

WRITTEN STATEMENT

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SPIRE

**REAUTHORIZING THE WEATHER ACT: DATA AND INNOVATION FOR
PREDICTIONS**

SUBCOMMITTEE ON ENVIRONMENT

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

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Chairman Miller, Ranking Member Ross, and Members of the Subcommittee thank you for inviting Spire to testify today before the Subcommittee on Environment to discuss commercial weather data and the National Oceanic and Atmospheric Administration (NOAA). I am Michael Eilts, General Manager for Weather and Earth Intelligence at Spire Global. In my role, I manage a business unit that collects Radio Occultation (RO) data and other space-based data from Spire's satellite constellation and provides clean data to NOAA and other international entities. Prior to joining Spire, I was the Assistant Director of NOAA's National Severe Storms Laboratory and then co-founded Weather Decision Technologies, a weather information company that I was the CEO of for 18 years. We sold that business to a much larger company, and there I led a weather business unit of over 700 people. During 2021, I was a Task Team co-lead for the NOAA Scientific Advisory Board Priority of Weather Research (PWR) study where in a yearlong process we engaged over 150 subject matter experts to provide guidance to NOAA for its research priorities for the next 10 years.

I aim today to present you with crucial information on the significance of satellite data in creating accurate global forecasts. I urge our nation to invest in a comprehensive, long-term program that purchases satellite data from the private sector to facilitate our ability to make substantial investments in a constellation of nanosatellites. This investment will enable NOAA to fulfill its mission of providing our nation with the most exceptional global weather forecasts.

Spire Global was founded by a desire to build a better planet. While information about the Earth and its environment had traditionally been collected from ground networks and satellite imagery, Spire set out to do something different: create a vast network of affordable nanosatellites that orbit just above Earth's atmosphere, collecting rich, granular data from the ultimate vantage point of space. Whether we are providing data to support enhanced weather forecasts to minimize the impact of natural disasters or location data to protect assets, optimize efficiency, and mitigate risk, we empower our customers to address our planet's toughest challenges.

Pertinent to today's hearing topic, Spire provides satellite-derived radio occultation data operationally to NOAA to improve its numerical weather prediction skill. Radio occultation data provides vertical profiles of temperature and humidity anywhere on the globe. Our first contract began seven years ago in 2016 under NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) Commercial Weather Data Pilot Program, which was first authorized by the Committee on Science, Space, and Technology. During this pilot, Spire provided radio occultation data to NOAA for testing and evaluation. After several rounds of evaluation, NOAA determined that commercial radio occultation data was an impactful and cost-effective strategy for adding more atmospheric data into its global forecast modeling and greatly enhancing the accuracy of its forecasts. Today, NOAA buys our data through competitive solicitations for only months at a time.

Spire has repeatedly demonstrated the ability to deliver the largest amount of compliant radio occultation data to support NOAA's operational numerical weather models. Our current performance on the IDIQ Delivery Order 4 consistently exceeds contract requirements, delivering 3,300 RO profiles a day.

Spire currently operates over 40 satellites with GNSS-RO sensors that produce up to 18,000 RO profiles a day. Spire's resilient and growing constellation of satellites is on-orbit and collecting operational radio occultation and ionospheric space weather data today and into the future, with the capacity to potentially increase this daily number to 100,000/day provided there is enough demand from the international meteorological community, including NOAA.

We believe in building stronger and longer-lasting partnerships between NOAA and the private sector; Spire has the advantage of providing data for multiple years and can provide unique perspectives for improving relationships. We offer the following examples below of strengthening our partnership:

First, long-term commitments and signals from NOAA and other U.S. Government Agencies are hard to decipher and there appear to be minimal out-year funding plans. This leaves the private sector, including Spire, in a place where we do not have a long-term commitment, making it difficult for us to determine the continued investment we should make in providing services to the government and maintaining and growing our satellite constellation. Let me be clear, Spire is a strong advocate for partnership with NOAA, and we are ready and willing to play a larger role in helping NOAA meet its government mandates and missions.

Further, there is broad support from the scientific community for private-sector partnerships and relying on the technological advancements of the U.S. weather and space enterprises. Here is an excerpt from the NOAA SAB PWR report, recommendation OD-10, page 44:

“NOAA observations have been based on large satellites that are reliable, capable, impactful, yet expensive with a long development cycle. Recently, substantial and rapid progress has been made in smallsat/cubesat technology. This provides a great opportunity for NOAA to define the role of smallsats/cubesats in its observing system; i.e., for gap mitigation, faster technology refreshment, more frequent revisit opportunities; complementing large satellites in temporal and spatial coverages; opening up new ventures with the private sector.”

The U.S. Government has made investments in other areas that have led to private sector growth and ultimately created great value for both the economy and a cost-effective manner for the

government to obtain data sets and services. NASA's Commercial Orbital Transportation Services (COTS) program and Commercial Crew Program (CCP) funded over \$1.8B for the commercial space services industry and has resulted in a rapidly growing space industry, with SpaceX being the biggest player at this time. Similarly, the National Geospatial Agency (NGA) and National Reconnaissance Office (NRO) have funded the "EnhancedView" program at \$7.3B, which has led to Maxar and other companies becoming large businesses that provide significant services to the government.

The United States has fallen behind the EU, China, and even Canada in our capabilities to forecast the weather. We believe that in the next 5-10 years we need to regain that leadership, and one way to make sure we lead is to assimilate significantly more satellite data into weather models. In fact, recent studies show that if we removed all satellite data from NWP model forecasts the accuracy will drop by 2 days, meaning what we can forecast today out to 5 days will be reduced to 3 days, this is the equivalent of setting us back 2 decades in our capabilities. The most cost-effective manner to obtain this data is by building a long-term program that funds the acquisition of RO and other satellite data from the private sector.

In addition to radio occultation data, Spire is now actively working on next-generation hyperspectral microwave-sounding technologies (HyMS). The two-year program, focused on enhancing the value and accuracy of NOAA's model forecasts), will assist Spire's development of a HyMS in-orbit demonstration sensor on a Spire 16-unit satellite. The HyMS instrument is an advanced millimeter wave technology that delivers new hyperspectral microwave-sounding information to measure atmospheric moisture, which is a key parameter for enhancing model forecasts. In fact, microwave-sounding data is consistently one of the most impactful, if not the most impactful, sources of data that NOAA uses for creating accurate and timely forecasts. Today and in decades past, NOAA has built its own large satellite constellations with microwave-sounding instruments with costs routinely exceeding billions of dollars. New commercial advancements have allowed these same and next-generation microwave instruments to be orders of magnitude smaller and substantially cheaper (millions vs. billions).

In addition to the RO and HyMS data, Spire's data scientist team has developed a number of climate analytics using satellite data. These analytics include global, daily soil moisture insights, sea ice extent and altimetry, ocean winds, and other parameters. These analytics could also be valuable supplements to NOAA data sets, often filling both spatial and temporal gaps.

Mr. Chairman, Ranking Member, and Members of the Subcommittee thank you for the opportunity to testify before you today. I would be pleased to answer any questions you may have.