

The following saw increases of 15 percent or more: Florida, Delaware, North Carolina, Idaho, Georgia, Colorado, Arizona, Texas, Utah, and Nevada.

The following states saw decreases of 10 percent or more: Michigan, Maine, New Hampshire, and Vermont.

In 2018, 7 million or 13.7 percent of public school students received special education services.

In 2017, 9.6 percent of public school students were learning English as a second language.

I ask my colleagues to join me in supporting H.R. 8162.

The SPEAKER pro tempore. The question is on the motion offered by the gentlewoman from Pennsylvania (Ms. WILD) that the House suspend the rules and pass the bill, H.R. 8162, as amended.

The question was taken; and (two-thirds being in the affirmative) the rules were suspended and the bill, as amended, was passed.

A motion to reconsider was laid on the table.

PROMOTING RESEARCH AND OBSERVATIONS OF SPACE WEATHER TO IMPROVE THE FORECASTING OF TOMORROW ACT

Mr. PERLMUTTER. Madam Speaker, I move to suspend the rules and pass the bill (S. 881) to improve understanding and forecasting of space weather events, and for other purposes.

The Clerk read the title of the bill.

The text of the bill is as follows:

S. 881

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

“Sec.

“60601. Space weather.

“60602. Integrated strategy.

“60603. Sustaining and advancing critical space weather observations.

“60604. Research activities.

“60605. Space weather data.

“60606. Space weather knowledge transfer and information exchange.

“60607. Pilot program for obtaining commercial sector space weather data.

“60608. Space weather benchmarks.

“§ 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 requirements 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 conductivity 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 enactment 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, technologies, 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 observations 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 cooperation 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 Ad-

ministrator 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 forecasts 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.

The SPEAKER pro tempore. Pursuant to the rule, the gentleman from Colorado (Mr. PERLMUTTER) and the gentleman from Oklahoma (Mr. LUCAS) each will control 20 minutes.

The Chair recognizes the gentleman from Colorado.

GENERAL LEAVE

Mr. PERLMUTTER. Madam Speaker, I ask unanimous consent that all Members may have 5 legislative days to revise and extend their remarks and to include extraneous material on S. 881, the bill now under consideration.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from Colorado?

There was no objection.

Mr. PERLMUTTER. Madam Speaker, I yield myself such time as I may consume.

Madam Speaker, I am very excited we are here today to pass S. 881, the PROSWIFT Act, a bill that I have been working on for almost 5 years.

Space weather is the electromagnetic activity that comes from the Sun, and it can have significant societal, economic, national security, and health implications both here on Earth and in space.

About 5 years ago, Dr. Dan Baker from the University of Colorado Boulder testified in front of the Science, Space, and Technology Committee about the dangers of space weather events on the electric grid. At that hearing, he said that had an observed July 2012 space weather event actually hit Earth, we would “still be picking up the pieces.”

That testimony stuck with me, and when Senators GARY PETERS and CORY

GARDNER introduced the first version of this bill a few months later, I was eager to start working on the House companion.

Over the last 4 years, the House and the Senate have been working toward the shared goal of passing this legislation into law, but we have had a few differences we have had to work out. I am glad we finally worked through those differences and can send this bill to the President's desk today.

In 2015, the Office of Science and Technology Policy pulled together the best and brightest from within the various agencies working on space weather to produce the National Space Weather Strategy and Action Plan. These documents helped renew our focus on the critical research and operational needs to improve our space weather enterprise, and OSTP updated the strategy and action plan in 2019.

The PROSWIFT Act builds upon this work by providing the structures needed for the continued advancement of heliophysics research, collection of new data and observations, and improvements to our modeling and forecasting.

This bill also, for the first time, clearly delineates the roles and responsibilities of the key Federal agencies involved in space weather, including the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, the National Science Foundation, the Department of Defense, the Federal Aviation Administration, and the United States Geological Survey, as well as the Office of Science and Technology Policy.

Importantly, our legislation brings in new voices from the academic community, commercial space weather sector, and space weather forecast end-users. These communities will participate in the space weather advisory group created in the bill as well as on a new government-academia-commercial roundtable we create to be facilitated by the National Academies of Sciences, Engineering, and Medicine.

Finally, the bill also sets up formal research-to-operations and operations-to-research mechanisms to help break down barriers between the research community and operational forecasters by encouraging sharing of information and requirements to improve the pipeline of new observations, technologies, models, and forecasts.

This bill will improve our understanding of space weather and better prepare us for its impacts on the electric power grid, communications networks, satellite operations, and airlines. It will also help NASA understand the radiation environment for our astronauts on the International Space Station, on their way back to the Moon, and, most importantly, on their journey to Mars by 2033.

We have been working on this bill for a long time now, and I want to thank the gentleman from Alabama, Representative MO BROOKS, for his help

pushing for this bipartisan legislation. I also want to thank Chairwoman JOHNSON and her staff for their support over the years, getting us to where we are today, and Ranking Member FRANK LUCAS for his support of the bill. I also want to thank my friend, Senator GARY PETERS from Michigan, who happens to be in the House Chamber today, for all the work he and his staff have put into this effort over the years.

Madam Speaker, I urge all of my colleagues to support this bill, and I reserve the balance of my time.

Mr. LUCAS. Madam Speaker, I yield myself such time as I may consume.

Madam Speaker, I rise in support of S. 881, the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act, commonly referred to as the PROSWIFT Act.

Fluctuations in solar magnetic activity create variations in the environment between Earth and the Sun that can affect technologies in space and here on Earth. This phenomenon is what we refer to as space weather.

For the most part, space weather has a minimal effect here, but increased solar activity and severe events can create widespread problems and even disrupt our electric grid. Satellites that have less protection from Earth's magnetic field are especially vulnerable.

Significant space weather events are not a new phenomenon, and we have evidence dating back more than 150 years of severe space weather events affecting human activity. However, the impact of these events is much greater now that we rely on satellites and remote sensing for everything from cell phone communication to energy production to GPS navigation.

For example, farmers in Oklahoma have been at the forefront of utilizing precision agriculture to help ensure the most effective use of our resources when planting crops, a technology dependent on GPS.

Space weather is also a national security issue. Our military has a variety of assets in orbit around the Earth, which could potentially be harmed by electromagnetic interference. They rely on satellites built by NASA and operated by the National Oceanic and Atmospheric Administration, or NOAA, for timely and accurate information about potential space weather events.

It is not only technology that is threatened by space weather events. There are the astronauts who currently work on the International Space Station more than 200 miles above the Earth's surface and will one day serve on missions to the Moon and Mars. While we have developed techniques and technology to reduce the threats posed by increased radiation exposure due to a severe solar event, we have more work to do to mitigate these hazards to our astronauts as we venture beyond low-Earth orbit.

In short, severe space weather can have significant effects on each and

every one of us. That is why timely and accurate information from agencies like NASA and NOAA is so important. These agencies play an important role in better monitoring and forecasting space weather.

The bill before us today represents a good faith effort by the House and Senate to provide a framework that will provide for better coordination across the Federal Government. This is especially timely given that we are about to enter a period of increased solar activity, which will create more space weather events.

I am pleased this legislation includes an amendment I introduced during the markup of this legislation. My amendment creates a pilot program that will ensure that emerging private-sector companies will have a seat at the table and will be able to provide monitoring and forecast data, which the Federal Government can purchase and utilize in their space weather forecasts.

I thank the sponsors of this legislation for their work on this important topic. I ask my colleagues to support this bill, and I reserve the balance of my time, Madam Speaker.

□ 1230

Mr. PERLMUTTER. Madam Speaker, I yield 4 minutes to the gentlewoman from Oklahoma (Ms. KENDRA S. HORN), my friend, the chair of the Subcommittee on Space and Aeronautics.

Ms. KENDRA S. HORN of Oklahoma. Madam Speaker, I thank Mr. PERLMUTTER for yielding me the time.

Madam Speaker, I begin by saying, I rise in strong support of S. 881, the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow, or the PROSWIFT Act, and recognize my colleague, Mr. PERLMUTTER, for all of his efforts on this, as well as my fellow Oklahoman and ranking member of the committee, Mr. LUCAS, and particularly, too, recognize Senator PETERS for all of his work on this important issue, which I think can often go underrecognized and unappreciated.

I was proud to cosponsor the House version of the PROSWIFT Act, H.R. 5260, with Mr. PERLMUTTER and many others, which passed out of the Committee on Science, Space, and Technology, and I would like to, again, recognize the leadership on this bipartisan and bicameral bill, including Mr. BROOKS and others for the committee's work to advance an understanding of and the importance of predictive capabilities of space weather.

The PROSWIFT Act is really the culmination of years of work and reflects input from hearings, including joint hearings, the Subcommittee on Environment and the Subcommittee on Space and Aeronautics, which I chair.

Though, it can feel remote, space weather can have a significant impact on us right here on Earth, as you have heard. Space weather, such as solar flares, solar wind and geomagnetic storms of energized, charged particles

can affect everything from our electric power grids, to satellites, to aviation operations, human spaceflight operations, and much more.

In short, severe space weather events pose significant risks to our infrastructure, and in turn, our economy and our national security. This is an important time and an important thing to take action on.

Madam Speaker, space weather forecasting is years, if not decades, behind the maturity of terrestrial forecasting, and that is why S. 881, the PROSWIFT Act, is critical.

Without improvements in space weather forecasts and prediction, we run the risk of potential disruptions to our critical infrastructure. The PROSWIFT Act establishes U.S. policy to help prepare and protect us against the social and economic impacts of space weather phenomena by supporting actions to improve space weather forecasts and predictions.

This act makes clear the importance of federal agency contributions, and their effective coordination, including NASA. To carry out research on the Sun and its effects on near-Earth environments, NASA operates research satellites whose measurements are also essential to NOAA's operational space weather forecasts.

The PROSWIFT Act moves us forward from relying, in part, on these research assets, some of which have been operating for over two decades, to developing a strategic and coordinated approach to sustaining a baseline of space weather operations and better predicting space weather events.

It is also important to enabling our future goals of space, including exploration goals to send humans to the Moon and to Mars, as laid out in H.R. 5666, the bipartisan NASA Authorization Act of 2020. Improvements in space weather forecasts will help keep our astronauts safe from harmful space radiation, which can be elevated during solar storms.

In addition, H.R. 5666 complements S. 881, the PROSWIFT Act, by directing the NASA administrator to establish a space weather research and applications program.

Madam Speaker, the Senate passed S. 881 on July 27, 2020, and now the House must act to make sure this important legislation becomes law.

Mr. LUCAS. Madam Speaker, I yield 5 minutes to the gentleman from Alabama (Mr. BROOKS).

Mr. BROOKS of Alabama. Madam Speaker, I support the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act, called the PROSWIFT Act.

I thank Congressman PERLMUTTER for his leadership on this important issue and for working with me in the Committee on Science, Space, and Technology to advance the Senate bill, which is identical to the House version we have worked so long and hard on.

The PROSWIFT Act advances America's understanding of potentially se-

vere weather events and damaging consequences.

Space weather is a collection of physical processes beginning at the Sun with solar winds and ultimately affecting human activities on Earth and in space. Humanity needs a better understanding of these solar winds and their interaction with Earth's atmosphere. The PROSWIFT Act is a step towards that better understanding.

In Alabama's Marshall Space Flight Center, scientists and engineers are at the forefront of space weather research. Under the PROSWIFT Act, their enhanced research will advance our understanding of and ability to forecast space weather.

The PROSWIFT Act recognizes that space weather not only impacts us on Earth, it can and will impact us in deep space exploration.

For example, before we launch NASA's Artemis man-to-Moon-missions, it is best that we should better understand how space weather phenomena impacts life in space, satellites, and other space instrumentation.

Madam Speaker, it is critical that we properly forecast space weather and prepare for and protect astronauts from the dangers of solar radiation.

Madam Speaker, I, again, thank my colleague, Mr. PERLMUTTER, for his leadership on space weather and his partnership on the PROSWIFT Act.

I encourage my colleagues to vote for Senate Bill 881 and send it to President Trump to sign.

Mr. PERLMUTTER. Madam Speaker, I thank my friend from Alabama for being a good partner and really working with me and with the Senate to refine and get this thing into an excellent product.

Madam Speaker, I include in the RECORD the following letters of support we received for the PROSWIFT Act: a letter from the University of Colorado at Boulder; a letter from the University Corporation for Atmospheric Research; a letter from the American Commercial Space Weather Association; a letter from the American Astronomical Society; a letter from the American Geophysical Union; a letter from the University of Michigan; a letter from the University of New Hampshire; and a letter from the Pennsylvania State University.

LASP,
January 8, 2020.

Hon. ED PERLMUTTER,
House of Representatives,
Washington, DC.

DEAR REPRESENTATIVE PERLMUTTER: On behalf of my colleagues at the Laboratory for Atmospheric and Space Physics (LASP) and the University of Colorado Boulder, I write in support of the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act (PROSWIFT) Act (H.R. 5260). Given the continued threat and vulnerabilities facing our world from solar interactions with the Earth, we applaud the bicameral and bipartisan approach Congress is taking to address the challenges we face with respect to enhancing our nation's space weather forecasting capabilities.

Throughout the Space Age, we have discovered and accumulated a vast knowledge on the governing physical processes of the various regions of both deep space as well as the space surrounding near-Earth. This knowledge has provided an opportunity to expand our reach into the solar system and beyond, as well as increase our Earth observation capabilities. Over time, the increased utilization of satellites continues to have a broad reach across our society, including within the security, public safety and commercial realms. The data we acquire from these satellites is vital in order to protect our national security and economic interests, and interruptions stemming from increased solar activity could prove detrimental in carrying out these important functions.

As a result, the call to increase our space weather forecasting and mitigation capabilities was amplified by the National Academies Decadal Survey in Solar and Space Physics in 2012, and again through the Office of Science and Technology Policy's Space Weather Action Plan that was released in October 2015. Through these calls, it has become a national imperative to streamline the mechanisms designed to help develop and maintain a forecasting system that not only help to predict space weather events, but to respond to them. We believe the PROSWIFT Act will provide a collaborative framework for the federal government and its agencies to work together alongside academic, international and commercial space communities to advance this critical undertaking.

An important component of space weather research and monitoring is collaboration and cooperation among its many stakeholders. The legislation's call for the development of a Space Weather Government-Academic-Commercial Roundtable in addition to a Space Weather Advisory Group will foster collaboration among academic, commercial and space weather end users designed to provide the federal interagency working group with guidance from key constituent groups. In addition, the renewed expansion of basic and multidisciplinary research as well as the federal partnership with the National Academies of Sciences, Engineering and Medicine to "implement missions that meet the science objectives identified in solar and space physics decadal surveys" is a great step forward toward increasing our nation's future forecasting and responsive capabilities. Finally, the strong focus on research and operational capacity within this legislation underscores the important role academic institutions will continue to play in addressing the needs of federal agencies. Here at LASP (and I, daresay, across all of CU-Boulder), we take great pride in our expertise in research to operations and operations to research (R2O/O2R) capabilities, and we stand ready to assist in the cooperative model outlined in the H.R. 5260 to advance our national space weather forecast and response capabilities.

Again, we applaud this legislation and its aim to streamline federal efforts working in conjunction with academic and commercial space partners in order to better understand and predict space weather activities and their impacts on our national interests. Thank you for your outstanding support and leadership, and please continue to think of us as a resource and partner going forward.

Sincerely,

DANIEL N. BAKER, Ph.D.,
Distinguished Professor of Planetary & Space Physics, Moog-BRE Endowed Chair of Space Sciences, Director, Laboratory for Atmospheric and Space

Physics; Professor, Astrophysical and Planetary Sciences; Professor, Department of Physics; Professor, Aerospace Engineering Sciences.

UCAR,
OFFICE OF THE PRESIDENT,
January 8, 2020.

Hon. ED PERLMUTTER,
Washington, DC.

DEAR CONGRESSMAN PERLMUTTER: As a research organization committed to better understanding the earth system, including the critical role of the sun in geospace sciences, the University Corporation for Atmospheric Research (UCAR) would like to thank you for proposing H.R. 5260—Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act—and voice our strong support for PROSWIFT. H.R. 5260 will enhance the integration of existing national efforts to understand, predict, prepare for, and mitigate space weather and will strengthen economic and national security as a result.

Scientists are just beginning to understand the interactions between our sun and the Earth. Given the growing national importance and reliance on technology, it is critical that we expand our scientific understanding of the interactions between the sun and Earth so that we may improve forecasting and mitigate the effects of space weather events. Coupled with the National Space Weather Strategy and National Space Weather Action Plan, this legislation sets national priorities to increase and improve space weather observations, science, and forecasting abilities.

H.R. 5260 lays out a clear road map for the space weather enterprise which consists of the public, private and academic sectors, and in so doing will enable better research to operations transitions that will benefit all communities that rely on technology both on the ground and in space that can be affected by these sun-driven events. The creation of the Space Weather Advisory Group is to be lauded as an excellent first step as it will establish the necessary linkages between government, academia and the private sector in an organized way that is currently done in an ad hoc fashion. This new approach will allow Congress to be kept up to date on the latest advances in science that are translated into operations and will help to identify the highest priority areas that are in need of resources in both the research and operational realms.

Most of our understanding of space weather is based on experience and knowledge gained over the last 30 years, though the historical record indicates space weather events of much greater severity have occurred within the last 150 years. Impacting airlines, GPS, and electric utilities, space weather events in recent history resulted in economic consequences in the tens of millions of dollars. Estimates for damage resulting from a repeat of the worst known event of the last 150 years range from \$1–2 trillion in the first year alone. Scientists do not know the likelihood of such an event recurring, or even whether such an event is the worst-case scenario. Thus, predictability of such events needs to be the driver for all research in the space weather domain. As part of the need to organize the research optimally to meet this threat, and in line with input from your recent hearing, UCAR encourages the committee to establish the Geosciences Directorate within the National Science Foundation (NSF) to be the lead within NSF for all space weather research activities.

Additionally, we commend H.R. 5260 for its emphasis on "Sustaining Ground-Based Observational Capability" and we believe it is imperative to draw the distinction between astronomy and space weather research in this regards. Ground-based observations are less costly and are the appropriate way to prove an observational capability and ensure risk reduction for instruments that may later be flown in space. Current ground-based telescopes used in astronomy are inadequate for space weather research so this section is vital to ensure a robust "ground to space" strategy.

H.R. 5260 would provide clear roles and responsibilities to the various federal agencies responsible for understanding, predicting, and forecasting space weather, including the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF), and the Department of Defense (DOD). As these are all agencies with which we work regularly, this clarity would enable us to pursue research that will have the best impact on society's ability to predict and respond to space weather events.

Again, thank you for your tireless work supporting the science community in Colorado and across the United States. We appreciate your efforts on this bill and many other endeavors.

Best regards,

DR. ANTONIO J. BUSALACCHI,
President, University Corporation for Atmospheric Research.

AMERICAN COMMERCIAL SPACE
WEATHER ASSOCIATION,
December 6, 2019.

JEFF O'NEIL,

Legislative Director, Office of Congressman Ed Perlmutter (CO-07), Washington, DC.

DEAR MR. O'NEIL: On behalf of the American Commercial Space Weather Association (ACSWA), we are writing to express our strong support for H.R. 5260, Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act. The current version of the bill highlights the growing importance of space weather across a broad range of technology areas. We are pleased to see references to the expanding role of the commercial sector in addressing gaps in fundamental knowledge, providing the means to develop and improve observational resources, enabling the research to operations and operations to research enterprise, and mitigating the impacts of space weather threats. ACSWA stands ready to aid federal agencies in undertaking this critically important enterprise.

The studies and survey mandated by the bill will be extremely helpful to the space weather community as it mobilizes to address the high priority science and technology objectives that continue to drive space weather activities in federal laboratories, academic institutions, and the private sector. ACSWA member companies strive to continue agency and academia close partnerships that have been established and strengthened through the years. We fully anticipate that the five members of the PROSWIFT Advisory Committee from the commercial sector will ensure that ACSWA expertise, assets, and resources will be fully integrated in the space weather strategies emerging from the PROSWIFT-mandated actions.

ACSWA fully supports the observational priorities outlined in the PROSWIFT bill. More specifically, ACSWA feels it is important to continue L1 observations with a follow-on mission while simultaneously working aggressively toward developing an L5

platform. The combination of solar observations from L1 and L5 orbits provide an unprecedented view of the disturbances from which most space weather effects at Earth originate. Additionally, the rapidly improving capabilities in monitoring the ionosphere using radio occultation techniques will address a long-standing challenge in mitigating space weather effects on navigation and communication systems. The data sets generated by these observations will offer many opportunities for commercial sector companies to develop tailored products for government and industry customers.

We note that the PROSWIFT bill provides some latitude to federal agencies in how the commercial sector will be involved in space weather research and operations. ACSWA hopes that the language in the bill provides sufficient encouragement for agencies to overcome long-standing barriers that inhibit full cooperation and involvement with the commercial sector, not all of which are based on fiscal constraints. Again, the commercial sector members of the PROSWIFT Advisory Committee will have an important role to play in identifying strategies for taking full advantage of the private sector in meeting space weather goals. The pilot program removed from the earlier version of this bill would have effectively demonstrated the merits of such strategies. ACSWA looks forward to seeing such pilot programs implemented by federal agencies as they strive to meet space weather research and operational goals.

While we don't want to jeopardize the passage of the bill, there are additional small changes we believe could be added to the bill to ensure that all available technologies and processes are applied to reduce space weather hazards:

Page 7, lines 23-24 (Section 60601(d)(3)): change "Each Federal agency participating in the space weather . . ." to "All Federal agencies participating in the space weather . . ."

p. 18., line 19 in section 60603(d)(2): ". . . airflow imagers, spectrometers, interferometers, airborne radiation instrumentation, and . . ."

ACSWA agrees with the Agency changes of Page 21-22; 23-5: ". . . transition National Aeronautics and Space Administration, National Science Foundation, United States Geological Survey, and other relevant Federal agencies space weather research findings, models, and capabilities, as appropriate, to the National Oceanic and Atmospheric Administration and the Department of Defense" to: "transition space weather research findings, models, and capabilities, as appropriate, from the National Aeronautics and Space Administration, National Science Foundation, United States Geological Survey, other relevant Federal agencies, the academic community, and the commercial space weather sector to the National Oceanic and Atmospheric Administration and the Department of Defense"

ACSWA agrees with the Agency changes of Page 22, 9-15: ". . . communicate National Oceanic and Atmospheric Administration and Department of Defense operational needs of space weather forecasters, as appropriate, to the National Aeronautics and Space Administration, the National Science Foundation and United States Geological Survey." to: "communicate National Oceanic and Atmospheric Administration and Department of Defense operational needs of space weather forecasters, as appropriate, to the National Aeronautics and Space Administration, the National Science Foundation, United States Geological Survey, other relevant Federal agencies, the academic community, and the commercial space weather sector."

ACSWA appreciates all the hard work and careful thought devoted to crafting the PROSWIFT bill. It not only provides a tremendous boost to the entire space weather enterprise, but also takes a huge step toward protecting the nation from threats to technological infrastructure that is becoming ever more susceptible to space weather disturbances. We hope that this vital bill is quickly approved and federal agencies move forward with the activities so carefully delineated in the document.

Sincerely,

DEVRIE INTRILIGATOR,
W. KENT TOBISKA,
BOB ROBINSON
(SciencePrime, LLC),
on behalf of the ACS
WA Executive Committee;

Geoff Crowley (Atmospheric and Space Technology Research Associates),
Alec Engell (NextGen),
Jennifer Gannon (Computational Physics, Inc.),
Janet Green (Space Hazards Applications),
Devrie Intriligator (Carmel Research Center, Inc.),
Bob Robinson (SciencePrime, LLC),
Conrad C. Lautenbacher, Jr., VADM USN (ret.) (GeoOptics),
Bob Schunk (Space Environment Corporation),
W. Kent Tobiska (Space Environment Technologies),
American Commercial Space Weather Association (ACSWA) www.ACSWA.us.

AMERICAN ASTRONOMICAL SOCIETY,
OFFICE OF THE PRESIDENT,
December 12, 2019.

Hon. ED PERLMUTTER,
House of Representatives,
Washington DC.

Hon. MO BROOKS,
House of Representatives,
Washington, DC.

DEAR REPRESENTATIVES PERLMUTTER AND BROOKS: On behalf of the over 8,500 members of the American Astronomical Society (AAS) and its Solar Physics Division (SPD), we write to express our strong support for the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Bill and to thank you for your leadership on this vitally important topic. The legislation that you have introduced in the House is comprehensive in its scope, addressing key aspects of space weather and its significance for national security, communications, and human and robotic space operations in low Earth orbit and interplanetary space.

In particular, we endorse the following components of the bill, all of which are essential to further our understanding of the causes and effects of space weather, as well as to advance our ability to reliably forecast space weather events:

the recognition of the wide impact of space weather and the concomitant call for strong cooperation between stakeholder agencies such as NOAA, NSF, NASA, FAA, and the Departments of Defense and the Interior through the establishment of an interagency working group through the National Science and Technology Council on space weather, with accountability to Congress through the submission of pertinent reports;

the call for the formation of a space weather advisory group with broad representation across the academic, commercial, and non-governmental end-user communities to identify new technologies to aid in understanding and forecasting space weather;

the implementation of an integrated strategy that identifies the observation capabilities necessary for near-real-time solar and

coronal mass ejection imaging and that must be sustained beyond the lifetime of current ground-based and space-based assets in order to maintain capability;

the development of space weather instrumentation and competitive, peer-reviewed proposals for conducting research, including interdisciplinary research, in subjects that further the understanding of solar physics, space physics, and space weather and its impacts; and

increased engagement and cooperation with the international, academic, and commercial space weather communities on the observational infrastructure and scientific research necessary to advance the forecasting of and preparation and protection from space weather phenomena.

Thank you for your attention to this timely and important issue. The membership of the SPD, which includes the nation's foremost experts in many of the areas addressed in this legislation, stands ready to assist in any way it can. If there is anything we can do, please do not hesitate to contact us.

Sincerely,

MEGAN DONAHUE,
President, AAS.
DALE GARY,
Chair, SPD.

AGU 100,
January 8, 2020.

Hon. ED PERLMUTTER,
Washington, DC.

Hon. MO BROOKS,
Washington, DC.

DEAR CONGRESSMEN PERLMUTTER AND BROOKS: On behalf of the American Geophysical Union (AGU) and its 60,000 members, I am writing to endorse H.R. 5260, The Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act, and to thank you for crafting this important legislation.

Space weather has the potential to inflict trillions of dollars of damage on our economy, weaken our national security, and alter our way of life. The National Research Council estimates that a severe space weather event has the potential to inflict \$1-2 trillion dollars of economic and societal damage in the first year alone and impact more than 130 million people. To recover from such an event could take from 4-10 years. Moreover, space weather fluctuations are not limited to rare catastrophic events but regularly impact our society and economy. It's estimated that the average economic impact of moderate geomagnetic events on the electric power grid in the U.S. is \$7 to \$10 billion per year. Additionally, advancing our understanding of the Sun is essential for the United States to realize its space exploration ambitions.

Given the economic and opportunity costs associated with space weather, we support the bill's approach of creating a national, coordinated plan to advance our understanding of the relationship between the Sun and Earth and to ensure the development of new technologies and forecasting capabilities to mitigate the threat posed by space weather. We appreciate the bill's recognition that a partnership between industry, academia, and federal agencies is needed to further our understanding and capacity to address the impacts of space weather. As a community dedicated to advancing the understanding of Earth and space science, we applaud the bill's intent to further scientifically informed action towards disaster preparation, mitigation, response, and recovery.

AGU looks forward to working with you as this legislation advances.

With best wishes,

CHRISTINE W. MCENTEE,
CEO/Executive Director,
American Geophysical Union.

OFFICE OF RESEARCH,
UNIVERSITY OF MICHIGAN,
January 7, 2020.

Hon. ED PERLMUTTER,
House of Representatives,
Washington, DC.

DEAR REPRESENTATIVE PERLMUTTER: On behalf of the University of Michigan Office of Research, I write to thank you for introducing the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act (H.R. 5260).

As this legislation notes, severe space weather events "could have significant societal, economic, national security, and health impacts." This bipartisan legislation is essential to helping us predict and mitigate such events that could drastically disrupt our economy and national security.

We are pleased this legislation outlines clear roles and responsibilities for the relevant federal agencies that are involved with improving our understanding, prediction and forecasting of space weather events. Importantly, PROSWIFT recognizes the necessity of engagement and cooperation with the academic community, among other sectors, by establishing a Space Weather Advisory Group whose membership will be equally comprised of a diverse stakeholder group including the academic community. Additionally, this bill creates a Space Weather Government-Academic-Commercial Roundtable to facilitate advances in space weather prediction and forecasting, among other items, which is necessary to efficiently advance our understanding of space weather.

The University of Michigan is focused on helping to improve the characterization, prediction, and mitigation of space weather events. Researchers on our campus study the effects of large solar eruptions and coronal mass ejections, and develop high-performance computational models to describe and predict hazardous conditions. If any of our experts on campus can ever be a resource, please do not hesitate to reach out.

Once again, thank you for your leadership on this legislation. We appreciate your continued commitment to improving efforts to predict and mitigate space weather events and we hope the full House of Representatives will approve this legislation expeditiously.

Sincerely,

REBECCA CUNNINGHAM, M.D.,
Interim Vice President for Research.

UNIVERSITY OF NEW HAMPSHIRE,
January 7, 2020.

Hon. EDDIE BERNICE JOHNSON,
Chair, Committee on Science, Space, and Technology, House of Representatives, Washington, DC.

Hon. FRANK LUCAS,
Ranking Member, Committee on Science, Space, and Technology, House of Representatives, Washington, DC.

DEAR CHAIR JOHNSON AND RANKING MEMBER LUCAS: We are writing on behalf of the University of New Hampshire (UNH) to voice our strong support for the PROSWIFT Act (H.R. 5260). UNH urges swift approval of this bipartisan legislation critical to ensuring that the United States is equipped to predict, mitigate, and respond to the hazards that space weather poses to our national security and economic wellbeing.

Federal support for research and technology development is essential to improving the Nation's space weather readiness. Current space weather monitoring capabilities rely on an observational infrastructure that is incapable of providing the lead time required to undertake proper space weather mitigation measures. We applaud the Committee's recognition of the importance of

fundamental research into the physical processes behind space weather. Such research will enable more sophisticated prediction capabilities and equip decision-makers with the information and tools necessary to avert crippling damage to our satellites, electric power grid, and other sensitive assets that underpin our economy and national security apparatus.

UNH is especially supportive of Sections 60603 and 60604. The former would strengthen support for critical ground-based and space-based space weather observational platforms while the latter would identify specific roles and responsibilities for research, development, and R20/02R activities at relevant agencies such as NASA, NSF, and NOAA. Particularly important to UNH and many of its peer institutions is the legislation's commitment to advancing the consensus-based priorities identified by the scientific community and articulated in the National Academies Solar and Space Physics Decadal Survey.

We thank you for putting forward this important piece of legislation, and we hope that UNH can serve as a resource for you as you continue working to address the pressing issue of space weather.

Sincerely,

DR. KEVIN GARDNER,
Vice Provost for Research, University of New Hampshire.

DR. HARLAN SPENCE,
Director, Institute for the Study of Earth, Oceans, and Space, University of New Hampshire.

PENN STATE,
January 8, 2020.

Hon. ED PERLMUTTER,
House of Representatives,
Washington, DC.

DEAR MR. PERLMUTTER: I write to express support for H.R. 5260, the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act, and appreciation for your leadership on this legislation that aims to improve efforts for predicting and mitigating space weather events.

By delineating clear roles and responsibilities to federal agencies that study and predict space weather, the legislation will improve resources and make critical measurement data available for the research community to model the frequency and severity of space weather events. This information will be helpful for monitoring space weather events, particularly coronal mass ejections and geomagnetic disturbances that can cause interruptions to the power grid and in satellites, affecting critical infrastructure that is dependent on communications technology and electricity.

With an increase in focus and attention to space weather activities provided by this legislation, researchers with expertise in data assimilation and big data analysis at Penn State and around the nation can conduct risk analysis and plan for responses to space weather events before they occur. Penn State researchers and educators in meteorology, geoinformatics, energy business and engineering, as well as social science, look forward to the data opportunities made available through this legislation.

If I or any of our experts in the College of Earth and Mineral Sciences can be of assistance to you, please feel free to contact my federal relations colleagues.

Sincerely,

LEE R. KUMP,
John Leone Dean.

Mr. PERLMUTTER. Madam Speaker, I also include in the RECORD an op-ed

from The Hill dated September 10, 2020, by Dr. Antonio Busalacchi, who supports this bill.

[From the Hill, Sept. 10, 2020]

CONGRESS NEEDS TO FINALIZE SPA WEATHER BILL AS SOLAR STORMS POSE HEIGHTENED THREAT

(By Antonio J. Busalacchi)

The COVID-19 pandemic has left us more dependent than ever on advanced information and communication technologies, with many businesses and schools relying on a range of remote services. In this environment, building resilience to potential threats that can disrupt society's essential daily activities is critical.

For this reason, it is heartening to see Congress advancing legislation to better protect the nation from solar storms that spew millions of tons of charged matter toward Earth. Such space weather events can distort GPS signals, scramble satellite operations, and disable communications and power systems, with serious consequences for our economy and armed services—a particularly major concern as the Pentagon prepares for future space-based conflicts.

Significant space weather events occur every decade or so with far-reaching and destructive consequences. A powerful solar storm in 1989 cut off power to millions of Canadians, and major storms in 2003 affected more than half of Earth-orbiting spacecraft. Just three years ago, solar flares caused radio blackouts for hours during critical emergency response efforts to approaching hurricanes in the Caribbean and nearby regions.

A solar superstorm poses even greater risks. The so-called Carrington Event in 1859, which ignited fires in telegraph offices, would have catastrophic impacts on today's society, potentially resulting in widespread damage to power grids, communication networks, and other technologies that would take weeks, months, or even years to repair. Even before COVID-19 led to an increased reliance on e-based technologies, the National Academy of Sciences estimated that such an event could result in as much as \$2 trillion in damages—or more than 10 times the costs of Hurricane Katrina.

Despite a growing array of advanced satellites that monitor the sun, forecasters cannot accurately predict when a major storm will erupt from the sun and begin its one- to four-day journey toward Earth. Observations provide only limited information about where the storm will hit and its potential for damage until it is within about a half-hour of Earth. This does not leave satellite operators and utility managers with sufficient notice to fully shield vulnerable electronics and power down critical hardware.

To improve its forecasting capability, the nation needs to invest in a new generation of space- and ground-based instruments that can provide continual measurements of magnetic fields throughout the solar atmosphere. These measurements would alert us to conditions that are conducive for storms and help us determine whether an incoming storm will penetrate our atmosphere and target certain regions on Earth, or harmlessly glance off.

Scientists are also working toward more advanced computer models of the sun. One of their primary goals is to stimulate the build-up of energy in twisted magnetic fields within the solar atmosphere, enabling forecasters to predict when the fields will erupt and spew tons of charged particles toward Earth.

Fortunately, Congress is starting to take action on this important issue. The Senate last month unanimously passed legislation to improve scientific understanding and forecasting of space weather. The Promoting Research and Observations of Space Weather to

Improve the Forecasting of Tomorrow (PROSWIFT) Act would break down barriers between the nation's researchers and forecasters, coordinate the efforts of key federal agencies, and establish an integrated strategy across the federal government to address space weather research and observational needs.

This legislation, appropriately, has strong bipartisan support. Sens. Gary Peters (D-Mich.) and Cory Gardner (R-Colo.) co-sponsored the Senate bill. In the House of Representatives, Rep. Ed Perlmutter (D-Colo.) is working with eight co-sponsors on both sides of the aisle to advance the measure.

With just months remaining on the calendar of the current Congress, the House must provide the final passage of this important legislation.

CONGRESS NEEDS TO PROVIDE FLEXIBLE FUNDING TO STATES TO DEPLOY

Our solar forecasting capabilities at present are comparable to terrestrial weather prediction before the Second World War when communities had little warning of incoming storms. Since then, government agencies, private companies, and university researchers have collaborated on landmark advances in weather prediction, which have saved countless lives, fostered economic growth, and supported military operations.

We have now arrived at a pivotal moment in forecasting solar storms. At a time when society is more dependent than ever on advanced e-based technologies, the PROSWIFT Act lays out a clear road map for bringing together expertise in government, the private sector, and academia to forecast these damaging events. If Congress and the administration successfully enact the legislation, this predictive capability will provide a critical safeguard for America's economic competitiveness and national security, and for the business and school technologies that we have all come to rely upon.

Mr. PERLMUTTER. Madam Speaker, just reading quickly from the op-ed as to why we are doing this:

"Significant space weather events occur every decade or so with far-reaching and destructive consequences. A powerful solar storm in 1989 cut off power to millions of Canadians, and major storms in 2003 affected more than half of the Earth-orbiting spacecraft. Just 3 years ago, solar flares caused radio blackouts for hours during critical emergency response efforts to approaching hurricanes in the Caribbean and nearby regions.

"A solar superstorm poses even greater risks. The so-called Carrington Event in 1859, which ignited fires in telegraph offices, would have catastrophic impacts on today's society, potentially resulting in widespread damage to power grids, communication networks, and other technologies."

Madam Speaker, I reserve the balance of my time.

Mr. LUCAS. Madam Speaker, I am prepared to close, and I yield myself such time as I may consume.

Madam Speaker, I, again, would like to thank the sponsors of this legislation for their hard work on this important topic.

I encourage all my colleagues to support this bill, and I yield back the balance of my time.

Mr. PERLMUTTER. Madam Speaker, I yield myself the balance of my time.

Madam Speaker, I thank my colleagues on both sides of the aisle for

supporting this legislation and for both sides of the Capitol. We have been working on it for a long time. There has been a lot of serious interest in this piece of legislation because of the potential for damage that a space weather event can have.

As I said before, we have worked together on the Committee on Science, Space and Technology and the Senate Committee on Commerce, Science, and Transportation to advance this bill for almost 5 years.

Each iteration of the bill brought new perspectives and new ideas, and we worked across two administrations. We put all that work together into the bill before us today, and I, again, thank the Members and staff who helped make this possible.

Madam Speaker, I encourage all my colleagues to vote "aye" on this space weather bill, and I yield back the balance of my time.

Ms. JOHNSON of Texas. Madam Speaker, I rise in strong support of S. 881 "The Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow, or PROSWIFT, Act."

Space weather is something the American public may not yet have an awareness of, but it has the potential to impact society across the world—every single day.

Geomagnetic storms or solar flares can cause disturbances in both space and the near-Earth environment.

These effects can reach the Earth's surface and pose significant risks to humans operating in space, some aircraft flights, space communications, GPS-based services, the electric grid, pipelines, and other space-based and ground-based infrastructure.

In short, space weather events can have major societal, national security, economic, and health impacts.

That is why I was an original co-sponsor of Mr. PERLMUTTER's H.R. 5260, "The PROSWIFT Act," which is the basis of the text of the Senate-passed space weather bill we are voting on today. H.R. 5260 was widely supported by the space weather community, including academia, industry, and not-for-profit entities.

I want to commend my colleague on the House Science Committee, Mr. PERLMUTTER, for tirelessly pushing to make this legislation a reality for over five years.

He and his dedicated staff worked closely with my Committee staff, with the staff of the Committee's Ranking Member, as well as staff of our colleagues in the Senate, to bring this legislation to the floor today.

Unlike previous attempts to move this legislation, I am proud that the bill being voted on today came out of regular order in the House Science Committee.

This bill took into consideration feedback from major stakeholders in the space weather community and was strengthened during our markup process to include a commercial space weather pilot program. It was further strengthened following negotiations with our colleagues in the Senate.

I am pleased that this bill represents both bicameral and bipartisan agreement on this important issue.

I have supported the overall agenda to advance the space weather enterprise and en-

sure capabilities for space weather observation and forecasting for many years and Congresses before this. I am looking forward to finally passing this legislation today, and have it enacted after years of hard work.

Being able to better understand and predict space weather events is vitally important to protecting our society, our economy, and our critical national infrastructure. I urge my colleagues to support this bipartisan and good governance bill.

The SPEAKER pro tempore. The question is on the motion offered by the gentleman from Colorado (Mr. PERLMUTTER) that the House suspend the rules and pass the bill, S. 881.

The question was taken; and (two-thirds being in the affirmative) the rules were suspended and the bill was passed.

A motion to reconsider was laid on the table.

RURAL STEM EDUCATION ACT

Ms. JOHNSON of Texas. Madam Speaker, I move to suspend the rules and pass the bill (H.R. 4979) to direct the Director of the National Science Foundation to support STEM education and workforce development research focused on rural areas, and for other purposes, as amended.

The Clerk read the title of the bill.

The text of the bill is as follows:

H.R. 4979

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 "Rural STEM Education Act".

SEC. 2. FINDINGS.

Congress finds the following:

(1) The supply of STEM workers is not keeping pace with the rapidly evolving needs of the public and private sector, resulting in a deficit often referred to as a STEM skills shortage.

(2) According to the Bureau of Labor Statistics, the United States will need one million additional STEM professionals than it is on track to produce in the coming decade.

(3) Many STEM occupations offer higher wages, more opportunities for advancement, and a higher degree of job security than non-STEM jobs.

(4) The 60,000,000 individuals in the United States who live in rural settings are significantly under-represented in STEM.

(5) According to the National Center for Education Statistics, nine million students in the United States—nearly 20 percent of the total K–12 population—attend rural schools, and for reasons ranging from teacher quality to shortages of resources, these students often have fewer opportunities for high-quality STEM learning than their peers in the Nation's urban and suburban schools.

(6) Rural areas represent one of the most promising, yet underutilized, opportunities for STEM education to impact workforce development and regional innovation, including agriculture.

(7) The study of agriculture, food, and natural resources involves biology, engineering, physics, chemistry, math, geology, computer science, and other scientific fields.

(8) Employment in computer and information technology occupations is projected to grow 11 percent from 2019 to 2029. To help meet this demand, it is important rural students have the opportunity to acquire computing skills through exposure to computer