

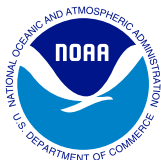


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# STRATEGIC PLAN

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## **NOAA'S NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE**



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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# From Dr. Stephen M. Volz



Dr. Stephen M. Volz  
Assistant Administrator for NESDIS

NOAA's Satellite and Information Service, also known as NESDIS, is preparing for a new paradigm. The environment in which NESDIS operates is evolving. Because of this, NESDIS is actively undergoing an evolution that will allow us to adapt and thrive in the future.

While we continue to provide the highly accurate and consistent delivery of data, information, products and services NESDIS is known for, we must also take time to assess our current state and respond to changing technology, emerging partnership opportunities and national trends. Looking ahead, our challenge lies in evaluating and incorporating innovative and adaptive approaches to our systems and processes, both today and in the future, while continuing delivery of the reliable operational Earth observations that our users expect and the Nation depends on, providing trustworthy, comprehensive environmental data and use-inspired products.

Because of the quality and dedication of the people within the organization, NESDIS continues to be at the forefront of setting standards and best practices for the global environmental observing community. The success of the NESDIS mission has been, and always will be, rooted in the consistent high-quality work and dedication of its people. Our workforce is critical to meeting the challenges of the future and we must continue to strengthen, support and diversify our team in order to ensure a workforce that consistently performs at a high level of excellence in support of our mission.

In the future, we will be expanding beyond our traditional focus on maximizing utilization of individual satellite programs, the POES and GOES systems of today, towards a broader view of how observations may best be integrated and distributed from the larger constellation of global observing platforms. This includes a focus on developing the ability to ingest, harmonize and fuse data from across platforms and agencies in order to provide more comprehensive and innovative sets of data and information products to better serve our user's needs.

NESDIS must adapt to known and prepare for expected changes in satellite and information technologies as well as evolving relationships with the commercial sector and our international partners. As we move forward, we must recognize that NESDIS is only one part of the global environmental observing constellation. Our partnerships are essential and we must continue to define our role in the global Earth observing system as well as maintain our commitment to full and open data policies.

This evolution towards a broad-based, data-acquisition and distribution approach will take NESDIS beyond the delivery of single-source informational

products towards a future of products that utilize and integrate multiple sources of data, allowing a broader spectrum of use in order to better meet user requirements. We will do this while remaining true to our operational heritage, maintaining the highest standards of reliability and information integrity.

Following this strategic plan will help us ensure the reliability, robustness and richness of our user-based services and allow us to develop an engaged and vibrant workforce.

A handwritten signature in black ink, appearing to read "Stephen Volz". The signature is fluid and cursive, with a long horizontal stroke at the end.

Dr. Stephen M. Volz  
Assistant Administrator, NESDIS



NATIONAL ENVIRONMENTAL  
SATELLITE, DATA, AND  
INFORMATION SERVICE



**OUR  
MISSION**

The National Environmental Satellite, Data, and Information Service (NESDIS) provides secure and timely access to global environmental data and information from satellites and other sources to both promote and protect the Nation's environment, security, economy and quality of life.

**OUR  
VISION**

Expand understanding of our dynamic planet as the trusted source of environmental data.

**OUR  
COMMITMENTS**

NESDIS will honor its commitments by keeping to cost and schedule, meeting observational and monitoring requirements for the enterprise, ensuring the security of the enterprise, maximizing the utility of data and information and promoting and developing use-inspired and innovative science with an engaged and highly skilled workforce. NESDIS will honor its long-standing commitment to the Nation by maintaining the delivery of reliable around-the-clock, high-quality operational data, leveraging existing and future partnerships and fostering international cooperation in environmental observation through full and open data exchange.



*ENSURING RELIABILITY, RICHNESS  
AND ROBUSTNESS OF SERVICES*



INTRODUCTION

The National Oceanic and Atmospheric Administration's (NOAA) mission is to understand and predict changes in climate, weather, oceans and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources as the Nation's authoritative environmental intelligence agency.

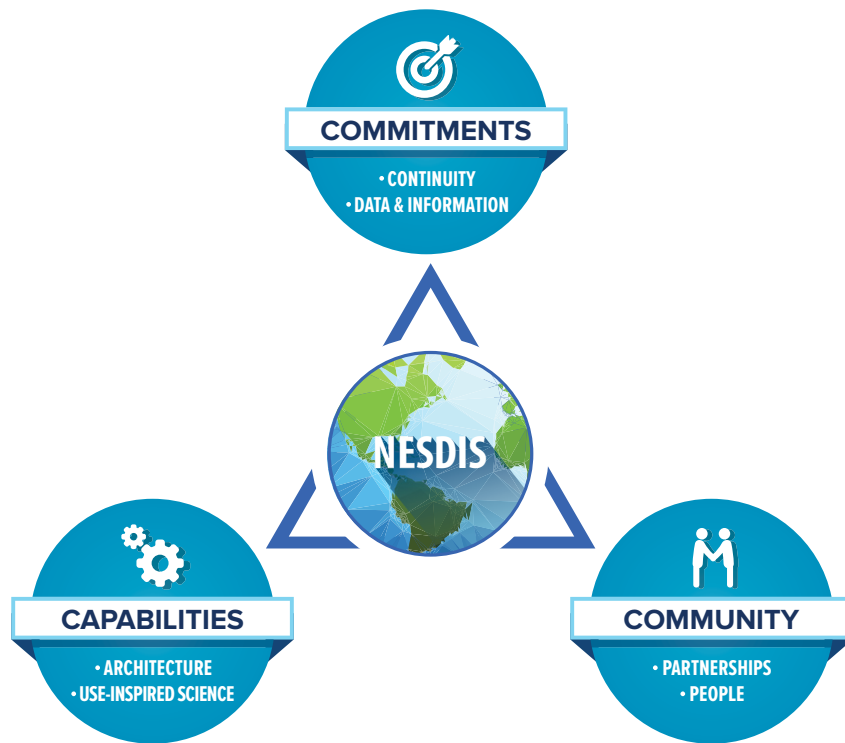
NESDIS supports NOAA's mission of Science, Service and Stewardship through our satellite missions, data centers, data and information products and services as well as use-inspired science. It is an end-to-end responsibility that underpins NOAA's value to the Nation. The United States depends on NOAA to provide satellite data and imagery for meteorological forecasts and emergency services to support continuity of government. NESDIS' responsibility is to collect and provide the critical satellite Earth observations and other essential environmental information needed for disaster preparedness, all hazards response and recovery and the protection of the Nation's critical infrastructure and natural resources. The 24/7 global coverage provided by NESDIS generates an uninterrupted stream of information and products. These products and information enable services used across the country in preparation for events that impact our climate, weather, oceans, daily lives and national safety and provide essential information for national, regional and local planners and officials.

The continuity of operations and services provided has been, and will continue to be, the foundation of the NESDIS mission. In the years to come, NESDIS shall continue to provide these reliable and robust services across our enterprise, from systems operations, architecture and data archival systems, to the production of use-inspired science and data applications. However, the environment in which NESDIS operates is changing. As user needs, observational requirements and data sources continue to evolve, NESDIS must also be ready to adapt and grow in order to thrive in this new environment.

Because the future of environmental information and data services continues to evolve, NESDIS must instill an organizational agility that will allow the enterprise to take advantage of both anticipated and unexpected changes in satellite and information technology as well as the environmental observing community as a whole.

This plan defines the NESDIS view of success and prioritizes the organizational features necessary to make the NESDIS vision a reality—helping NESDIS provide the greatest benefit possible to NOAA, the Nation and the world as the trusted source of environmental data and information.

# COMMITMENT, COMMUNITY AND CAPABILITY



Three principles of commitment, community and capability embody the six facets of our new, agile organization.

**Commitment** is demonstrated by our enduring focus on the *Continuity* of products and services delivered by NOAA over the last 45 years, and those we will continue to deliver into the future—even as requirements, technologies and Earth’s climate continue to evolve. It is also shown through our dedication and expertise in *Data and Information*. We are committed to ensuring the quality, accuracy and preservation of the Nation’s historical environmental data archives while improving and augmenting this vast environmental repository with new data sets, merged products and integrated observations from NOAA, U.S. and global observing systems.

**Community** addresses our internal strength, our *People*, and our contributions to and collaborations with others, our *Partnerships*. NESDIS will focus on retaining, creating and developing an agile, expert workforce built around the value of full engagement and a continuous learning environment. Through our partnerships, we will maximize both NOAA’s and the Nation’s value through observations and scientific capabilities, share these capabilities with our partners and users and draw significant value from our partner’s investments and expertise.

**Capability** includes our penchant for continuous learning and growth as well as our focus on the scientific exploitation of Earth observations. *Architecture* clarifies the importance of considering, analyzing and planning observing systems as an integrated system. We also understand the need to regularly evaluate our systems, requirements and plans as new conditions and capabilities emerge. *Use-Inspired Science* outlines our approach to delivering ever-increasing value, including new and better information products and services. This will be done in close coordination with our user community in an open and transparent way.

These themes, and the very nature of the NESDIS organization, are and should be cross-cutting and integrated. Each principle, and their associated goals, do not exist independent of the others, but instead are meant to support and enable each individual goal and objective.

This plan is a long-term vision for NESDIS, establishing the direction and scope for the organization and its activities, defined by goals and priorities for the next five years. Its implementation will provide a pathway for day-to-day decisions, evaluating progress and changing approaches when needed in the years to come.



# GOALS CONTINUITY

Continuing the operation of NOAA's satellite constellation to provide the uninterrupted flow of the environmental information, data products and services NESDIS provides is our highest priority. NESDIS must continue to ensure the continuity of our observations over time and anticipate future risks to mission success with the reliability and robustness that have come to define the organization.

The Nation relies on NOAA to provide satellite observations for meteorological forecasts to support the continuity of government at all times. NESDIS plays a key role in supporting these functions, and NOAA's observational requirements overall, from the unique vantage point of space by:

**Providing satellite observations and services:** NESDIS collects and provides the Nation with critical observational and remote sensing data, imagery and other essential information for predictive environmental and atmospheric modeling and satellite-aided distress alert systems by operating NOAA-controlled satellites, communications equipment and associated systems 24/7 with the high reliability expected by our users.

**Providing data used for meteorological forecasts:** NESDIS provides the Nation with an uninterrupted flow of essential environmental data and information used in forecasts and warnings, which are critical to public safety, disaster preparedness, all hazards response and recovery, the national transportation system, safe navigation and the protection of the Nation's critical infrastructure and natural resources.

## **Operate the current satellite constellation and ground systems with the continued high-reliability, secure and timely delivery of data and services that the Nation requires.**

Our challenge lies in continuing to deliver the consistent and high-quality Earth observations that our users expect and the Nation depends on, while evaluating and incorporating innovative approaches to operations, maintenance, security and data product quality. Process evolution and innovation is key to remaining flexible and adaptable in the face of changing circumstances. In order to accomplish this, NESDIS must respond to an increase in user demand as new solutions for the real-time distribution of data products become available and data are made more accessible and shareable by:

- Ensuring the proper staff, resources and systems exist to process and distribute acquired data as sources, technology and security environments evolve.
- Developing a plan for efficient facility utilization to ensure that there are sufficient resources for primary and back-up operations.
- Investigating ways to improve efficiency and security for all existing systems using the most cost effective business models.



## **Bring to operational service planned missions, data products and services on cost and on schedule while effectively managing risks and opportunities.**

JPSS and GOES-R represent the next-generation of core satellite observations. Their successful launch and operation will provide continuity of data for NESDIS and the Nation through 2038. However, in order to maintain the continuity of critical observations, NESDIS must develop, successfully launch and operate these missions while ensuring the effective and secure delivery of accurate and reliable operational data and observational products from our entire satellite portfolio.

As our users' needs and requirements develop and evolve over time, NESDIS will continually map these to our current and future observational platform capabilities. This will allow NESDIS to identify potential or existing gaps in observations and to recognize emerging opportunities to improve the quality and timeliness of environmental data to meet mission requirements. To meet NOAA's observational requirements more rapidly, NESDIS aims to identify potential pathways to a NOAA future where systems are developed to meet requirements that provide more secure and robust space-based capabilities at the best value for the investment by considering the entire global observing constellation. This may include space-based and in situ observational platforms from a variety of public and private agencies and organizations, including our international partners, as well as ride shares, hosted payloads, data buys and new lower cost or small satellite technologies operating from a variety of orbits.

In order to ensure the continued effective delivery of environmental data, NESDIS will track observing system risks across the entire system regularly and employ system-risk control processes that consider all elements of the observing system. NESDIS will be open and engaged with its partners to study the existing risks to ensure that the mitigation strategies are thorough and exploit all available data to ensure the continuous and reliable delivery of environmental data.

In order to ensure the continuity of critical observations, NESDIS will:

- Successfully develop, launch and operate future satellite systems, including the JPSS and GOES-R satellite series and associated ground segments.
- Bolster space-based capabilities by considering the entire global observing constellation.
- Proactively manage risk across the entire NESDIS observing system portfolio.
- Improve program planning, risk assessment cost estimation and staff planning to ensure proper resources, systems and staff exist to sustain NESDIS programs for the length of their expected service life.
- Embrace independent assessments and community standard best practices to ensure schedules, plans and budgets are base-lined to ensure maximum program success.

## **Redefine the requirements management and pre-formulation process to enable agility while meeting expectations.**

A clear understanding and simplification of requirement management processes will allow external stakeholders to better understand our process and to define or update existing requirements. To do this, NESDIS will:

- Engage with users of NESDIS data, especially other NOAA line offices, to prioritize user requirements such that the programs can implement them accordingly.
- Conduct analysis to identify the benefits of candidate future investments and proactively choose those that contribute most to satisfying existing priorities.
- Work closely with all stakeholders to ensure that all user requirements are captured early in the process and are routinely and systematically updated.
- Conduct future systems planning to improve the accuracy of out-year budgets and cost estimations and ensure they are inclusive and meet the needs of the user.

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## Metrics

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Ensuring a continuous flow of reliable, high-quality data and services while developing an agile and responsive enterprise requires careful advanced planning and begins long before new systems are deployed. Preparation and planning for both the JPSS and GOES-R programs began as early as 2000. This period includes not only the efforts to design, manufacture and deploy the satellites, but also the work NESDIS has done, and continues to do, to develop the associated algorithms, the updated system models used to implement modifications to the ground systems and to prepare users for the enhanced products and services. Both the GOES-R and JPSS programs are moving forward on plan toward their respective launch dates while NOAA's Satellite Operations Facility continues to provide uninterrupted 24/7 operation of current on-orbit legacy polar and geostationary systems. In the next five years, NESDIS' continued progress in *Continuity* will be measured by:

- *The development and implementation of operations innovations that result in increased efficiency and quality improvements as measured by: data product availability; system reliability, security and robustness; missions operated; science service per annual Operations, Research and Facilities appropriations.*
  - *Meet programmatic commitments for cost and schedule while mitigating risks and pursuing opportunities consistent with annual performance metrics.*
  - *Develop, implement and institutionalize a systematic recursive process that links users, priorities and requirements management.*
  - *Develop and implement a formulation process for the definition and execution of a best value portfolio requirements and plans on an on-going basis.*
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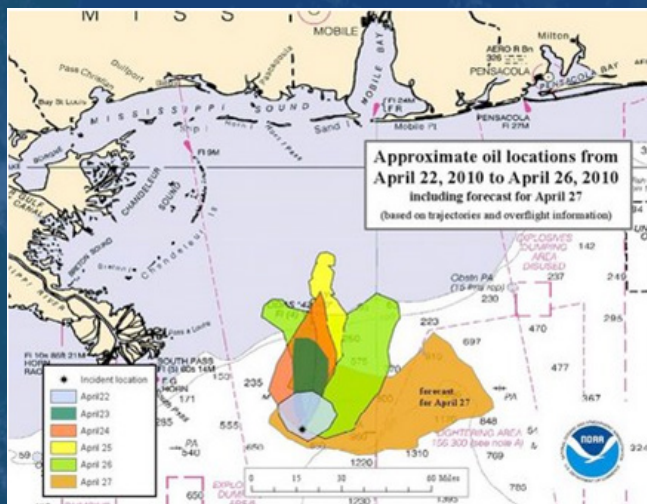
# A GILITY IN THE FACE OF DISASTER

NESDIS' Satellite Analysis Branch (SAB) is responsible for operating new proof of concept satellite analysis techniques and distributing real-time satellite imagery products in order to support disaster mitigation, warning and response activities around the world. While these products are often forward looking, occasionally SAB must respond at a moment's notice.

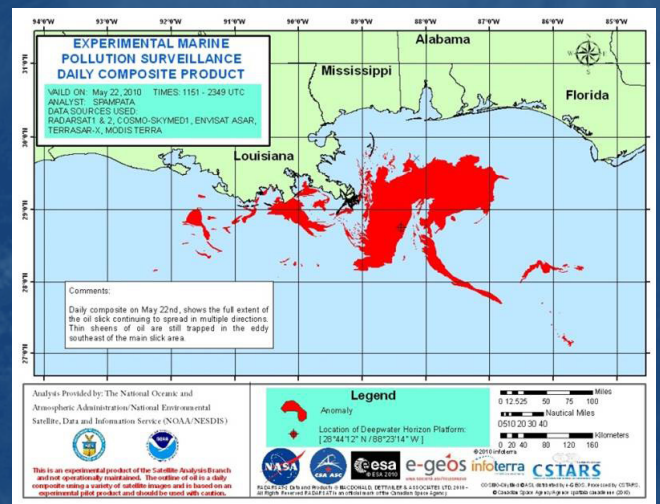
On April 20, 2010, the Deepwater Horizon oil rig exploded, resulting in a massive offshore oil spill in the Gulf of Mexico—the largest environmental disaster in U.S. history. As the oil spread, it was quickly understood that satellite analysis would be needed in order to understand the massive extent of the spill. Despite its infancy, having only operated for about 6 months, the SAB quickly activated its newly developed oil spill analysis product. Within hours of the disaster, an SAB satellite analyst had issued the first of what would be hundreds of reports, showing the location and spread of the oil.

These reports quickly became integral to the response effort, being widely used at the Incident Command Centers, among federal, state and private responders, in every daily Presidential briefing and across nearly every major news outlet. Throughout the event, SAB continued to evolve its procedures and deadlines in real-time as users came on board and new needs arose. As response efforts evolved and changed, SAB continued to develop and implement new products to match them. The ability of NESDIS to respond with speed, accuracy and reliability was critical to the effective response and mitigation of this tragic disaster.

*“Word got out this morning that you had a new analysis out and it was like sharks in a feeding frenzy. With the high wind conditions, no one is doing any overflights today so this imagery is the only source of where the oil is.” Ed Olenic, Chief, Operations Branch, NCEP/Climate Prediction Center*



SAB shape files were used in NOS/Emergency Response Division products to depict past trajectory and current analysis of oil and form the basis for a forecast.



SAB analysis of the oil in the Gulf about one month following the spill.



# GOALS DATA AND INFORMATION

At its heart, NESDIS is an environmental data organization. Specifically, NESDIS is a use-inspired science-based services organization that strives to provide integrated and trustworthy environmental data, data products and information to meet user requirements and needs. NESDIS works with NOAA line office partners, such as the National Weather Service (NWS), National Ocean Service (NOS) and National Marine Fisheries Service (NMFS), to provide a robust suite of high quality, near real-time data and environmental information to meet NOAA's operational mission. NESDIS also makes available retrospective data and information to an array of agencies and users in order to assist them in meeting their requirements for planning and effective operations.

The requirements for the services NESDIS provides are driving a fusing of data across platforms, agencies and political boundaries using observations from a multitude of sources, including both the public and private domains. Data fusion, harmonization and integration increase the value and usability of environmental data. This means developing the ability to ingest, harmonize and integrate data from not just the satellites that NESDIS operates, but environmental information collected from land, air, and ocean sensing platforms, and in situ observations overall into usable products, and to make these data accessible and shareable.

NESDIS' duty to provide environmental data, information and data products extends beyond the provision of high impact data to our traditional partners. While it is imperative to continue the delivery of reliable and comprehensive data to our traditional partners, like NWS and the Department of Defense (DoD), NESDIS must also make data accessible to many other existing users within and outside the federal sector and to new users to assure maximum benefit for the Nation and scientific community alike.

The usefulness of data collected through the international set of observing systems and NOAA's vast array of remote and in situ observations, as well as its many computational models, does not end with its initial application. In fact, the value of the information increases over time, highlighting the importance of the data archival systems NESDIS has in place.

To meet future user needs, NESDIS must not only deliver single-source informational products, but also broad-based data-acquisition and distribution products that utilize and integrate multiple sources of data, allowing a broader spectrum of use.

## **Provide a comprehensive and trusted set of products to serve users' needs.**

NESDIS is the trusted source of operational data streams from space-based observing platforms critical for near real-time applications as well as retrospective information on the state of the planet for effective planning and operations. NESDIS will continue to provide these services while increasing its use of data fusion techniques and utilizing a wider array of data sources to make more key environmental resources available. NESDIS will:

- Continue to deliver critical high-quality near real-time data and retrospective products to primary operational users and planners.
- Continue to diversify our portfolio by ingesting, validating and certifying data and information from within NOAA, our interagency and international partners and potential commercial sources based on established priorities and requirement needs.
- Create integrated products based on validated user requirements.

## **Ensure data reaches new users to assure maximum benefit to the nation and scientific community.**

NESDIS ingests and stewards environmental data from a variety of sources. As a trustworthy provider of this information, we also have a duty to increase the return on investment on data obtained. Consistent with USG Open Data Policy, NESDIS will accomplish this by:

- Continuing to ensure full, open and timely data policies.
- Develop clear metadata and standard data formats to increase the accessibility of our environmental data.
- Improve the discoverability and accessibility of environmental data through the use of open standards.

## **Strengthen support of NOAA's data stewardship needs.**

To ensure consistent, long-term data usefulness, NESDIS will work with NOAA and the broader community to provide and maintain the systems, policies and procedures that enable long-term information stewardship in a cost-effective, efficient and reliable manner. NESDIS will:

- Enable data discovery of all NOAA's environmental data by supporting cross line office integration of stand-alone data sets.
- Introduce and promote more rigorous data management standards.
- Improve data interoperability and usability through common data management standards.
- Implement stewardship tools across the organization.
- Connect more users to its data and information through the enhancement and optimization of its web tools to deliver data securely, effectively and efficiently to users.
- Strengthen its partnerships with non-NOAA entities to enable them to contribute validated data and develop tailored value-added products to reach a broader range of users.
- Take a leadership role in teaching and promoting the proper value of archiving data including helping partners with Public Access to Research Results (PARR) compliance and educating partners, both within NOAA and externally.

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## Metrics

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NESDIS has a tradition of providing comprehensive public access to the vast national archives of Earth environmental observation data and is continuously working to make these data more accessible. The amount of detailed and robust data sources available and the complexity and scale of data fusion is ever increasing. Blended data products are used in a variety of applications across NOAA and its partners. In the last few years, scientists have been merging long-term data sets, near real-time space-based environmental observations, and in situ data to create products vital for products including weather forecasts, drought indicators and flood susceptibility maps—the ultimate user needs. In the next five years, NESDIS' continued progress in Data and Information will be measured by:

- *Quantity, quality and effectiveness of data and information products for the intended stakeholder community as evaluated by user surveys, advisory committees, registered users, publications, operational use and downloads.*
  - *Peer-reviewed data and information products that have incorporated new requirements requested by stakeholders and vetted through the NOAA Observing System Council.*
  - *Provide long-term stewardship for NOAA data including, where appropriate, non-NOAA data.*
  - *Adoption, definition and use of data standards consistent with national and international best practices.*
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## REPARING FOR THE FUTURE OF DATA NOW

With the next generation of weather observing satellites on the horizon, NOAA is poised to once again significantly improve weather forecasting and severe weather prediction. The GOES-R Series satellites represent the first major technological advancement in geostationary environmental observations since the launch of the GOES-I Series in 1994. The first satellite in the series, GOES-R (operationally known as GOES-16), will scan the Earth five times faster at four times image resolution, and triple the number of channels scientists can tap into to observe global weather and climate. The GOES-R series satellites will also carry the first lightning mapper ever flown from geostationary orbit, the Geostationary Lightning Mapper (GLM).

In order to realize the full benefit of this revolutionary technology and reduce the time between research and operations, the GOES-R Proving Ground was established. A collaborative effort between the GOES-R Program Office, NOAA Cooperative Institutes, a NASA center, NWS Weather Forecast Offices, NCEP National Centers, and NOAA Test Beds across the country, the Proving Ground allows for simulated GOES-R products to be tested and evaluated before the satellite is ever launched into space. The Proving Grounds allow forecasters to train with new products, identify their utilities and applications and provide critical user feedback. By utilizing current GOES imagery, in combination with simulated GOES-R data from current, higher resolution satellite instruments, forecasters can prepare for the future of geostationary imagery and data now, allowing for nearly immediate improvements in weather forecasting and severe weather monitoring.

*“The Proving Grounds aim for day-one readiness and maximum utilization for both the developers and users of GOES-R products, and effective transition operations.”*



Heidi Obermeier, meteorologist at KETV-TV in Omaha, Nebraska, issues a tornado warning after utilizing the GOES-R ProbSevere product during the NOAA Hazardous Weather Testbed (HWT) 2015 spring experiment.



# GOALS ARCHITECTURE

Many of NESDIS' existing ground and space assets were developed as stand-alone systems, with unique designs specific to each mission or mission set. Moving forward, NESDIS will work to evolve its ground and space architecture and move away from stand-alone systems in order to improve observational capabilities, resiliency and efficiency. By developing a flexible and integrated ground and space enterprise, NESDIS can ensure the continuity of critical observations, adapt to new and enabling capabilities, expand national and international cooperation, increase assurance of mission-critical functions and meet the growing needs of our users. NESDIS will continually strive to deploy ground and space systems that are economically sustainable, scalable, secure and flexible to satisfy our users' evolving needs and manage data from a growing array of sources.

NESDIS will work with our acquisition partners and commercial sources to identify low-cost, rapidly deployable space-based capabilities—including instruments, spacecraft and launch services—to meet current and future needs. In addition, NESDIS will develop an integrated ground enterprise that is scalable for future satellite missions and built on a common ground services architecture that will provide a wide range of benefits to NOAA and NESDIS. These benefits include increased performance, improved utilization through shared resources, faster, more economical product development and deployment, increased interoperability, simpler incorporation of new assets and the insertion of more flexible technology.

## **Critically assess the space architecture.**

Following an Enterprise-wide critical assessment, NESDIS will establish a process to perform periodic system reviews, continually striving for a more efficient, secure and reliable observing system to meet our user needs. NESDIS will:

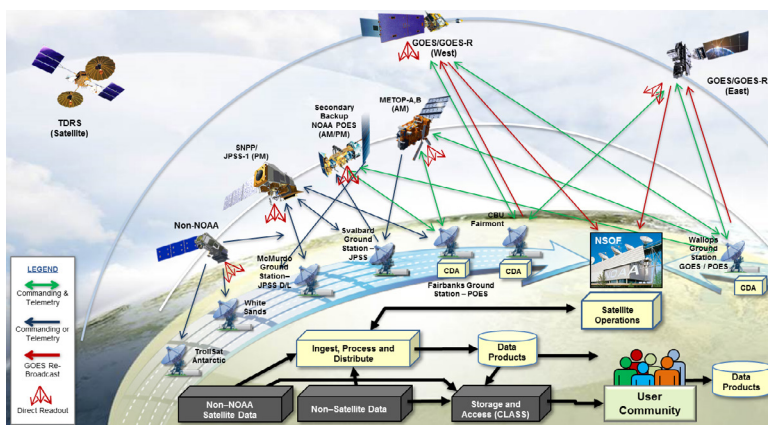
- Conduct an architecture level review of NOAA requirements and partnership agreements with other nations and entities as well as evaluate emergent technologies and innovations in both space and ground systems approximately every five years.
- Examine the health of our operational assets to inform development decisions.
- Develop an architecture that can accommodate emerging technologies, shorten development and production timelines and reduce technical and programmatic (e.g., budget) risk.
- Explore launch strategies and partnerships to allow rapid, reliable and affordable access to space.
- Annually explore the feasibility of commercially provided instrument, data, payload and communications solutions to further meet NOAA's operational needs from space.



**Develop a shared infrastructure based on common ground services.**

NESDIS will create a ground infrastructure in which resources are shared across the enterprise to improve efficiency, enhance security and increase operational flexibility. NESDIS will:

- Create common interfaces between ground and space segments consistent with international standards.
- Implement sound systems engineering processes across the enterprise to manage increasingly complex ground systems and rapidly evolving technologies.
- Leverage NOAA and partner data acquisition capabilities to lower latencies, increase resiliency and lower costs of operations.
- Implement a multi-mission ground enterprise that provides access to partner and commercial data sources.
- Develop a streamlined, consistent approach to algorithm/product development and sustainment in order to accelerate the delivery of new products, merge commercial data and increase responsiveness to user needs.
- Ensure continuity of operations and the integrity of data by implementing a secure ground enterprise responsive to emerging threats.



The NESDIS Ground Enterprise connects the multiple elements of NESDIS, leading to the timely and accurate delivery of user needs on a 24/7 basis. This system is critical in supporting NESDIS' an end-to-end responsibility to provide a never-ending stream of information and services used across the country in preparation for events that impact our climate, weather, oceans, daily lives and national safety. Credit: NOAA

**Metrics**

In 2015, NESDIS began a comprehensive review of all observing system requirements and capabilities to determine potential challenges and begin identifying possible solutions. In spring 2016, NESDIS released the draft NESDIS Commercial Space Activities Assessment Process. This release, along with the release of the Commercial Weather Data Pilot, is part of NOAA's multi-step approach to engaging the commercial sector to ensure best use of sector capabilities to meet our NOAA mission requirements. In the next five years, NESDIS' continued progress in Architecture will be measured by:

- *Established top-level, prioritized observing systems requirements to codify and validate user needs and expectations that include a regular process for re-evaluation in the future.*
- *Establish as a NESDIS enterprise expertise a routine observing system architecture assessment capability.*
- *Identified optimum space-based platforms to meet requirements.*
- *Completed analysis of alternatives for use of emerging technologies or non-NOAA data to meet NOAA observational mission needs.*
- *Develop a process for the periodic analysis of the architecture to maintain agility and responsiveness to changing technological and commercial environments and execute as appropriate.*
- *Regularly explore the feasibility of commercially provided instrument, data, payload and communication solutions to meet NOAA's operational requirements.*
- *Conduct the successful and timely ground architecture transition to common services.*
- *Implemented enterprise-based data ingest, product generation and distribution, storage and security services.*
- *Implemented source-agnostic data ingest, development and distribution services for international, interagency and commercial data sources.*



# GOALS USE-INSPIRED SCIENCE

The NESDIS science enterprise produces environmental information that allows individuals, businesses, emergency managers and governments to make informed decisions by providing accurate and reliable data for weather forecasting and through the development of science-based products and services that multiply the value of the observed data. NESDIS, working with their partners in academia, international agencies, U.S. national agencies, commercial and nonprofit sectors, uses science to transform the “bits and bytes” it receives from around the world into timely, actionable and reliable environmental information across the entire Earth observing system.

NESDIS has a strong operational component focused on the delivery of information and services to its stakeholder community. NESDIS provides important data products to the NWS for near real-time weather and marine forecasts and warnings, as well as to the NOS and NMFS for their operational applications. NESDIS data and information also supports other NOAA line offices, such as the office of Oceanic and Atmospheric Research (OAR), in a variety of capacities and drives science throughout the environmental community. The NESDIS science program integrates with science throughout the world in service of NOAA’s stakeholders.

With its extensive knowledge and capacity for observation, NESDIS has an opportunity to help better inform future environmental assessments through innovative science and meaningful engagements with stakeholders and decision makers. These engagements will also help develop the next generation of science-based product and services. The NESDIS science portfolio strikes a balance between use-inspired science, focused on meeting user needs, and innovative science, driving the community forward where opportunity exists.

## **Develop, support or adapt algorithms to provide state-of-the-art science products.**

Enterprise algorithms— different algorithms implemented using the same scientific methodology and software base— allow for more consistent products generated from different input data sources and result in greater reliability among satellite products and applications. NESDIS will:

- Sustain the science that enables production and distribution of the critical data products to operational users.
- Continually improve the application of science to the harmonization of multiple data sources for more accurate and continued retrospective data and information on the planet.
- Complete the transition to enterprise algorithms.
- Leverage new science conducted outside of NESDIS in order to assist in the development of state-of-the-art algorithms.
- Establish more effective processes for upgrading products and services consistent with new science.

## **Use data science to enhance mission value of environmental data.**

Data science is the science of extracting useful information from large, complex collections of data. The challenge of data science is storytelling. In order to provide decision makers with the most accurate and comprehensive insight possible, the data NESDIS collects must be analyzed and understood, seamlessly combined with information from a variety of other sources and presented in an easily readable and accessible manner. Effective data science provides an opportunity to highlight the complex relationships between multiple environmental factors and to uncover previously undetected insights by leveraging advances in the technical aspects of collecting, storing and retrieving data along with innovative ideas and techniques for understanding and analyzing data.

NESDIS will exploit innovation in the data science arena by:

- Exploring and integrating advances in the field.
- Applying Big Data techniques to its vast collection of environmental data.
- Enabling the private sector in their ability to produce tailored products and services that allow designated user communities to exploit the information.
- Using the increased availability and accessibility of its data resources to drive scientific development and support decision making not just within NESDIS but across the environmental community.

## **Provide integrated reference data sets that describe the state of the environment.**

NESDIS provides authoritative and timely assessments of the environment through proven and peer-reviewed scientific data analysis methods to create authoritative, consistent and continuous data sets for weather, climate, oceans, coastal and geophysical variables. These foundational data sets result in trustworthy information about how our environment is changing to help inform risk management and identify future opportunities. NESDIS will:

- Develop and build upon the existing reference data sets (i.e. Reference Environmental Data Records).
- Produce reference products for targeted sectors, including government, industry and the public.

## **Transition to new science and retire outdated products and services.**

NESDIS science provides a tremendous capability for new products and services that vastly increase value to the stakeholder. A crucial part of delivering these services to the end user is the transition of research to operations and the retirement of outdated or lesser priority services. The goal is to provide an increasingly relevant, updated and balanced portfolio of scientific products and services. NESDIS will:

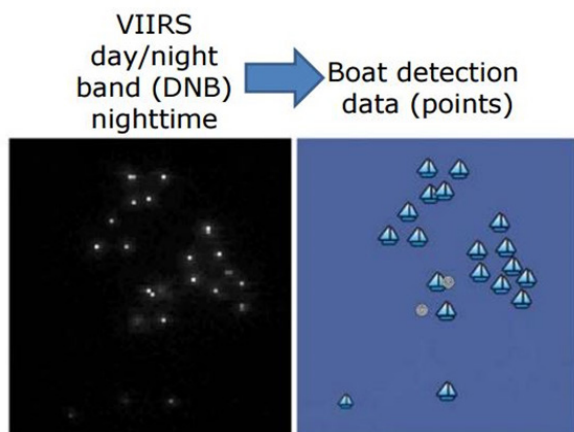
- Develop and publish a procedure for the transition of sciences that assures stakeholder input and understanding of service prioritization and a smooth integration with existing operational services through reviews of the NESDIS portfolio.
- Maintain and update current processes for the transition of science and retiring of outdated products and services.
- Efficiently integrate a scientific development process that is flexible enough to ensure the best quality science is delivered at a speed that is consistent with operational and stakeholder requirements.
- Effectively retire old products following the transition to a new science.



## Provide oversight to ensure data are accurate and meets quality requirements.

NESDIS must always assure the quality and integrity of data it provides, regardless of origin. External data incorporation will involve stringent scientific assessment of data accuracy, quality and applicability. Scientific quality assessments are an essential function of establishing the trustworthiness and reliability of environmental data. NESDIS will:

- Document and communicate the quality of data through clear and descriptive metadata.
- Provide scientifically driven quality assessments for its key data and information products.
- Actively engage with the community to assure that these assessments meet the needs of users and key decision makers.



The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument on board Joint Polar Satellite System satellites collects data used by the fisheries management authorities to spot illegal fishing vessels by the light they emit. In 2016, NOAA plans to develop VIIRS Boat Detection products that can be used by fisheries management authorities in Indonesia, the Philippines and three other countries. Based on the success of these programs, future partnerships will be developed with other countries in the coming years. Credit: NOAA

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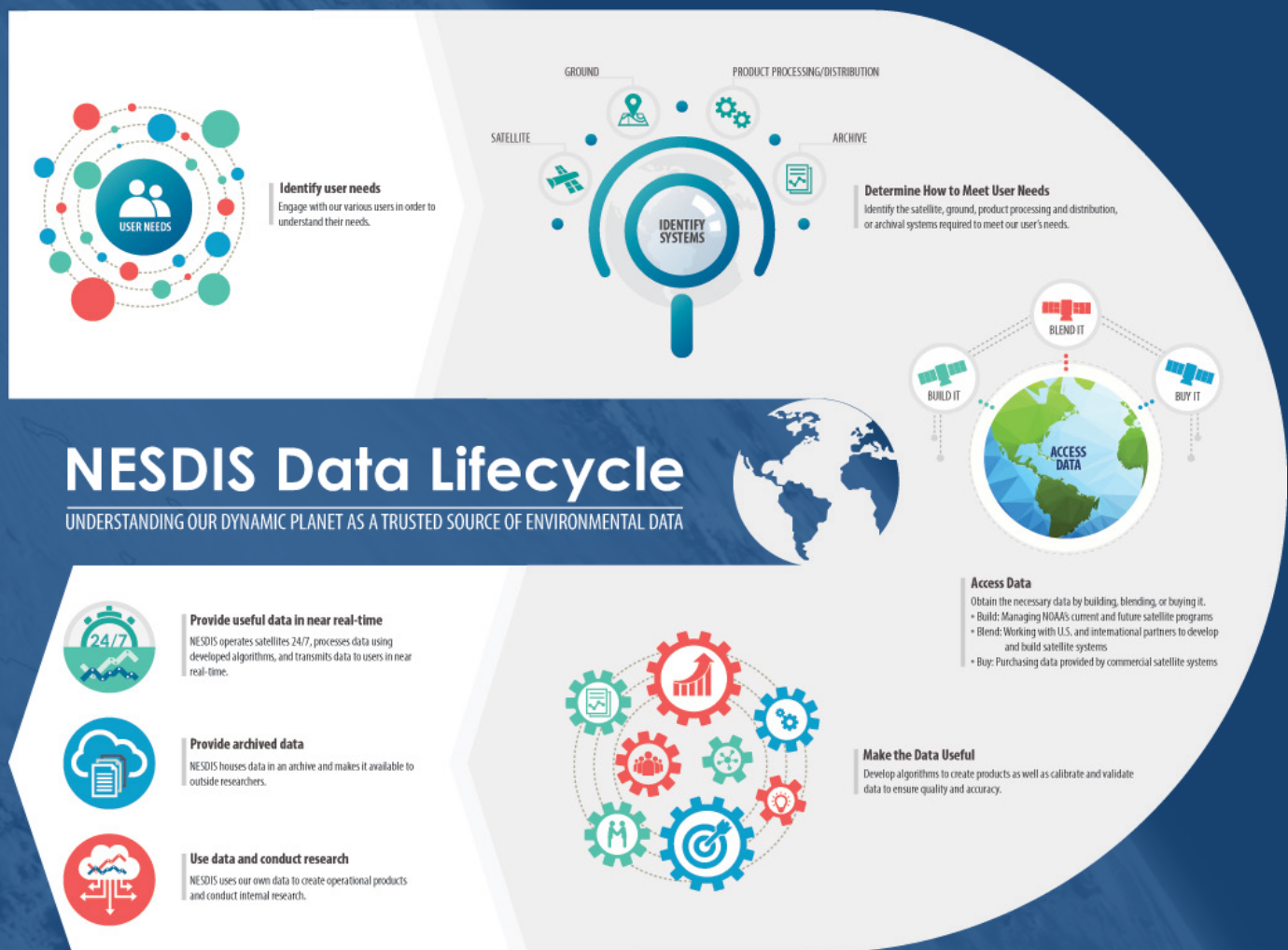
## Metrics

To facilitate the development of integrated state-of-the-art science products, NESDIS has already begun the transition to enterprise algorithms. Work is currently underway to update NOAA Heritage Cloud, Cryosphere, Volcanic Ash and Aerosol algorithms to enable use of the same algorithms across the new GOES-R Advanced Baseline Imager (ABI) and JPSS VIIRS suite of products. In the next five years, NESDIS' continued progress in Use-Inspired Science will be measured by:

- *The development and delivery of new or significant products and data sets, scientific studies and updated analyses as well as the effective management of existing portfolio products and scientific reviews.*
  - *The timely delivery, monitoring and updating of fully validated and characterized prioritized data sets and products from research to operations for open and public access.*
  - *The utilization of NESDIS developed science by internal and external partners and stakeholders through enhanced coordination with partners and the user community.*
  - *The shared regular assessment of new data product development progress with the user community through an open, transparent process.*
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# NESDIS DATA LIFECYCLE

NESDIS supports NOAA's mission of Science, Service and Stewardship through every facet of our operation, including satellite missions, data centers, data and information products and services as well as the development of use-inspired science. It is an end-to-end responsibility, requiring the unique contributions of each office, which underpins NOAA's value to the nation.





# GOALS PARTNERSHIPS

Strategic, sustained partnerships are a key enabling function of the other NESDIS strategic goals. Successful partnerships allow us to meet our mission cost-effectively and to be more responsive to the needs of our users and stakeholders. Under this strategic plan, our international and interagency partnerships will remain a priority for NESDIS. These include our long-standing partnerships with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the National Aeronautics and Space Administration (NASA) and the DoD, as well as enhanced coordination with emerging partners as capabilities improve and our observing system requirements evolve.

The international community has long shared resources and expertise in order to acquire data for operational weather and environmental forecasting. Global numerical weather prediction is highly dependent on international networks of space-based and in situ observations, modeling and research. Global environmental assessment and forecasting is equally dependent on a worldwide network of observations. This is why we remain committed to the principle of full, open and timely sharing of data that underpins this international exchange.

In addition, interagency collaboration allows us to leverage the capabilities, capacity and/or infrastructure of other U.S. agencies in support of the NESDIS mission to ensure the best use is made of NOAA's observing system. These partnerships have the potential to provide a better return on investment for the U.S. government as a whole.

NESDIS will also be open to other arrangements. Partnerships with the commercial sector and academic institutions can provide flexibility and allow for innovative approaches to fulfilling NESDIS mission goals.

Pursuant to the January 2016 NOAA Commercial Space Policy, for example, NESDIS is committed to engaging with the commercial sector to explore how commercial data products might enhance our space-based observing enterprise. We are also actively partnering with the commercial sector to make NOAA's vast data resources more accessible to the public under Cooperative Research and Development Agreements (CRADAs).

Finally, academic partnerships, such as those maintained with the Cooperative Institutes, allow us to benefit from the best scientific expertise and research infrastructure to augment and complement our strategic planning efforts and to facilitate and accelerate user readiness. These relationships have the added benefit of helping to prepare our future work force by providing valuable educational opportunities for students and nurturing future science and engineering leaders for NESDIS.

## ▶ Commit to act as a good partner.

We recognize four values that a good partner demonstrates. NESDIS is committed to modeling these values and to holding ourselves accountable to act as a good partner through our actions and policies. These values are:

- Trustworthiness; especially by providing transparency and keeping commitments.
- Inclusivity; especially by seeking input from others.
- Reciprocity; especially by seeking common purpose.
- Cultural awareness; especially by seeking to understand the culture of partner organizations.

## ▶ Develop and strategically manage partnerships.

NESDIS will develop and employ formal tools and processes that will help us to manage our partnerships with greater clarity as we seek to integrate the values identified above into our work with partners.



In 2016, NOAA and EUMETSAT signed an agreement to continue to share the burden of operating polar orbiting weather satellites for the next twenty years. Under the Joint Polar System Agreement, NOAA and EUMETSAT will split responsibility for the two primary polar orbits. Dr. Stephen Volz, Assistant Administrator for NOAA's Satellite and Information Service, and Alain Raitier, Director General of EUMETSAT, officially signed the agreement on December 2, 2016. Credit: NOAA

## Metrics

NESDIS accomplishes much of what we do because of the scientific and data exchange with our many partners, built on years of cooperation and underpinned by full, open and timely data sharing policies. Currently, NOAA shares data, and sometimes instruments, with several international satellite programs. These programs include the Meteosat and Metop series of satellites with EUMETSAT, Himawari-8 with JMA, GCOM-W1 with the JAXA, COSMIC with the National Space Organization of Taiwan (NSPO), the Sentinel series with the European Commission and Jason-2 and -3 in partnership with NASA, CNES and EUMETSAT, among others. Additionally, NESDIS and NOAA have, through our leadership in international meteorological and satellite organizations, modeled mutually beneficial best practices, including capacity building and meteorological office training in the developing world. In the next five years, NESDIS' continued progress in Partnerships will be measured by:

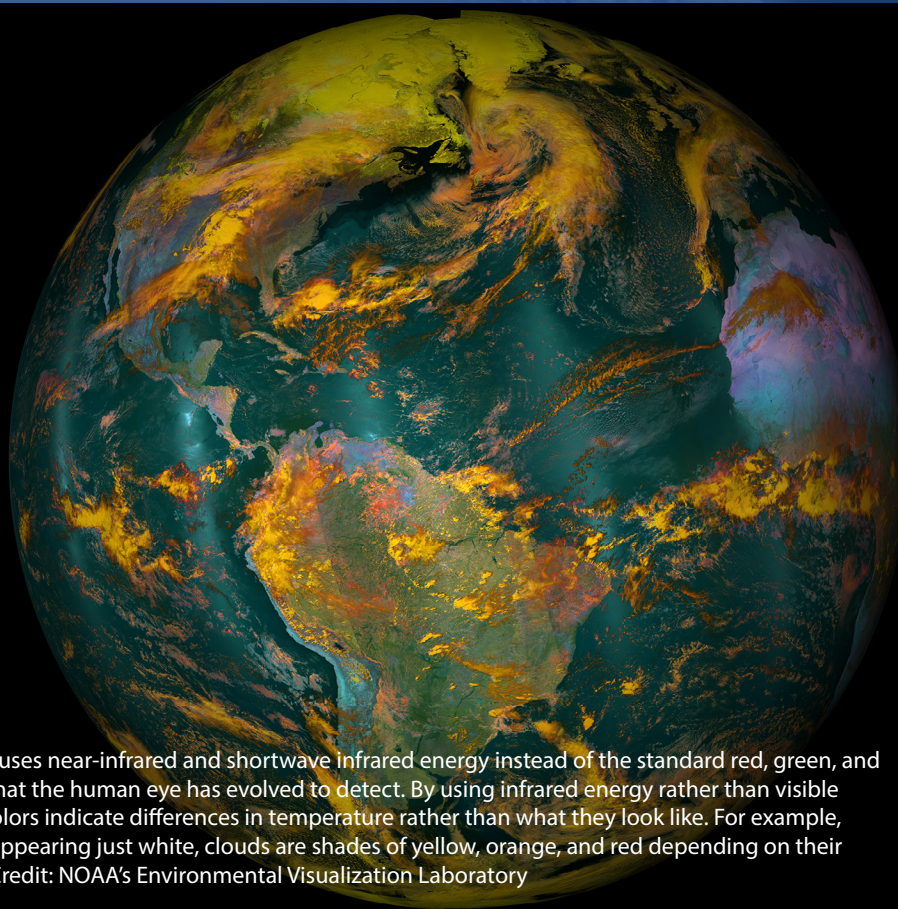
- *Continuing sustained, reliable and robust partnerships as part of an integrated global observing system, including serving in leadership roles for international meteorological and satellite organizations.*
- *Increased operational use of all appropriate data sources that bring enhanced value to the NOAA mission through partnerships and sustained long-term agreements.*
- *Increased ability for communities, in both the developed and developing worlds, to access, understand and use NOAA data.*

# U NDERSTANDING OUR SHARED PLANET

We live on an incredibly complex and changing planet. Conditions in one part of the world can change the weather on the other side of the globe. Forecasting weather, understanding climate trends and monitoring environmental hazards is no easy task and requires high-quality, timely information from Earth observation satellites around the globe. While NOAA operates many satellites, no one country alone can afford to effectively monitor the entire planet. Instead, NOAA partners with the international community to leverage data from satellites around the world, providing a more complete understanding of our ever changing planet.

To support this level of international collaboration, the International and Interagency Affairs Division of NOAA's Satellite and Information Service coordinates global solutions to shared challenges through multilateral organizations, maintains and expands bilateral partnerships and promotes the adoption of full and open data policies.

*"Modern weather prediction is perhaps the most cooperative activity of our species. To forecast the weather anywhere on the globe requires weather data from everywhere on the globe." Cliff Mass- Meteorologist and Professor of Atmospheric Sciences at the University of Washington*



This image uses near-infrared and shortwave infrared energy instead of the standard red, green, and blue light that the human eye has evolved to detect. By using infrared energy rather than visible light, the colors indicate differences in temperature rather than what they look like. For example, instead of appearing just white, clouds are shades of yellow, orange, and red depending on their elevation. Credit: NOAA's Environmental Visualization Laboratory



This image shows the current space-based portion of the World Meteorological Organization's Global Observing System, plus additional space weather and environmental satellites.





# GOALS PEOPLE

The success of the NESDIS mission has been, and always will be, rooted in the consistent high-quality work and dedication of the people within the organization. As the scope, breadth and level of expertise of services and information provided by NESDIS expands in the years to come, we will continue to rely on a workforce that is engaged, diverse, dedicated and nationally and internationally recognized as authorities in their fields. Through the activities highlighted in this plan, we will provide a NESDIS vision and trajectory for our workforce moving forward.

As an organization, we will create an inclusive work environment that fosters creativity and innovation, while promoting collegial engagement through supportive and effective leadership. We will strengthen and bolster our workforce by attracting diverse and skilled employees that perform at a high level of excellence in support of the NESDIS mission. Ensuring team flexibility, proficiency and high morale leads to a working environment that promotes diversity, fosters teamwork, demonstrates fairness and trust and increases knowledge for the health of our organization and the personal success of our employees.

## ▶ Provide training and development opportunities.

The success of NESDIS relies on the success of each individual employee. Opportunities for career growth, leadership and professional development and learning ensure that employees and teams have the necessary skills, training and motivation to meet the challenges NESDIS faces in the next five years and into the indefinite future. We will:

- Foster opportunities for career growth, personal development and learning.
- Perform training needs assessment to determine gaps for overall training recommendations.
- Utilize NOAA/Department of Commerce mentoring and/or coaching program at all levels.

## ▶ Effectively manage workforce.

As the NESDIS mission continues to evolve, so must our workforce. Our workforce must demonstrate the qualities of agility and openness to new and different capabilities as our infrastructure moves towards a future of integrated systems, partnerships and agility. NESDIS will:

- Update and maintain the workforce and succession planning needs of the organization.
- Ensure human capital decisions are executed and aligned with the NESDIS human capital plan.
- Establish and maintain the critical level of expertise needed within NESDIS through effective training and recruitment.
- Utilize periodic reviews to continuously evaluate and improve employee performance.

## ▶ Create a healthy, engaged and productive culture.

The successes of NESDIS are shared as a team. We will create a culture focused on meeting our commitments through collaboration and shared resources. Together, we will foster an inclusive, collaborative and trust-based culture that values innovation, attracts the best talent and delivers consistent high quality results. It will be a culture where employees feel valued for their contribution to the success of the organization. NESDIS will:

- Encourage a safe environment where our employees can take initiative and try new and innovative approaches.
- Develop and implement a NESDIS diversity plan which identifies programs and practices that encourage and value diversity and inclusion throughout the workforce.
- Provide consistent opportunities for honest feedback and non-adverse response, including the institution and utilization of an Employee Advisory Council (EAC) within each office/region to glean their innovative ideas for enhancing NESDIS success.
- Create a professional and supportive environment to promote the active engagement of employees in order to foster open dialog, inclusion and shared commitments and accountability.
- Enhance our programs for employee recognition and appreciation.
- Develop enhanced tools and structures to promote better work/life balance.



NESDIS employees and guests prepare for the launch of NOAA's DSCOVR satellite from the Cape Canaveral Air Force Station in Florida on February 11, 2015.

## Metrics

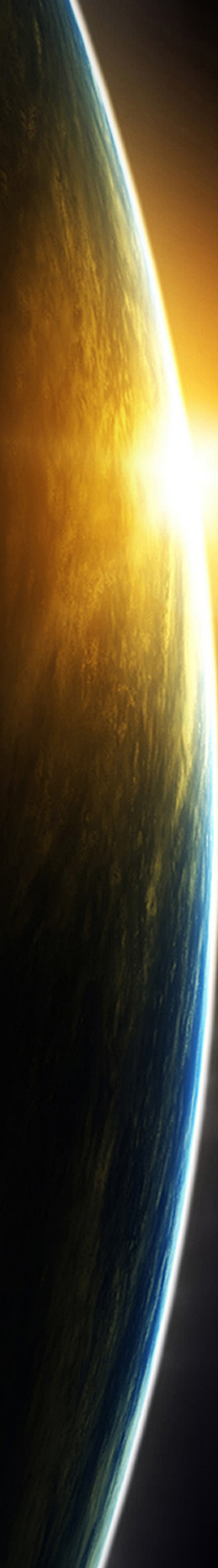
The people of NESDIS are the heart and soul of the organization. In order to support and sustain a diverse and engaged workforce, NESDIS has been making a focused effort to address the feedback provided through the Federal Employee Viewpoint Survey and improve leadership communication on all levels. The organization has also established the quarterly NESDIS Awards to recognize employees for their hard work and outstanding achievements in support of the NESDIS and NOAA missions and has developed many unique diversity training and education opportunities. In the next five years, NESDIS' continued progress in People will be measured by:

- NESDIS core competency(s) needs realized through effective employee recruitment, training and development.
- Significant improvement in employee recruitment, diversity and retention.
- Enhanced employee engagement and job satisfaction, measured through the Federal Employee Viewpoint Survey or similar reviews.
- An active Employee Advisory Council (EAC) at each geographic location/region in order to focus on inclusion, collaboration and a trust-based culture.
- The development of an updated NESDIS succession plan that identifies career development opportunities.
- The completion of a NESDIS training needs assessment and the fielding of improved training opportunities.



# NEXT STEPS





**The successful execution of this plan relies on a continuous commitment to adhere to, as well as exceed, the standards of excellence that have come to define NESDIS. The organization will maintain its standing and future commitments to both the Nation and global community through engaged and supportive leadership and a dynamic and collaborative workforce that embraces both innovation and effectiveness.**

**Underlying all aspects of NESDIS are systems that drive effective program, systems risk and budget management. Continuing successful and effective program management and system engineering must be a cornerstone principle of the NESDIS enterprise. The NESDIS mission and the organization's goals are only achievable through proactive and professional management principles.**

**NESDIS is on the forefront of setting the standards and best practices for the global environmental observing and monitoring community and must continue to do so with a dedication to openness and transparency as well as the highest regard for scientific principles, security and integrity. This also means a strong commitment to continuous learning, defined by regular introspection and process evaluation, including open dialogue with partners and colleagues within the United States and around the globe.**

**The development and release of this strategic plan is only the first step in a multi-step process in preparation for the future. The success of the NESDIS mission relies on the organization's ability to implement meaningful and productive change through the goals and metrics outlined in this plan. To do this, NESDIS is currently developing an implementation plan to guide the organization through this process, placing ownership in the hands of the NESDIS offices—the heart and soul of the organization.**

**As the organization enters this new paradigm and adjusts to a changing environment, NESDIS will remain a global leader in reliable operational space-based observation solutions and continue to be the Nation's trusted source of environmental data and information.**



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