NESDIS Commercial Data Program Community Day

Overview and Outcome of NESDIS' Commercial Data Pilot Activities

National Environmental Satellite, Data, and Information Service

Sept. 26, 2024

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Welcome

Participants are welcome to ask questions. Please enter your questions via the Q&A Box at the bottom of the screen. We will be answering questions at the end of the presentation.

Thank you!

Trends Shaping Our Next-Gen Architecture

New business models: Joint Venture, other transactional authority, commercial data buys

Commercial capability: Rapid pace of innovation, cheaper launch capability, more EO satellites

Ground/data system and services to match space capability: Cloud, Enterprise Ground

Partnerships with private industry, other agencies & strategic partners: Obtaining global data

Engaging our users: User needs are evolving as quickly as the climate changes (e.g., demand for more ocean science)

Our aspiration

Provide a truly integrated digital understanding of our earth environment that can evolve quickly to meet changing user expectations by leveraging our own capabilities and partnerships

NESDIS Reimagined

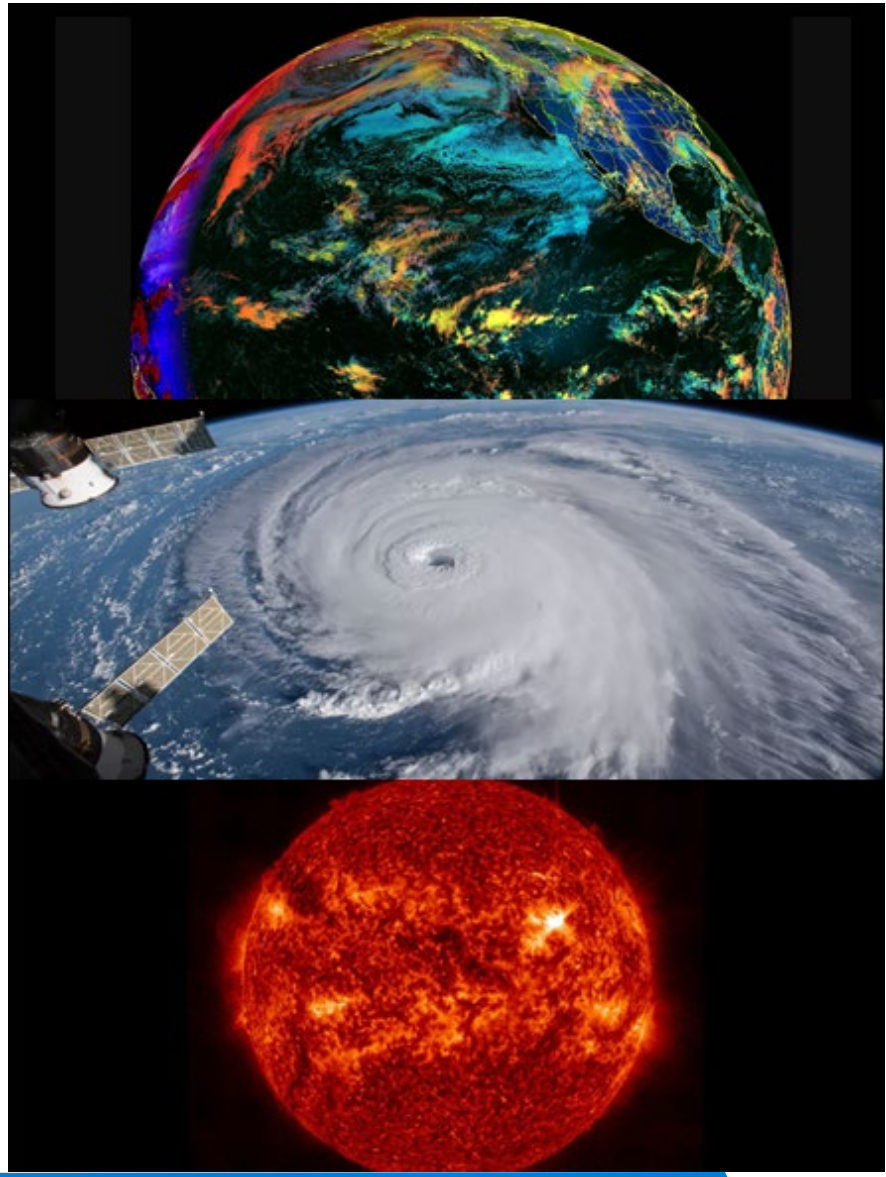

NOAA
Satellites
USA
JAPAN
SOUTH KOREA
INDIA
CHINA
FRANCE
RUSSIA
SPAIN
NOAA
EUMETSAT
EUROPEAN COMMISSION
NATIONAL SPACE ORGANIZATION (NSPO)
EUROPEAN SPACE AGENCY
NASA
DEPARTMENT OF DEFENSE
STEREO
DSCOVR
SOHO
ACE
GK-2A
GK-2B
FY-4
FY-2
HIMAWARI-8/9
INSAT-3D
ELECTRO-L
INSAT-3DR
KALPANA
EWS-G1
METEOSAT-8
METEOSAT-9
METEOSAT-10
METEOSAT-11
KOMPSAT-5
PAZ
GPM
MEGHA-TROPIQUES
JASON-3
GCOM
SCATSAT-1
FY-3
METOP A/B
NOAA-20
A-TRAIN CONSTELLATION
SUOMI NPP
NOAA-15/18/19
SENTINEL-6 MICHAEL FREILICH
SENTINEL-2
SENTINEL-5P
SENTINEL-3
METEOR
DMSP-F14-18
COSMIC 1/2
GOES - WEST
GOES - 15
GOES - 14
GOES - EAST
140.7°E
128.2°E
105°E
90°E
86.5°E
82°E
78°E
74°E
41.5°E
180°W
137°W
135°W
105°W
89.5°W
75°W
9.5°E
0°
3.4°W
GEOSTATIONARY ORBIT
NEAR-POLAR ORBIT
LAGRANGE POINT 1

NESDIS Systems Architecture and Engineering (SAE)

https://www.nesdis.noaa.gov/about/our-offices/systems-architecture-and-engineering

Purpose: Accelerate development of our nation's environmental information systems, data products, and services to meet evolving user needs

- Inform NOAA observing system investments through satellite architecture planning and systems engineering
- Integrate NESDIS functions – from observations to product and data dissemination
- Manage product and services governance
- Leverage Earth observing data/technology through Commercial Data and Joint Venture programs
- Manage ongoing user engagement activities



NESDIS
Commercial Data Program (CDP)

NESDIS Commercial Data Program Overview

Purpose: Acquire and assess value-added commercial *space-based environmental* observation data to support NOAA's mission.

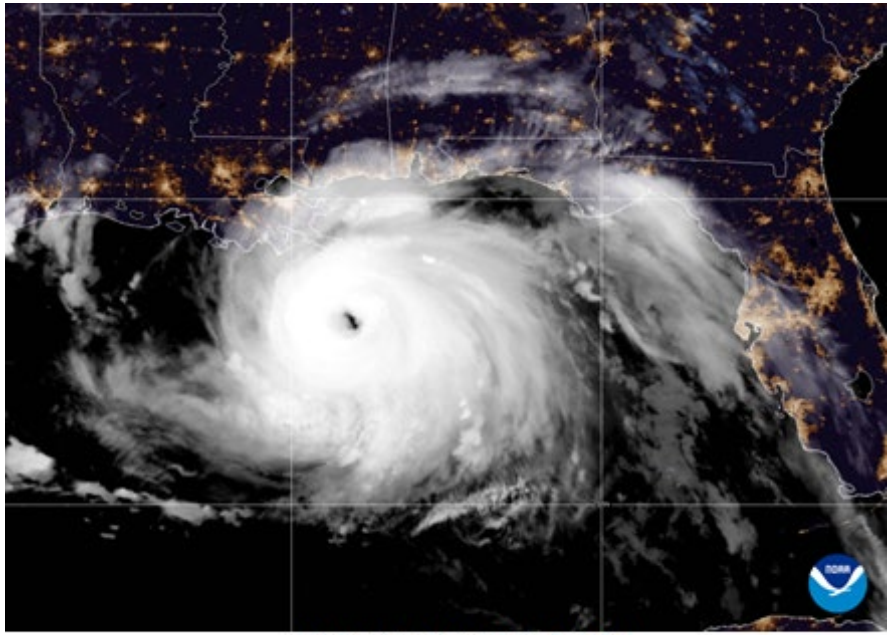
The NESDIS Commercial Data Program (CDP) contains two lines of effort:

Commercial Weather Data Pilots:

Demonstrates the quality and impact of commercial data on weather, climate and space environment applications

Commercial Data Purchases:

Supports operational weather forecast applications



Hurricane Ida making landfall

NESDIS Commercial Data Program Information:

https://www.space.commerce.gov/business-with-noaa/commercial-weather-data-pilot-cwdp/

NOAA/NESDIS Commercial Data Program Background

- In 2016, NOAA began the NESDIS Commercial Data Program with a Radio Occultation (RO) Data Pilot
- In 2018, NESDIS CDP conducted a 2nd RO Data Pilot
- In 2020, awarded the 1st Commercial Data Buy (RODB-1)
- Today, NOAA uses commercially available Radio Occultation (RO) data to respond to the demand for environmental information and satisfy observational requirements.
- Derive Neutral Atmosphere and Ionospheric products from Global Navigation Satellite System RO (GNSS-RO)
- Exploring non RO-based commercial space-based environmental monitoring data sources

Artist rendering of Terran Orbital's SmallSat GEO. Credit: Terran Orbital

NESDIS CDP Drivers and Guidance

Drivers: Congress, Executive Order, DOC Office of Space Commerce

NOAA Commercial Space Policy

NESDIS Commercial Space Activities Assessment Process

Weather Research and Forecasting Innovation Act of 2017

PROSWIFT Act of 2020

Guidance: NESDIS Objectives & Program Management

- NESDIS Level Requirements (NESDIS-REQ-1001.1)
- NESDIS Product Baseline (NESDIS-REQ-1002.2)
- NESDIS Five-Year Product Plan (NESDIS-REQ-1003.2)
- Space Weather Next Program Objectives (NESDIS-REQ-4500.3)
- Near-Earth Orbit Network (NEON) Program Observational Objectives
- NWS Prioritization of Space-Based Observational Objectives
- ***New NOAA Commercial Data Buy Guidance***

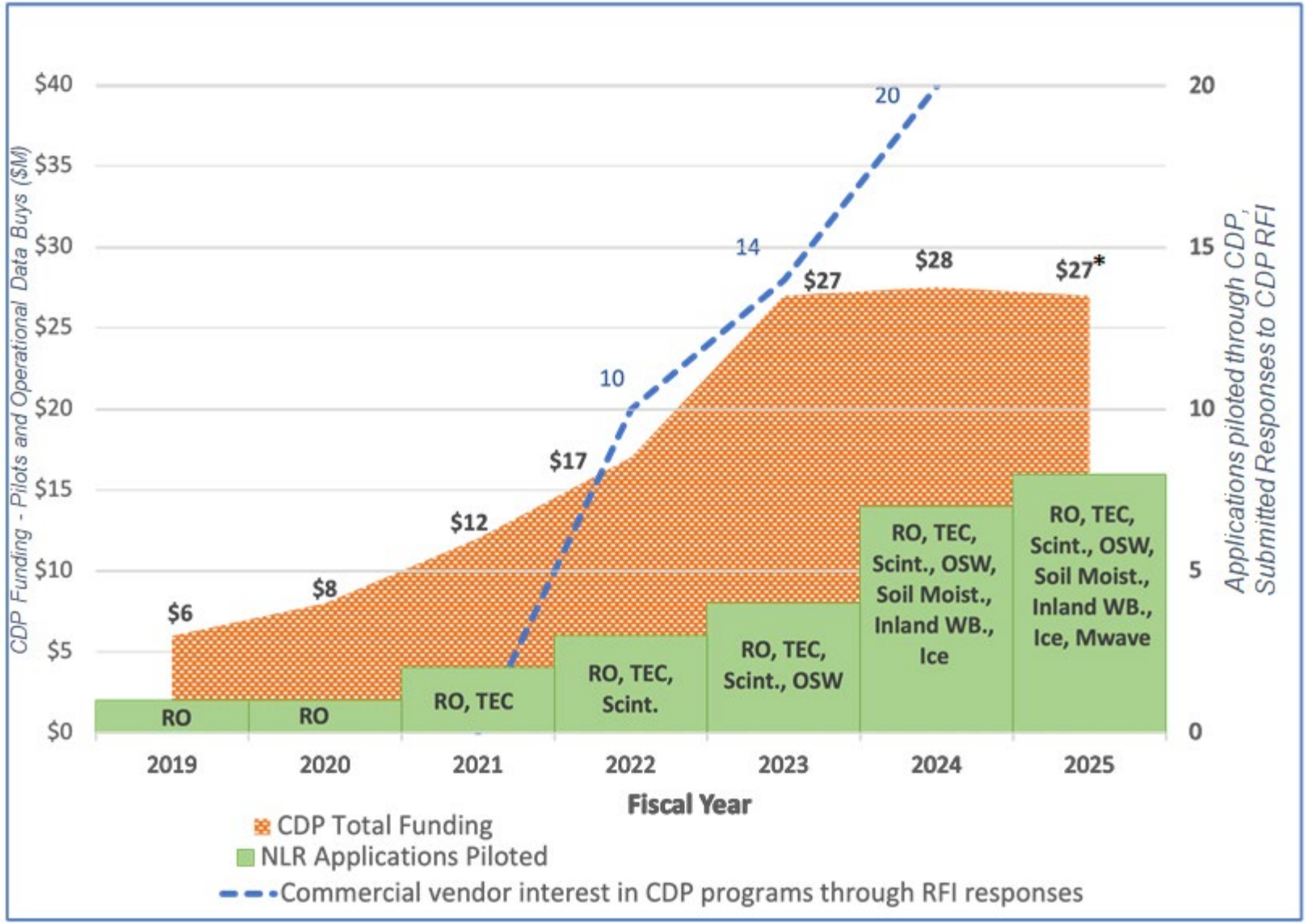
NESDIS CDP's Growing Contribution to NOAA Observations

Since its inception, CDP has grown with increases in:

- Number of applications piloted with commercial data that meet NESDIS Level Requirements (NLR)
- Funding levels
- Commercial vendor interest (Responses to RFI's)

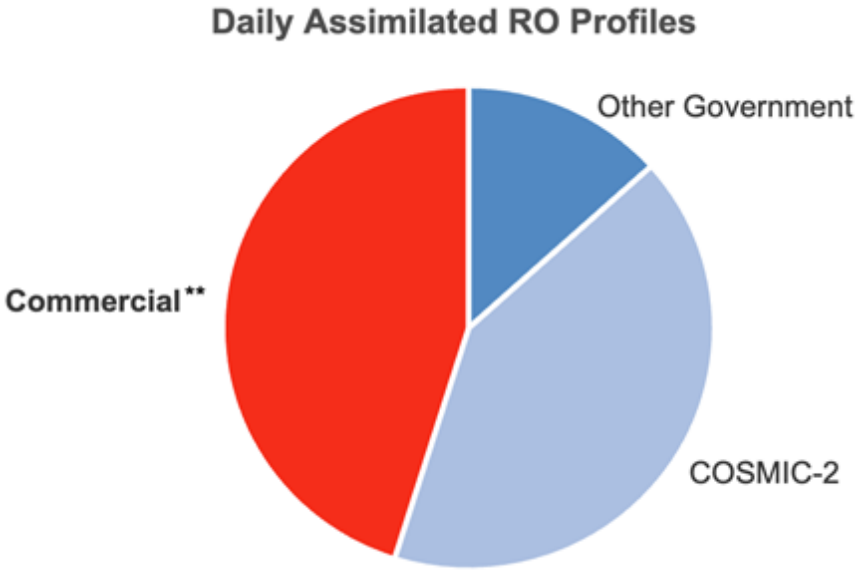
NESDIS CDP Funding: CDP Enacted Appropriation ($M)
** NOTE: FY25 reflects President's Budget*

Applications include:
RO = radio occultation,
TEC = space weather total electron content,
Scint.= space weather scintillation,
OSW = GNSS-reflectometry ocean surface winds,
Soil Moist.= GNSS-reflectometry soil moisture,
Inland WB. = GNSS-reflectometry inland water body properties,
Ice = GNSS-reflectometry ice properties
Mwave = microwave atmospheric sounding



NESDIS CDP Operational RO Data Buys (RODB)

- NESDIS CDP successfully purchases and integrates commercial GNSS-RO data, which is a highly valuable input for operational weather modeling.
- Used in Operational NWP Neutral Atmosphere and Space Weather models



Source: NESDIS CDP, UCAR COSMIC 2023.
***Commercial data consists of coordinated NOAA (CDP) and EUMETSAT purchases*

Commercial GNSS-RO data from NESDIS CDP and EUMETSAT purchases now make up nearly half of all RO data assimilated into weather models.

Radio Occultation Data Buy (RODB)-2 IDIQ Delivery Orders:

Delivery Order	Vendor	RO Profiles per day	Period of Performance	Length	Data Sharing License
DO-1T	PlanetiQ Spire	500 500	6 Apr 2023 – 4 May 2023	1 month	Unrestricted
DO-2	PlanetiQ	3100	18 Jul 2023 – 18 Jan 2024	6 months	Unrestricted
DO-3	Spire	3000	18 Jan 2024 – 18 Sep 2024	8 months	Unrestricted
DO-4	**PlanetiQ Spire**	**2200 800**	**18 Sep 2024 – 18 Sep 2025**	**12 months**	**Unrestricted**

NOAA Data Sharing License Options

Operational Data Purchases	Option 1	Unlimited distribution rights
Data Pilots	Option 2	Distribution to U.S. Government agencies, National Meteorological Centers (NMC), WMO Met Centers, CGMS members, nonprofit organizations, Academic entities for non-commercial use with no further distribution
	Option 2a	Option 2 plus unlimited distribution after 24 hours

NESDIS CDP prefers less restricted data sharing options

What is a Commercial Weather Data Pilot (CWDP)?

Purpose: To evaluate the quality and impact of commercial space-based environmental data on weather, climate, and space environment applications

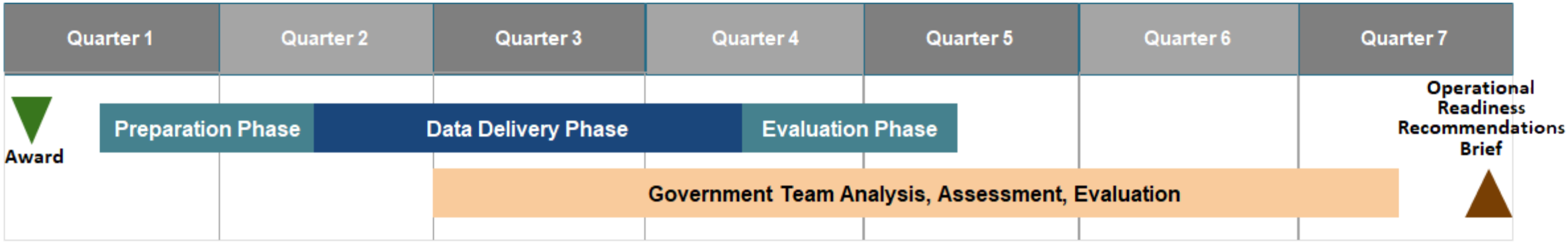
- To demonstrate potential utility and value to NOAA's mission
- Acquire and evaluate the data for potential integration into operations

Phase 1: Preparation - Set-up secure ingest, dissemination, and data processing

Phase 2: Data Delivery - Continuous commercial data delivery

Phase 3: Evaluation - Provide engineering and technical support

Post-Pilot: Government Evaluation period - Gov't team conducts assessment and evaluation of supplied datasets. Delivers final report.



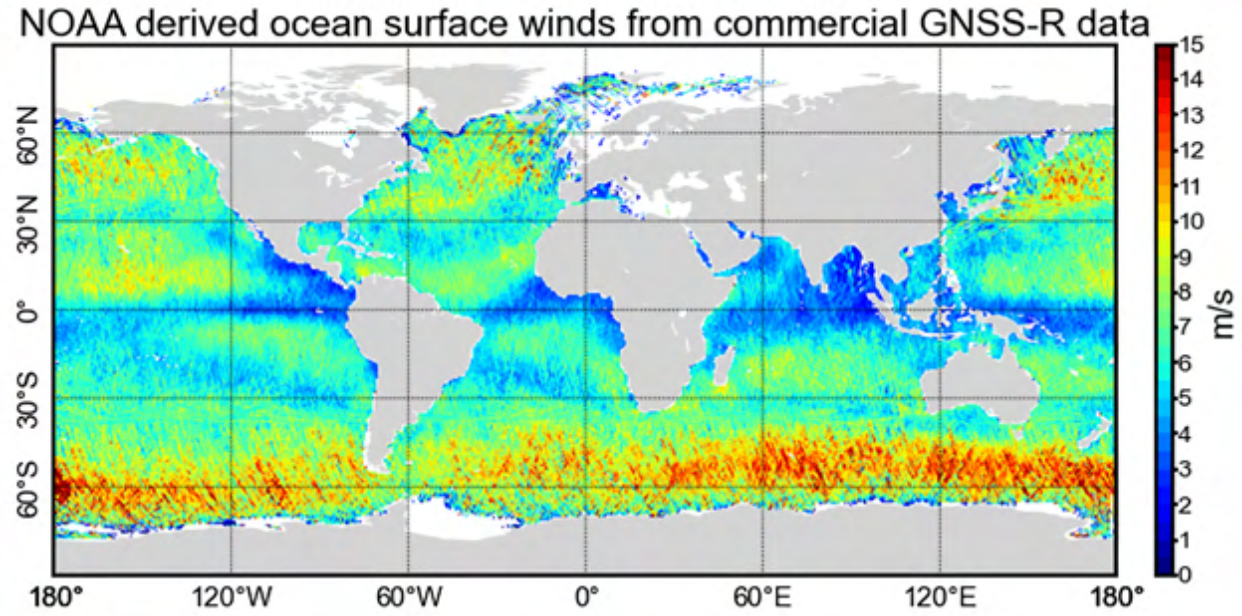
Notional schedule for a Commercial Weather Data Pilot

2023-2024 NESDIS Commercial Weather Data Pilots

- **Space Weather Pilot (ended in 2024):**
  NESDIS CDP conducted a successful pilot study of exploiting commercial GNSS-RO data for space weather parameters.

  The final report is now available

- **GNSS Ocean Surface Winds (OSW) GNSS Reflectometry Pilot (ongoing):**
  NESDIS CDP is executing a pilot study to use commercial reflectometry data to derive ***ocean surface wind speeds*** and additional environmental measurements.



Through a Commercial Weather Data Pilot, NOAA is developing methods for determining ocean surface wind speeds globally using commercial GNSS-R (reflectometry) satellite data.

Pilot Assessment and Evaluation Criteria

NESDIS CDP assembles a Government team of subject-matter experts to analyze the Pilot data and conduct a thorough assessment and evaluation.

- Determine potential for a future commercial data purchase by investigating the following:

Value:

- Accuracy
- Quality
- Timeliness
- Reliability

Use:

- Impact to operations
- Mission need
- Ability to assimilate into NOAA applications
- Security

Cost:

- Value added
- On-orbit availability
- Sustainability

Commercial Weather Data Pilot Process

Market Research

- Pulse the community: Issue RFIs to identify potential data types of interest
- Evaluate responses against NOAA goals, requirements, resources and schedules

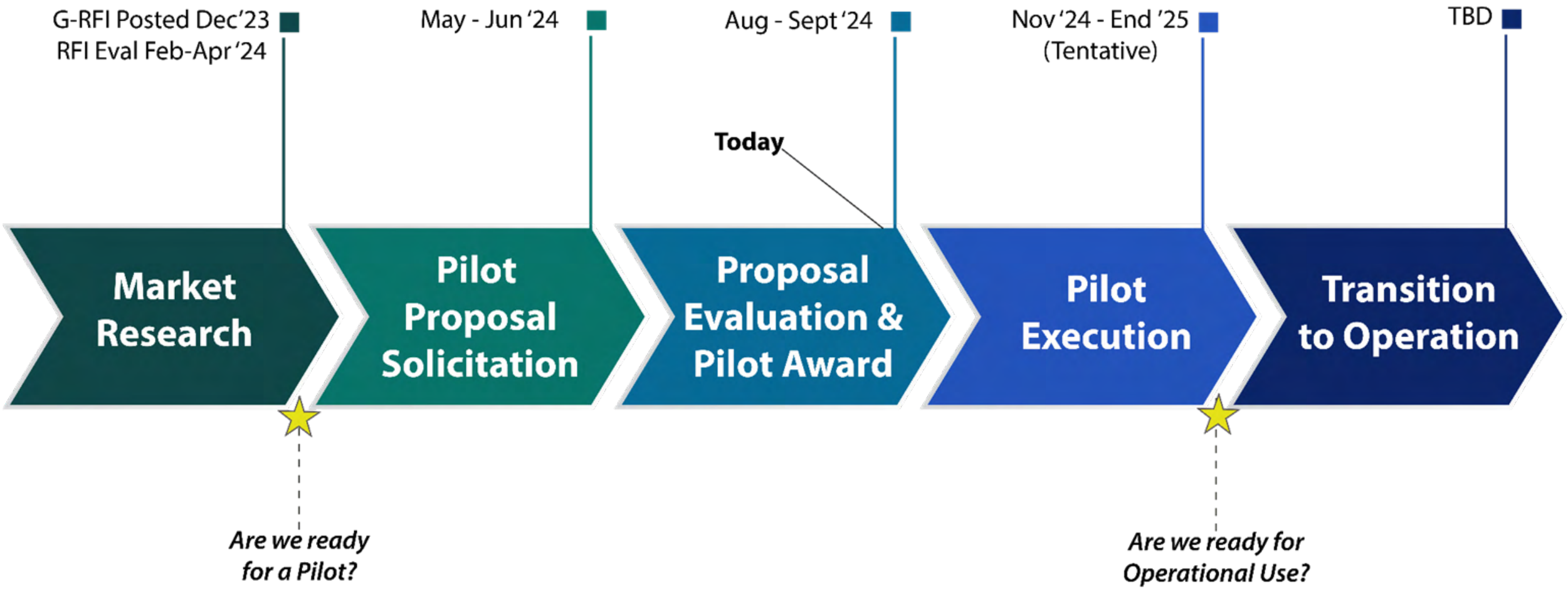
Pilot Planning

- Develop requirements, engaging user community and experts
- Release draft “Statement of Work”
- Issue solicitation (“Request for Proposals”)
- Evaluate proposals
- Award contracts as appropriate

Pilot Execution

- Plan for data ingest, processing, dissemination and archive
- Conduct data delivery
- Assess and evaluate data quality and impact, report results to community at large
- Recommend data type(s) for operational purchase when appropriate

FY 2024 G-RFI Pilot Process and Timeline



NESDIS CDP General Request For Information (G-RFI)

- **Objective:** The General RFI helps NESDIS CDP understand how industry may help NOAA meet it's observation requirements and what new technologies are available.
- **Process:** NESDIS CDP team pulses commercial sector ~ annually for capabilities that *could* address NOAA's space-based environmental monitoring requirements, focusing on new and emerging technologies that could improve NOAA's mission.
- **FY 2024 RFI:** NOAA issued a Commercial Satellite Data General RFI in Dec 2023 (sam.gov)
  - Solicited on-orbit (existing or planned) capabilities for the FY 2024-2032 timeframe that could meet NESDIS requirements.

Progression from this G-RFI to Pilot Decision

- NESDIS CDP formed a Capability Assessment Team (CAT) to evaluate the RFI responses
- The CAT prioritized the RFI responses that offered *space-based environmental monitoring (SBEM)* capabilities and a *data-as-a-service (DaaS)* model

Assessment Team considered four main criteria:

- Does it meet a mission need(s)?
- Availability (on-orbit viability, technology maturity)
- NOAA mission impact and priorities
- Path to utilization

24 RFI responses received – The CAT identified 16 applicable for future SBEM & DaaS capabilities

FY 2024 G-RFI Results for Near-Term Piloting

- Prioritized Neutral Atmosphere capabilities (non Space Weather) for this assessment
- Considered NOAA guidance to focus on higher-priority mission needs

The 2024 Capabilities Assessment Team produced a set of recommended technologies from qualified vendors that are available for *near-term* piloting (FY25):

- Microwave Sounder
- Microwave Radar
- Polarimetric Radio Occultation
- HyperSpectral IR (for Greenhouse Gas Monitoring)
- HyperSpectral Microwave

FY 2024 G-RFI Way Forward

NESDIS decision for FY 2025 Commercial Weather Data Piloting:

- Proceed with a **Pilot** for Microwave Sounding capabilities because:
  - Highest impacts to Numerical Weather Prediction models
  - Provides opportunities to add novel vertical temperature sounding capabilities (118 GHz)
  - Expands efforts developed from the NASA TROPICS mission
  - Opportunity to fill constellation gaps across the US-EU Government architecture
  - **On September 17, 2024, NOAA awarded two Commercial Weather Data Pilot contracts for Microwave Sounding to Tomorrow.io and Orbital Micro Systems**
- Investigate Hyperspectral Microwave Sounding capabilities with the goal of commencing a Pilot once on-orbit capabilities are available
  - Leveraging efforts from SAE's own Joint Venture program & CDP coordinating and tracking
- Investigate utility of GNSS-Polarimetric RO (PRO) technologies
  - Detects presence of precipitation and estimates rates and types of precipitation

FY 2024 G-RFI and Public-Private Partnerships

The 2024 G-RFI included an evaluation of public-private partnerships:

- **For the FY 2024 G-RFI, NESDIS CDP and the Office of Satellite Products and Operations (OSPO) also reviewed non-traditional vendor submissions:**
  - Reviewed survey responses for ideas on innovative public-private partnerships
  - Reviewed respondent capabilities for:
    - Partnering capabilities (what is being offered, path-forward approach)
    - Overall viability and potential impacts to current approaches
    - Tech readiness level, costs, risks, and schedule
    - Alignment with NESDIS NEON and GEO-XO program objectives
- **Evaluations are being used to inform NESDIS on possible future hybrid architectures**

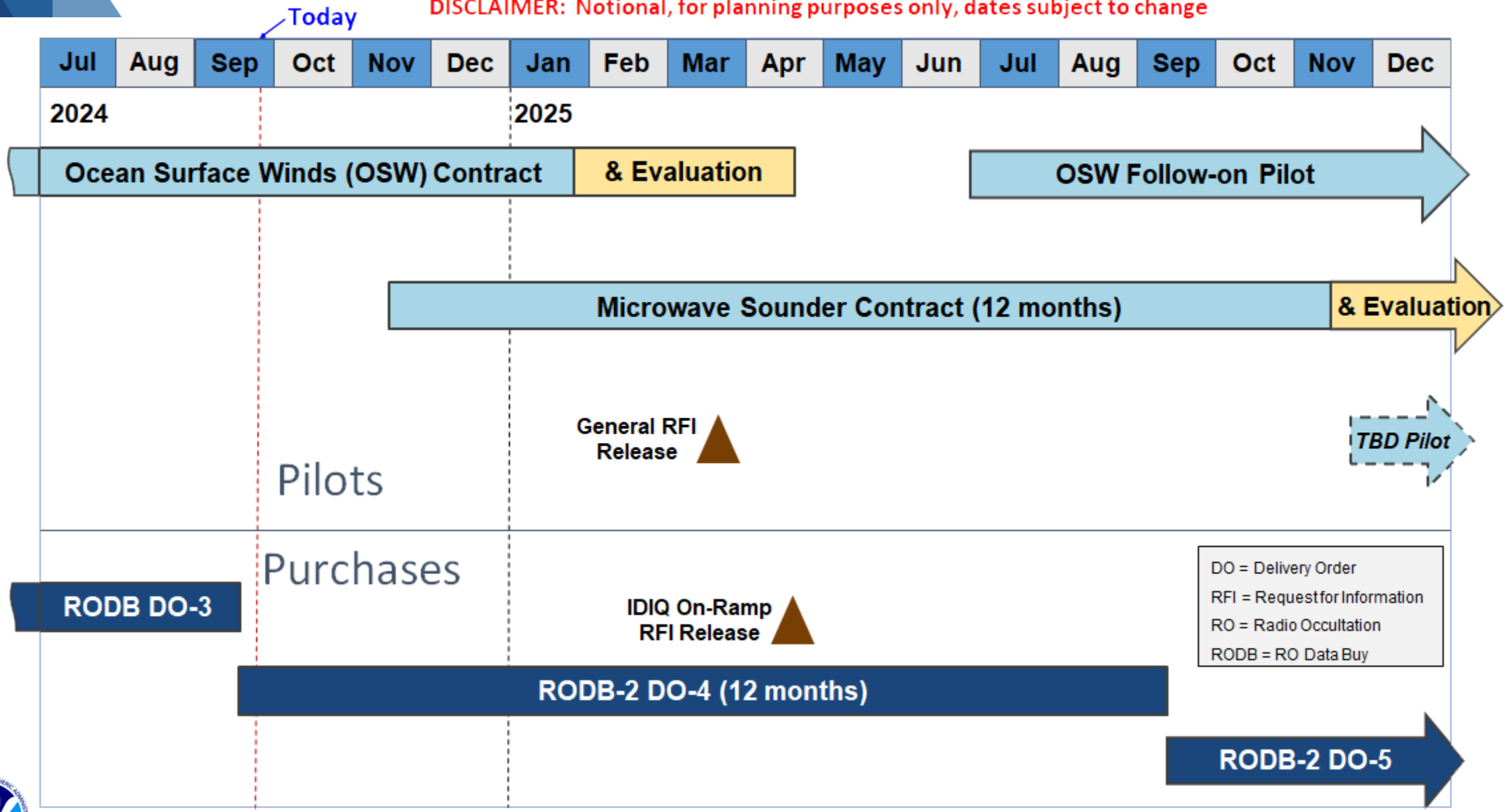
FY 2024 G-RFI and Public-Private Partnerships

G-RFI Public-Private Partnership Evaluation Conclusions:

- **Highlights**:
  - The G-RFI provided valuable market research for NOAA Concept and Technology Development projects
  - Several valid public-private partnership approaches were provided
  - Data licensing concerns were noted by vendors
  - Many vendors were requesting Government “anchor” contracts
- **Recommendations included**:
  - Demonstration of a vendor solution in support of cloud processing
  - Partnership with a vendor for implementing a new capability supplementing NESDIS observations
  - Consider innovative & rapid development approaches

2024-2025 NESDIS CDP Planning

DISCLAIMER: Notional, for planning purposes only, dates subject to change



Questions?

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NESDIS Commercial Data Program Information:

https://www.space.commerce.gov/business-with-noaa/commercial-weather-data-pilot-cwdp/

Questions & Answers

Enter your questions in the on-screen Q&A Box