Maximizing Value from Earth Observation Systems

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Monitoring the Earth and its environment from space contributes positively to scientific, social, economic, and political activities on Earth. It provides policymakers with the ability to better understand ongoing and sudden occurrences and thereby leads to more informed decision-making. Earth observation data and derived information and applications allow us to monitor and forecast weather conditions, measure land-use change such as deforestation, and monitor and respond to natural disasters. The United States needs to ensure continuity of service by developing both national and commercial capabilities, continuing to improve the commercial licensing processes, and championing open and free data-sharing principles.

Background

In the more than five decades since the first satellite was launched, space-based remote sensing, defined as the scanning of Earth by satellites in order to obtain information about it, has transformed from a small set of military-driven satellites producing low-resolution images to thousands of government, commercial, and academic satellites producing a huge variety of datasets for civil, research, and military purposes. This technology and associated applications improve life on Earth in innumerable ways. For instance, Earth observation satellites allow us to assess the impacts of natural disasters, monitor land use, make weather predictions, measure ocean temperatures, and create nautical charts. Data is used to conduct supply chain monitoring, support precision agriculture and aquaculture, and support building and other infrastructure projects.

For decades, the United States has been the clear leader in designing, manufacturing, and operating remote sensing satellite systems. One example is the Geostationary Operational Environmental Satellite (GOES) series of satellites. A joint effort of NASA and the National Oceanic and Atmospheric Administration (NOAA) beginning in 1975, the GOES series of spacecraft helps meteorologists observe and predict local weather events, including thunderstorms, tornadoes, fog, hurricanes, flash floods, and other severe weather. Also, in the 1970s, NASA and the U.S. Geological Survey (USGS) launched the Landsat program, which provides the longest continuous space-based record of Earth's land in existence and contributes to a better understanding of agriculture management, assessing regeneration of tropical forests, tracking forest fire damage, and other changes to land cover and use. These are just two examples of the cutting-edge and critical Earth observation technology supported by NASA,

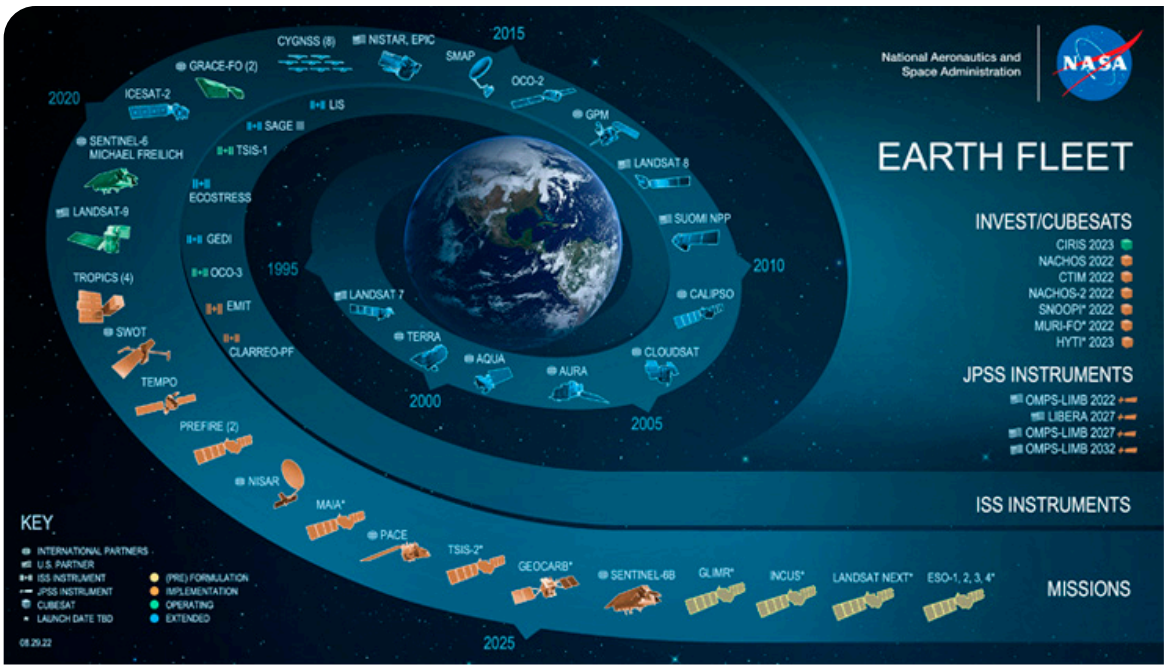

Figure 05 | NASA Earth Science Division Missions. *Credit: NASA*

NOAA, USGS, the National Geospatial-Intelligence Agency (NGA), and the Department of Defense (DoD). Many other countries have also developed their own capabilities. Fueled by a changing regulatory landscape, improved launch capabilities, and innovations in manufacturing, recent years have also seen an explosion of commercial Earth observation capabilities, including a growing array of optical, radar, hyperspectral, and video imagery and data.

Current Policy and Gaps or Shortcomings

Recognizing the importance of maintaining critical public services, enabling new discoveries, and advancing knowledge, the United States has sustained strong political support to ensure the continuity of service for meteorological-related satellites. Land-observing systems, equally important for the nation, have received less consistent study, funding, and coordination. The United States Group on Earth Observations, a subcommittee under the National Science and Technology Council, is made up of a number of relevant federal agencies and serves as the forum for coordinating, planning, and assessing nation's civil Earth Observations Enterprise (EOE) and for finding ways to improve Earth system data management and interoperability throughout the government. This group has released a series of plans designed to to ensure greater coordination of the research, operations, and activities relating to civilian Earth observation. The most recent, the 2024 National Plan for Civil Earth Observations,[1] builds on the 2019 version and focuses on the following goals:

1. *Improve the integration of Earth observing services across federal agencies and the broader Earth Observation Enterprise,*
2. *Ensure integrity and long-term quality of EO data across the EOE, and*
3. *Ensure the continued availability of foundational U.S. government capabilities in EO, while expanding the use of commercial data and services.*

1 United States Group on Earth Observations, "2024 National Plan for Civil Earth Observations," December 2024, https://usgeo.gov/uploads/USGEO-National-Plan-2024.pdf

Under multiple recent administrations, the United States has maintained as a core principle that Earth observation data are public goods, paid for by the American people, and that free, full, and open access to these data significantly enhances their value. As more commercial data sources are becoming available and purchased by the government to augment public data, the government needs to ensure that federal programs do not compete with commercial markets/products, while also maintaining critical public good datasets as free and open. Commercial activities serve to complement government satellites and offer new analytic capabilities for aggregate or service providers to generate new information for better decision-making. Currently, government agencies are more academic and research-focused: the U.S. government builds and funds big, exquisite satellites and allows anyone to access the data. To date, there are many unexplored possible partnerships with technology and other firms for hosting, interpreting, and using data that represent opportunities for Americans to receive even more value from the satellites they are funding.

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Additionally, the government has recently taken strong action to support the development of a competitive American remote sensing industry. Rule changes, such as those to Licensing of Private Remote Sensing Space Systems, have simplified and updated regulations in order to allow American businesses to compete in the global arena at a faster pace. More recent regulatory changes streamlined satellite export controls, allowing for commercial opportunities for U.S.-based Earth observation companies. The current focus is now on implementing these rule changes and determining further needed adjustments, creating processes for licensing of non-traditional satellite operations, and on assessing the need for supportive legislation that would update the Land Remote Sensing Policy Act of 1992, which is the most recent piece of legislative guidance on this issue. ●

Policy Recommendations

→ Support continuity of service for all Earth-observing satellite capabilities and continue to champion free and open data-sharing principles.

The U.S. government should remain committed through policy and funding to having an appropriate pipeline of essential meteorological satellites and should extend the same commitment to continuity of coverage for land observing systems. Further, the government should continue to adhere to the core principle of free and open by supporting technology and best practices designed to improve data discoverability and usability.

→ Enable commercial sector value-added services and promote a thriving American commercial remote sensing industry.

The U.S. government should include expanding public-private partnerships to increase the use and value of Earth observation data that is already being produced. The government should also continue to improve the regulatory environment for U.S. companies by ensuring that implementation of recent rule changes is carried out swiftly and with clear guidance. Industry and other stakeholders should be fully consulted to ensure that any additional oversight and licensing rules are updated as needs evolve. A further update of older legislation, such as the Land Remote Sensing Policy Act of 1992, may also be required to accomplish this.