NESDIS’ mission is to provide 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 is to expand the understanding of our dynamic planet as the trusted source of environmental data.
NESDIS Principal Activities

Provide on-orbit satellite operations

Acquire next-generation satellites

Provide data processing and operational product distribution

Provide information for decision support at federal, state, and local levels

Provide long-term data stewardship and short-, mid-, and long-term environmental assessments

NESDIS is the primary data source for National Weather Service forecast models
# NOAA’s Role in National Space Policy

## Civil Space Sector

<table>
<thead>
<tr>
<th>Focus on Earth system research</th>
<th>Focus on weather and space weather observations and applications</th>
<th>Focus on land remote observations and land use applications</th>
<th>Focus on intelligence gathering and weather and environmental applications to support military operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usually no more than one satellite per new research area. No backup satellites and less demanding reliability requirements</td>
<td>Operational, continuous missions. 2-4 satellites per block purchase, spares on ground or in space</td>
<td>Operational, continuous missions – utilizing capabilities provided by NASA (Landsat series)</td>
<td>Operational, continuous missions – block purchase of satellites, spares on ground or in space</td>
</tr>
<tr>
<td>Large, changing array of research observations dictated by national research priorities</td>
<td>Core set of observational requirements, with requirements increasing in response to operational needs</td>
<td></td>
<td>Core set of observational requirements, increasing in response to operational needs</td>
</tr>
<tr>
<td>Partners with both NOAA and USGS to leverage satellite building expertise</td>
<td>History of relying on NASA for space segment development</td>
<td></td>
<td>Independent space and ground segment development capability</td>
</tr>
</tbody>
</table>

## Agency or Mission Drivers

| Science Question Driven Maximum Performance Technology development | User Needs Driven Continuity & Reliability Near Real Time access Long term weather plan | Land imaging Latency not an issue | DOD User Needs Driven Global tailored products No long term weather plan |
NESDIS Strategic Plan

Commitments
- Enduring focus on continuity of products & services delivered by NOAA – past, present and future
- Dedication to, and expertise in, data and information

Capabilities
- Importance of considering, analyzing and planning an integrated observing system architecture
- Delivering ever-increasing value, including new and better information products and services, through science

Community
- People: NESDIS will focus on retaining, creating and developing an agile, expert workforce
- Through partnerships, maximize both NOAA’s and the Nation’s value through observations and scientific capabilities
NESDIS Budget Trends

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>President's Budget</th>
<th>Enacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2008</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>FY2009</td>
<td>$1,500,000</td>
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<tr>
<td>FY2010</td>
<td>$2,000,000</td>
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<tr>
<td>FY2011</td>
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<td>FY2012</td>
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<td>FY2015</td>
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<tr>
<td>FY2016</td>
<td>$4,000,000</td>
<td>$4,000,000</td>
</tr>
<tr>
<td>FY2017</td>
<td>$4,500,000</td>
<td>$4,500,000</td>
</tr>
</tbody>
</table>
Cooperative Institutes (CIs)

CICS: CI for Climate and Satellites [DC Metro & Asheville, NC]
CIMSS: CI for Meteorological Satellite Studies [Madison, WI]
CIRA: CI for Research in the Atmosphere [DC Metro & Fort Collins, CO]
CIRES: CI for Research in Environmental Sciences [Boulder, CO]
CREST: Cooperative Remote Sensing Science and Technology Center [New York, NY]

Contractors

Assurance Technology Corporation: SEISS [Carlisle, MA]
Ball Aerospace: JPSS-1 spacecraft bus, OMPS [Azusa, CA & Boulder, CO]
Harris: CrIS, ABI, antenna, GOES-R ground [Melbourne, FL; Fort Wayne, IN; & Rochester, NY]
Laboratory for Atmospheric & Space Physics: EXIS [Boulder, CO]
Lockheed Martin: GLM, SUVI, GOES-R spacecraft bus, mag [Palo Alto, CA; Denver, CO; Stennis, MS; and DC Metro]
Northrop Grumman: ATMS, CERES, JPSS-2 spacecraft [Azusa, CA, Gilbert, AZ & DC Metro]
Raytheon: VIIRS, JPSS ground [El Segundo, CA & Aurora, CO]
United Launch Alliance: Launch services [Englewood, CO]
NOAA Operates 16 Satellites
Partnerships for Integrated System

- Existing Partnership
- Potential Partnership
- NOAA Mission
Three Observation Points

**Polar-orbiting Operational Environmental Satellites**
- Each satellite covers the Earth twice per day
  - Pole-to-pole orbit is 102 minutes and views each location at the same time of day
  - Global coverage every 12 hours with one satellite
  - DOD in the early morning orbit; EUMETSAT in the mid-morning orbit; NOAA in the early afternoon orbit

**Geostationary Operational Environmental Satellites**
- Continuous monitoring of the Western Hemisphere
  - Same geographic image over time
  - Western Hemisphere image every 30 minutes and continental United States image every 15 minutes*
  - Usable images between 60°N and 60°S
  - *GOES-R Series to improve spatial and temporal resolution

**Deep Space at Lagrange 1 Point**
- Continuous monitoring of the surface of the Sun
  - Located ~1 million miles from Earth, at the Lagrange Point 1 position of the Sun-Earth system
  - Uninterrupted view of the sun
  - Real-time solar wind monitoring
  - Provides 15 – 60 minutes warning time

*GOES-R Series to improve spatial and temporal resolution
Geostationary Operational Environmental Satellites (GOES)

Two + spare satellite system continuously monitors the western hemisphere
- Two active satellites (GOES-E and -W) plus one on-orbit spare
- Current GOES: Western Hemisphere imaged every 30 min, continental U.S. imaged every 15 min
- GOES-R Series: Western Hemisphere imaged every 15 minutes, continental U.S. imaged every 5 minutes

<table>
<thead>
<tr>
<th>Program Scope</th>
<th>4 Satellites (GOES-R, S, T &amp; U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Design Life</td>
<td>10 years for each spacecraft</td>
</tr>
<tr>
<td>GOES-R (GOES-16) Launch Date</td>
<td>November 19, 2016</td>
</tr>
<tr>
<td>GOES-R Series Launch Commitment Dates</td>
<td>GOES-S: Q4 FY2018; GOES-T: Q4 FY2020; GOES-U: Q1 FY2025</td>
</tr>
<tr>
<td>Program Operational Life</td>
<td>FY2017 – FY2036</td>
</tr>
<tr>
<td>Program Life Cycle Cost</td>
<td>$10.828 billion</td>
</tr>
</tbody>
</table>
# Polar Weather Satellites

NESDIS operates 3 distinct polar-orbiting weather satellite families:

- **Suomi NPP / Joint Polar Satellite System (JPSS) / Polar Follow On (PFO)**
  - Suomi NPP is the Nation’s primary polar-orbiting weather satellite
- **Polar-orbiting Operational Environmental Satellites (POES)**
- **Defense Meteorological Satellite Program (DMSP) for the U.S. Air Force**

| JPSS/PFO Program Scope | JPSS Program: 3 Satellites (Suomi NPP, JPSS-1, JPSS-2)  
| PFO: 2 Satellites (PFO/JPSS-3, PFO/JPSS-4) |
|------------------------|--------------------------------------------------|
| Operational Design Life | Suomi NPP – 5 years: JPSS/PFO – 7 years |
| JPSS Launch Commitment Dates | JPSS-1: Nov. 10, 2017; JPSS-2: Q1 FY2022  
| PFO Launch Commitment Dates | JPSS-3: Q4 FY2026; JPSS-4: Q4 FY2031 |
| Program Operational Life | JPSS: FY2012 - FY2025; PFO extends to 2038 |
| JPSS Program Life Cycle Cost | JPSS: $11.322 billion; PFO: $7.6 billion |
Other Operational Satellites

- **DSCOVR** (deep space, launched 2015)
  - Space weather early warning
  - Nation’s first operational satellite in deep space (L1)

- **COSMIC-1** (polar, launched 2006)
  - Research radio occultation mission, led by NSF
  - Supporting numerical weather prediction
  - Only 1 out of original 6 in operation

- **Jason-2 & -3** (polar, launched 2008 & 2016)
  - Radar altimetry
  - Tracks global sea surface height
Recent and planned launches

- **DSCOVR**: Operational July 27, 2016
- **JASON-3**: Operational July 1, 2016
- **COSMIC-2A**: 2018
- **GOES-R Series**:
  - GOES-16: Operational Dec 18, 2017
  - GOES-S: 2018
  - GOES-T: 2020
  - GOES-U: 2025
- **JPSS Series**:
  - NOAA-20: Launched Nov 18, 2017
  - JPSS-2: 2021
  - JPSS-3: 2026
  - JPSS-4: 2031
Other Future Capabilities

- **COSMIC-2A**
  - Radio occultation constellation (6 satellites) in the equatorial orbit
  - Launch date dependent on SpaceX Falcon Heavy readiness, currently CY 2018
  - Partnership between Taiwan and U.S. (NOAA, NASA, and U.S. Air Force)

- **Space Weather Follow On**
  - First included in the FY 2016 President Budget request
  - Provides continuity of space weather data
    - Solar wind
    - Compact coronagraph
Office of Satellite and Product Operations

Satellite Operations

- The NOAA Satellite Operations Facility, located in Suitland, Maryland, is the control center for satellite operations
- Command and control of all NOAA and DMSP satellites
- Provides critical near-real-time data to the United States Government and international partners
- Orbit determination
- Spacecraft navigation
- Data acquisition
- Special operations (e.g. hurricane “rapid scan”)
- 24-hour mission control for satellite-aided search & rescue
- Command and data acquisition facilities in Wallops, VA and Fairbanks, AK

Satellite Data Processing and Distribution

Near Real Time Products

- Atmospheric sounders (e.g., total perceptible water, snowfall rate, temperature)
- Geostationary imagery (e.g., tropical cyclone products)
- Hazard products (e.g., fire and smoke, volcanic ash)

Lower-latency Products

- Surface, Hydrology, and Vegetation Products (used by USDA to monitor vegetation health, emergency managers to monitor fire risk, public health officials for malaria risk, etc.)
- Ocean Products (Sea Surface Height for climate studies)
- Ice Products (as part of the tri-agency Navy-Coast Guard-NOAA National Ice Center)
National Centers for Environmental Information (NCEI)

Acquire and archive environmental data from U.S. and foreign sources
  • Satellite, land, air, and ocean-based observations

Preserve the Nation’s environmental data

Assemble data into easy to use long-term datasets

Provide access to environmental data for government, business and academic users

Assess the Earth’s environment
  • Produce monthly reports on state of the climate for U.S. and world
Other Programs

Center for Satellite Applications and Research (STAR)
- STAR leads NESDIS research, development, validation, and maintenance of satellite-derived products and applications
- Supports the calibration and validation of sensors in NOAA’s satellite operations, and calibrates data with interagency partners
- Develops new environmental satellite applications, techniques, and algorithms based on end-user needs
- Collaborates with researchers at a range of Cooperative Institutes (CIs) across the country

Cooperative Data and Rescue Services (CDARS)
- Legacy satellites hosting Argos and SARSAT instruments are operating beyond design life
- NOAA is conducting a replan to ensure these capabilities continue to be supported.

Commercial Weather Data Pilot
- Working with the commercial sector to provide space-based radio occultation data for the purpose of demonstrating data quality and potential value to NOAA’s weather forecasts and warnings.

Group on Earth Observations (GEO)
- Collaborate globally in the Earth observation intergovernmental partnership with 100 governments and 93 international organizations to foster EO data sharing

Office of Space Commerce
- Advocate for commercial space industry
- Entry point for NOAA Commercial Space Policy queries

Commercial Remote Sensing Regulatory Affairs
- Regulatory authority and enforcement of commercial satellites with ability to view Earth
Primary NESDIS Focus Ahead

- Delivering on development milestones for all programs, including for launches of GOES-S, JPSS-1, and COSMIC-2A
- Gaining sufficient and sustainable funding for Polar Follow On, Space Weather Follow On, and Argos/SARSAT
- Defining and investing in a future system architecture in coordination with internal NOAA partners and external stakeholders
- Active engagement with the commercial sector, both as suppliers of data and as customers
- Defining and implementing a budget that supports NESDIS commitments and future plans
Backup Slides
NESDIS Organization
Operational Geostationary Satellites

- Weather sentinel, critical for nowcasting, provides constant monitoring of:
  - Hurricanes
  - Severe storms
- Input to weather models, forecasts, and warnings
- Usable images between 60°N and 60°S
- Sea surface temperature monitoring for fisheries and climate use
- Winds for aviation use and space weather
- Solar imagery for communications satellites, utility companies, and astronaut safety
- Communications hub for buoy and stream gauge, and other environmental data collection
- Satellite-aided search and rescue

GOES data are shared globally
GOES-R Series provides significant improvements in performance over legacy GOES satellites, including:

- New lightning mapping capability for improved early warnings of severe weather, including increased tornado warning lead time
- Improves hurricane track and intensity forecasts
- Improves aviation flight route planning, air quality warnings, and fire detection
- Improves warning of solar events to minimize impacts to communications, navigation systems, power grids, and satellites on-orbit
Operational Polar Satellites

- Provides global data for medium- and long-range (3-7 days) weather prediction
- Critical monitoring for hurricanes, droughts, floods, snowstorms, and other severe weather events
- Detection of significant environmental events (e.g., fires, oil spills, volcanic events)
- Ocean observations
- Measurements of climate variables
- Collection of data from surface platforms
- Satellite-aided search and rescue
- Suomi NPP, and JPSS/PFO, provides advances in weather, environmental, and oceanographic science through technological improvements in satellite instruments and capabilities over legacy POES satellites

Polar data shared globally
# JPSS/PFO Instruments

<table>
<thead>
<tr>
<th>JPSS-1 Instruments (<em>JPSS-2 and PFO instruments</em>)</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATMS</strong> - Advanced Technology Microwave Sounder *</td>
<td>ATMS and CrIS together provide high vertical resolution temperature and water vapor information needed to maintain and improve forecast skill out to 7 days in advance for extreme weather events, including hurricanes and severe weather outbreaks</td>
</tr>
<tr>
<td><strong>CrIS</strong> - Cross-track Infrared Sounder*</td>
<td></td>
</tr>
<tr>
<td><strong>VIIRS</strong> – Visible Infrared Imaging Radiometer Suite*</td>
<td>VIIRS provides many critical imagery products including snow/ice cover, clouds, fog, aerosols, fire, smoke plumes, vegetation health, phytoplankton abundance/chlorophyll</td>
</tr>
<tr>
<td><strong>OMPS</strong> - Ozone Mapping and Profiler Suite Nadir*</td>
<td>Ozone spectrometers for monitoring ozone hole and recovery of stratospheric ozone and for UV index forecasts</td>
</tr>
<tr>
<td><strong>CERES</strong> - Clouds and the Earth’s Radiant Energy System</td>
<td>Scanning radiometer which supports studies of Earth Radiation Budget (ERB). Note: JPSS-2 will fly the Radiation Budget Instrument (RBI), a next-generation instrument of CERES provided by NASA</td>
</tr>
</tbody>
</table>
Continuous Exploration of Commercial Weather Data

- NOAA Commercial Space Policy (January 2017) calls for NOAA to explore commercial data viability through demonstration projects
- NESDIS Commercial Space Activities Assessment Process (January 2018) outlines the NESDIS steps to pursuing commercial data purchase opportunities
- The Commercial Weather Data Pilot carries out these policies through issuing contracts for the purchase and evaluation of commercial data

**FY16 $3M Round 1**
- Release RFI
- Released draft RFQ/Held Industry Day
- Released Final RFQ
- Awarded 2 Contracts
- Collect Data by April 30, 2017
- Evaluate Data through FY 2017

**FY17 $5M Round 2**
- Release RFP
- Award Contract(s)
- Collect Data
- Perform Data Evaluation