

**AMENDMENT IN THE NATURE OF A SUBSTITUTE
OFFERED BY MS. EDDIE BERNICE JOHNSON
OF TEXAS TO THE AMENDMENT IN THE NA-
TURE OF A SUBSTITUTE OFFERED BY MR.
PERLMUTTER**

Strike all after the enacting clause and insert the following:

1 SECTION 1. SHORT TITLE.

2 This Act may be cited as the “Space Weather Re-
3 search and Forecasting Act”.

4 SEC. 2. SPACE WEATHER.

5 (a) IN GENERAL.—Subtitle VI of title 51, United
6 States Code, is amended by adding after chapter 605 the
7 following:

8 “CHAPTER 607—SPACE WEATHER

“Sec.

“60701. Space weather.

“60702. Observations and forecasting.

“60703. Research and technology.

“60704. Space weather data.

9 “§ 60701. Space weather

10 “(a) FINDINGS.—Congress makes the following find-
11 ings:

1 “(1) Space weather events pose a significant
2 threat to humans working in the space environment
3 and to modern technological systems.

4 “(2) The effects of severe space weather events
5 on the electric power grid, satellites and satellite
6 communications and information, airline operations,
7 astronauts living and working in space, and space-
8 based position, navigation, and timing systems could
9 have significant societal, economic, national security,
10 and health impacts.

11 “(3) Earth and space observations provide cru-
12 cial data necessary to predict and warn about space
13 weather events.

14 “(4) Clear roles and accountability of Federal
15 departments and agencies are critical for an efficient
16 and effective response to threats posed by space
17 weather.

18 “(5) In October 2015, the National Science and
19 Technology Council published a National Space
20 Weather Strategy and a National Space Weather
21 Action Plan seeking to integrate national space
22 weather efforts and add new capabilities to meet in-
23 creasing demand for space weather information.

24 “(b) FEDERAL AGENCY ROLES.—

25 “(1) FINDINGS.—Congress finds that—

1 “(A) the National Oceanic and Atmos-
2 pheric Administration provides operational
3 space weather forecasting and monitoring for
4 civil applications, maintains ground and space-
5 based assets to provide observations needed for
6 forecasting, prediction, and warnings, provides
7 research to support operational responsibilities,
8 and develops requirements for space weather
9 forecasting technologies and science;

10 “(B) the Department of Defense provides
11 operational space weather forecasting, moni-
12 toring, and research for the department’s
13 unique missions and applications;

14 “(C) the National Aeronautics and Space
15 Administration provides increased under-
16 standing of the fundamental physics of the
17 Sun-Earth system through space-based observa-
18 tions and modeling, develops new space-based
19 technologies and missions, and monitors space
20 weather for NASA’s space missions;

21 “(D) the National Science Foundation pro-
22 vides increased understanding of the Sun-Earth
23 system through ground-based measurements,
24 technologies, and modeling;

1 “(E) the Department of the Interior col-
2 lects, distributes, and archives operational
3 ground-based magnetometer data in the United
4 States and its territories, works with the inter-
5 national community to improve global geo-
6 physical monitoring, and develops crustal con-
7 ductivity models to assess and mitigate risk
8 from space weather-induced electric ground cur-
9 rents; and

10 “(F) the Federal Aviation Administration
11 provides operational requirements for space
12 weather services in support of aviation and for
13 coordination of these requirements with the
14 International Civil Aviation Organization, inte-
15 grates space weather data and products into the
16 Next Generation Air Transportation System,
17 and conducts real-time monitoring of the
18 charged particle radiation environment to pro-
19 tect the health and safety of crew and pas-
20 sengers during space weather events.

21 “(2) OFFICE OF SCIENCE AND TECHNOLOGY
22 POLICY.—The Director of the Office of Science and
23 Technology Policy shall—

24 “(A) coordinate the development and im-
25 plementation of Federal Government activities

1 to improve the Nation’s ability to prepare,
2 avoid, mitigate, respond to, and recover from
3 potentially devastating impacts of space weath-
4 er events; and

5 “(B) coordinate the activities of the space
6 weather interagency working group established
7 under subsection (c).

8 “(c) SPACE WEATHER INTERAGENCY WORKING
9 GROUP.—In order to continue coordination of executive
10 branch efforts to understand, prepare, coordinate, and
11 plan for space weather, the National Science and Tech-
12 nology Council shall establish an interagency working
13 group on space weather.

14 “(d) MEMBERSHIP.—In order to understand and re-
15 spond to the adverse effects of space weather, the inter-
16 agency working group established under subsection (c)
17 shall leverage capabilities across participating Federal
18 agencies, including—

19 “(1) the National Oceanic and Atmospheric Ad-
20 ministration;

21 “(2) the National Aeronautics and Space Ad-
22 ministration;

23 “(3) the National Science Foundation;

24 “(4) the Department of Defense;

25 “(5) the Department of the Interior;

1 “(6) the Department of Homeland Security;

2 “(7) the Department of Energy;

3 “(8) the Department of Transportation, includ-
4 ing the Federal Aviation Administration; and

5 “(9) the Department of State.

6 “(e) INTERAGENCY AGREEMENTS.—

7 “(1) SENSE OF CONGRESS.—It is the sense of
8 Congress that the interagency collaboration between
9 the National Aeronautics and Space Administration
10 and the National Oceanic and Atmospheric Adminis-
11 tration on terrestrial weather observations pro-
12 vides—

13 “(A) an effective mechanism for improving
14 weather and climate data collection while avoid-
15 ing unnecessary duplication of capabilities
16 across Federal agencies; and

17 “(B) an agency collaboration model that
18 could benefit space weather observations.

19 “(2) INTERAGENCY AGREEMENTS.—The Ad-
20 ministrator of the National Aeronautics and Space
21 Administration and the Administrator of the Na-
22 tional Oceanic and Atmospheric Administration shall
23 enter into one or more interagency agreements pro-
24 viding for cooperation and collaboration in the devel-
25 opment of space weather spacecraft, instruments,

1 and technologies and in the transition of research to
2 operations in accordance with this chapter.

3 “(f) INTERNATIONAL, COMMERCIAL, AND ACADEMIC
4 COLLABORATION.—Participating Federal agencies in the
5 space weather interagency working group established
6 under subsection (c) shall, to the extent practicable and
7 appropriate, increase engagement and cooperation with
8 the international, commercial, and academic communities
9 on the observational infrastructure, data, and scientific re-
10 search necessary to advance the characterization, pre-
11 diction, and mitigation of space weather events.

12 **“§ 60702. Observations and forecasting**

13 “(a) POLICY.—It is the policy of the United States
14 to establish and sustain a baseline space and ground-based
15 capability for space weather observations.

16 “(b) INTEGRATED STRATEGY.—

17 “(1) IN GENERAL.—The Director of the Office
18 of Science and Technology Policy, in coordination
19 with the Administrator of the National Oceanic and
20 Atmospheric Administration, the Administrator of
21 the National Aeronautics and Space Administration,
22 the Director of the National Science Foundation,
23 and the Secretary of Defense, and in consultation
24 with the academic and commercial communities,
25 shall develop an integrated strategy for space and

1 ground-based space weather observations, including
2 solar and solar wind observations beyond the lifetime
3 of current assets, that considers—

4 “(A) the provision of solar wind measure-
5 ments and other measurements essential to
6 space weather forecasting; and

7 “(B) the provision of solar and space
8 weather measurements important for scientific
9 purposes.

10 “(2) CONSIDERATIONS.—In developing the
11 strategy under paragraph (1), the Director of the
12 Office of Science and Technology Policy shall con-
13 sider small satellite and microsatellite options,
14 hosted payloads, commercial options, international
15 options, and prize authority.

16 “(c) CRITICAL OBSERVATIONS.—In order to sustain
17 current space-based observational capabilities, the Admin-
18 istrator of the National Aeronautics and Space Adminis-
19 tration shall—

20 “(1) as appropriate, in cooperation with the
21 European Space Agency, maintain operations of the
22 Solar and Heliospheric Observatory/Large Angle and
23 Spectrometric Coronagraph (referred to in this sec-
24 tion as ‘SOHO/LASCO’) for as long as the satellite
25 continues to deliver quality observations; and

1 “(2) prioritize the reception of LASCO data.

2 “(d) ADDITIONAL CAPABILITY FOR SOLAR IMAG-
3 ING.—

4 “(1) IN GENERAL.—The Administrator of the
5 National Oceanic and Atmospheric Administration
6 shall secure reliable secondary capability for near
7 real-time coronal mass ejection imagery.

8 “(2) OPTIONS.—The Administrator of the Na-
9 tional Oceanic and Atmospheric Administration, in
10 coordination with the Secretary of Defense and the
11 Administrator of the National Aeronautics and
12 Space Administration, shall develop options, includ-
13 ing commercial solutions, to build and deploy one or
14 more instruments for near real-time coronal mass
15 ejection imagery.

16 “(3) CONSIDERATIONS.—In developing options
17 under paragraph (2), the Administrator of the Na-
18 tional Oceanic and Atmospheric Administration shall
19 consider commercial solutions, prize authority, aca-
20 demic and international partnerships, small satellites
21 and microsattellites, ground-based instruments, and
22 opportunities to deploy the instrument or instru-
23 ments as a secondary payload on an upcoming
24 planned launch.

1 “(4) COSTS.—In implementing paragraph (1),
2 the Administrator of the National Oceanic and At-
3 mospheric Administration shall consider a cost-effec-
4 tive and reliable solution.

5 “(5) OPERATIONAL PLANNING.—The Adminis-
6 trator of the National Oceanic and Atmospheric Ad-
7 ministration shall develop an operational contingency
8 plan to provide continuous space weather forecasting
9 in the event of a SOHO/LASCO failure.

10 “(6) BRIEFING.—Not later than 120 days after
11 the date of enactment of the Space Weather Re-
12 search and Forecasting Act, the Administrator of
13 the National Oceanic and Atmospheric Administra-
14 tion shall provide a briefing to the Committee on
15 Commerce, Science, and Transportation of the Sen-
16 ate and the Committee on Science, Space, and Tech-
17 nology of the House of Representatives on the op-
18 tions for building and deploying the instrument or
19 instruments described in paragraph (2) and the
20 operational contingency plan developed under para-
21 graph (5).

22 “(e) FOLLOW-ON SPACE-BASED OBSERVATIONS.—

23 “(1) PLAN.—The Administrator of the National
24 Oceanic and Atmospheric Administration, in coordi-
25 nation with the Secretary of Defense, shall develop

1 requirements and a plan for follow-on space-based
2 observations for operational purposes, in accordance
3 with the integrated strategy developed under sub-
4 section (b).

5 “(2) RESEARCH NEEDS.—In developing the re-
6 quirements and plan under paragraph (1), the Ad-
7 ministrator of the National Oceanic and Atmos-
8 pheric Administration shall coordinate with the Na-
9 tional Aeronautics and Space Administration and
10 the National Science Foundation regarding the re-
11 search necessary to improve space weather fore-
12 casting and the space-based observations that will
13 advance research and development.

14 “(f) REPORT.—Not later than 180 days after the
15 date of enactment of the Space Weather Research and
16 Forecasting Act, the Director of the Office of Science and
17 Technology Policy shall submit to the Committee on Com-
18 merce, Science, and Transportation of the Senate and the
19 Committee on Science, Space, and Technology of the
20 House of Representatives a report on the integrated strat-
21 egy under subsection (b), including the Plan for follow-
22 on space-based observations under subsection (e).

23 “(g) REVIEW OF INTEGRATED STRATEGY.—

24 “(1) REVIEW.—The Director of the National
25 Science Foundation, in conjunction with Federal

1 agencies participating in the space weather inter-
2 agency working group established under section
3 60701(c), shall enter into an agreement with the
4 National Academies to review the integrated strat-
5 egy developed under subsection (b).

6 “(2) TRANSMITTAL.—The Director of the Na-
7 tional Science Foundation shall transmit the results
8 of the review required under paragraph (1) to the
9 Committee on Science, Space, and Technology of the
10 House of Representatives and the Committee on
11 Commerce, Science, and Transportation of the Sen-
12 ate not later than 18 months after the enactment of
13 the Space Weather Research and Forecasting Act.

14 “(h) GROUND-BASED OBSERVATIONS.—The Na-
15 tional Science Foundation, the Air Force, and, where
16 practicable in support of the Air Force, the Navy shall
17 each—

18 “(1) maintain and improve, as necessary and
19 advisable, ground-based observations of the Sun in
20 order to help meet the priorities identified in section
21 60703(a); and

22 “(2) provide space weather data by means of its
23 set of ground-based facilities, including radars,
24 lidars, magnetometers, radio receivers, aurora and

1 airglow imagers, spectrometers, interferometers, and
2 solar observatories.

3 “(i) GROUND-BASED OBSERVATIONS DATA.—The
4 National Science Foundation shall—

5 “(1) provide key data streams from the plat-
6 forms described in subsection (h) for research and to
7 support space weather model development;

8 “(2) develop experimental models for scientific
9 purposes; and

10 “(3) support the transition of the experimental
11 models to operations where appropriate.

12 **“§ 60703. Research and technology**

13 “(a) USER NEEDS.—

14 “(1) IN GENERAL.—The Administrator of the
15 National Oceanic and Atmospheric Administration,
16 the Secretary of the Air Force, and where prac-
17 ticable in support of the Air Force, the Secretary of
18 the Navy, in conjunction with the Administrator of
19 the National Aeronautics and Space Administration
20 and the heads of other relevant Federal agencies,
21 shall conduct a comprehensive survey to identify and
22 prioritize the needs of space weather forecast users,
23 including space weather data and space weather
24 forecast data needed to improve services and inform
25 research priorities and technology needs.

1 “(2) CONTENTS.—In conducting the com-
2 prehensive survey under paragraph (1), the Adminis-
3 trator of the National Oceanic and Atmospheric Ad-
4 ministration, the Secretary of the Air Force, and
5 where practicable in support of the Air Force, the
6 Secretary of the Navy, at a minimum, shall—

7 “(A) consider the goals for forecast lead
8 time, accuracy, coverage, timeliness, data rate,
9 and data quality for space weather observa-
10 tions;

11 “(B) identify opportunities to address the
12 needs identified under paragraph (1) through
13 collaborations with academia, the commercial
14 sector, and the international community;

15 “(C) identify opportunities for new tech-
16 nologies, research, and instrumentation to ad-
17 dress the needs identified under paragraph (1);
18 and

19 “(D) publish a report on the findings
20 under subparagraphs (A) through (C).

21 “(3) PUBLICATION.—Not later than 1 year
22 after the date of enactment of the Space Weather
23 Research and Forecasting Act, the Administrator of
24 the National Oceanic and Atmospheric Administra-
25 tion, the Secretary of the Air Force, and where prac-

1 ticable in support of the Air Force, the Secretary of
2 the Navy, shall—

3 “(A) make the results of the comprehen-
4 sive survey publicly available; and

5 “(B) notify the Committee on Commerce,
6 Science, and Transportation of the Senate and
7 the Committee on Science, Space, and Tech-
8 nology of the House of Representatives of the
9 publication under subparagraph (A).

10 “(b) RESEARCH ACTIVITIES.—

11 “(1) BASIC RESEARCH.—The Director of the
12 National Science Foundation, Administrator of the
13 National Aeronautics and Space Administration, and
14 the Secretary of Defense shall continue to carry out
15 basic research activities on heliophysics, geospace
16 science, and space weather and support competitive,
17 merit-based, peer-reviewed proposals for research,
18 modeling, and monitoring of space weather and its
19 impacts, including science goals outlined in Solar
20 and Space Physics Decadal surveys conducted by the
21 National Academy of Sciences.

22 “(2) OTHER RESEARCH ACTIVITIES.—The Di-
23 rector of the National Science Foundation and the
24 Administrator of the National Oceanic and Atmos-
25 pheric Administration shall support basic research

1 activities in the social, behavioral, and economic
2 sciences that will lead to improved national pre-
3 paredness and encourage mitigation and protection
4 measures before a space weather event.

5 “(3) MULTIDISCIPLINARY RESEARCH.—

6 “(A) FINDINGS.—Congress finds that the
7 multidisciplinary nature of solar and space
8 physics creates funding challenges that require
9 coordination across scientific disciplines and
10 Federal agencies.

11 “(B) MULTIDISCIPLINARY RESEARCH.—
12 The Director of the National Science Founda-
13 tion, the Administrator of the National Oceanic
14 and Atmospheric Administration, and the Ad-
15 ministrator of the National Aeronautics and
16 Space Administration shall pursue multidisci-
17 plinary, coordinated research in subjects that
18 further our understanding of solar physics,
19 space physics, and space weather.

20 “(C) SENSE OF CONGRESS.—It is the
21 sense of Congress that the Administrator of the
22 National Aeronautics and Space Administration
23 and Director of the National Science Founda-
24 tion should support competitively awarded

1 Heliophysics Science Centers that support re-
2 search to operations and operations to research.

3 “(c) SCIENCE MISSIONS.—The Administrator of the
4 National Aeronautics and Space Administration shall seek
5 to implement missions that meet the science objectives
6 identified in Solar and Space Physics Decadal surveys con-
7 ducted by the National Academy of Sciences.

8 “(d) RESEARCH TO OPERATIONS.—

9 “(1) IN GENERAL.—The Administrator of the
10 National Aeronautics and Space Administration, the
11 Director of the National Science Foundation, the
12 Administrator of the National Oceanic and Atmos-
13 pheric Administration, the Secretary of the Air
14 Force, and where practicable in support of the Air
15 Force, the Secretary of the Navy, shall—

16 “(A) develop a formal mechanism to tran-
17 sition National Aeronautics and Space Adminis-
18 tration, National Science Foundation, Air
19 Force, and Navy research findings, research
20 needs, models, and capabilities, as appropriate,
21 to National Oceanic and Atmospheric Adminis-
22 tration and Department of Defense space
23 weather operational forecasting centers; and

1 “(B) enhance coordination between re-
2 search modeling centers and forecasting cen-
3 ters.

4 “(2) OPERATIONAL NEEDS.—The Adminis-
5 trator of the National Oceanic and Atmospheric Ad-
6 ministration and the Secretary of Defense, in coordi-
7 nation with the Administrator of the National Aero-
8 nautics and Space Administration and the Director
9 of the National Science Foundation, shall develop a
10 formal mechanism to communicate the operational
11 needs of space weather forecasters to the research
12 community.

13 “(e) TECHNOLOGY DEVELOPMENT.—

14 “(1) FINDINGS.—Congress finds that observa-
15 tions and measurements closer to the Sun and ad-
16 vanced instrumentation would provide for more ad-
17 vanced warning of space weather disturbances (as
18 defined in section 3 of the Space Weather Research
19 and Forecasting Act).

20 “(2) TECHNOLOGY AND INSTRUMENTATION DE-
21 VELOPMENT.—The Administrator of the National
22 Aeronautics and Space Administration and the Di-
23 rector of the National Science Foundation shall sup-
24 port the development of technologies and instrumen-
25 tation that address research priorities and improve

1 space weather forecasting lead-time and accuracy to
2 meet the needs identified by the Administrator of
3 the National Oceanic and Atmospheric Administra-
4 tion.

5 **“§ 60704. Space weather data**

6 “(a) IN GENERAL.—The Administrator of the Na-
7 tional Aeronautics and Space Administration and the Di-
8 rector of the National Science Foundation shall—

9 “(1) make space weather related data obtained
10 for scientific research purposes available to space
11 weather forecasters and operations centers; and

12 “(2) support model development and model ap-
13 plications to space weather forecasting.

14 “(b) RESEARCH.—The Administrator of the National
15 Oceanic and Atmospheric Administration shall make space
16 weather related data obtained from operational forecasting
17 available for scientific research.

18 “(c) SPACE WEATHER GOVERNMENT-INDUSTRY-
19 UNIVERSITY ROUNDTABLE.—The Administrator of the
20 National Oceanic and Atmospheric Administration, in col-
21 laboration with the Administrator of the National Aero-
22 nautics and Space Administration and the Director of the
23 National Science Foundation, shall enter into an arrange-
24 ment with the National Academies to establish a Space
25 Weather Government-Industry-University Roundtable to

1 facilitate communication and knowledge transfer among
 2 Government participants in the space weather interagency
 3 working group established under section 60701(c), indus-
 4 try, and academia to—

5 “(1) facilitate advances in space weather pre-
 6 diction and forecasting;

7 “(2) help enable the 2-way coordination of re-
 8 search and operations; and

9 “(3) improve preparedness for potential space
 10 weather events.”.

11 (b) **TECHNICAL AND CONFORMING AMENDMENTS.—**

12 (1) **REPEAL OF SECTION 809.**—Section 809 of
 13 the National Aeronautics and Space Administration
 14 Authorization Act of 2010 (42 U.S.C. 18388) and
 15 the item relating to that section in the table of con-
 16 tents under section 1(b) of that Act (124 Stat.
 17 2806) are repealed.

18 (2) **TABLE OF CHAPTERS.**—The table of chap-
 19 ters of title 51, United States Code, is amended by
 20 adding after the item relating to chapter 605 the fol-
 21 lowing:

 “607. Space weather 60701”.

22 **SEC. 3. SPACE WEATHER METRICS.**

23 (a) **DEFINITIONS.**—In this section:

24 (1) **SPACE WEATHER DISTURBANCE.**—The term
 25 “space weather disturbance” includes geo-electric

1 fields, ionizing radiation, ionospheric disturbances,
2 solar radio bursts, and upper atmospheric expansion.

3 (2) SPACE WEATHER BENCHMARK.—The term
4 “space weather benchmark” means the physical
5 characteristics and conditions describing the nature,
6 frequency, and intensity of space weather disturb-
7 ances.

8 (b) BENCHMARKS.—

9 (1) PRELIMINARY.—Not later than 90 days
10 after the date of enactment of this Act, the space
11 weather interagency working group established
12 under section 60701(c) of title 51, United States
13 Code, in consultation with academic and commercial
14 experts, shall—

15 (A) assess existing data, the historical
16 record, models, and peer-reviewed studies on
17 space weather; and

18 (B) develop preliminary benchmarks, based
19 on current scientific understanding and the his-
20 torical record, for measuring solar disturbances.

21 (2) FINAL.—Not later than 18 months after
22 the date the preliminary benchmarks are developed
23 under paragraph (1), the space weather interagency
24 working group shall publish final benchmarks.

1 (3) REVIEW.—The Administrator of the Na-
2 tional Aeronautics and Space Administration shall
3 contract with the National Academy of Sciences to
4 review the benchmarks established under paragraph
5 (2).

6 (4) REVISIONS.—The space weather inter-
7 agency working group shall update and revise the
8 final benchmarks under paragraph (2), as necessary,
9 based on—

10 (A) the results of the review under para-
11 graph (3);

12 (B) any significant new data or advances
13 in scientific understanding that become avail-
14 able; or

15 (C) the evolving needs of entities impacted
16 by solar disturbances.

17 **SEC. 4. PROTECTION OF CRITICAL INFRASTRUCTURE.**

18 (a) IN GENERAL.—The Administrator of the Na-
19 tional Oceanic and Atmospheric Administration, in con-
20 sultation with the heads of other relevant Federal agen-
21 cies, shall provide information about space weather haz-
22 ards to the Secretary of Homeland Security for purposes
23 of this section.

24 (b) CRITICAL INFRASTRUCTURE.—The Secretary of
25 Homeland Security, in consultation with sector-specific

1 agencies, the Administrator of the National Oceanic and
2 Atmospheric Administration, and the heads of other rel-
3 evant agencies, shall—

4 (1) include, in meeting national critical infra-
5 structure reporting requirements, an assessment of
6 the vulnerability of critical infrastructure to space
7 weather events, as described by the space weather
8 benchmarks under section 3; and

9 (2) support critical infrastructure providers in
10 managing the risks and impacts associated with
11 space weather.

12 (c) PROHIBITION ON NEW REGULATORY AUTHOR-
13 ITY.—Nothing in subsection (b) may be construed to grant
14 the Secretary of Homeland Security any authority to pro-
15 mulgate regulations that was not in effect on the day be-
16 fore the date of enactment of this Act.

17 (d) DEFINITION OF SECTOR-SPECIFIC AGENCY.—In
18 this section, the term “sector-specific agency” has the
19 meaning given the term in Presidential Policy Directive—
20 21 of February 12, 2013 (Critical Infrastructure Security
21 and Resilience), or any successor.

22 **SEC. 5. PROTECTION OF NATIONAL SECURITY ASSETS.**

23 (a) IN GENERAL.—The National Security Council, in
24 consultation with the Office of the Director of National

1 Intelligence, the Secretary of Defense, and the heads of
2 other relevant Federal agencies, shall—

3 (1) assess the vulnerability of the national secu-
4 rity community to space weather events, as described
5 by the space weather benchmarks under section 3;
6 and

7 (2) develop national security mechanisms to
8 protect national security assets from space weather
9 threats.

10 (b) COOPERATION.—The Secretary of Defense, in
11 consultation with the heads of other relevant Federal
12 agencies, shall provide information about space weather
13 hazards to the National Security Council, Director of Na-
14 tional Intelligence, and heads of Defense Agencies for pur-
15 poses of this section.

16 **SEC. 6. ENSURING THE SAFETY OF CIVIL AVIATION.**

17 (a) IN GENERAL.—The Administrator of the Federal
18 Aviation Administration, in consultation with the heads of
19 other relevant Federal agencies, shall—

20 (1) assess the safety implications and vulner-
21 ability of the national airspace system by space
22 weather events, as described by the space weather
23 benchmarks under section 3;

24 (2) assess methods to mitigate the safety impli-
25 cations and effects of space weather on aviation

1 communication systems, aircraft navigation systems,
2 satellite and ground-based navigation systems, and
3 potential health effects of radiation exposure; and

4 (3) assess options for incorporating space
5 weather into operational training for pilots, cabin
6 crew, dispatchers, air traffic controllers, meteorolo-
7 gists, and engineers.

8 (b) SPACE WEATHER COMMUNICATION.—The Ad-
9 ministrator of the Federal Aviation Administration, in
10 consultation with the heads of other relevant Federal
11 agencies, shall develop methods to increase the interaction
12 between the aviation community and the space weather re-
13 search and service provider community.

