NESDIS Industry Engagement Forum

Please stand by for the webinar to begin.....
Housekeeping

- **Attendees**
  - Microphone and Webcam Functionality are disabled
  - Use the chat box to submit questions
  - 15 minutes for presentation followed by 5 minute period for questions

- **Panelists**
  - Mute microphone when you are not speaking
Purpose

- Provide a forum for NESDIS Leadership to share its vision for current and future NESDIS priorities and programs
- **NOT** to status current or upcoming acquisitions
Agenda

- **Acquisitions and Grants Office Overview**  
  Jay Standring, Branch Chief for the Professional and Technical Services Branch (ProTech)

- **NSOSA Implementation: Developing our Next-Gen Earth Observation Architecture**  
  Vanessa Griffin, Director of the Office of Systems Architecture and Advanced Planning

- **Major Systems Overview**  
  Tim Walsh, Deputy Director, JPSS, Acting in the role of the Duties of Deputy Assistant Administrator for Systems (DAAS)

- **National Centers for Environmental Information (NCEI) Overview**  
  Mary Wohlgemuth, Director of the National Centers for Environmental Data
Acquisition and Grants Office (AGO)

- **Mission**
  Enable the NOAA mission through premier acquisition and financial assistance solutions.

- **Vision**
  Valued as strategic business advisors advancing the NOAA mission through strong partnerships with clients and internal and external stakeholders.

- **Core Values**
  - **Inclusion**: Strive to create a work environment in which all individuals are treated fairly and respectfully, and can contribute fully to the organization's success.
  - **Innovation**: Constantly engage with our clients and industry to bring cutting-edge technology and solutions to address NOAA’s complex requirements.
  - **Integrity**: Conduct ourselves with the highest degree of fiduciary responsibility, ethics, and fairness.
  - **Excellence**: Consistently deliver a superior experience and high quality outcomes for our clients and the American people.
Acquisition and Grants Office (AGO)

FY 2019 Summary

- 18,816 Acquisition Transactions
- $1.86B Executed to Obligate
- Managing 5,218 Active Contracts
- 4,300 Financial Assistance Transactions Worth $1.36B
- Managing 2,430 Active Grants
- Accomplished approximately 47% Overall Small Business Achievement

Visit: https://www.noaa.gov/organization/acquisition-grants for more information
Opening Remarks

Dr. Stephen Volz
Assistant Administrator for Satellite and Information Services
NOAA National Environmental Satellite, Data, and Information Service
Implementing NSOSA: Business Models

- **Industry Concept Studies**: 31 studies worth $16.4 million to study soundersats in LEO, and instruments, missions and spacecraft in GEO

- **Ongoing BAA Study Cycle**: Regular cadence of industry studies to make use of expertise and innovation and fill out remainder of LEO constellation

- **Commercial Weather Data Purchase**: RFP release planned for operational Radio Occultation (RO) data purchase

- **Commercial Weather Data Pilots**: Completion of Round 2 in RO, exploring other data types available commercially

- **NESDIS Ground Enterprise Study**: NSOSA-model analysis to inform next-gen ground system decisions
Partnering with Industry: Ongoing Cycles to Leverage Industry Concepts, Ideas & Innovation

- **Broad Agency Announcements**
  - SounderSat: Oct 2019
  - GEO: Oct 2019

- **Industry Concept Studies**
  - May 2020

- **Phase A Mission Concept and Tech Dev Activities**
  - 2021

- **Next-Gen Earth Observation Architecture**
  - Mid 2020s
    - ~2030
GEO-XO Industry Concept Analyses

FY20 funds being used to partner with industry for options to replenish GOES-R Series data by 2030:

**Instruments**
- Regional, real-time weather imagery
- Space weather data
- High latitude observations – highly elliptical orbits (Tundra) for Arctic observations
- Hyperspectral sounding

**Implementation solutions**
- Standard satellite bus
- Small satellites for space weather instruments
- Hosting services
- Commercial data

2020: Complete pre-Phase A studies
2021: Phase A start
SounderSat Industry Concept Analyses

NSOSA recommends transitioning to a partially-disaggregated LEO architecture by:
● Flying a constellation of small satellites dedicated to providing critical sounding data
● Augmenting LEO by flying small to medium instruments observing 3D winds, ocean surface vector winds, precipitation data, and low light imagery.

NESDIS has awarded industry contracts to explore and examine small sounding satellite design and capability options, to begin demonstration flights to augment JPSS by mid-2020s:
• Sounding instruments (microwave, infrared, radio occultation)
• New acquisition and observing system concepts:
  • Commercial services
  • Multi-orbit coverage
  • Common satellite bus for flexibility in instruments flown
  • Rapid launch cadence
  • Demonstration missions
  • Risk tolerance and observing system risk management

2020: Initial pre-Phase A studies
2021: Complete pre-Phase A and begin focused industry designs and collaborations
Developing Capabilities Through Joint Venture

NOAA develops new technology and capabilities with NASA and industry through Joint Venture.

- **COLLABORATIVE CONCEPTS**
- **NASA**
  - TRL 2-7
    - Potential NASA ESTO Collaboration
    - Industry concept studies for future LEO soundings
  - Possible Enhanced Operational Opportunity with NASA Earth Venture Mission (EVM)-3
- **NOAA**

**TESTED INSTRUMENT OR MISSION CONCEPTS**
Commercial Weather Data Pilot & Purchase

Radio Occultation Data to Date:

- **Commercial Weather Data Pilot Round 2 Completed Spring 2020**: Demonstrated readiness of commercial sector to provide RO data operationally

- **Commercial Weather Data Purchase**: $5M in FY20 and additional funds requested in FY21 to buy commercially-provided RO data for operational use

Upcoming work:

- **Continuing Commercial Weather Data Pilots**: FY21 budget request includes funds to investigate additional commercial capabilities beyond RO

- **Planning RFI in near future to inform upcoming Pilots**
NESDIS Ground Enterprise Study

Strategic Architecture Study to Identify the NESDIS Common Ground vision for the 2030s

- Satellite Operations
  - Space-Ground Communications
  - Mission Operations

- Science Operations
  - Algorithm Operations
  - Environmental Information Operations

- Data Operations
  - Production Operations
  - Data Delivery

Study to be Completed by Summer 2021
Matching Tomorrow’s Common Ground Services to our Next Gen Flight Systems

- NOAA SmallSats
- Commercial Data
- Other USGS Data
- New Data Types
- Int’l Partner Data

Command / Control / Communication
Secure Data Ingest
Data Processing
Product Development

- Transitioning to the cloud
- Considering commercial capabilities
- Employing an enterprise approach
Next Steps in Next Gen: Taking Initiative

NESDIS is expanding partnerships to explore and initiate new space and ground capabilities:

- **Industry Concept Studies:** First round of studies in LEO SounderSats and GEO
- **Ongoing BAA Study Cycle:** Exploring concepts and capabilities on a regular basis
- **Commercial Weather Data Purchase:** RFP release planned for operational RO data purchase
- **Commercial Weather Data Pilot:** Ongoing pilots in other observation capabilities
- **Ground Study:** Developing our next-gen ground system
Backup
BAA Concept Studies awarded to date: GEO-XO

Instruments

- **Raytheon**: Real Time Imager (RTI)
- **Lockheed Martin**: Flexible Hosted Imager (FHI)
- **L3Harris**: Advancing Today’s ABI Foundation into the Next-Gen GEO Imaging Solution
- **L3Harris**: Hyperspectral GEO Sounder Study
- **Leidos**: GEO Earth Multispectral Mapper (GEMM) for Terrestrial Weather Imaging
- **JPL**: GEO IR Sounder
- **JPL**: GeoSTAR: A Geostationary Microwave Sounder for NOAA
- **Ball Aerospace**: Ball Operational Weather Instrument Evolution - (BOWIE) Geostationary IR Sounder Study for Compact Hyperspectral IR Observations (CHIRO)
- **Northrup Grumman**: Photonic Imaging Spectrometer Instrument Concept Exploration
- **Northrup Grumman**: Geostationary Microwave Sounding Unit (GEMSU)
- **Ball Aerospace**: Dedicated Auroral Imager for a Tundra Satellite

LEO constellations/Commercial data and services

- **BAE Systems**: Infrared Sounding Instrument Constellation Study
- **ASTRA**: GEO Utilization of Common LEO Architecture for Weather (G-CLAW)
- **GeoMetWatch**: Global HyperSpectral Atmospheric Sounding Capability: Commercial Fee-for-Service Option
- **Maxar SSL**: Commercial Hosting Service for Sustained GEO Weather Missions
- **Xplore**: PANORAMA - Commercial Earth-Sun L1, L4, L5 Missions
BAA Concept Studies awarded to date: LEO Soundings

- **L3Harris**: Infrared LEO Sounder Instrument Study
- **Northrup Grumman**: Alternative Leo Small Microwave Sounder (ASMiS)
- **Ball Aerospace**: Ball Operational Weather Instrument Evolution -Microwave (BOWIE-M) Sounder Study
- **Ball Aerospace**: Ball Operational Weather Instrument Evolution (BOWIE) IR Sounder Study
- **Raytheon**: LEO Sounding Satellite (SounderSat) Concept Exploration (HIRIS)
- **Colorado State University**: TEMPEST-based CubeSat Microwave Sounder for Temperature and Moisture Profiling
- **JPL**: Developing Microwave Sounders for NOAA Users in 2030

Missions

- **York Space Systems**: Gaea – LEO SounderSat Mission Concept Study
- **Brandywine Photonics**: MetNet Small Weather Satellite Network Mission Concept
- **L3Harris**: Joint LEO Sounding Mission Study
- **Northrup Grumman**: Next-Gen MW/IR/RO Sounder Sat Evaluation
- **GeoOptics**: CICERO-X: An Alternative Mission Concept For Global Atmospheric Sounding
- **Northrup Grumman**: Microwave Reference Radiometer (MIRER) Constellation Architecture

Constellations

- **Northrup Grumman**: Small Satellite Constellation
- **MAXAR SSL**: Common Bus for Sustained Hosting of LEO Weather Missions
Questions?
Major Systems Overview

Tim Walsh
Deputy Director, JPSS Program (acting in the role of the DAAS)
NEDIS
**Pillars of NESDIS Observing System Implementation**

<table>
<thead>
<tr>
<th>Integrated, Adaptable and Affordable: Orbits, Instruments &amp; Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GEO</strong></td>
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<tr>
<td>Continuous real-time observations supporting warnings and watches of severe weather and hour-by-hour changes. High-inclination orbits to observe northern latitude &amp; polar regions.</td>
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</table>

<table>
<thead>
<tr>
<th>Common Ground Services</th>
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<tbody>
<tr>
<td>Secure ingest of data in different formats from different partners requires a flexible, scalable platform. Common Services approach integrates Cloud, AI and machine-learning capabilities to verify, calibrate and fuse data into new and better products and services.</td>
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</table>
GOES-R Mission Overview

• GOES-R is the newest generation of United States geostationary weather satellites
  • Provides the first update in sensor technology since the GOES-I launch in 1994
• Two in orbit (GOES-16 and GOES-17); two being integrated (GOES-T and U)
• Joint mission between NOAA and NASA

- Improve hurricane track & intensity forecasts
- Increase thunderstorm & tornado warning lead time
- Improve aviation flight route planning
- Data for long-term climate variability studies

- Improve solar flare warnings for communications and navigation disruptions
- More accurate monitoring of energetic particles for radiation hazards to humans and spacecraft
- Better monitoring of Coronal Mass Ejections to improve geomagnetic storm forecasting
GEO-XO Introduction

**GEO-XO = Geostationary and Extended Orbits**
- The initiative planning the missions to follow GOES-R
- Will provide continuity for observations from GEO
- Considering expanding to include observations from “Tundra”

**Includes:**
- All NOAA Earth-observing assets deployed above LEO:
  - Government spacecraft
  - Instruments or payloads hosted on commercial or partner spacecraft
  - Potential use of commercial services and observational data

**Operational in the 2030-2050 timeframe**
- Currently in formulation:
  - Instrument and constellation studies underway
  - User needs assessment and underway
  - Beginning requirements definition
- Approximate Program Schedule
  - Mission Concept Review, 2021
  - System Requirements Review, 2022
  - Preliminary Design Review & KDP-C, 2026
  - 1st GEO Launch FY31

*Data Continuity, and Potential New Observations*
What’s next for JPSS

**JPSS-2**
- The JPSS-2 spacecraft bus is nearing completion.
- Instrument integration and environmental testing on track to start in late summer / early fall 2020.
- JPSS-2 is scheduled to launch in 2022.

**JPSS-3 & -4**
- JPSS-3 & -4 instruments and the JPSS-3 spacecraft have started integration and are on track to meet NOAA launch commitment dates in 2027 and 2032.

*BATC bus for S-NPP and JPSS-1
*NGIS bus for JPSS-2, 3 and 4
Evolving LEO Satellite Technology to Improve Forecast Accuracy

<table>
<thead>
<tr>
<th>Year</th>
<th>Events</th>
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<tbody>
<tr>
<td>1960</td>
<td>- TIROS-1 launch in April 1960. 48° inclination</td>
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<tr>
<td></td>
<td>- Nimbus-1 launch in Aug. 1964. First infrared sensor</td>
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<tr>
<td></td>
<td>- TIROS-9 launch in 1965. “Cartwheel configuration.” First polar orbit</td>
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<tr>
<td>1980</td>
<td>- TIROS-N launch in October 1978. First AVHRR</td>
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<td></td>
<td>- First microwave sounder—increase in forecast accuracy due to ability to see through clouds</td>
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<tr>
<td>2000</td>
<td>- NOAA-15, 16, 17. More microwave channels</td>
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<tr>
<td></td>
<td>- NOAA + EUMETSAT IJPS agreement</td>
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<tr>
<td></td>
<td>- NPOESS/JPSS development</td>
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<td></td>
<td>- DoD Collaboration: DMSP and WINDSAT Coriolis</td>
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<tr>
<td></td>
<td>- First hyperspectral infrared sounders</td>
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<tr>
<td>2020</td>
<td>- JPSS series operational</td>
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<tr>
<td></td>
<td>- METOP-SG</td>
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<tr>
<td></td>
<td>- Jason-2/3</td>
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<tr>
<td></td>
<td>- COSMIC-2 GNSS RO</td>
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<tr>
<td></td>
<td>- GOSAT3 / AMSR3</td>
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<tr>
<td></td>
<td>- Next-gen sounder development</td>
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<tr>
<td>2040</td>
<td>- Increased national and international partnerships</td>
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<td></td>
<td>- Enterprise ground system</td>
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<td></td>
<td>- Distributed / disaggregated space segment</td>
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<tr>
<td></td>
<td>- Capitalize on cutting-edge technology</td>
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<td></td>
<td>- Information integration</td>
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Solar Wind and CME Imagery for Space Weather Prediction

• NWS Space Weather Prediction Center (SWPC) is the nation’s official source of space weather Watches, Warnings and Alerts

• Coronal Mass Ejection (CME) Imagery
  • Visible light imagery of CMEs used for 1-4 day warnings of geomagnetic storm conditions
  • Primary source: ESA/NASA Solar and Heliophysics Observatory (SOHO, 1995) - solar power limited to 2025
  • Backup: *none*

• Solar Wind In-Situ at Sun-Earth Lagrange – L1
  • Solar wind magnetic field and bulk plasma provide 15-60 minute warning of geomagnetic storm conditions
  • Primary source: NOAA/Deep Space Climate Observatory (DSCOVR), launch 2015
  • Backup: NASA Advanced Composition Explorer (ACE) launch 1997 – propulsion limited to 2026
SWFO Program Key Technical Components

**SWFO-L1**
3-Axis Stabilized
ESPA Class
Spacecraft

**Compact Coronagraph (CCOR)**

**GOES-U Solar Pointing Platform (SPP)**

**CCOR + SUVI + EXIS**

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**SWFO-L1 Mission Overview**
- Space Weather Operational Observation at Earth-Sun Lagrange Point 1
- ESPA Grande compatible spacecraft (NASA RSDO)
- SWIS (Solar Wind Instrument Suite) awards complete
- CCOR in Phase D
- NOAA ground services
- Rideshare with NASA IMAP
- Nominal launch: 2024
- Potential ESA contributed instrument (X-Ray flux monitor)

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**Coronagraph Project**
- Compact Coronagraphs under development by NRL via an IAA
- CCOR for SWFO-L1 Satellite, deliver 2022
- CCOR for GOES-U, deliver 2021
- Potential CCOR for ESA-L5 Satellite, deliver 2023

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**Coronagraph Accommodation on GOES-U**
- CME imaging from geostationary orbit
- CCOR Integrated onto GOES-U SPP
- Commanding and data flow through GOES-R ground services
- Nominal launch: 2024
It’s been a busy two years for Space Weather...

- Established the baseline operational Space Weather Follow On (SWFO) Program

  - Secured funding in the NOAA budget for L1 coverage
  - Begun flight fabrication of the Compact CORonagraph (CCOR) with NRL
  - Secured funding in the NOAA budget for CCOR on GOES-U
  - Established a joint project office with NASA for SWFO
  - Established an agreement with the NASA IMAP mission for a rideshare for SWFO-L1
  - Let procurement RFPs for instruments
  - Formulated arrangements with ESA for data sharing with the L5 mission
  - Negotiating with ESA for instrument exchanges

- Launched the COSMIC-2 mission with Taiwan
Challenges and Opportunities

• “Business as Unusual”
  • On track for JPSS-2 and GOES-T launches in FY22
  • Gearing up for LEO and GEO enterprise ground system procurements in 2023
  • Continue next gen efforts for GEO, LEO and SW systems
  • Continuing our migration to cloud-based systems and services
  • Leveraging NASA/NOAA Restart Readiness Reviews to restart mission activities

• Leverage the positives
  • Secure remote access of mission data
  • Increased utility of virtual workplace software
Questions?
National Centers for Environmental Information (NCEI) Overview

Mary Wohlgemuth

Director of the National Centers for Environmental Data

NOAA National Environmental Satellite, Data, and Information Service

August 2020
National Centers for Environmental Information (NCEI)

• Responsible for hosting and providing access to one of the most significant archives on Earth, with comprehensive oceanic, atmospheric, and geophysical data

• From the depths of the ocean to the surface of the sun and from million-year-old sediment records to near real-time satellite images

• Nation’s leading authority for environmental information
NCEI’s Nationwide Presence
NCEI Organizational Excellence
Building a culture based on integrity, teamwork, and agility

• INTEGRITY
  We hold the public’s trust by demonstrating ethical behavior in all aspects of our operations

• TEAMWORK
  We cultivate cohesive, highly functioning teams

• AGILITY
  We embrace and rapidly respond to change
Increasing Data Volumes from Station, Model, Radar, and Satellite Sources

2019 Total: 41.5 Petabytes

41.5 PB = Storage in a stack of smartphones 25 Eiffel Towers high (1,063 feet), or 5.1 miles

Due to increase in satellite and model data
NCEI: High Impact, Global Reach

Earth Observing Systems

Scientific Data Stewardship

Research-quality products for decision making

Oceans & Coasts
- Tsunami Warning
- Coastal Digital Elevation Models
- Extended Continental Shelf

Climate & Weather
- Climate Assessments
- Billion $ Disasters
- Temperature & Precipitation Outlooks

Geophysics
- Space Weather
- World Magnetic Model
NCEI Data Stewardship Division
Providing stewardship from acquisition to archive to access

1. Long-Term preservation and Basic Access
2. Enhanced Access and Basic Quality Assurance
3. Scientific Improvements
4. Derived Products
5. Authoritative Records
6. National Services and International Leadership
Climate & Weather
Providing climate information to inform the future

Monthly U.S. & Global Climate Reports
U.S. Billion-Dollar Weather & Climate Disasters report
U.S. Drought Monitor
Regional Snow Fall Index

Tornado Climatology
Hourly Precipitation Data
Climate Extremes Index
Blended Sea Winds
Coasts, Oceans, & Geophysics
Providing data & information from the Sun to Earth’s seafloor

Ocean Exploration Digital Atlas
Enhanced Magnetic Model
Passive Acoustics
Gulf of Mexico Data Atlas
Model Reanalysis
Deep Sea Corals Data Portal
Bathymetry and Global Relief
World Ocean Database
NCEI’s Value to the Nation

NCEI Stakeholders by Sector

- Science, Technology, and Engineering: 23.6%
- Ecosystems (Agriculture/Aquaculture): 17.6%
- Transportation and Infrastructure: 12.4%
- Energy: 10.9%
- Insurance, Finance, and Legal: 7.6%
- Health and Emergency Management: 6.9%
- Higher Education: 4.0%

Range of Products
- Time scale: Hourly to Decadal
- Geographic scale: Local to Global

Technical Expertise
- Aerosols to Coastal Inundation
- Drought Monitoring to Ocean Surface Winds
- Paleoclimatology to US/Global Climate Monitoring
Learn More About NCEI

www.ncei.noaa.gov
Questions?