NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
WRITTEN TESTIMONY OF
KENNETH GRAHAM
ASSISTANT ADMINISTRATOR FOR WEATHER SERVICES
AND DIRECTOR OF THE NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HEARING
ON
WEATHERING THE SOLAR STORM:
ADVANCING AMERICA'S SPACE WEATHER CAPABILITIES

BEFORE THE
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

NOVEMBER 19, 2026

Chairman Babin, Ranking Member Lofgren, and Members of the Committee, thank you for the opportunity to testify on the National Oceanic and Atmospheric Administration's (NOAA) accomplishments under the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act, or PROSWIFT Act. I am Kenneth Graham, NOAA Assistant Administrator for Weather Services and Director of NOAA's National Weather Service.

Overview

Since the 1960s, NOAA and its predecessor agencies have provided the Nation's civil operational space weather monitoring, forecasting, and warnings. Today, NOAA delivers on this mission through observations, partner data, models, forecasts, watches, warnings, alerts, and decision support. We do this in coordination with agencies responsible for complementary research, defense, exploration, and infrastructure missions. Actionable space weather information has become essential to the U.S. economy, as well as national and homeland security. NOAA's space weather mission provides critical information used for aviation, satellite operations, precision agriculture, Global Positioning System and positioning, navigation, and timing services (PNT), electric grid reliability, astronaut safety, emergency management, public safety, and national security.

NOAA's Space Weather Mission

NOAA carries out this role as an end-to-end operational enterprise. The National Weather Service (NWS) Space Weather Prediction Center (SWPC) delivers the Nation's 24/7 civilian

space weather forecasts, watches, warnings, alerts, and decision support. This operational arm is supported by multiple offices within the National Environmental Satellite, Data, and Information Service (NESDIS) that support SWPC with critical space-based observing capabilities, satellite command, control, and data delivery, archive, and stewardship. This chain—from observations to models to warnings to archive and access—gives NOAA's space weather mission its national value.

PROSWIFT 2020

The 2020 Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act provides a legislative framework for space weather preparedness. It clarified Federal roles, strengthened coordination, advanced observation planning, promoted research-to-operations and operations-to-research, encouraged commercial engagement, and established user input mechanisms. The PROSWIFT Act states that it is U.S. policy "to prepare and protect against the social and economic impacts of space weather phenomena" and established the Space Weather Advisory Group (SWAG), representing academia, the commercial sector, and end users. The SWAG 2023 Findings and Recommendations, together with SWAG's first national user-needs survey, translated user, academic, and commercial input into a practical roadmap for improving observations, models, benchmarks, data access, and impact-based space weather services.

One of the PROSWIFT Act directives was to turn promising science into operational capability. Accordingly, NOAA, in collaboration with other federal agencies, initiated the Space Weather Prediction Testbed. Collocated with SWPC, the Testbed takes observations, models, and techniques that must be tested, validated, integrated into forecaster workflows, and measured against user needs before they can improve warnings. The Testbed is the two-way bridge between research and operations: it moves promising science into trusted forecasting tools and seeks to feed operational experience, performance gaps, and user needs back to researchers to guide what comes next.

NOAA relies on observations from Lagrange point-1 (L1), a location in deep space roughly one million miles upstream along the Sun-Earth line, where NOAA's new Space Weather Observations at L1 to Advance Readiness-1 (SOLAR-1)[1] satellite and other L1 assets provide critical operational data for solar imaging and solar wind data for Earth-directed events. To support SWPC, NOAA is working to ensure continuity of and to establish resilience for these critical observations at L1 via the Space Weather Next program. In partnership with the European Space Agency (ESA), NOAA will secure observations from Lagrange point-5 through the Vigil mission.

[1] https://www.noaa.gov/news-release/noaas-solar-1-enters-new-era-of-space-weather-monitoring

NOAA also collects important operational space weather observations from the Geostationary Operational Environmental Satellites-R (GOES-R) Series and will sustain these assets for as long as is practical. The Space Weather Next program is developing continuity plans for these space weather observations in geostationary orbit once the current GOES-R Series of satellites is retired.

To enhance our capabilities and modeling, NOAA is engaging the commercial sector in novel ways beyond the traditional procurement of instruments, spacecraft buses, and launch services. In recent years NOAA has purchased low-latency total electron content data for ionospheric monitoring and model validation. Commercial capabilities can supplement federal systems, fill gaps, accelerate innovation, and improve efficiency, while NOAA retains responsibility for the quality, reliability, latency, and operational suitability of data used in public forecasts and warnings. NOAA continues to solicit input from the commercial sector for data that could be purchased to support its space weather mission.

In total, NOAA observes and collects space weather data from many different locations, including ground-based sensors, aircraft measurements, and from low-earth orbit, geostationary orbit, and deep-space locations such as L1. In fact, space weather data are collected from a wider aperture of locations compared to terrestrial weather—which makes forecasting challenging. As NOAA plans for future improvements of space weather forecasting, we are working with our scientists, modelers, engineers, and federal partners to better understand the appropriate mix of assets and observations from different vantage points. This will better inform our acquisition planning for the next generation of space weather missions.

NOAA Partnerships

NOAA has strengthened coordination across the Federal space weather enterprise, including with the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF); the Department of War (DOW), Department of the Air Force (DAF); the Department of the Interior and the United States Geological Survey (USGS); the Federal Aviation Administration (FAA); and other agencies. The 2023 memorandum of agreement among NASA, NSF, NOAA, and DAF provides a structure to coordinate research-to-operations and operations-to-research activities involving models, observations, applications, techniques, and technologies. NOAA's 2022 agreement with NASA formalizes space radiation environment forecasting support for human spaceflight, including the International Space Station and lunar missions. NOAA leverages data from NASA research satellites, the DAF, and the U.S. Naval Research Laboratory, which built multiple instruments for NOAA and the ESA.

Partners such as the NSF and USGS support NOAA's operational readiness by providing ground-based observations and research infrastructure. Additionally, a mutually beneficial partnership with DOW leverages both ground- and space-based observations for NOAA, while providing DOW with critical data streams and forecasts for space weather monitoring and meet

national security mission readiness and assurance. The Space Weather Prediction Testbed, discussed above, is already strengthening many of NOAA's partnerships.

For example, the 2025 Artemis II Testbed exercise aligned NOAA, NASA, DOW, academia, and industry around realistic mission-time decisions for time-critical radiation hazards that could be encountered during a crewed mission. That readiness supported SWPC's operational role during the Artemis II mission, when SWPC provided space weather support for NASA at Mission Control throughout the mission. NOAA will apply the same Testbed model in an upcoming power grid exercise focused on critical infrastructure readiness.

Space weather is a global phenomenon which requires global data to meet SWPC's operational needs and the needs of the Nation. NOAA is also coordinating with other nations that fly space weather instrumentation to leverage these data to meet SWPC's mission. Through these international partnerships, NOAA is able to access data without incurring the costs of building, launching, and operating additional space-based systems.

The Future

The challenge ahead is turning better observations, science, and models into increasingly reliable and more capable forecasts, warnings, and decision support. This requires innovation across the full operational chain: better observations, improved models, rigorous validation, faster transition to operations, and decision-ready services for users. A mature Space Weather Prediction Testbed and sustainment of space weather operational observations are essential to national resilience and to helping critical sectors prepare for, respond to, and recover from significant space weather events.

Space weather is a national resilience challenge, and NOAA continues to turn trusted observations into actionable information. That capability helps decision-makers protect people, infrastructure, national security, and the economy. Thank you for the opportunity to testify. I look forward to your questions.