among other things, remote sensing, mapping, and surveying technologies and may involve images and raster datasets, aerial photographs, and other forms of geospatial data or datasets in digitized or non-digitized form.⁶ A second definition: information that identifies the geographic location and characteristics of natural or constructed features and boundaries on or about the earth and includes: (a) data and information derived from, among other things, remote sensing, mapping, and surveying technologies; and (b) mapping, charting, geomatics data, and related products and services.⁷ For the purposes of this document, these civil sector definitions will be applicable. Additional definitions for geospatial information used by the Department of Defense and the Intelligence Community are in Title 10 of the U.S. Code.

Geospatial Intelligence (GEOINT): exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on or about the Earth. GEOINT consists of imagery, imagery intelligence, and geospatial information.⁸

License Uplift: increasing the pool of licensed users for the same Earth observation image, or unit data. An uplift is when a product is acquired or purchased using one EULA pricing and then moving it to

⁴ For the purpose of this document, commercial enterprise is defined as any for profit activity formed for the ongoing conduct of lawful business including, but not limited to, a sole proprietorship, partnership (whether limited or general), holding company, joint venture, corporation, business trust, or other entity which may be publicly or privately owned. This definition was inspired by and adapted from [8 C.F.R. § 204.6\(e\)](#).

⁵ [2019 National Plan for Civil Earth Observations](#)

⁶ Geospatial Data Act of 2018 (Pub. L. 115-254) § 752(5)(A)-(C), [43 U.S.C. § 2801\(5\)\(A\)-\(C\)](#).

⁷ [10 U.S.C. § 467\(4\)](#).

⁸ [10 U.S.C. § 467\(5\)](#).

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another EULA pricing that is more shareable. This would increase the price of the product based on any delta between how it was originally procured to the cost of the uplift.

Value-Added Product: work created when data are modified—through technical manipulation, addition of data, or both—where the principal features and characteristics of the source data are retained in the work and are extractable through technical means.

2. License Schema

External Perspectives

USGEO received comments on the use of data licenses to address issues not otherwise addressed by general Federal Acquisition Regulations (FAR) provisions in the primary contract terms, most notably data use and sharing rights.

Public comments generally emphasized the importance of clarity and predictability in license structures and definitions. Data providers were mixed on whether a single licensing framework was possible given the diversity of data types and uses. Users were concerned about understanding any data restrictions, leading some to suggest the use of well-known open data licenses (such as the Creative Commons suite) for data procured with a license enabling distribution to the public. The emphasis should be on creating a small set of relevant acquisition licensing frameworks to account for the various data buys.

Regarding the extent of data sharing rights in any license, there was not consensus between data providers and users. Many data providers emphasized that licenses, allowing full and open sharing, undercut their opportunity to sell to multiple users and create markets. Their preference was oriented toward allowing internal purchasing-agency use only or limiting sharing to third parties solely for scientific or other non-commercial use. Concerns of the data providers were that the investor community views open licenses as a negative, so the government's use of them undermines the ability of start-ups and small businesses to raise investor funds in a highly competitive market. On the other hand, data users argued that data obtained with taxpayer money, whether from a government-owned and operated sensor/system or from a commercial data buy, should be made publicly available for scientific purposes and for creating vibrant downstream businesses.

In addition, respondents noted there are government documents recommending data be made available for research in an equitable and objective manner. An example is the [United States Federal Data Strategy Data Ethics Framework](#). Also, respondents expressed their view that legislation such as the Foundations for Evidence-Based Policymaking Act of 2018 (hereinafter "Evidence Act"),⁹ requires that open data should be the agency default, while acknowledging exemptions.

Related to the distribution of derived products, public comments generally supported the release of the product with unrestricted use if the product: (1) could not be reverse engineered to allow the data to be reproduced, and (2) did not create a derivative product that could compete with the original commercial data provider's offering.

Agency Perspectives

Across civil agencies, approaches to data license structures and content have varied. Agencies are open to common language and structures but emphasize that different data types, use cases (including different development and use of derived products), missions, and legal/policy mandates necessitate

⁹ Foundations for Evidence-Based Policymaking Act of 2018 (Pub. L. 115-435) (hereinafter "Evidence Act").

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that agencies have the flexibility to adapt solicitations to meet their specific missions and requirements. The agencies recognize the viewpoint that data procured using taxpayer money should be publicly available, however this is not a straightforward proposition, as open rights to share the data is not the same as ownership. The agencies have been working together to develop equitable licensing schema which involves discussions and trade space with the Earth Observations Enterprise.

Agencies recommend that data sharing provisions consider the business cases of specific classes of data providers—for example: vendors providing satellite imagery may have different business models than those providing *in-situ* meteorological observations, leading to different impacts on pricing and competition from data use and sharing provisions. Agencies noted that some data are of significant use to existing third party users and may be subject to statutes, policies, or international agreements that require/encourage sharing, while other data may not. Agencies noted that there are more options for data sharing than are presently being used. Data can be shared with restrictions on use to meet academic needs, for example, as well as to fulfill United States laws, policies, and international agreements regarding ensuring the reproducibility of scientific information. Other creative approaches may attempt to meet third party user needs in ways that do not take away potential customers from the data provider—for example: if a given dataset is primarily of commercial value only in near-real-time, the use of data could be restricted to the Federal Government only for a limited period of time, after which it could be shared.

Agencies also considered that, if the same type of data are of use to multiple agencies, there could be efficiencies in procuring the data with a license that permits sharing across the Federal Government. For geospatial imagery, the National Reconnaissance Office (NRO)'s Commercial Systems Program Office (CSPO) has negotiated contracts that allow for shared usage across multiple agencies. These contracts have lowered the overall cost per image. The agencies are working, through coordinating bodies such as USGEO and Interagency Council for Advancing Meteorological Services (ICAMS), to increase these types of contracts. However, this type of acquisition requires coordination, both technically and from a financial perspective. Further information on relevant national policies is included in Appendix C.

Alternatively, if the same type of data is of use to multiple agencies, but not exactly the same data, agencies could consider working together to develop a flexible contractual framework with those data providers that allow each agency to directly procure the precise data they need using their own appropriated funds. This would also require agency coordination to ensure contractual arrangements and legal authorities enable this, that the contract ceiling is sufficient for use by multiple agencies, and that the terms of the contract are acceptable to all agencies that may potentially use this contract vehicle. Further discussion on acquisition issues is found in Section 4.

On January 14, 2019, the OPEN Government Data Act was signed into law as part of the Evidence Act.¹⁰ The law requires the development and maintenance of an online repository ([Resources.data.gov](https://resources.data.gov)) of “tools, best practices, and schema standards to facilitate the adoption of open data practices across the civil agencies,” and that agencies “make each public data asset of [their agency] available as an open Government data asset; and available under an open license.¹¹ An open license means a “legal guarantee that the asset is made available at no cost to the public and with no restrictions on copying, publishing, distributing, transmitting, or adapting” the data.¹² The Office of Management and Budget

¹⁰ Evidence Act, title II (§§ 201-202).

¹¹ 44 U.S.C. § 3511(c), as added by the Evidence Act § 202.

¹² 44 U.S.C. § 3502(21), as added by the Evidence Act § 202.

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(OMB) memorandum, Open Data Policy—Managing Information as an Asset (2013), also requires that agencies apply open licenses to their data. § III.1.c of the Open Data Policy, however, also requires that civil agencies meet the open data objectives when procuring data via a contract, while recognizing the protection of proprietary data may be required in some circumstances.

Federal Use of EULAs and other Licensing Schema

NRO developed a common family of EULAs for the next generation of commercial imagery operational contracts. The EULAs were developed to ensure maximum shareability across diverse user groups. This standardization works to improve user understanding of when and with whom imagery can be shared and supports automated ordering and dissemination of commercial imagery. The EULA tiers-of-use range from “national security” to “public release.” Models of the EULAs are available on the USGEO website at <https://usgeo.gov/ad-hoc-teams.html>.

The National Aeronautics and Space Administration (NASA) has adopted the NRO-developed family of EULAs to facilitate standard scientific collaborations. NASA’s use of EULAs enables broad levels of dissemination and shareability of commercial data with its partners and other agencies. NASA is currently procuring commercial data for Scientific other than commercial¹³ use only. Within NASA, at a minimum, the United States government and its partners shall have the ability to share and use Data and any Derived Products for other than commercial use including, but not limited to, inclusion in scientific and technical articles and publication of academic or similar works.

While the National Oceanic and Atmospheric Administration (NOAA) has not adopted the EULAs developed by NRO, it has developed a tiered system for the procurement of operational satellite data. Most notably, NOAA’s recent purchase of Radio Occultation (RO) data required the proposing data provider to include pricing for nine data license sharing options ranging from “unrestricted public sharing rights” to “no rights to distribute outside NOAA.” All data license options provided NOAA the unrestricted right to use, reproduce (for its own use), and prepare and publicly distribute derivative works, and authorize others to do so on its behalf (including its contractors and grantees). NOAA also included four alternative data license options, which allowed unrestricted public sharing 24 hours after receipt of the contractor’s data. Models of NOAA’s licensing structure are available on the USGEO website at <https://usgeo.gov/ad-hoc-teams.html>. Beginning with the Indefinite Delivery Indefinite Quality (IDIQ)-1 Delivery Order (DO)-3, the data sharing license implemented allows NOAA to distribute all RO data to U.S. Government agencies and international partners, for non-commercial use but not for further distribution. After 24 hours, the data are released without restrictions, permitting any redistribution and commercial use. As NOAA continues to learn from experience and continued public input, it will refine its data license sharing options, including adopting the use of standard open data licenses for defining options that permit unrestricted public sharing, and reducing the number of data sharing options to ones most likely to be selected.

One major difference between the EULAs (used by the Intelligence Community and NASA) and NOAA’s licensing is the use of the term “public” use. The current EULAs, developed by NRO, define “public” use as retaining industry copyright and prevents use for commercial purposes. NOAA has defined “public”

¹³ Within NASA contracts for commercial data, Scientific other than commercial use means use by Licensed Users of the Data, pursuant to a government initiated United States Government-funded and/or United States government peer-reviewed investigation. Peer reviewed research originates from a Government Research Announcement or similar public notice of opportunity and is performed for the sole purpose of conducting experiments, evaluation, research, and/or development, including basic and applied research under a Government Science Program. <https://earthdata.nasa.gov/esds/csdap>.

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use as without any restrictions on use, including commercial use. USGEO agencies will continue to discuss this difference as the government balances fostering commercial enterprises (e.g., Weather Enterprise) and the perception the government is buying data that someone could resell.

For civil agencies, the EULAs and NOAA Licensing schema state that derived products created by the government using the contractor's data are publicly distributed without use restriction and, in some cases, can be used for commercial use. For NRO EULA contracts, derived products are shared with the agencies; however, the reselling of copyright protected derived product is not allowed. The use of EULAs and NOAA Licensing schema provide the ability to uplift from more restrictive licenses to less restrictive licenses (effectively increasing the number of licensed users) without renegotiation of awards.

3. Sharing Considerations

Academic Sector

External Perspectives

USGEO received feedback from representatives of academia expressing concern about the potential loss of access to critical datasets given the increased use of commercial data by civil agencies. The main areas of concern included the impacts of such data loss on a broad array of Earth observations-reliant research. Also, concerns were raised about the impact of not having complete datasets of key observations for use in the classroom to train the next generation of scientists and other professionals in an array of Earth observations-reliant fields.

Issues raised related to research and education included concerns from specific scientific domains. For example, climate researchers who provided feedback noted the importance of having access to a continuous record of climate observations, over time, to ensure the validity of analyses. Also relevant to education and research is the need for academic access to raw data and metadata, for students to learn the full lifecycle of data analysis and verification techniques and researchers to fully verify data to ensure research outcomes are reliable and comparable. In addition, the research community may be hindered in its ability to test, verify, and validate research without access to all available data. Further, many peer-reviewed journals require data accessibility for publishing; therefore, ability to publish could be hampered.

Academic users will still be able to access this commercial data if they pay, but such pay walls will most likely benefit institutions with existing grants and greater resources over those institutions serving underserved communities. In addition, restricted academic access to commercial data has the potential to limit early phase exploratory research, where research ideas and innovations often develop. Two strategies were suggested by academic respondents: (1) the agencies could provide increased funding to researchers who can quote the costs of data required for their research and (2) Support for Earth Observations could be considered as part of agency proposal review and award mechanisms (e.g., as agencies have considered for cloud computing credits, in partnership with the vendors).

Agency Perspectives

The agencies recognize there is an impact on academic and international partners, as well as industry and related professional organizations, when the government moves to commercially provided data

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that has restricted licensing and/or user fees associated with commercially provided data from what was historically provided for free by government platforms. The agencies noted the important role academia plays and public-academic collaborations have on providing data checking and verification. Academia often has more ability to focus on verifying Earth observation data and associated algorithms than the government does. Existing academic-public sector relationships provide important checks and balances on Earth observation information. With limited academic access to commercial data resources, those verifications could be compromised. If access to data is limited to a small set of funded Principal Investigators and/or academic researchers, peer review and scientific reproducibility are likely to be negatively impacted, which will have impacts on Federal and academic users. The agencies are working with the academic institutions within the EULA and licensing schemas to clarify access to data via agreements (contract, grant, and/or cooperative agreement). Both the EULAs and licensing schemas are tiered approaches, with unlimited sharing with academic institutions under the public license tier.

It was noted that agencies focused on research, such as the National Science Foundation (NSF) and the National Institutes of Health (NIH), would be impacted by reduced academic access to commercial Earth observations. For example, NSF awards must comply with a data management plan and open-source data policy to promote data sharing. Datasets that do not conform to such standards are not viewed as reproducible and are deemed obstacles to open-source and transparent science. Universities and other research institutions also rely on the free flow of data to conduct government agency-sponsored research and depend on the consistency that comes with receiving such data.

Overall, to leverage the collaborative roles of each sector of the Earth Observations Enterprise that is highly valued by USGEO, it is crucial that data access for each sector be prioritized to continue to incentivize partnerships for innovation and societal and economic benefit. While license restrictions may be necessary, in some cases, as agencies begin to increasingly rely on commercial data, collaboration across all sectors is crucial to sustaining value of the overall enterprise. For example, development and growth of cross-disciplinary and cross-sector federations for data use for public benefit are critical to continuing to enhance the value of Earth observations to society.

In regards to creating similar Earth observation data programs akin to the [Cloud Access Program](#) (NSF) and the [STRIDES Initiative](#) (NIH), agencies are encouraged to discuss the feasibility of similar partnerships with the vendors to provide cost-effective and flexible access to data.

Intergovernmental Organizations

The United States government's international obligations related to Earth observations are predominantly intergovernmental in nature and are rooted in agreements related to intergovernmental organizations including, but not limited to, the World Meteorological Organization (WMO) and the Group on Earth Observations (GEO).

External Perspectives

USGEO received input from organizations and private sector entities with international and United States interests on cross-border issues related to Earth observations data sharing. The international community – governments and organizations – rely heavily on freely available United States Federally-funded Earth observations collected by civil agencies' platforms. Much of the international community does not have and cannot afford to build, deploy, operate, and maintain its own ground based and/or space-based Earth observations infrastructure.

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Public comments emphasized that the adherence to WMO and agencies' Earth observations data sharing policies that promote free, open, and timely access (for other than commercial purposes) of data globally will enable wide use by the public, enhance scientific understanding and improve the agencies' operational products.

Overall, respondents noted that, if compensation and data rights issues can be resolved to allow international sharing, then it will allow the international community, especially developing countries, to access new and innovative products and services. To enable this capacity sharing, public-private partnerships will be required, based on agreed-to technical, scientific, commercial, and legal frameworks for sharing Earth observations data and analysis to the international community.

Agency Perspectives

For decades, dating to at least the “Bromley Principles” promulgated by the Director of OSTP in July 1991, the United States has promoted policies ensuring full and open access to environmental data around the world¹⁴. These policies are growing in acceptance among governments and international organizations alike, which has been a significant foreign policy achievement that promotes transparency and advances science and environmental policy. These policies also directly benefit the government, academia, private sector, and public of the United States by ensuring rights to use foreign-produced Earth observations.

The United States is a member of the WMO, a charter country of GEO and the G7, all of which promote data sharing. The United States government does not purchase commercial data on behalf of the international community, but there are cases where the United States government would purchase data for its own use that would then be shared with international partners in support of specific projects and/or agreements. An example of a program where procured data is shared internationally includes when the United States (NOAA, Federal Aviation Administration, and the Air Force) procures and shares globally Aircraft Meteorological Data Relay data, a program coordinated by the WMO.

Historically, real-time open access to United States Federally supported datasets, from civil agencies, have been critical to improving global prediction models, early-warning capabilities for short-term weather, and longer-term climate projections in data-sparse regions of the world. Similarly, for its own models, the United States has relied on Earth observations provided by the international community. Such mutual reliance has depended on “free and open” data policies that have predominated throughout the history of the WMO.

The agencies noted that continued international sharing will also encourage international partners to continue their commitment to data sharing. For example, in 2008, the United States Geological Survey (USGS) made Landsat data¹⁵ accessible online for free across the globe, which led to open data policies among other international governments. The WMO is well known for its Resolutions 40, 25, and 60, which address data policy related to weather, water, and climate services.

New types of commercial data entering the market, in the atmospheric sciences community, have generated conversations on the appropriate arrangements for access to commercial Earth

¹⁴ See *Principles for Promoting Access to Government-Supported Scientific Data and Research Findings through International Scientific Cooperation*, Interagency Working Group on Open Data Sharing Policy of the Subcommittee on International Issues of the Committee on Science of the National Science Technology Council (2016), for additional background and policy guidance to the agencies.

¹⁵ <https://www.usgs.gov/emergency-operations-portal/data-policy>.

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observations data and analysis. The agencies, through active involvement in USGEO, ICAMS, GEO, and WMO, will continue to recognize the importance of sharing procured data that has historically been provided by the agencies and will structure contracts to share as many data as possible.

The United States is a signatory to established WMO policies (WMO Resolutions 40, 25, and 60) promoting free, open, and timely access to Earth observation data. In October 2021¹⁶, the WMO approved a new Unified Data Policy and the Global Basic Observing Network (GBON), reflecting how weather and climate services have become increasingly dependent upon continued access to observational data from around the globe, with data being exchanged internationally. The Unified Data Policy provides a comprehensive update of the policies guiding the international exchange of weather, climate, and related Earth system data between the 193 WMO Member states. The new policy reaffirms commitment to the free and unrestricted exchange of data. In addition, the GBON is a new approach under which basic surface-based observing networks feed atmospheric models with input data using an approach that is designed, defined, and monitored at the global level, providing fundamental coordination of international datasets for modeling.

The civil agencies appreciate that a reduction in availability of data and associated products from the United States agencies would have a negative impact on this and other WMO initiatives to reduce weather and climate related risk to the global community. NOAA's purchase of Radio Occultation data was done under a licensing schema that accounted for sharing under the WMO policies, see Section 4 below. EUMETSAT, Europe's meteorological satellite agency, announced a pilot program in July 2021 to buy and provide a worldwide license for Radio Occultation data for use in atmospheric models. EUMETSAT will receive the commercial data in near-real time with a global license that will allow the data to be shared immediately with any third party. The United States will continue working collaboratively with international partners as these purchases evolve.

The United States government will continue to share enormous amounts of Earth observations from Federally owned systems, even if it does not share all the data it buys from commercial vendors. USGEO recognizes that, with the increase of commercially available Earth observations, commercial data may become the dominant type of data sometime in the future. Therefore, it is important that USGEO, and agencies representing the United States in the intergovernmental process, continue to have an open dialog with the Earth Observations Enterprise on this topic.

4. Federal Acquisition Coordination

External Perspectives

USGEO received input that centered around how the agencies can enable a more agile acquisition process for commercial Earth observations and geospatial data. Public comments emphasized the need for greater expertise in commercial Earth observations and geospatial data by those in the agencies writing solicitations. Concerns were raised that solicitations were written without clearly articulating the requirements of data buys, analytics on the data, and derived products.

The public comments did not indicate a consensus on whether larger multi-agency contracts or small contracts were preferred, though there were specific recommendations offered by small- and medium-sized enterprises. Some noted that multiple-agency contracts can be an efficient procurement

¹⁶ Though these developments occurred after the listening sessions, their considerable importance and impact on these topics could not be ignored in this report, especially since the broader community long anticipated them, though we were unable to get feedback from the non-government community on these developments.

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mechanism, if funded and structured appropriately, and can reduce the proposal burden on small to medium companies. However, larger contracts that could result from multi-agency arrangements may drive small- to medium-sized companies to team with a larger company, thereby opening Intellectual Property (IP) to sharing with the larger company's proposal team, something smaller companies see as detrimental to their viability.

Open multi-agency contract vehicles with consistent terms that allow small- to medium-sized companies to interact directly with the agencies to which they will provide data appears to be preferred by commenters from the commercial sector. Further, the public comments encouraged the public and private sectors to expand the scope of policy discussions beyond data and to formally address the acquisition of derived commercial analytics and services, which could offer greater value than the data alone.

Some additional points offered included:

- “Data as a service” (DaaS) as a method for providing commercial Earth observations and geospatial data. This concept is becoming more dominant in industry and could be a new paradigm for Federal contracting. This could provide an alternative to agencies purchasing data “by the pound,” *per se*, providing commercially developed assets that are inserted into products by the Federal Government itself.
- A government-wide Broad Agency Announcement (BAA) process would greatly facilitate efficient responses to notices of funding opportunities.
- A single common set of consistent proposal submission instructions would ease the challenge of navigating commercial data purchases across multiple agencies.
- Request for using the General Services Administration (GSA) schedule as a procurement method.

Agency Perspectives

The agencies are guided by both policies and legislation that promote the increased procurement of commercial Earth Observations and geospatial data. These include, but are not limited to, the Geospatial Data Act¹⁷ and the National Space Policy (see details in Appendix C). Further, the agencies recognize the viewpoint for the need for increased understanding for the procurement of Earth Observations and geospatial data. The agencies are evolving related to the purchase of commercial data and the types of contracts they use (see agencies' roles in Appendix D). USGEO sponsored the [Tabletop Exercise on Data Licensing Challenges](#) in October 2021 to increase understanding. Coordination bodies such as USGEO and ICAMS provide fora for further discussion between the agencies on sharing practices. Highlights of agency commercial procurement activities include:

- NRO is the lead for a government-wide contract for procurement of imagery sharable with other agencies. This has eliminated the need for many civil agencies to procure imagery themselves given their more limited budgets.
- NOAA will continue with its on-going commercial data buys for lightning, aircraft-based observations, and MESO-NETwork (MESONET) data. NOAA will continue to contract for bathymetric mapping services under Architecture and Engineering (A&E) procedures, as well as foster lasting partnerships with academic institutions, other Federal and State entities, and the private sector which provide mapping data collected for other purposes at no cost to the government. Additionally, its National Environmental Satellite, Data, and Information Service (NESDIS) Commercial Data Program (CDP) led the procurement of Radio Occultation data. For the first Indefinite Delivery Indefinite Quantity (IDIQ) contract, NOAA awarded two firm-fixed price (FFP)

¹⁷ Geospatial Data Act (Pub. L. 115-254) § 759, [43 U.S.C. § 2808](#).

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contracts in November 2020 to procure commercial Radio Occultation data. NOAA plans to use the same FFP IDIQ acquisition vehicle for the follow-on contract currently under development.

- In some cases, commercial data are wholly purchased by a single agency or in partnership with other agencies. For example, LiDAR is purchased as a service using funds from the USGS and its partner organizations and made openly available without restrictions. These A&E contracts also allow State and local governments and other entities to partner with USGS or leverage these contracts. USGS's Geospatial Product and Service Contracts (GPSC) is a suite of contracts used by Federal, State, and municipal governments, as well as non-profits, Tribal governments, and private entities to partner with the USGS to fulfill their geospatial data requirements. Photogrammetric and mapping services are primarily awarded under the umbrella of A&E contracting. Broad in scope, these contracts can accommodate any activity related to standard, nonstandard, graphic, and digital cartographic products. The contracts are Qualifications-Based Selection (QBS), and task orders are negotiated directly with selected firms to provide contract services.
- NASA's Commercial SmallSat Data Acquisition (CSDA) program is using a firm-fixed price Blanket Purchase Agreement as the acquisition approach for data evaluation and subsequent sustained data purchases. For detailed evaluation and assessment, NASA is procuring small constellation satellite data products that augment and/or complement NASA-collected data. NASA's CSDA issues a Request for Information (RFI) every 12 to 18 months to identify data that may be valuable for the agency's application activities.

As part of the market research process for Government acquisitions, agencies noted that they are evaluating whether there are sufficient sources of commercial data to assure sustained availability of data, and whether the data are purchased by other organizations. Business models and sector-specific mergers and acquisitions are considered to help determine whether there is a sustained market for specific Earth observations. Agencies are encouraged to consider the supply and value chains required to deliver commercial data and whether they are horizontally or vertically integrated, which can impact the delivery of data. Potential mitigations include maintaining multiple suppliers of commercial Earth observations.

To assure quality of data and sustain collaborations between the Federal and private sectors, agencies are encouraged to review how often suppliers modify their offerings to maintain pace with technological and scientific advancements, and how these advancements may change agency requirements. Agencies may also wish to consider situations, based on impact to agency mission, where relaxing requirements for Earth observations may provide additional options for obtaining Earth observations.

To protect agency operations from cyber-security risks, agencies should require commercial operators to follow established practices to protect their systems, agency systems, and the commercial data. Agencies may not have to impose Federal cyber-security guidelines; commercial best practices or international standards are often sufficient based on risk and impact to the agency's mission.

The agencies recognize the importance of the protection of IP. While the protection of IP lies with the individual contractor when responding to a government Request for Proposals (RFPs), the agencies are cognizant of this issue when determining the appropriate contract structure. The agencies assess the cost and efficiency of multiple small contracts or having larger, more pooled independent contractors. The agencies have structured contracts, allowing for multiple contract "winners" to reduce the reliance

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of small companies on larger companies. Further, the agencies provide IP protection through the terms of the contract and use of EULAs and licensing schema.

There are some outstanding issues between the agencies about whether a geospatial dataset itself constitutes “technical data” or “computer software” under the relevant FAR. In some agencies the geospatial dataset is licensed under a EULA, while ancillary or accompanying deliverables like reports, user manuals, studies, and analysis are considered to be the technical data.

The government acquires data via several different methods, including direct commodity purchases and direct services collection, and as such the application of FAR requirements varies according to the type of contract to be offered. There was some discussion among agencies and the public regarding the applicability of the FAR to procurements. Specifically, do the “data rights” provisions of FAR Part 27 apply to these procurements, and if so, how? How do these clauses relate to any custom data use right(s) defined directly in the contract, and how do the EULAs (government or contractor) apply?

This issue is complex. Each data procurement may have valid reasons to resolve procurements differently. For example, if an agency is seeking data from a provider that is collecting the data routinely and offering the data commercially to multiple entities, it may be appropriate to consider a procurement with a EULAs, rather than issuing data rights clauses for the products. FAR Part 27 would not be applicable to the license terms where the EULAs are applicable to but not to the data rights clause for the purpose of a contract, whereas the EULAs provision contained in the contractor’s standard commercial license or government EULAs would not be contrary to the clauses. For example, if an agency is seeking collection of specific data that were not collected commercially, the data rights may be procured under an EULA, with additional charges for withholding rights or by implementing the data rights clauses that may be more appropriate, allowing all data rights to the agency (as opposed to the data provider retaining ownership and offering a license to the agency). Agencies should be cognizant of what type of contract they are offering when determining which data rights or licensing are appropriate for each acquisition.

As the availability of commercial Earth observations and geospatial data increases, the agencies have found that a multiple step process is more effective than a single step process. The agencies have found that a first step that enables the agencies to evaluate the data over a 6-to-12-month process allows for the validation of the data and interaction with the vendors on their ability to meet the needs of the agencies. The agencies can then move to a second stage for a larger contract in a streamlined fashion by having a basis for evaluating the vendors’ responses.

Across the government, agencies can purchase commercial geospatial and Earth observations data, products, and services via GSA Schedule 70. Schedule 70 is an IDIQ multiple award contract for information technology products and services. GSA has implemented a Special Item Number (SIN) 541370GEO for all Earth observations data, products, services, and solutions. This single SIN, grouping geospatial data, knowledge, and analytics within the Consolidated Schedule, makes it easier for agencies to acquire commercial Earth observations and geospatial data, products, and services. For example, NOAA uses this schedule to purchase lightning detection data.

For commercial data used in government scientific research, scientific traceability is very important and requires low-level products (aka “raw” data) from sensors. Traditionally, the sensor data required

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would be Level 0¹⁸, which is the data stream received at downlink. However, it may not be entirely reasonable for a commercial company to provide this to the government since there may be proprietary and/or non-scientific data within the downlink stream. Thus, the rawest form of the observation is needed, even if that observation is not what is classically defined as ‘Level 0’. Furthermore, higher-level (i.e., Level 1b, Level 2) products may be acceptable for some agency purposes, requiring the vendor to conduct lower-level processing (e.g., geolocation, calibration). This allows for broader use of the data by the scientific community. Inclusion of all levels of processing, such as Levels 0 through 2+, allow for an improved assessment of data quality by leveraging low-level processing expertise across the scientific community.

5. Legal Considerations

External Perspectives

USGEO received comments on legal matters related to liability, IP, Tribal rights, and third-party usage of commercially procured data.

The public comments emphasized the importance of commercially standard limitations of liability to manage provider risk and enable providers to price accordingly. The comments noted that licenses developed by the vendors exclude consequential damages, include a cap on direct damages (typically amounts paid and payable within some set number of months), and an explicit listing of remedies if service levels are not met, which typically involves service credits. Without these limitations, the risk of a contract can quickly outstrip its benefits to the data provider. Private sector data providers noted that when agencies are using their commercial data for operational missions it is important these limitations remain, and specifically noted the importance of the [SAFETY Act](#) (which limits third-party damages for contractors supporting homeland security missions) and the [Price-Anderson Act](#) (which limits third-party damages for contractors assisting with nuclear energy).

The greatest value to the data provider is the IP associated with the data – including elements like its contents, its metadata, and the processes and procedures related to its production. Inability to ensure protection of these rights can create a substantial risk to a company’s viability. There are challenges with ensuring third parties to government procurements understand their use rights if their rights are restricted to other than commercial use or other restrictions. Public commenters raised the concerns that third parties who are not bound by the contract may see a low legal risk to using data in ways in excess of the granted license. The data provider would need to bring an action against the offending third party in court under copyright laws, rather than through a contractual remedy.

Concerns were expressed about sharing geospatial data over Tribal lands with the Federal Government. Given existing arrangements, commenters are concerned that when data are shared they could become accessible to third parties through the Freedom of Information Act (FOIA). This can put Tribal entities at risk, with Tribal commenters specifically raising their concerns based on the Supreme Court decision in [Department of Interior v. Klamath Water Users Protective Assn., 532 United States 1 \(2001\)](#). For example, commenters raised concerns that third parties could use FOIA to exploit Tribal natural resources, such as forests, minerals, water, etc. or to obtain information they would not otherwise have access to, even if they are in litigation with a Tribal government. Tribal governments are also concerned about others outside the government acquiring high-resolution commercial satellite imagery of their ancestral lands and resources. Some Tribes and Indigenous Peoples may have privacy concerns about certain types of geospatial data becoming available to the public (e.g., protection of traditional gathering areas, sacred

¹⁸ [NASA Data Level Definitions](#)

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and cultural sites, etc.). Earth observations and geospatial data that has a higher resolution than what is readily available or reveals new types of information about physical features on Tribal lands could potentially affect the interests of Tribes and Indigenous Peoples. Additionally, there is growing interest across Indigenous Nations and communities regarding Indigenous data sovereignty over data collection, ownership, and application of its own data as this applies to the Tribes' rights to govern their peoples, lands, and resources.

Agency Perspectives

USGEO agencies appreciate the need to protect IP and guard against inappropriate use of data under license agreements. The agencies are working to ensure the community is aware of EULAs and licensing schema. Within NASA and NRO, each user is provided with a copy of the agreement included in the metadata and is required to read it. NOAA ensures third-party users are aware of the restrictions but has told vendors that NOAA will not be liable for any third-party misuse. The agencies communicate the contractual (data rights) to the users. There are safeguards and practices in place to protect the data and shareability, as well as path for vendors to be compensated, which is addressed in the disputes clause and FAR commercial terms and conditions clause.

The agencies recognize the importance of upholding Tribal rights and have been active within the [GEO Indigenous Alliance](#), and are working to create a similar alliance at the national level. The agencies note and appreciate the development of the CARE Principles for Indigenous Data Governance¹⁹.

6. Fostering Improved Public-Private Collaborations in the Earth Observations Enterprise

External Perspectives

USGEO received extensive input on how to improve public-private collaborations as part of the Earth Observations Enterprise, especially for small- and medium-sized companies. Below is a synopsis of recommendations to the agencies.

- The Federal Government is encouraged to provide highly-refined training datasets to easily enable new algorithms and services.
- Agency-based seed money initiatives, with limited restrictions, can help early-stage commercial data concepts, spur innovation, and support the startups revenue sourcing efforts.
- Proactive and interactive conversations on agency requirements would enable vendors to assess whether small changes to their applications and technologies could turn a platform from unusable to usable for many applications.
- Increased understanding of the venture capital and private equity investor enterprise, including their risk perceptions and red flags, especially related to IP. A recurring issue for investors is that the target company must have clear ownership of the core IP necessary to execute its business case.
- Greater appreciation of how start-ups fuel innovation. Innovation requires investment.
- Develop and continue to support mentor-protege programs and seminars centered around commercial Earth observations data provision and related innovations.
- Burdens on small- and medium-sized business can be minimized by increasing specificity of requirements, minimizing the length of government procurements, reducing scope changes prior

¹⁹Carroll, S.R., Garba, I., Figueroa-Rodríguez, O.L., Holbrook, J., Lovett, R., Materechera, S., Parsons, M., Raseroka, K., Rodriguez-Lonebear, D., Rowe, R., Sara, R., Walker, J.D., Anderson, J. and Hudson, M., 2020. The CARE Principles for Indigenous Data Governance. *Data Science Journal*, 19(1), p.43. DOI: <http://doi.org/10.5334/dsj-2020-043>

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to awarding the contract, reducing government payment timelines, and structuring contracts in ways that enable small- to medium-sized companies to bid competitively on their own.

- Maximize opportunities, as practical, for in-person interactions, such as pitches, meetings, workshops, and Federal employee attendance at conferences. Such interactions are among the most productive ways to build relationships between agency and commercial officials. In-person opportunities need to be widely disseminated, not only through government procurement systems but also through social media and trade journals.
- Conferences are often the most cost-effective way for small- to medium-sized companies to demonstrate their products to government audiences. Limits to government travel have impacted important opportunities for learning and collaboration.
- Develop concierge services to foster new and greater links between agencies and companies, and to build connections with end users and partners.

Agency Perspectives

USGEO is continuing to implement the actions within the 2019 National Plan, many of which are rooted in enhancing the Earth Observations Enterprise, including through the activities leading to this report. The agencies have set up programs intended to work with small and medium enterprises. For example:

The vision for the Office of Small Business Programs at NASA Headquarters is to promote and integrate all small businesses into a competitive base of contractors that pioneer the future of space exploration, scientific discovery, and aeronautics research. <https://www.nasa.gov/osbp>

USGS GPSCs are based on QBS and the resulting task orders are negotiated directly with selected firms to provide contract services. GPSC provides contracts for large to small business firms to provide LiDAR information and other geospatial collections. <https://www.usgs.gov/core-science-systems/national-geospatial-program/geospatial-products-and-services-contracts>

Recommended Practices

Based on the dialogues, written comments, and discussions outlined in this paper, the EXGEO Subcommittee recommends consideration of the following practices, when appropriate and allowable by law and regulation, across the government:

1. Adopt standard definitions (see Themes - Section 1) for all future procurements (including RFIs, sources sought, RFPs, responses to government solicitations) and policy documents issued in connection with commercial Earth observations and geospatial data.
2. Adopt the EULAs and existing data sharing frameworks identified in this document for future procurements.
3. Consider the following factors, as applicable, when evaluating data sharing rights:
 - a. Data usage to create influential scientific information subject to the Information Quality Act or other applicable US laws or policies.
 - b. Regulatory considerations.
 - c. Applicable intergovernmental/international agreements.

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- d. General business and pricing models based on licensing levels.
 - e. “Downstream” business sector impacts because of data restrictions.
 - f. Academic sector impacts because of data restrictions.
 - g. Procuring agencies’ needs for grants/cooperative agreements recipients to have access to the data.
 - h. Partnership efforts with State, local, Tribal and territorial governments.
 - i. Creative approaches to data sharing that can meet third party needs, minimize the impact to the data provider, and not significantly increase the cost to the procuring agency.
4. When writing civil agency contracts consider making data available under standard open data license, some possible options are:
 - a. Creative Commons Zero 1.0 Universal Public Domain Dedication (CC0 1.0) (<https://creativecommons.org/publicdomain/zero/1.0/>),
 - b. Creative Commons Attribution 4.0 International (CC BY 4.0) (<https://creativecommons.org/licenses/by/4.0/>), or
 - c. Creative Commons Attribution-Noncommercial 2.0 Generic (CC BY-NC 2.0) (<https://creativecommons.org/licenses/by-nc/2.0/>).
 5. Structuring solicitations that provide the vendors options to respond to different data sharing tiers and allow a provision for “uplift.”
 6. Consider the value of public access and the additional costs of data sharing rights when comparing the cost to produce the data internally as compared to purchasing the data.
 7. Include contract provisions and administrative mechanisms to allow data to be purchased using funds from and/or on behalf of other agencies.
 8. Consider the feasibility of current programs that enable grantees access to cloud computing as a model that could be translated to the purchasing of Earth observation and geospatial data.
 9. Monitor the international data policies of intergovernmental organizations and the evolving of commercial global data rights as they pertain to domestic procurement.
 10. Include the necessary language in procurement documents so agencies can share the responses and proposals received across the agencies. Additionally, consider including language in commercial data agreements to allow data sharing with other agencies for data characterization and evaluation purposes.
 11. Input, to a central repository, what commercial data is already purchased/available in the Federal sector.
 12. Coordinate and jointly issue solicitations and make them available on Sam.gov and on the [Acquisition Research Center site](#).
 13. Continually review and strengthen safeguards for the protection of IP and use rights.

Appendix A: External Participants

USGEO would like to thank the following non-Federal entities for their valuable participation through Industry Dialogues and/or through written input to 86 Fed. Reg. 28078, May 25, 2021. Participants are listed in alphabetical order.

AECOM	Minnesota Department of Transportation
Alabama Water Institute	MITRE Corporation
American Meteorological Society	North Carolina State University
Astraea, Inc	Northrop Grumman
Ball Aerospace	Oklahoma State University
BlackSky	Planet
Bluesky International Ltd	PlanetIQ
Canadian Space Agency	RedCastle Resources
Capella Space	Rochester Institute of Technology
Caelus Partners	SAIC
CareWeather	SeaGate
Center for Western Water Extremes	SeaTrac Systems, Inc.
CASE Consultants International	Shared GEO
Colorado University - Boulder	SPIRE
Collins Aerospace	Synoptic data
Computing Community Consortium	Telophase Corporation
County of Ventura	Tetra Tech
Development Seed	Tomorrow IO
DevGlobal	UCAR
Displacement Dynamics	Umbra
Earth Networks	UNAVCO
ERT	Universidad Central De Venezuela
Esri	University of Arizona
First Street Foundation	University of California San Diego/Scripps
George Washington University	Institute of Oceanography
GeoOptics, Inc.	University of Florida
GHGSat Inc.	University of Minnesota/Polar Research Center
Global Science & Technology, Inc.	University of Washington
H A Cikanek Consulting LLC	USBR
HawkEye 360	USCLIVAR
IBM Thomas J. Watson Research Center	Vaisala Inc.
ICSI	
IMECS, LLC	
IMSG	
I. M. Systems Group, Inc	
International Food Policy Research Institute	
ISYS Technologies	
L3Harris	
Leica Geosystems/Hexagon	
Leidos, INC	
Maxar	
Merrick Surdex	

Appendix B: Summary of Additional External Input

Creative Data sharing rights

What are creative options for expanding data sharing rights without significantly increasing costs to the Federal Government?

Summary of External Input

Many commercial providers are moving toward subscription-based products. The practices could consider providers whose products are only offered with time bound licensing, where users may only have access to the data source for a year vs. in perpetuity.

If considering other than commercial and commercial uses of a dataset, the agencies may determine those characteristics of the dataset that are most valuable to the marketplace (e.g., horizontal resolution, real-time availability) and those that can provide significant societal benefit without devaluing the dataset (e.g., spatial or temporal aggregations of higher resolution data, limiting access to small subsets of data). The agencies could choose to issue commercial licenses for a fee and use those funds to defray the cost to the taxpayer of the dataset's procurement. In this way, datasets can "pay their own way" through leveraging their value to the commercial marketplace while still allowing for agency, non-profit, and research uses.

Various means of "diluting the value of the data" (e.g., using a coarser resolution or putting data on a time delay), to allow broader distribution of restricted data by the agencies, are unlikely to be effective and may even be counterproductive in that, by definition, they reduce the efficacy of the data. Alternatively, agencies could fully acknowledge and embrace that they are likely to only be one of many users of some datasets and simply recognize that free and open distribution may not be possible for data providers for whom government licensing fees pay only a fraction of their costs.

Agencies could focus on creating mechanisms that allow controlled sharing of the data in a way that does not negatively impact the data owner's potential for monetizing the data. Most data owners are open to allowing researchers to use their data if the provider is given appropriate attribution. Use of matching datasets in repeatability studies would be an acceptable option for expanding data rights. For example, a sharing requirement that allows a third-party free access to a specific dataset used in agency research for the purpose of verifying the accuracy of the research by attempting to independently repeat the results would be acceptable.

Cost Information

How should the government solicit information on the cost of different data sharing rights in the context of a specific procurement?

Summary of External Input

Financial assessments, such as government Independent Cost Estimate or market research, could assess data sharing rights outside of the Earth science community. The agencies should be explicit about the data sharing rights (or different options for such rights) they expect and need. The agencies should be encouraged to ask offerors to propose pricing for License Uplifts, allowing datasets of

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interest to uplifted case by case at efficient pricing rather than a large up-front bulk purchase priced at a great premium. Data sharing categories offered included:

- Intended data use
 - Internal to the procuring organization
 - Derived works intended for wider dissemination
 - Research and development internal to the procuring organization with operational customer-facing application
 - Distributed outside the procuring organization
- Number of users
- Area size on Earth for which to provide data
- Type of data (historical data vs real-time)
- Technical specifics (e.g., sampling rate and sample density)

Best Value and Return on Investment

When considering data sharing rights, how should the Federal Government determine the best value and return on investment for the taxpayer?

Summary of External Input

Return on investment involves the return and the investment. The terms “Value” and “Return on Investment” (ROI) for commercial data carry different meanings for the Federal Government and the data provider. Often the Federal Government measures ROI by the number of individuals and agencies accessing the licensed data. The more entities and individuals using licensed data under a single procurement, the lower “per unit” cost. Multiple projects using this data can therefore attribute a similar lower cost of licensed data based on the economies of scale provided. Data providers judge ROI from a profit/loss perspective: future revenue and sales gained minus research and development costs to deploy an architecture to collect and process the data sold. The following statements are an abridged version of the public comments:

- Industry
 - Avoid impact on potential of the private sector for accelerated technological advancement and unlock free market forces to create a vibrant economy that achieves rapid technological advancement.
- United States Government
 - Permissive data sharing rights for research and development purposes allow the government to lower its overall research and development unit cost.
 - When over-buying unnecessary rights, more than the program’s needs, a single agency conducting the procurement ends up burdening its own funds for other agencies’ use of the data.
 - The Federal Government should look at establishing similar contract vehicles at the agency level to support data sharing within each agency and to achieve the best return on investment.

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- Science and Academia
 - Scientific research can help fuel innovation and scientific understanding only if these data are free and openly accessible to the research and educational communities to maximize its value.
 - Many commercial providers are moving forward with subscription-based products that are only offered with time bound licensing.
- Balance (Government, Taxpayer, and Industry Interests)
 - The government should balance data sharing rights policies to provide an ROI and benefit to the taxpayer with the allowance for certain restrictions that materially preserve the commercial value of the data for private industry.
- Balance (Industry and United States Government)
 - Use caution when comparing commercial data prices to agency Earth observation platforms, as the agencies provide the maximum data possible, so the cost per byte decreases as the mission continues.

Comparison to Non-governmental Clients

How does the Federal Government's requirements compare to non-governmental customers? If significantly different, does that make diversifying the customer base more difficult and/or increase the prices offered to the Federal Government?

Summary of External Input

Commercial customers approach purchasing decisions like the government's "best value" determination, as the market for Earth observations is not yet commoditized. Commercial customers seek to maximize the value-per-dollar spent on observational data; scaling affords data providers the ability to offer the largest possible data set at a competitive unit cost to maximize derived insight from the use of the data.

Some interactions with the agencies are overly focused on the sensor being developed and not on the data that could be delivered. Commercial customers are driven by data quality, not hardware implementation. Commercial customers are better able to validate their needs and sign letters to confirm their willingness to pay. This makes it much faster to validate market risk, because commercial customers can acknowledge the impact of the data without needing to understand all the aspects of the technology used to generate the data.

Non-governmental customers, excluding academia, typically move purchases of data to operating expenses from capital expenditures once the value of the data is proven. However, with very few exceptions, the agencies tend to see data purchases as capital expenditures. This means that most purchases from agencies must go through solicitations, as opposed to just having the data be a line-item purchase annually.

In general, non-governmental customers usually do not impose as many requirements as governmental customers, which reduces the cost of sales and therefore the price. The government's more rigorous proposal and contracting process adds time and expense, which increases the cost of sales and therefore the price to the government.

Categories of Data Sharing Rights

What are useful categories of data sharing rights within the Federal Government and externally?

Summary of External Input

There was strong support for identifying data into two categories: commercial and other than commercial. Fee structures that distinguish safety, welfare, research, and humanitarian purposes from commercially profitable purposes, with the other than commercial category operating on a lower fee schedule or enhanced product redistribution licensing than the commercial use category.

Data providers do sometimes price and limit their licenses by use case, particularly for academia or scientific/research uses, but would prefer to keep to categories above (internal, derivative works, customer application, re-distribution). Limiting by use case is more difficult to ensure because, for example, a researcher who has access to the data by virtue of their position at a university may also have a position at a business. Ensuring the researcher does not use the data for commercial use is difficult, whereas ensuring the data is only used internally is easier to check.

Additional Legal Concerns – Validation and Certification

What is the industry perspective on certification and validation of commercial data?

Summary of Agency programs

While calibration/validation are critical components, the nature of this question for the purposes of this document focused on whether the data provided by the vendor meets what it advertised.

The NASA CSDA Program will provide Quality Assurance/Quality Control of the commercial data. The CSDA will evaluate the quality of data and metadata for the long-term sustained data use. The CSDA will utilize the quality maturity matrix completed during evaluation of the data to develop the baseline quality metrics for the data and metadata. The process will compare the data and metadata quality of future products against the baseline. The quality of data products will be continuously monitored, whereas metadata will be analyzed for completeness and consistency. The CSDA will continuously check the quality of the commercial satellite data and capabilities of data services over time to ensure capabilities do not degrade to a point that data is not usable by the research and applied communities. If quality does degrade, it will be the basis for termination of the contract for failure to meet a data standard present at the time of initial data evaluation.

NOAA's CDP validates the commercial data through a multiple step process. The University Corporation for Atmospheric Research (UCAR) is the Radio Occultation data processing center. UCAR receives low-level observation data files by way of the NOAA Cloud through the Office of Satellite and Product Operations. Prior to transmitting products to the users, UCAR first conducts data specification compliance checks and applies detailed quality control procedures for each sounding. In addition, NOAA's Satellite Applications and Research serves as a commercial Radio Occultation data validation quality monitoring center internally and has developed an independent processing/monitoring package to conduct validation quality checks.

For the National Agriculture Imagery Program (NAIP) data, the United States Department of Agriculture (USDA) has staff to oversee the Quality Assurance/Quality Control process.

Through the Joint Agency Commercial Imagery Evaluation (JACIE) effort, agencies collaborate across the Federal and non-Federal community to characterize civil and commercial remote sensing systems, data, and products. This activity provides an understanding of data characterization best practices,

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data quality, and data interoperability. JACIE promotes the acquisition and delivery of quality remote sensing data based on independent characterization and validation activities.

Earth observations data and services provided by the agency employees may be protected under the Federal Tort Claims Act; entities providing commercially-procured Earth observation data and analytics are not. The agencies do not certify commercial data but perform quality checks for use in mission products. There is one exception, the [Integrated Coastal and Ocean Observation System Act of 2009](#) requires the [IOOS](#) Program to develop and implement a process to ensure that [Regional Associations](#) – IOOS partners located around the nation – gather and manage data and information to Federal standards. This means that users can rely on data or information tools offered through these regional entities or built upon that information to be as reliable as data directly from NOAA. The [certification](#) process involves extensive documentation to ensure the organization is collecting and managing data and information consistent with established NOAA standards. The documentation is vetted by a panel of Federal reviewers, and once all requirements are fully satisfied, the partner is certified as a Regional Information Coordination Entity and Federal Tort Liability is extended.

Appendix C: Relevant National Policies and Legislation

Foundations for Evidence-Based Policymaking Act of 2018 (Pub. L. 115-435) § 202(c)(1)(A)(iv), [44 U.S.C. § 3506\(b\)\(6\)](#)

Requires each “public data asset” of an agency to be made available to the public under an open license, meaning at no cost and with no restrictions on use or dissemination. However, it includes as “criteria” when considering particular datasets for release, whether such data “is restricted by contract or other binding, written agreement.”

Geospatial Data Act of 2018 (Pub. L. 115-254) § 725, [43 U.S.C. § 2801\(13\)](#)

Requires the “National Spatial Data Infrastructure” to ensure that geospatial data from multiple sources, including the private sector, are available, and directed that one of its goals is to ensure “free and open access for the public to geospatial data.”

Requires “covered agencies”²⁰ to search all sources, including the GeoPlatform, to determine if existing Federal, State, local, or private geospatial data meets the needs of the covered agency before expending funds for geospatial data collection.

For further information, <https://www.fgdc.gov/gda>

Open Data Policy—Managing Information as an Asset, [OMB M-13-13](#) (2013), § III.1.c

Requires agencies to apply open licenses to their public data, and when procuring data using a contract, to use appropriate FAR clauses to meet the open data objectives “while recognizing that contractors may have proprietary interests in such information.”

Managing Information as a Strategic Resource, [OMB Circular No. A-130](#) (2016)

Recognizes that “[t]he open and efficient exchange of scientific and technical Federal information, subject to applicable security and privacy controls and the proprietary rights of others, fosters excellence in scientific research and effective use of Federal research and development resources.”

Improving Implementation of the Information Quality Act, [OMB M-19-15](#) (2019), § 3.3

Discusses other laws and policies requiring the release of government data but emphasizes the additional importance of such release for compliance with the “reproducibility standard” for influential information under the Information Quality Act (IQA). Confirms that the IQA Guidelines apply to non-government data and “set an expectation of access to data underlying influential information,”

²⁰ “The term ‘covered agency’—(A) means—(i) an Executive department, as defined in section 101 of title 5 that collects, produces, acquires, maintains, distributes, uses, or preserves geospatial data on paper or in electronic form to fulfill the mission of the Executive department, either directly or through a relationship with another organization, including a State, local government, Indian tribe, institution of higher education, business partner or contractor of the Federal Government, and the public; (ii) the National Aeronautics and Space Administration; or (iii) the General Services Administration; and (B) does not include the Department of Defense (including 30 components and agencies performing national missions) or any element of the intelligence community” (Source: 43 U.S.C. § 2801(3)).

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but notes this expectation is “subject to ‘compelling interests such as privacy, trade secrets, IP, and other confidentiality protections.’”

FAR Subpart 27.4-Rights in Data and Copyrights

Provides standard FAR clauses for United States government rights to data procured under a contract, including for “unlimited” rights.

resources.data.gov

An online repository of guidance and tools to implement the OPEN government Data Act (Title II of the Evidence Act) and the Federal Data Strategy. "When agencies purchase data or content from third-party vendors, care must be taken to ensure the information is not hindered by a restrictive, non-open license.”

[*Principles for Promoting Access to Federal Government-Supported Scientific Data and Research Findings through International Scientific Cooperation, NSTC \(2016\)*](#)

“Scientific data should be made openly accessible to the extent permitted by law and subject to privacy, confidentiality, security, and other appropriate restrictions (e.g., recognizing proprietary interests, business confidential information, and intellectual property rights). Government-supported scientific data should be available without charge whenever feasible.”

[*United States Commercial Remote Sensing Policy, April 25, 2003 \(National Security Presidential Directive \(NSPD 27\)\)*](#)

This policy establishes the foundation for the United States government to rely on, to the maximum practical extent, United States commercial remote sensing space capabilities for filling imagery and geospatial needs for military, intelligence, foreign policy, homeland security, and civil users.

[*2019 National Plan for Civil Earth Observations- December 9, 2019*](#)

The 2019 National Plan for Civil Earth Observations recognizes the Earth Observations Enterprise and illuminates the paradigm shift from Federal data collection and analysis to increased reliance on the commercial sector to provide environmental data and analytics. The Plan recognizes the opportunities and challenges that must be addressed for the agencies to increase their reliance on commercial environmental data.

[*National Space Policy December 9, 2020*](#)

This policy builds on the National Space Policy from June 28, 2010 and focuses on developing and supporting a robust, innovative, and competitive commercial space sector. It directs agencies to “purchase and use United States commercial space capabilities and services to the maximum practical extent under existing law, when such capabilities and services meet the United States Government requirements.” It further directs the agencies to prioritize partnerships with commercial industry and consider inventive and nontraditional arrangements for acquiring commercial space goods and services. It states that government systems should only be developed when a commercial service is not available or could be available. The policy specifically calls out the purchasing of commercial environmental data for use in meteorological and space weather models, where appropriate. It also addresses open sharing of environmental data, which is addressed later in this guide. For example, it

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requires agencies to “[p]romote the adoption of policies and practices internationally that facilitate full, open, and timely access to Government space-derived environmental data on a reciprocal basis.”

[U.S. Space Priorities Framework December 1, 2021](#)

This policy builds on prior space policies and highlights benefits U.S. benefits from space activities and U.S. space policy priorities. The framework directs agencies to “advance the development and use of space-based Earth observation capabilities that support action on climate change” and “through collaboration between the public, private, and philanthropic sectors, accelerate the development and use of Earth observation to support climate change mitigation and adaptation”.

Legislation has been directing agencies to pursue commercial data:

- *H. R. 5503, Introduced in the House on 04.13.2018 (NASA Authorization Act of 2018)*
 - In carrying out the strategic implementation plan under subsection (a), the Director shall take into account and incorporate into such plans, as appropriate, purchasing Earth observation data and services from the private sector or through public-private partnerships to meet Earth observation requirements.

- *Weather Research and Forecasting Innovation Act of 2017 (Pub. L. 115-25) § 302, [15 U.S.C. § 8532](#)*
 - The Department of Commerce is directed to develop a strategy “to enable the procurement of quality commercial weather data. The strategy shall assess the range of commercial opportunities, including public-private partnerships, for obtaining surface-based, aviation-based, and space-based weather observations. The strategy shall include the expected cost-effectiveness of these opportunities as well as provide a plan for procuring data, including an expected implementation timeline, from these nongovernmental sources, as appropriate.”
 - Weather Industry and Weather Enterprise. The terms ‘weather industry’ and ‘weather enterprise’ are interchangeable in this section and include individuals and organizations from public, private, and academic sectors that contribute to the research, development, and production of weather forecast products and to primary consumers of these weather forecast products.
 - The purchase of weather data through contracts with commercial providers; and
 - The placement of weather satellite instruments on co-hosted government and/or private payloads.
 - Requires NOAA to “continue to meet the international meteorological agreements into which [NOAA] has entered, including practices set forth through World Meteorological Organization Resolution 40” when procuring commercial data.

Appendix D: Agency and Committee Roles

Federal Geographic Data Committee

The [Federal Geographic Data Committee](#) (FGDC) is an organized structure of Federal geospatial professionals and constituents that provide executive, managerial, and advisory direction and oversight for geospatial decisions and initiatives across the Federal government. The Geospatial Act codified the role and authorities of the FGDC and directs the FGDC to lead the development and management of the National Spatial Data Infrastructure Strategic Plan.

Interagency Council for Advancing Meteorological Services

ICAMS is the formal mechanism by which all relevant Federal departments and agencies coordinate implementation of policy and practices to ensure United States global leadership in the meteorological services enterprise. Under ICAMS, the Working Group for Non-governmental Data is chartered to provide interagency cooperation and collaboration on the policy, acquisition, data sharing, and use of proprietary data from commercial, academic, and other non-governmental sources for operational and research use by the agencies.

NASA Commercial Data Buys

- Information on NASA's past and current commercial data purchases via its Commercial SmallSat Data Acquisition Program. Available at <https://earthdata.nasa.gov/esds/csdap>.
- In FY2022, search and discovery of NASA's Earth observation data and commercial data holdings will be operational via the same search tool (<https://earthdata.nasa.gov>). Access to the commercial datasets will be subject to the terms of the EULA.

National Geospatial-Intelligence Agency

- National Geospatial-Intelligence Agency (NGA) is the lead Federal agency for Geospatial Intelligence (GEOINT) and remains the primary buyer of commercial geospatial data analytics.
- As the GEOINT functional manager, the NGA Director recently published the National System for Geospatial Intelligence Enterprise [Commercial GEOINT Strategy](#), calling on the GEOINT community to leverage more commercial technologies.
- In 2018, the [NGA Commercial GEOINT Strategy](#) update focused community efforts to complement existing imagery sources with access to non-traditional commercial datasets and geospatial analytic services.

National Science Foundation

- The National Science Foundation does not procure data from external sources.

NOAA Commercial Data Acquisitions

- The National Weather Service manages approximately \$25M in environmental data purchases through contractual vehicles. These include global, *in-situ*, lightning data; global observations from aircraft; and a variety of weather observation types across the United States through State and academic observing networks and atmospheric water content through ground-based GPS derivations. The National Weather Service also has a pilot project to obtain ocean-borne environmental observations.
- The National Ocean Service oversees awards that collect ocean data – both surface and subsurface - through airborne, ship, stationary, and autonomous capabilities. Some of these

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awards are contracts for commercial data purchases, but it should be noted that significant amounts of the data procured by the National Ocean Service are from other than commercial providers, such as those acquired through cooperative agreements with universities and not-for-profit entities.

- NESDIS manages NOAA's Commercial Weather Data procurement. Information about NOAA's commercial procurement of space-based environmental data and NESDIS' commercial data purchases is available at: <https://www.space.commerce.gov/business-with-noaa/commercial-weather-data-pilot-cwdp/>.

NOAA Office of Space Commerce

The Office of Space Commerce is a policy organization whose mission is to foster conditions for the economic growth and technological advancement of the United States commercial space industry. This office is a designated entry point for commercial space companies seeking to do business with NOAA. <http://space.commerce@noaa.gov>

NRO - Commercial Systems Program Office

- NRO's Commercial Systems Program Office (CSPO) is the primary purchaser of commercial imagery for the Department of Defense and the Intelligence Community. CSPO can and does support the addition of requirements for other government agencies. NRO combines both standard RFP procurement and BAA acquisitions.

USDA

- USDA has a three-tiered approach to commercial Earth observation procurement. The USDA Foreign Agricultural Service hosts the satellite image archive. Funded from the USDA [Commodity Credit Corporation](#) and other USDA agencies provides for agricultural satellite monitoring over CONUS, it is put out for bid yearly and the imagery is not shared externally. The second tier is the National Agriculture Imagery Program (NAIP), hosted by the USDA Farm Production and Conservation (FPAC). This tier is responsible for the acquisition strategy of NAIP aerial imagery over the U.S. at the 60-centimeter resolution and provides options for cost sharing among Federal and State agencies. NAIP is shared externally. The third tier is satellite data collections funded by USDA/FPAC over United States territories.

USGS – National Geospatial Program

- The 3D Elevation Program (3DEP) is managed by the USGS National Geospatial Program to respond to growing needs for high-quality topographic data and for a wide range of other three-dimensional (3D) representations of the nation's natural and constructed features. The program informs critical decisions made daily across the U.S. that depend on elevation data, ranging from immediate safety of life, property, and environment to long-term planning for infrastructure projects. The first full year of 3DEP production began in 2016, and at the end of fiscal year 2021, 84% of the nation has available or in-progress elevation data that meet 3DEP specifications for high accuracy and resolution.
- The USGS National Geospatial Technical Operations Center (NGTOC) administers the GPSC. Technical points of contact are in Denver, CO, and Rolla, MO. The National Map Liaisons perform partnership-related functions in support of LiDAR and other data acquisition. National Map Liaisons are associated with each state to assist Federal, State, and municipal government partners with accessing the GPSC for their geospatial needs.

Appendix E: USGEO Commercial Task Team

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* Now with NASA

** Retired

*** Support contractors