116TH CONGRESS
2D SESSION

S. 881

AN ACT

To improve understanding and forecasting of space weather events, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act'' or the ''PROSWIFT Act''.

SEC. 2. SPACE WEATHER.

(a) POLICY.—It shall be the policy of the United States to prepare and protect against the social and economic impacts of space weather phenomena by supporting actions to improve space weather forecasts and predictions including: sustaining and enhancing critical observations, identifying research needs and promoting opportunities for research-to-operations and operations-to-research collaborations both within and outside of the Federal Government, advancing space weather models, engaging with all sectors of the space weather community, including academia, the commercial sector, and international partners, and understanding the needs of space weather end users.

(b) AMENDMENT TO TITLE 51, UNITED STATES CODE.—Subtitle VI of title 51, United States Code, is amended by adding after chapter 605 the following:

''CHAPTER 606—SPACE WEATHER

"§ 60601. Space weather

''(a) FINDINGS.—

''(1) SPACE WEATHER.—Congress makes the following findings with respect to space weather:

''(A) Space weather phenomena pose a significant threat to ground-based and space-based critical infrastructure, modern technological systems, and humans working in space.

''(B) The effects of severe space weather on the electric power grid, satellites and satellite communications and information, aviation operations, astronauts living and working in space, and space-based position, navigation, and timing systems could have significant societal, economic, national security, and health impacts.

''(C) Space-based and ground-based observations provide crucial data necessary to understand, forecast, and prepare for space weather phenomena.

''(D) Clear roles and accountability of Federal departments and agencies are critical for efficient and effective response to threats posed by space weather.

''(E) Space weather observation and forecasting are essential for the success of human and robotic space exploration.

''(F) In October 2015, the National Science and Technology Council published a National Space Weather Strategy and a National Space Weather Action Plan seeking to integrate national space weather efforts and add new capabilities to meet increasing demand for space weather information.

''(G) In March 2019, the National Science and Technology Council published an updated National Space Weather Strategy and Action Plan to enhance the preparedness and resilience of the United States to space weather.

''(2) ROLE OF FEDERAL AGENCIES.—Congress makes the following findings with respect to the role of Federal agencies on space weather:

''(A) The National Oceanic and Atmospheric Administration provides operational space weather monitoring, forecasting, and long-term data archiving and access for civil applications, maintains ground-based and space-based assets to provide observations needed for space weather forecasting, prediction, and warnings, provides research to support operational responsibilities, and develops require-

ments for space weather forecasting technologies and science.

''(B) The Department of Defense provides operational space weather research, monitoring, and forecasting for the Department's unique missions and applications.

''(C) The National Aeronautics and Space Administration provides increased understanding of the fundamental physics of the Sun-Earth system through basic research, space-based observations and modeling, developing new space-based technologies and missions, and monitoring of space weather for the National Aeronautics and Space Administration's space missions.

''(D) The National Science Foundation provides increased understanding of the Sun-Earth system through ground-based measurements, technologies, and modeling.

''(E) The Department of the Interior collects, distributes, and archives operational ground-based magnetometer data in the United States and its territories, works with the international community to improve global geophysical monitoring, and develops crustal con-

ductivity models to assess and mitigate risks from space weather-induced electric ground currents.

''(F) The Federal Aviation Administration provides operational requirements for space weather services in support of aviation and for coordination of these requirements with the International Civil Aviation Organization, and integrates space weather data and products into the Next Generation Air Transportation System.

''(b) COORDINATION BY OFFICE OF SCIENCE AND TECHNOLOGY POLICY.—The Director of the Office of Science and Technology Policy shall—

''(1) coordinate the development and implementation of Federal Government activities conducted with respect to space weather to improve the ability of the United States to prepare for, avoid, mitigate, respond to, and recover from potentially devastating impacts of space weather; and

''(2) coordinate the activities of the interagency working group on space weather established under subsection (c).

''(c) SPACE WEATHER INTERAGENCY WORKING GROUP.—Not later than 90 days after the date of enact-

ment of the PROSWIFT Act, the National Science and Technology Council shall establish an interagency working group on space weather (in this chapter referred to as the 'interagency working group') to coordinate executive branch actions that improve the understanding and prediction of and preparation for space weather phenomena, and coordinate Federal space weather activities.

''(1) MEMBERSHIP.—The following entities shall be members of the interagency working group:

''(A) The National Oceanic and Atmospheric Administration.

''(B) The National Aeronautics and Space Administration.

''(C) The National Science Foundation.

''(D) The Department of Defense.

''(E) The Department of the Interior.

''(F) Such other Federal agencies as the Director of the Office of Science and Technology Policy deems appropriate.

''(2) INTERAGENCY AGREEMENTS.—

''(A) The members of the interagency working group may enter into one or more interagency agreements providing for cooperation and collaboration in the development of space weather spacecraft, instruments, tech-

nologies, and research to operations and operations to research in accordance with this chapter.

''(B) The Administrator of the National Aeronautics and Space Administration and the Administrator of the National Oceanic and Atmospheric Administration shall enter into one or more interagency agreements providing for cooperation and collaboration in the development of space weather spacecraft, instruments, and technologies in accordance with this chapter.

''(3) INTERNATIONAL, ACADEMIC COMMUNITY, AND COMMERCIAL SECTOR COLLABORATION.—Each Federal agency participating in the space weather interagency working group established under this subsection shall, to the extent practicable, increase engagement and cooperation with the international community, academic community, and commercial space weather sector on the observational infrastructure, data, and scientific research necessary to advance the monitoring, forecasting, and prediction of, preparation for, and protection from, space weather phenomena.

''(d) SPACE WEATHER ADVISORY GROUP.—

"(1) IN GENERAL.—

"(A) ESTABLISHMENT.—Not later than 180 days after the date of the enactment of the PROSWIFT Act, the Administrator of the National Oceanic and Atmospheric Administration, in consultation with other relevant Federal agencies, shall establish a space weather advisory group (in this chapter referred to as the 'advisory group') for the purposes of receiving advice from the academic community, the commercial space weather sector, and space weather end users that informs the interests and work of the interagency working group.

"(B) COMPOSITION.—The advisory group shall be composed of not more than 15 members appointed by the interagency working group, of whom—

"(i) 5 members shall be representatives of the academic community;

"(ii) 5 members shall be representatives of the commercial space weather sector; and

"(iii) 5 members shall be nongovernmental representatives of the space weather end user community.

''(C) CHAIR.—Not later than 30 days after the date on which the last member of the advisory group is appointed under subparagraph (B), the Administrator of the National Oceanic and Atmospheric Administration shall appoint 1 member as the Chair of the advisory group.

''(D) TERMS.—The length of the term of each member of the advisory group shall be 3 years beginning on the date on which the member is appointed.

''(E) TERM LIMITS.—

''(i) IN GENERAL.—A member of the advisory group may not serve on the advisory group for more than 2 consecutive terms.

''(ii) CHAIR.—A member of the advisory group may not serve as the Chair of the advisory group for more than 2 terms, regardless of whether the terms are consecutive.

''(2) DUTIES.—The advisory group shall advise the interagency working group on the following:

''(A) Facilitating advances in the space weather enterprise of the United States.

"(B) Improving the ability of the United States to prepare for, mitigate, respond to, and recover from space weather phenomena.

"(C) Enabling the coordination and facilitation of research to operations and operations to research, as described in section 60604(d).

"(D) Developing and implementing the integrated strategy under section 60602 including subsequent updates and reevaluations.

"(3) USER SURVEY.—

"(A) IN GENERAL.—Not later than 180 days after the establishment of the advisory group, the advisory group shall conduct a comprehensive survey of the needs of users of space weather products to identify the space weather research, observations, forecasting, prediction, and modeling advances required to improve space weather products.

"(B) SURVEY CONSIDERATIONS.—The survey conducted under subparagraph (A) shall—

"(i) assess the adequacy of current Federal Government goals for lead time, accuracy, coverage, timeliness, data rate, and data quality for space weather observations and forecasting;

''(ii) identify options and methods to, in consultation with the academic community and the commercial space weather sector, improve upon the advancement of the goals described in clause (i);

''(iii) identify opportunities for collection of new data to address the needs of the space weather user community;

''(iv) identify methods to increase coordination of space weather research to operations and operations to research;

''(v) identify opportunities for new technologies, research, and instrumentation to aid in research, understanding, monitoring, modeling, prediction, forecasting, and warning of space weather; and

''(vi) identify methods and technologies to improve preparedness for potential space weather phenomena.

''(C) COORDINATION WITH AGENCIES.—In carrying out the requirements of this subsection, the advisory group shall communicate and coordinate with the interagency working group to ensure the needs of the governmental space weather user community are adequately

and appropriately identified by the survey under subparagraph (A).

''(D) BRIEFING TO CONGRESS.—Not later than 30 days after the completion of the survey under subparagraph (A), the advisory group shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a briefing on the results of the survey under subparagraph (A).

''(E) PUBLICATION.—Within 30 days of the briefing to Congress, the advisory group shall make the results of the survey under subparagraph (A) publicly available.

''(F) REEVALUATION.—The advisory group shall review and assess the survey under subparagraph (A) not less than every 3 years and update, resubmit, and republish the survey in accordance with the requirements of subparagraphs (D) and (E).

''(4) FEDERAL ADVISORY COMMITTEE ACT.—Section 14 of the Federal Advisory Committee Act (5 U.S.C. App.) shall not apply to the advisory group.

"§ 60602. Integrated strategy

''(a) IN GENERAL.—The Director of the Office of Science and Technology Policy, in collaboration with the interagency working group and upon the advice of the advisory group, shall develop a strategy for coordinated observation of space weather among members of the interagency working group (in this chapter, referred to as the 'integrated strategy'). The integrated strategy shall identify—

''(1) observations and measurements that must be sustained beyond the lifetime of current ground-based and space-based assets, as described under section 60603, that are essential for space weather research, models, forecasting, and prediction;

''(2) new observations and measurements that may significantly improve space weather forecasting and prediction; and

''(3) plans for follow-on space-based observations under section 60603.

''(b) CONSIDERATIONS.—In developing the integrated strategy in subsection (a), the Director of the Office of Science and Technology Policy shall consider, as appropriate, the following:

''(1) Potential contributions of commercial solutions, prize authority, academic and international partnerships, microsatellites, small satellite options,

ground-based instruments, and hosted payloads for observations identified in section 60602(a)(2).

''(2) Work conducted before the date of enactment of the PROSWIFT Act by the National Science and Technology Council with respect to space weather.

''(3) The survey under section 60601(d).

''(4) Any relevant recommendations from the most recent National Academies of Sciences, Engineering, and Medicine Decadal Survey for Solar and Space Physics (Heliophysics).

''(c) REVIEW OF INTEGRATED STRATEGY.—

''(1) REVIEW.—The Administrator of the National Aeronautics and Space Administration and the Administrator of the National Oceanic and Atmospheric Administration, in consultation with Federal agencies participating in the interagency working group, shall enter into an agreement with the National Academies of Sciences, Engineering, and Medicine to review the integrated strategy developed in this section.

''(2) CONSIDERATIONS.—The review from paragraph (1) shall also consider the current state, capability, and feasibility of the commercial space weather sector to provide new and supplemental observa-

tions and measurements that may significantly improve space weather forecasting and prediction.

''(3) TRANSMITTAL.—The Director of the Office of Science and Technology Policy, the Administrator of the National Aeronautics and Space Administration, and the Administrator of the National Oceanic and Atmospheric Administration shall transmit the integrated strategy and the results of the review required under paragraph (1) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 1 year after the date of the completion of the survey under section 60601(d)(3). The integrated strategy and its review shall be made publicly available within 30 days of submittal to Congress.

''(d) IMPLEMENTATION PLAN.—Not later than 180 days after delivery of the review of the integrated strategy in subsection (c)(3), the interagency working group shall develop a plan to implement the integrated strategy, including an estimate of the cost and schedule required for implementation. Upon completion, the interagency working group shall submit the implementation plan to the Committees on Science, Space, and Technology and

Armed Services of the House of Representatives and the Committees on Commerce, Science, and Transportation and Armed Services of the Senate. The implementation plan shall be made publicly available within 30 days of submittal to Congress.

''(e) REEVALUATION.—The Director, in collaboration with the interagency working group, shall update the integrated strategy not later than 1 year after the reevaluation of the user survey from section 60601(d)(3)(F) in accordance with the requirements of subsections (a) through (d).

''§ 60603. Sustaining and advancing critical space weather observations

''(a) POLICY.—It is the policy of the United States to—

''(1) establish and sustain a baseline capability for space weather observations and to make such observations and data publicly available; and

''(2) obtain enhanced space weather observations, as practicable, to advance forecasting and prediction capability, as informed by the integrated strategy in section 60602.

''(b) SUSTAINING BASELINE SPACE-BASED OBSERVATIONAL CAPABILITIES.—

''(1) The Administrator of the National Aeronautics and Space Administration shall, in coopera-

tion with the European Space Agency and other international and interagency partners, maintain operations of the Solar and Heliospheric Observatory/Large Angle and Spectrometric Coronagraph (referred to in this section as 'SOHO/LASCO') for as long as the satellite continues to deliver quality observations.

''(2) The Administrator of the National Aeronautics and Space Administration shall prioritize the reception of SOHO/LASCO data.

''(3) The Administrator of the National Oceanic and Atmospheric Administration shall maintain, for as long as is practicable, operations of current space-based observational assets, including but not limited to the Geostationary Operational Environmental Satellites system, and the Deep Space Climate Observatory.

''(c) BACKUP SPACE-BASED OBSERVATIONAL CAPABILITY.—The Administrator of the National Oceanic and Atmospheric Administration, in coordination with the Secretary of Defense and the Administrator of the National Aeronautics and Space Administration, shall work with Federal and international partners in order to secure reliable backup baseline capability for near real-time coronal mass ejection imagery, solar wind, solar imaging, coronal

imagery, and other relevant observations required to provide space weather forecasts.

''(d) SOHO/LASCO OPERATIONAL CONTINGENCY PLAN.—The Administrator of the National Oceanic and Atmospheric Administration shall develop an operational contingency plan to provide continuous space weather forecasting in the event of an unexpected SOHO/LASCO failure, and prior to the implementation of the backup space-based baseline observational capability in section 60603(c).

''(e) BRIEFING.—Not later than 120 days after the date of enactment of the PROSWIFT Act, the Administrator of the National Oceanic and Atmospheric Administration shall provide a briefing to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the plan to secure reliable backup baseline capability described in subsection (c) and the SOHO/LASCO operational contingency plan developed under subsection (d).

''(f) SUSTAINING GROUND-BASED OBSERVATIONAL CAPABILITY.—The Director of the National Science Foundation, the Director of the United States Geological Survey, the Secretary of the Air Force, and, as practicable

in support of the Air Force, the Secretary of the Navy, shall each—

''(1) maintain and improve ground-based observations of the Sun, as necessary and advisable, to help meet the needs identified in the survey under section 60601(d)(3); and

''(2) continue to provide space weather data through ground-based facilities, including radars, lidars, magnetometers, neutron monitors, radio receivers, aurora and airglow imagers, spectrometers, interferometers, and solar observatories.

''(g) CONSIDERATIONS.—In implementing subsections (b), (c), and (d), the Administrators of the National Aeronautics and Space Administration and the National Oceanic and Atmospheric Administration, the Directors of the National Science Foundation and United States Geological Survey, and the Secretaries of the Air Force and the Navy shall prioritize cost-effective and reliable solutions.

''(h) GROUND-BASED OBSERVATIONAL DATA.—The Director of the National Science Foundation shall—

''(1) make available to the public key data streams from the platforms and facilities described in subsection (d) for research and to support space weather model development;

''(2) develop experimental models for scientific purposes; and

''(3) support the transition of the experimental models to operations where appropriate.

''(i) ENHANCED SPACE-BASED OBSERVATIONS.—The Administrator of the National Oceanic and Atmospheric Administration, in coordination with the Secretary of Defense, should develop options to build and deploy space-based observational capabilities, beyond the baseline capabilities referenced in subsection (b), that may improve space weather measurements and observations. These supplemental observational capabilities could include commercial solutions, prize authority, academic partnerships, microsatellites, ground-based instruments, and opportunities to deploy the instrument or instruments as a secondary payload on an upcoming planned launch.

''§ 60604. Research activities

''(a) BASIC RESEARCH.—The Director of the National Science Foundation, the Administrator of the National Aeronautics and Space Administration, and the Secretary of Defense, shall—

''(1) continue to carry out basic research on heliophysics, geospace science, and space weather; and

''(2) support competitive, peer-reviewed proposals for conducting research, advancing modeling, and monitoring of space weather and its impacts, including the science goals outlined in decadal surveys in solar and space physics conducted by the National Academies of Sciences, Engineering, and Medicine.

''(b) MULTIDISCIPLINARY RESEARCH.—

''(1) FINDINGS.—Congress finds that the multidisciplinary nature of solar and space physics creates funding challenges that require coordination across scientific disciplines and Federal agencies.

''(2) SENSE OF CONGRESS.—It is the sense of Congress that science centers could coordinate multidisciplinary solar and space physics research. The Administrator of the National Aeronautics and Space Administration and Director of the National Science Foundation should support competitively awarded grants for multidisciplinary science centers that advance solar and space physics research, including research-to-operations and operations-to-research processes.

''(3) MULTIDISCIPLINARY RESEARCH.—The Director of the National Science Foundation, the Administrator of the National Oceanic and Atmospheric Administration, and the Administrator of the

National Aeronautics and Space Administration, shall each pursue multidisciplinary research in subjects that further the understanding of solar physics, space physics, and space weather.

''(c) SCIENCE MISSIONS.—The Administrator of the National Aeronautics and Space Administration should implement missions that meet the science objectives identified in solar and space physics decadal surveys conducted by the National Academies of Sciences, Engineering, and Medicine.

''(d) RESEARCH TO OPERATIONS; OPERATIONS TO RESEARCH.—The interagency working group shall, upon consideration of the advice of the advisory group, develop formal mechanisms to—

''(1) transition the space weather research findings, models, and capabilities of the National Aeronautics and Space Administration, the National Science Foundation, the United States Geological Survey, and other relevant Federal agencies, as appropriate, to the National Oceanic and Atmospheric Administration and the Department of Defense;

''(2) enhance coordination between research modeling centers and forecasting centers; and

''(3) communicate the operational needs of space weather forecasters of the National Oceanic

and Atmospheric Administration and Department of Defense, as appropriate, to the National Aeronautics and Space Administration, the National Science Foundation, and the United States Geological Survey.

"§ 60605. Space weather data

''(a) IN GENERAL.—The Administrator of the National Aeronautics and Space Administration and the Director of the National Science Foundation shall continue to—

''(1) make space weather-related data obtained for scientific research purposes available to space weather forecasters and operations centers; and

''(2) support model development and model applications to space weather forecasting.

''(b) RESEARCH.—The Administrator of the National Oceanic and Atmospheric Administration shall make space weather-related data obtained from operational forecasting available for research.

"§ 60606. Space weather knowledge transfer and information exchange

''Not later than 180 days after the date of enactment of the PROSWIFT Act, the Administrator of the National Oceanic and Atmospheric Administration, in collaboration with the Administrator of the National Aeronautics and

Space Administration and the Director of the National Science Foundation, shall enter into an arrangement with the National Academies of Sciences, Engineering, and Medicine to establish a Space Weather Government-Academic-Commercial Roundtable to facilitate communication and knowledge transfer among Government participants in the space weather interagency working group established under section 60601(c), the academic community, and the commercial space weather sector to—

''(1) facilitate advances in space weather prediction and forecasting;

''(2) increase coordination of space weather research to operations and operations to research; and

''(3) improve preparedness for potential space weather phenomena.

''§ 60607. Pilot program for obtaining commercial sector space weather data

''(a) ESTABLISHMENT.—Not later than 12 months after the date of enactment of the PROSWIFT Act, the Administrator of the National Oceanic and Atmospheric Administration may establish a pilot program under which the Administrator will offer to enter into contracts with one or more entities in the commercial space weather sector for the provision to the Administrator of space weather

data generated by such an entity that meets the standards and specifications published under subsection (b).

''(b) DATA STANDARD AND SPECIFICATIONS.—Not later than 18 months after the date of enactment of the PROSWIFT Act, the Administrator of the National Oceanic and Atmospheric Administration, in consultation with the Secretary of Defense, may publish standards and specifications for ground-based, ocean-based, air-based, and space-based commercial space weather data and metadata.

''(c) CONTRACTS.—

''(1) IN GENERAL.—Within 12 months after the date of transmission of the review of the integrated strategy to Congress under section 60602(c)(3) and taking into account the results of the review, the Administrator of the National Oceanic and Atmospheric Administration may offer to enter, through an open competition, into at least one contract with one or more commercial space weather sector entities capable of providing space weather data that—

''(A) meets the standards and specifications established for providing such data under subsection (b); and

''(B) is provided in a manner that allows the Administrator of the National Oceanic and Atmospheric Administration to calibrate and

evaluate the data for use in space weather research and forecasting models of the National Oceanic and Atmospheric Administration, the Department of Defense, or both.

''(2) ASSESSMENT.—If one or more contract is entered into under paragraph (1), not later than 4 years after the date of enactment of the PROSWIFT Act, the Administrator of the National Oceanic and Atmospheric Administration shall assess, and submit to the Committees on Science, Space, and Technology and Armed Services of the House of Representatives and the Committees on Commerce, Science, and Transportation and Armed Services of the Senate, a report on the extent to which the pilot program has demonstrated data provided under contracts described in paragraph (1) meet the standards and specifications established under subsection (b) and the extent to which the pilot program has demonstrated—

''(A) the viability of assimilating the commercially provided data into National Oceanic and Atmospheric Administration space weather research and forecasting models;

''(B) whether, and by how much, the data so provided add value to space weather fore-

casts of the National Oceanic and Atmospheric Administration and the Department of Defense; and

''(C) the accuracy, quality, timeliness, validity, reliability, usability, information technology security, and cost-effectiveness of obtaining commercial space weather data from commercial sector providers.

''§ 60608. Space weather benchmarks

''The interagency working group established under section 60601(c) shall periodically review and update the benchmarks described in the report of the National Science and Technology Council entitled 'Space Weather Phase 1 Benchmarks' and dated June 2018, as necessary, based on—

''(1) any significant new data or advances in scientific understanding that become available; or

''(2) the evolving needs of entities impacted by space weather phenomena.''.

(c) TECHNICAL AND CONFORMING AMENDMENTS.—

(1) The table of chapters of title 51, United States Code, is amended by adding after the item relating to chapter 605 the following:

''606. Space Weather ..... 60601''.

(2) Section 809 of the National Aeronautics and Space Administration Authorization Act of 2010

(42 U.S.C. 18388) and the item relating to that section in the table of contents under section 1(b) of that Act (Public Law 111–267; 124 Stat. 2806) are repealed.

Passed the Senate July 27, 2020.

Attest:

Secretary.

116TH CONGRESS
2D SESSION

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AN ACT

To improve understanding and forecasting of space weather events, and for other purposes.