



NOAA NESDIS Commercial Data Program Overview and Status

Committee on Earth Science and Applications from Space -
Space Science Week Spring Meeting

National Environmental Satellite,
Data, and Information Service

April 2025

Natalie Laudier, Marc Gasbarro¹, Gerard Peltzer¹, Chunhui Pan¹,
Randy Deinlein

NOAA/NESDIS Systems Architecture & Engineering (SAE)

¹Science and Technology Corporation

CDP Supports the National Environmental Satellite, Data, and Information Service (NESDIS) Strategy

Maintain a hybrid architecture to meet NOAA's requirements:

- *Government owned systems*
- *Commercial data*
- *International partnerships*



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

“Buy and partner where we can and build what we must”

Commercial weather data supplements government program observations for improved coverage and more ***accurate weather forecasts***.



Commercial Data Program (CDP) Mission

PURPOSE: Acquire commercial space-based environmental observation data to support NOAA's operations.

TWO PILLARS:

1. Commercial Weather Data Pilots:

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

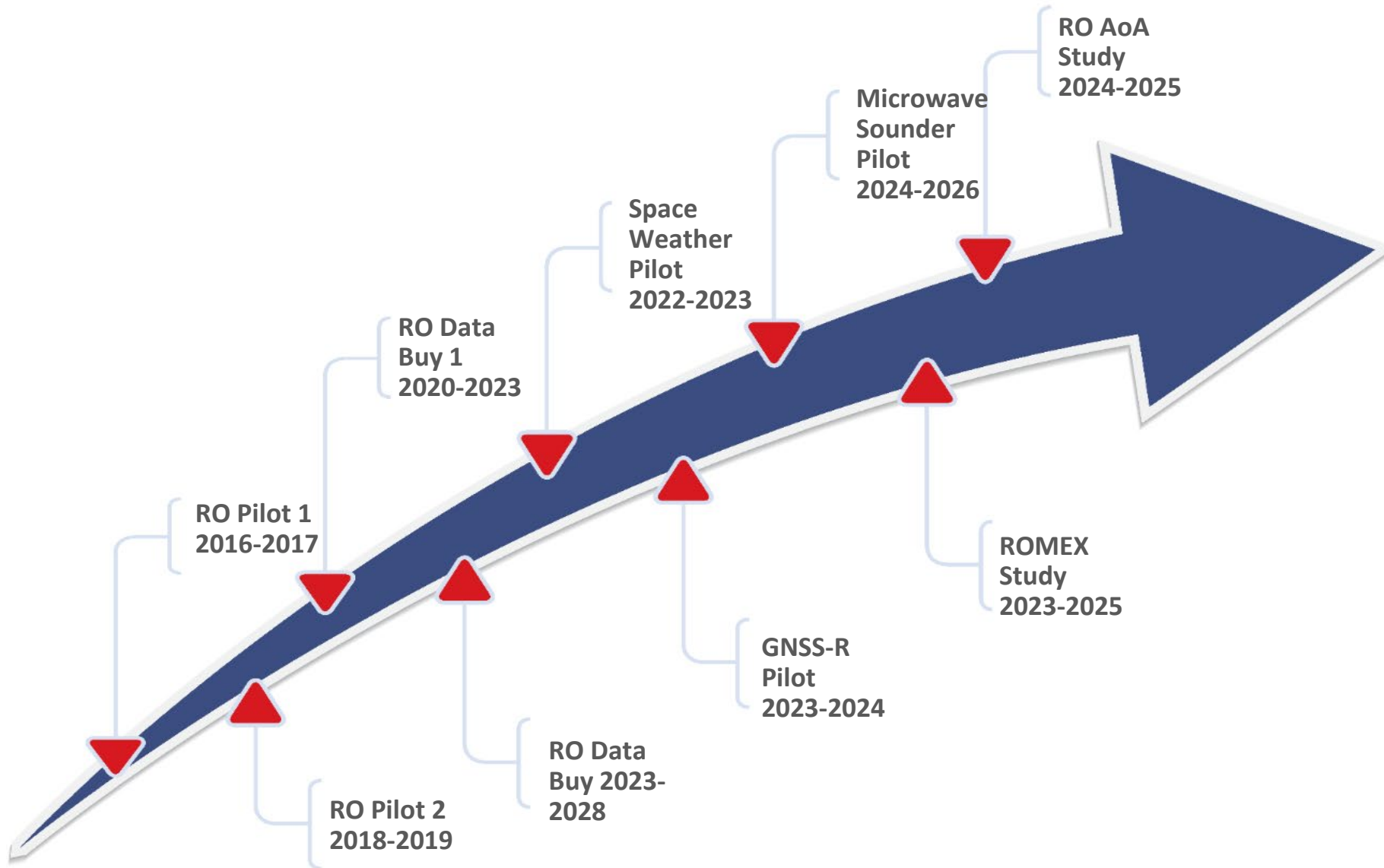
2. Commercial Data Purchases:

Procures data-as-a-service from commercial vendors including space environment and weather forecasting

IMPACT: Improves the accuracy and timeliness of NOAA's weather forecasts, space weather and atmospheric monitoring, ocean observations, and other critical environmental applications.



NOAA/NESDIS Commercial Data Program Background



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 vendors' interest (Responses to RFI's)

NESDIS CDP Funding: CDP Enacted Appropriation (\$M)

Applications include:

RO = radio occultation,

TEC = space weather total electron content,

Scint. = space weather scintillation,

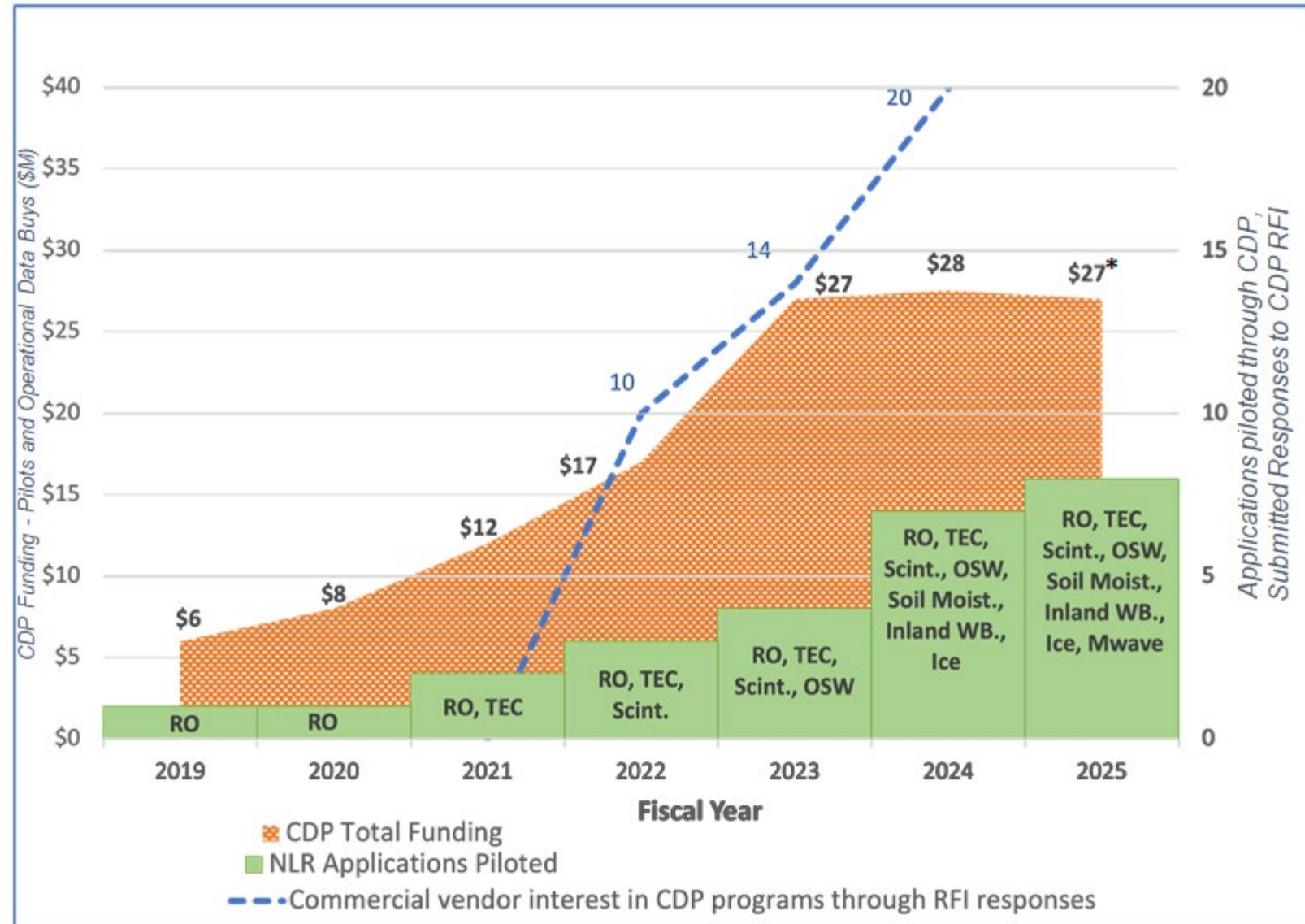
OSW = GNSS-reflectometry ocean surface winds,

Soil Moist. = GNSS-reflectometry soil moisture,

Inland WB. = GNSS-reflectometry inland water body properties,

Ice = GNSS-reflectometry ice properties

Mwave = microwave atmospheric sounding



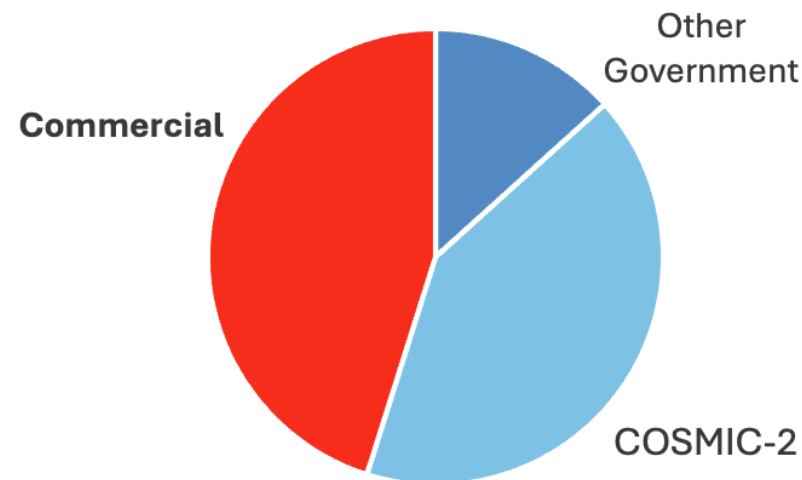
NESDIS CDP Operational Radio Occultation (RO) Data Buys (RODB)

- NESDIS CDP successfully purchases and integrates commercial GNSS-RO data
- Highly valuable input for operational weather modeling, including NWP Neutral Atmosphere and Space 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 July 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

Daily Assimilated RO Profiles



Source: NESDIS CDP, UCAR COSMIC, 12/2024. Commercial data consists of coordinated NOAA (CDP) and EUMETSAT purchases.

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

GNSS-RO Data Operationally Assimilated by NOAA

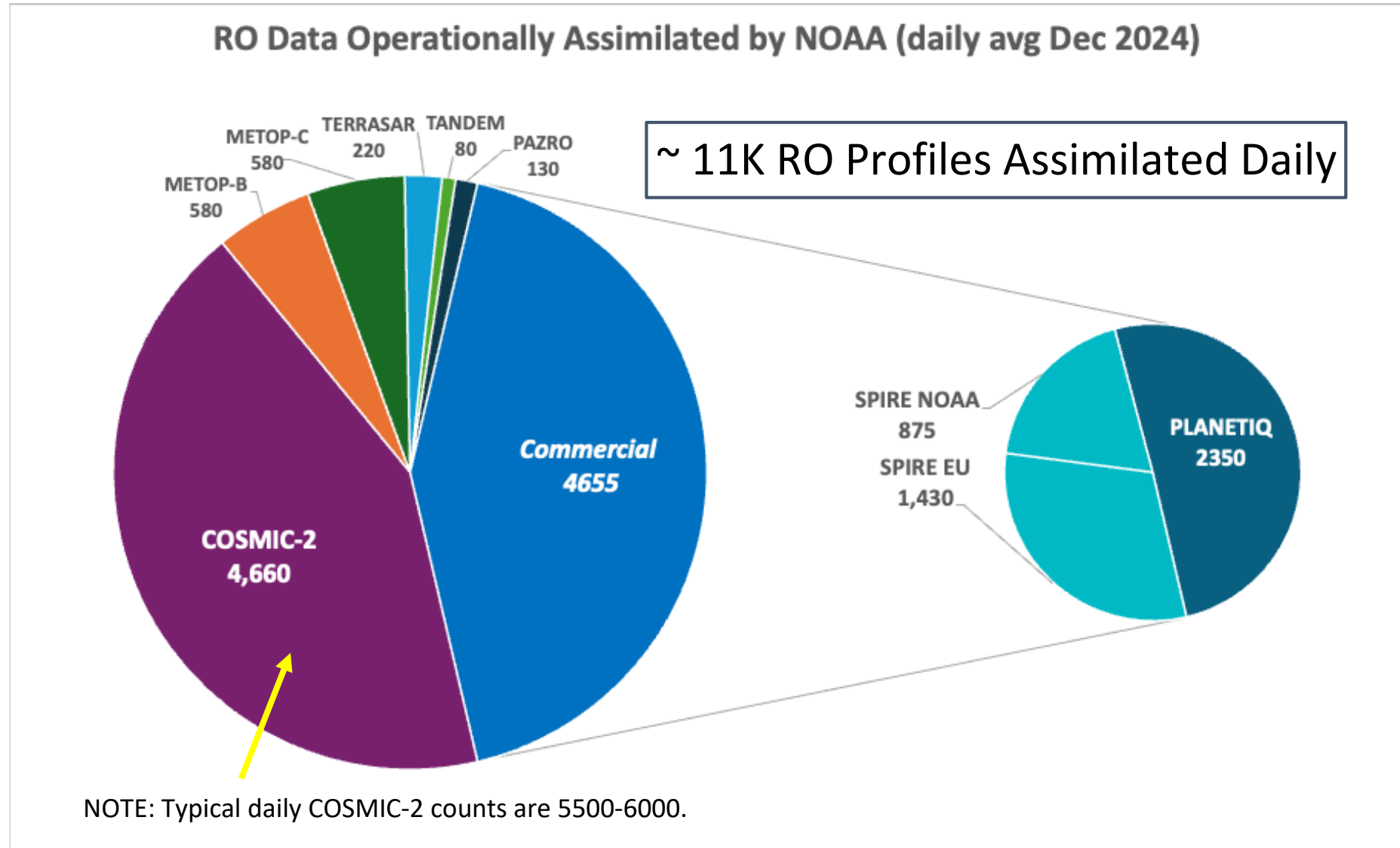
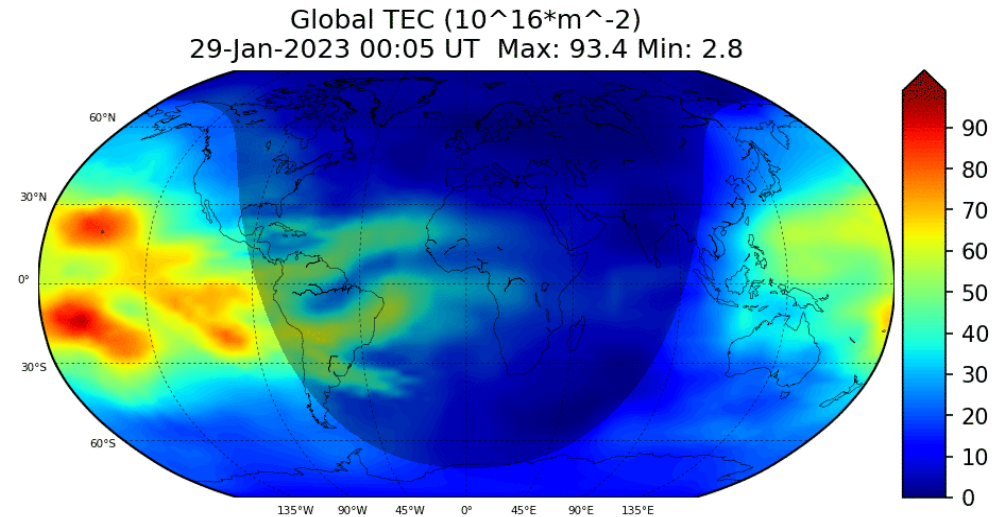
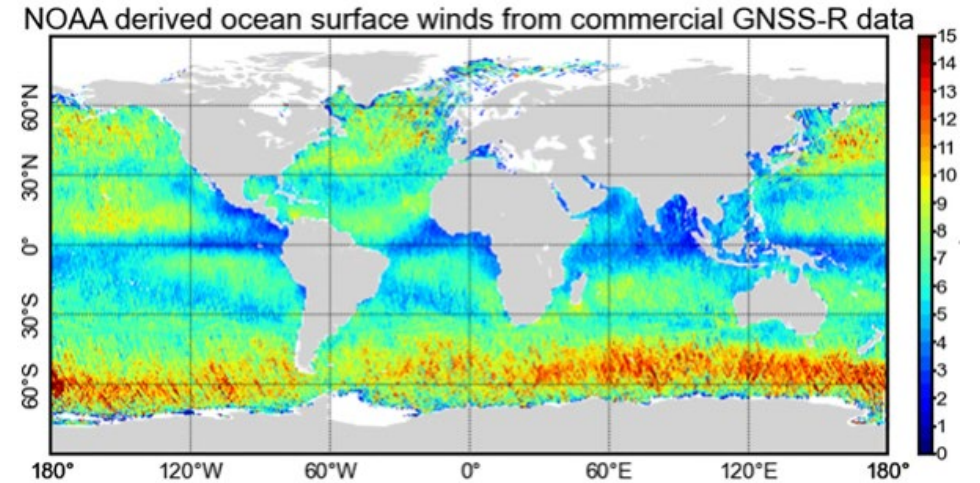


Chart illustrates daily RO data assimilated by NOAA as of December, 2024.

Commercial Weather Data Pilots

- GNSS-Reflectometry Ocean Surface Winds (OSW) Pilot – ongoing
- Microwave Sounder Pilot – ongoing
- Space Weather Pilot – Completed in 2024



Global Total Electron Content (GloTEC) Model (ground+GNSS RO)

Commercial Weather Data Projects

- **Analysis of Alternatives (AoA):**

- Study to identify the gaps in Radio Occultation coverage as COSMIC-2 degrades, and assess alternatives to meet NOAA's neutral atmosphere (NA) and Space Weather RO requirements.

- **RO Modeling Experiment (ROMEX):**

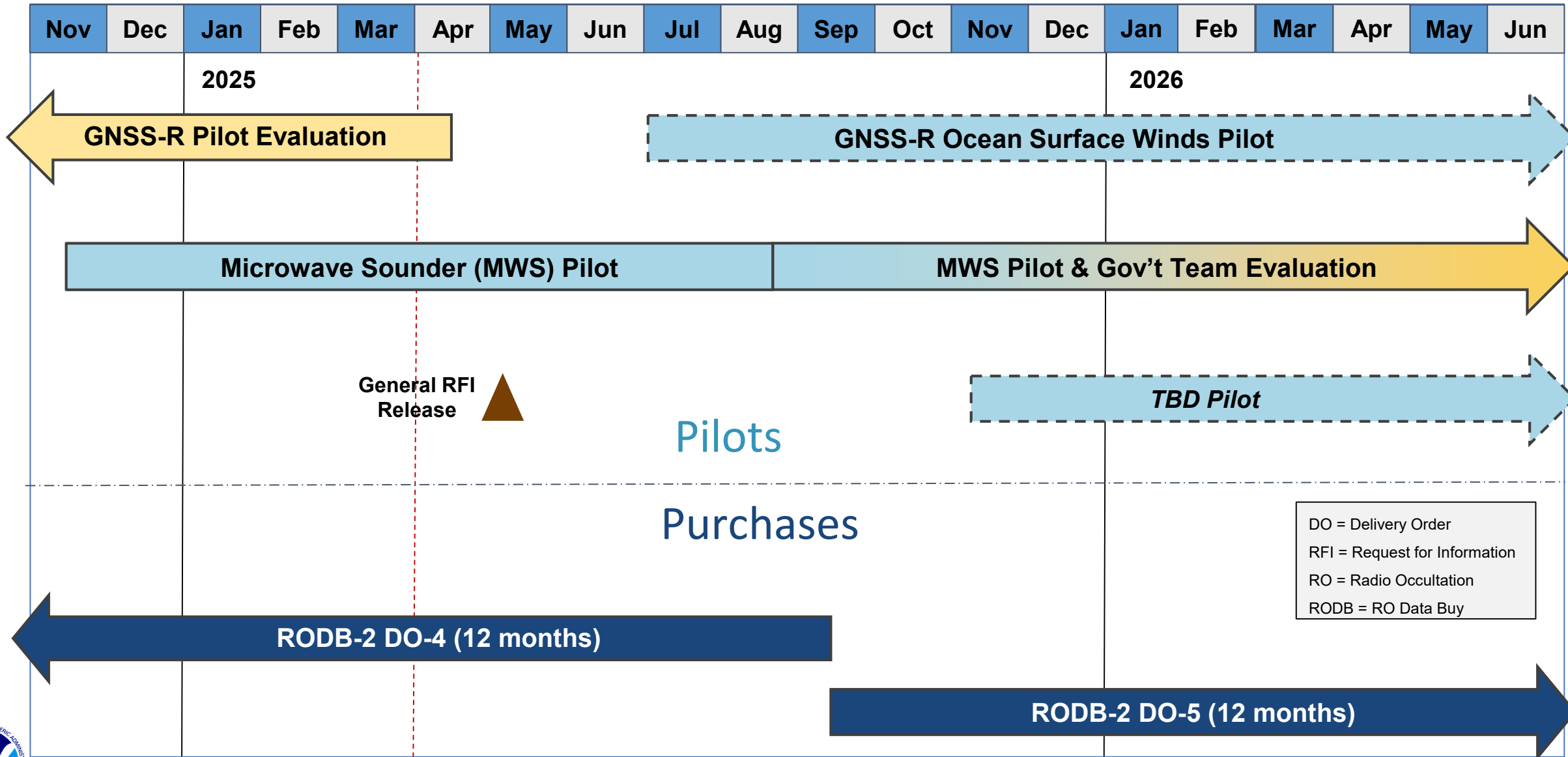
- International working group to understand the model impact of RO, utilizing Observation System Experiments (OSE) with real data.

- **HyperSpectral Microwave:**

- Investigate utility of novel Hyperspectral Microwave technology.
- Leveraging efforts from SAE's Joint Venture program – results will inform future CDP pilot plans.



2025-2026 NESDIS CDP Planning - Pilots & Purchases



GNSS-Reflectometry (GNSS-R) Weather Data Pilot

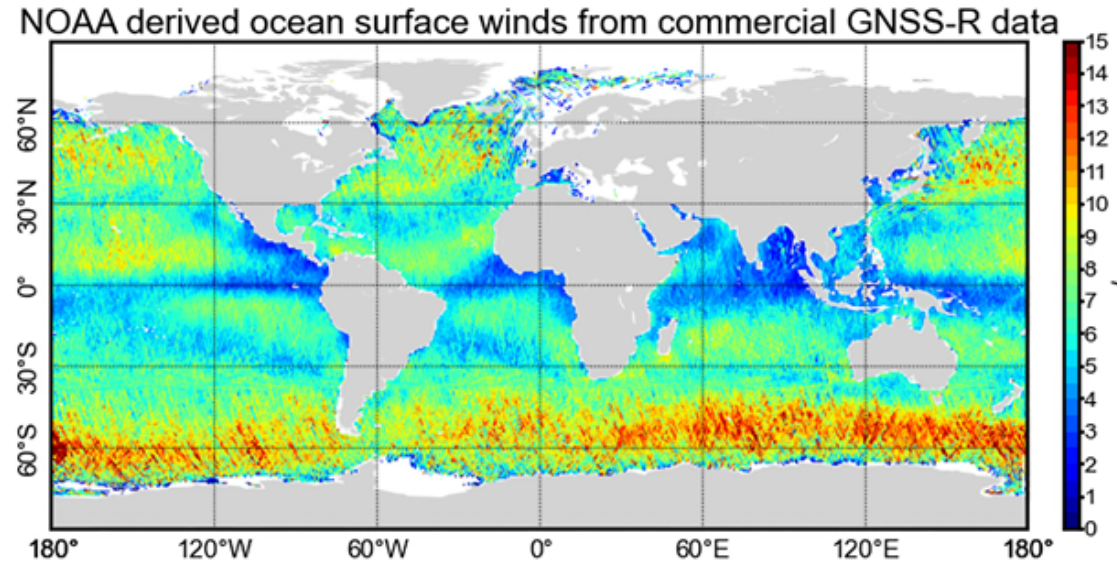
GNSS-R Ocean Surface Winds (OSW) Pilot (ongoing):

In 2024-25, NESDIS CDP executed a pilot study to use commercial reflectometry data to derive ***ocean surface wind speeds*** and additional environmental measurements.

- 1-year contract with Spire Global ended in Oct 2024
- Gov't Team evaluation is currently ongoing

Project activities include:

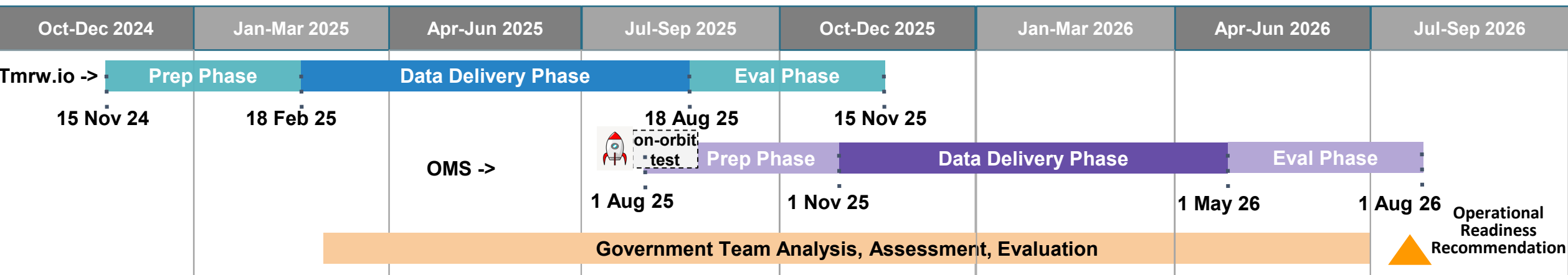
- Successful acquisition of 6 months of reflectometry data from vendor, Spire Global
- Adapting OSW products previously developed by NOAA to commercial GNSS-R observations and assessing their utility



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

Microwave Sounder Pilot

- NOAA awarded two Microwave Sounder Pilots to Tomorrow.io and Orbital Micro Systems (OMS)
- **Purpose:** Assess the quality and impact of commercial Microwave Sounder observation data
 - Investigate the utility of Microwave Sounder products developed by commercial vendors
 - Address potential benefits to NWP models by integrating commercial to the current Gov't LEO backbone
 - Microwave data products focused on vertical temperature and moisture profiles
- Tomorrow.io operates five Microwave Sounder satellites (three in SSO & two in 45° orbit)
- OMS scheduled to launch their first Microwave Sounder satellite in June/July 2025 (SSO)
- Data Sharing: U.S. Gov, Int'l Gov, CGMS members, Academia – non-commercial use only

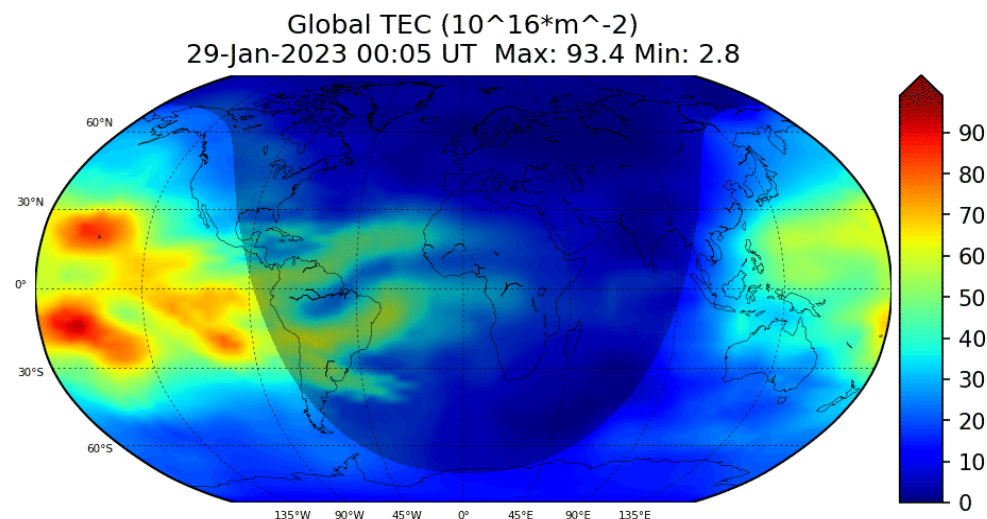


Space Weather Data Pilot

- NOAA concluded a pilot study exploiting commercial GNSS-RO data for space weather parameters
 - Awarded to Spire Global and PlanetiQ – 1-year contract ended Aug 2023
 - Investigated the utility of GNSS RO-derived Total Electron Content (TEC) and Scintillation data
- General Recommendations:
 - Update algorithms (to trigger high-rate data download) for scintillation event detection
 - Investigate better scintillation geolocation methods
 - Perform high-latitude data validation
 - Improve data anomaly detection methods
 - Reduce data latency (requirement: ≤ 30 minutes)

Bottom Line: TEC is near an operationally-ready state; For scintillation, further analysis of the data is needed in order to implement it into NOAA operational systems.

The final report is now available



Global Total Electron Content (GloTEC) Model (ground+GNSS RO)

Questions?

NESDIS CDP Organizational Email: nesdiscdp@noaa.gov

Natalie Laudier, NESDIS CDP PM: natalie.laudier@noaa.gov

NESDIS Commercial Data Program Information:

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

