

National  
Environmental Satellite  
and Data Information Service

# **NOAA Commercial Data Purchase Program**

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# Overview:

The U.S. National Oceanic and Atmospheric Administration (NOAA) is using commercially available radio occultation (RO) data to:

- Respond to the ever-growing demand for environmental information
- Satisfy observational requirements - potentially at lower cost than government alternatives

In this presentation we discuss the:

- History and current state of NOAA Commercial Data Program (CDP) RO data purchases
- Scope and specifications of NOAA's most recent purchases
- Results from examinations of the data including system performance and lessons learned
- Plans and scope of future NOAA commercial RO purchase activities



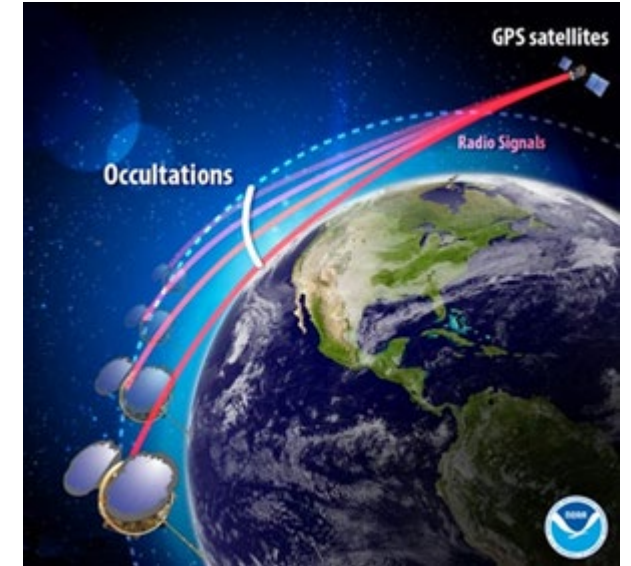
# NOAA Commercial Data Program Background:

After the launch of the COSMIC-1, several companies began plans to fly global navigation satellite RO (GNSS-RO) systems, with the first company collecting GNSS-RO profiles from space in 2016.

In 2016, NOAA/NESDIS initiated the **Commercial Weather Data Pilot (CWDP)** process to evaluate commercial satellite-based data, including GNSS-RO data, for use in weather models and other systems.

At that time, the NOAA Satellite Observing System Architecture study recommended a government backbone of 5,000 occultations per day augmented by commercial data, up to 20,000 occultations per day and beyond.

In 2020, NOAA/NESDIS concluded the commercial sector was ready to provide operational RO data and initiated the **Commercial Data Program (CDP)** to manage the acquisition, ingestion, use, and dissemination of commercially sourced data, including RO.



*GNSS-RO receivers observe distortion of GNSS signals as they transit the atmosphere*

# NOAA CDWP/CDP RO Purchases Overview:

- In 2020, Commercial RO data began to be operationally assimilated through the **Commercial Data Buy No. 1 (RODB-1)**.
- As of Summer 2022, NOAA/NESDIS has issued 4 Delivery Order (**DO**) contracts under RODB-1 for the operational delivery of near-real-time RO profiles. Acquisition planning for a final 5th order is underway.
- **RODB-2** will be the follow-on purchase contract to begin in 2023 when RODB-1 concludes. The goal of RODB-2 is to maintain continuity of operations initiated under RODB-1.



# NOAA CDP RO Purchase Timeline:

Year	2020	2021	2022	2023	2024
RODB-1	RFP	IDIQ-1 Delivery Period (2+ years) Up to Nov 2023			
DO-1	30 Days*				
DO-2		6 Months of Data			
DO-3			6 Months of Data		
DO-4			10 Months of Data		
DO-5				TBD Months of Data	
RODB-2 #			RFP Prep, Posting to Award #	IDIQ-2 Delivery Period # (5 years)	
DO-1				30 Days*	
DO-2					TBD Months of Data

# IDIQ-2 timeline is notional & for illustrative purposes only

\* 30 days of data to validate formats, latency, and prepare systems for operational use



# Scope and Specifications: CDP Commercial Data Buy 1

## RODB-1 Commercial Data Buy No. 1 (*current*)

- *Data Type:*
  - Radio Occultation (RO) observations to derive neutral atmospheric and ionospheric products.
  - Latency < 140-min; signal to noise ratio > 200; ~ global coverage
- *Approach:*
  - **Multi-award, Indefinite Delivery Indefinite Quantity (IDIQ) contracts**
  - 2-year delivery period (Nov 2020 - Nov 2022)
  - Delivery Orders (DO-1 through DO-5) specify quantity, license terms, and duration
- *Execution:*
  - 4 DOs executed. 4th began on March 16, 2022. 5th DO upcoming.
- *Products include neutral atmospheric and ionospheric products:*
  - Profiles of bending angle, refractivity, temperature and potentially water vapor from the mid-stratosphere to the lower troposphere,
  - Ionospheric absolute total electron content (TEC), electron density profiles (EDPs), amplitude and phase scintillation indices



# Current State: CDP Commercial Data Buy RODB-1

Delivery Order	Vendors	Profiles per day	Order Duration	Sharing License*	Results
1	Spire GeoOptics	<b>500</b> <b>500</b>	Dec 2020 -Jan 2021 (1 month)	US Gov.	Test data; prep for operations
2	GeoOptics	<b>1300</b>	Mar - Sep 2021 (6 months)	US Gov.	Operational use began May 2021
3	Spire	<b>3000</b>	Sep 2021 - Mar 2022 (6 months)	US Gov, WMO and CGMS Centers	Added Galileo GNSS occultations
4	GeoOptics Spire	<b>500</b> <b>5500</b>	Mar 2022 - Jan 2023 (10 months)	US Gov, WMO and CGMS Centers	10-month period began March 16, 2022
5	TBD	<b>TBD</b>	TBD	TBD	<b><i>Vendors requested to provide 2 pricing options (1 &amp; 3a)</i></b>



# Scope: NOAA RO Data Sharing:

NOAA's data sharing practices are driven by USG laws, policies, and international agreements:

- The NOAA Commercial Space Policy states **NOAA will negotiate the least restrictive terms possible, while evaluating data sharing on a case-by-case basis**
- The Weather Act directs NOAA to adhere to existing international agreements in use of commercial data
- **World Meteorological Organization Resolution 40 sets the standard of full and open data sharing for global meteorological data (WMO currently updating Res 40 to address commercial data considerations)**

As other USG agencies and EUMETSAT begin commercial data purchases, interagency and international coordination on the sharing of commercial data purchased by each will be critical

- Agreement to share data purchased is the first step (requires paying higher price per observation, but allows collective buying and sharing)
- Need coordination to ensure partners buy different data, to maximize the impact on the global system

CGMS WG II recommendations regarding RO data have further been defined:

- Plenary WGII R49 WG II recommends that Agencies when pursuing data clearly define all aspects of the data, e.g., orbits and coverage, in order to optimize the benefits of the data.
- Plenary WGII R49 WG II recommends that **Agencies consider data buy with an option for redistributing data to global NWP centers.**





# Scope: NOAA RO Data Sharing - Licensing Options:

<b>Option 1</b>	<b>Unlimited distribution rights</b>
Option 2	Distribution to U.S. Government agencies, National Meteorological Centers (NMC), WMO Met Centers, CGMS members, non-profits, academic entities for non-commercial use, with no further distribution
Option 2a	Option 2 plus unlimited distribution after 24 hours
<b>Option 3</b>	<b>Distribution to U.S. Government agencies, National Meteorological Centers (NMC), WMO Met Centers, and CGMS members for non-commercial use with no further distribution</b>
<b>Option 3a</b>	<b>Option 3 plus unlimited distribution after 24 hours</b>
Option 4	Distribution to U.S. Government agencies for non-commercial use and no further distribution (except to contractors for use on agency behalf)
Option 4a	Option 4 plus unlimited distribution after 24 hours
Option 5	No distribution outside NOAA (except for contractors and grantees for use on NOAA's behalf)
Option 5a	Option 5 for first 24 hours plus unlimited distribution after 24 hours



# Future RO Purchases: RODB-2

The Radio Occultation Data Buy 2 (**RODB-2**) contract will occur in 2023 following the completion of the original RODB:

- As part of the acquisition planning process, NOAA issued a Request for Information (RFI), and vendors responded in Jan 2022 with comments and responses that helped inform drafting of the final Statement of Work. The final RFP was released in July 2022.
- NOAA has chosen an Indefinite Delivery Indefinite Quantity (IDIQ) contract vehicle for RODB-2 that allows multiple awards to RO providers during the ordering period
- Over the period of the RODB-2 contract, NOAA is planning to compete and award multiple DOs against the IDIQ contracts
  - DOs may be issued to acquire neutral atmosphere products and/or space weather products
  - DOs will generally have 6- to 12-month Periods of Performance (POPs)
- RODB-2 will begin with two Delivery Order (DO-1 and DO-2) contracts:
  - **DO-1, 30 days, 500 profiles/day**, will procure a limited duration of data to be used to validate that the formats, latency, quality, and coverage of the data will be sufficient for longer-term operational use
  - **DO-2, 184 days, 5000-6000 profiles/day**, will acquire longer-term near-real-time radio occultation (RO) satellite data for use in operational numerical weather prediction models, space weather models, and other systems



# Future RO Purchases: RODB-2 Requirements

NOAA is issuing the RODB-2 contract to acquire commercial near-real-time satellite-based GNSS RO and ionospheric measurements that will be processed into neutral atmosphere and space weather products. Derived products will feed into NOAA operational and research data systems, including climate, weather, and space weather analysis and prediction.

The RODB-2 contract includes specific requirements for:

- Neutral atmosphere data, space weather data, and scintillation indices.
- Delivery including data quantity, duration, and reporting
- Security requirements
- Data formats
- Data rights definitions for RO data and derived products
- Processing level of the RO soundings or ionospheric tracks
- Optional requirements for enhanced specific geospatial distributions
- Optional requirements for enhanced-SNR neutral atmosphere products
- Optional requirements for data rights to be provided for each delivery order

