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(Original Signature of Member)

115TH CONGRESS
1ST SESSION

H. R. _____

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

IN THE HOUSE OF REPRESENTATIVES

Mr. PERLMUTTER introduced the following bill; which was referred to the Committee on _____

A BILL

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

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

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

6 **SEC. 2. SPACE WEATHER.**

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

1 **“CHAPTER 607—SPACE WEATHER**

“Sec.

“60701. Space weather.

“60702. Observations and forecasting.

“60703. Research and technology.

“60704. Space weather data.

2 **“§ 60701. Space weather**

3 “(a) FINDINGS.—Congress makes the following find-
4 ings:

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

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

15 “(3) Earth and space observations provide cru-
16 cial data necessary to predict and warn about space
17 weather events.

18 “(4) Clear roles and accountability of Federal
19 departments and agencies are critical for an efficient
20 and effective response to threats posed by space
21 weather.

22 “(5) In October 2015, the National Science and
23 Technology Council published a National Space

1 Weather Strategy and a National Space Weather
2 Action Plan seeking to integrate national space
3 weather efforts and add new capabilities to meet in-
4 creasing demand for space weather information.

5 “(b) FEDERAL AGENCY ROLES.—

6 “(1) FINDINGS.—Congress finds that—

7 “(A) the National Oceanic and Atmos-
8 pheric Administration provides operational
9 space weather forecasting and monitoring for
10 civil applications, maintains ground and space-
11 based assets to provide observations needed for
12 forecasting, prediction, and warnings, provides
13 research to support operational responsibilities,
14 and develops requirements for space weather
15 forecasting technologies and science;

16 “(B) the Department of Defense provides
17 operational space weather forecasting, moni-
18 toring, and research for the department’s
19 unique missions and applications;

20 “(C) the National Aeronautics and Space
21 Administration provides increased under-
22 standing of the fundamental physics of the
23 Sun-Earth system through space-based observa-
24 tions and modeling, develops new space-based

1 technologies and missions, and monitors space
2 weather for NASA's space missions;

3 “(D) the National Science Foundation pro-
4 vides increased understanding of the Sun-Earth
5 system through ground-based measurements,
6 technologies, and modeling;

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

16 “(F) the Federal Aviation Administration
17 provides operational requirements for space
18 weather services in support of aviation and for
19 coordination of these requirements with the
20 International Civil Aviation Organization, inte-
21 grates space weather data and products into the
22 Next Generation Air Transportation System,
23 and conducts real-time monitoring of the
24 charged particle radiation environment to pro-

1 tect the health and safety of crew and pas-
2 sengers during space weather events.

3 “(2) OFFICE OF SCIENCE AND TECHNOLOGY
4 POLICY.—The Director of the Office of Science and
5 Technology Policy shall—

6 “(A) coordinate the development and im-
7 plementation of Federal Government activities
8 to improve the Nation’s ability to prepare,
9 avoid, mitigate, respond to, and recover from
10 potentially devastating impacts of space weath-
11 er events; and

12 “(B) coordinate the activities of the space
13 weather interagency working group established
14 under subsection (c).

15 “(c) SPACE WEATHER INTERAGENCY WORKING
16 GROUP.—In order to continue coordination of executive
17 branch efforts to understand, prepare, coordinate, and
18 plan for space weather, the National Science and Tech-
19 nology Council shall establish an interagency working
20 group on space weather.

21 “(d) MEMBERSHIP.—In order to understand and re-
22 spond to the adverse effects of space weather, the inter-
23 agency working group established under subsection (c)
24 shall leverage capabilities across participating Federal
25 agencies, including—

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

3 “(2) the National Aeronautics and Space Ad-
4 ministration;

5 “(3) the National Science Foundation;

6 “(4) the Department of Defense;

7 “(5) the Department of the Interior;

8 “(6) the Department of Homeland Security;

9 “(7) the Department of Energy;

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

12 “(9) the Department of State.

13 “(e) INTERAGENCY AGREEMENTS.—

14 “(1) SENSE OF CONGRESS.—It is the sense of
15 Congress that the interagency collaboration between
16 the National Aeronautics and Space Administration
17 and the National Oceanic and Atmospheric Adminis-
18 tration on terrestrial weather observations pro-
19 vides—

20 “(A) an effective mechanism for improving
21 weather and climate data collection while avoid-
22 ing unnecessary duplication of capabilities
23 across Federal agencies; and

24 “(B) an agency collaboration model that
25 could benefit space weather observations.

1 “(2) INTERAGENCY AGREEMENTS.—The Ad-
2 ministrator of the National Aeronautics and Space
3 Administration and the Administrator of the Na-
4 tional Oceanic and Atmospheric Administration shall
5 enter into 1 or more interagency agreements pro-
6 viding for cooperation and collaboration in the devel-
7 opment of space weather spacecraft, instruments,
8 and technologies and in the transition of research to
9 operations in accordance with this chapter.

10 “(f) INTERNATIONAL, COMMERCIAL, AND ACADEMIC
11 COLLABORATION.—Participating Federal agencies in the
12 space weather interagency working group established
13 under subsection (e) shall, to the extent practicable and
14 appropriate, increase engagement and cooperation with
15 the international, commercial, and academic communities
16 on the observational infrastructure, data, and scientific re-
17 search necessary to advance the characterization, pre-
18 diction, and mitigation of space weather events.

19 **“§ 60702. Observations and forecasting**

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

23 “(b) INTEGRATED STRATEGY.—

24 “(1) IN GENERAL.—The Director of the Office
25 of Science and Technology Policy, in coordination

1 with the Administrator of the National Oceanic and
2 Atmospheric Administration, the Administrator of
3 the National Aeronautics and Space Administration,
4 the Director of the National Science Foundation,
5 and the Secretary of Defense, and in consultation
6 with the academic and commercial communities,
7 shall develop an integrated strategy for space and
8 ground-based space weather observations, including
9 solar and solar wind observations beyond the lifetime
10 of current assets, that considers—

11 “(A) the provision of solar wind measure-
12 ments and other measurements essential to
13 space weather forecasting; and

14 “(B) the provision of solar and space
15 weather measurements important for scientific
16 purposes.

17 “(2) CONSIDERATIONS.—In developing the
18 strategy under paragraph (1), the Director of the
19 Office of Science and Technology Policy shall con-
20 sider small satellite and microsatellite options,
21 hosted payloads, commercial options, international
22 options, and prize authority.

23 “(c) CRITICAL OBSERVATIONS.—In order to sustain
24 current space-based observational capabilities, the Admin-

1 istrator of the National Aeronautics and Space Adminis-
2 tration shall—

3 “(1) as appropriate, in cooperation with the
4 European Space Agency, maintain operations of the
5 Solar and Heliospheric Observatory/Large Angle and
6 Spectrometric Coronagraph (referred to in this sec-
7 tion as ‘SOHO/LASCO’) for as long as the satellite
8 continues to deliver quality observations; and

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

10 “(d) ADDITIONAL CAPABILITY FOR SOLAR IMAG-
11 ING.—

12 “(1) IN GENERAL.—The Administrator of the
13 National Oceanic and Atmospheric Administration
14 shall secure reliable secondary capability for near
15 real-time coronal mass ejection imagery.

16 “(2) OPTIONS.—The Administrator of the Na-
17 tional Oceanic and Atmospheric Administration, in
18 coordination with the Secretary of Defense and the
19 Administrator of the National Aeronautics and
20 Space Administration, shall develop options, includ-
21 ing commercial solutions, to build and deploy 1 or
22 more instruments for near real-time coronal mass
23 ejection imagery.

24 “(3) CONSIDERATIONS.—In developing options
25 under paragraph (2), the Administrator of the Na-

1 tional Oceanic and Atmospheric Administration shall
2 consider commercial solutions, prize authority, aca-
3 demic and international partnerships, small satellites
4 and microsatellites, ground-based instruments, and
5 opportunities to deploy the instrument or instru-
6 ments as a secondary payload on an upcoming
7 planned launch.

8 “(4) COSTS.—In implementing paragraph (1),
9 the Administrator of the National Oceanic and At-
10 atmospheric Administration shall consider a cost-effec-
11 tive and reliable solution.

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

17 “(6) BRIEFING.—Not later than 120 days after
18 the date of enactment of the Space Weather Re-
19 search and Forecasting Act, the Administrator of
20 the National Oceanic and Atmospheric Administra-
21 tion shall provide a briefing to the Committee on
22 Commerce, Science, and Transportation of the Sen-
23 ate and the Committee on Science, Space, and Tech-
24 nology of the House of Representatives on the op-
25 tions for building and deploying the instrument or

1 instruments described in paragraph (2) and the
2 operational contingency plan developed under para-
3 graph (5).

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

5 “(1) PLAN.—The Administrator of the National
6 Oceanic and Atmospheric Administration, in coordi-
7 nation with the Secretary of Defense, shall develop
8 requirements and a plan for follow-on space-based
9 observations for operational purposes, in accordance
10 with the integrated strategy developed under sub-
11 section (b).

12 “(2) RESEARCH NEEDS.—In developing the re-
13 quirements and plan under paragraph (1), the Ad-
14 ministrator of the National Oceanic and Atmos-
15 pheric Administration shall coordinate with the Na-
16 tional Aeronautics and Space Administration and
17 the National Science Foundation regarding the re-
18 search necessary to improve space weather fore-
19 casting and the space-based observations that will
20 advance research and development.

21 “(f) REPORT.—Not later than 180 days after the
22 date of enactment of the Space Weather Research and
23 Forecasting Act, the Director of the Office of Science and
24 Technology Policy shall submit to the Committee on Com-
25 merce, Science, and Transportation of the Senate and the

1 Committee on Science, Space, and Technology of the
2 House of Representatives a report on the integrated strat-
3 egy under subsection (b), including the Plan for follow-
4 on space-based observations under subsection (e).

5 “(g) REVIEW OF INTEGRATED STRATEGY.—

6 “(1) REVIEW.—The Director of the National
7 Science Foundation, in conjunction with Federal
8 agencies participating in the space weather inter-
9 agency working group established under section
10 60701(c), shall enter into an agreement with the
11 National Academies to review the integrated strat-
12 egy developed under subsection (b).

13 “(2) TRANSMITTAL.—The Director of the Na-
14 tional Science Foundation shall transmit the results
15 of the review required under paragraph (1) to the
16 Committee on Science, Space, and Technology of the
17 House of Representatives and the Committee on
18 Commerce, Science, and Transportation of the Sen-
19 ate not later than 18 months after the enactment of
20 the Space Weather Research and Forecasting Act.

21 “(h) GROUND-BASED OBSERVATIONS.—The National
22 Science Foundation, the Air Force, and, where practicable
23 in support of the Air Force, the Navy shall each—

24 “(1) maintain and improve, as necessary and
25 advisable, ground-based observations of the Sun in

1 order to help meet the priorities identified in section
2 60703(a); and

3 “(2) provide space weather data by means of its
4 set of ground-based facilities, including radars,
5 lidars, magnetometers, radio receivers, aurora and
6 airglow imagers, spectrometers, interferometers, and
7 solar observatories.

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

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

13 “(2) develop experimental models for scientific
14 purposes; and

15 “(3) support the transition of the experimental
16 models to operations where appropriate.

17 **“§ 60703. Research and technology**

18 “(a) USER NEEDS.—

19 “(1) IN GENERAL.—The Administrator of the
20 National Oceanic and Atmospheric Administration,
21 the Secretary of the Air Force, and where prac-
22 ticable in support of the Air Force, the Secretary of
23 the Navy, in conjunction with the Administrator of
24 the National Aeronautics and Space Administration
25 and the heads of other relevant Federal agencies,

1 shall conduct a comprehensive survey to identify and
2 prioritize the needs of space weather forecast users,
3 including space weather data and space weather
4 forecast data needed to improve services and inform
5 research priorities and technology needs.

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

12 “(A) consider the goals for forecast lead
13 time, accuracy, coverage, timeliness, data rate,
14 and data quality for space weather observa-
15 tions;

16 “(B) identify opportunities to address the
17 needs identified under paragraph (1) through
18 collaborations with academia, the commercial
19 sector, and the international community;

20 “(C) identify opportunities for new tech-
21 nologies, research, and instrumentation to ad-
22 dress the needs identified under paragraph (1);
23 and

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

1 “(3) PUBLICATION.—Not later than 1 year
2 after the date of enactment of the Space Weather
3 Research and Forecasting Act, the Administrator of
4 the National Oceanic and Atmospheric Administra-
5 tion, the Secretary of the Air Force, and where prac-
6 ticable in support of the Air Force, the Secretary of
7 the Navy, shall—

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

10 “(B) notify the Committee on Commerce,
11 Science, and Transportation of the Senate and
12 the Committee on Science, Space, and Tech-
13 nology of the House of Representatives of the
14 publication under subparagraph (A).

15 “(b) RESEARCH ACTIVITIES.—

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

1 and Space Physics Decadal surveys conducted by the
2 National Academy of Sciences.

3 “(2) OTHER RESEARCH ACTIVITIES.—The Di-
4 rector of the National Science Foundation and the
5 Administrator of the National Oceanic and Atmos-
6 pheric Administration shall support basic research
7 activities in the social, behavioral, and economic
8 sciences that will lead to improved national pre-
9 paredness and encourage mitigation and protection
10 measures before a space weather event.

11 “(3) MULTIDISCIPLINARY RESEARCH.—

12 “(A) FINDINGS.—Congress finds that the
13 multidisciplinary nature of solar and space
14 physics creates funding challenges that require
15 coordination across scientific disciplines and
16 Federal agencies.

17 “(B) MULTIDISCIPLINARY RESEARCH.—

18 The Director of the National Science Founda-
19 tion, the Administrator of the National Oceanic
20 and Atmospheric Administration, and the Ad-
21 ministrator of the National Aeronautics and
22 Space Administration shall pursue multidisci-
23 plinary, coordinated research in subjects that
24 further our understanding of solar physics,
25 space physics, and space weather.

1 “(C) SENSE OF CONGRESS.—It is the
2 sense of Congress that the Administrator of the
3 National Aeronautics and Space Administration
4 and Director of the National Science Founda-
5 tion should support competitively awarded
6 Heliophysics Science Centers that support re-
7 search to operations and operations to research.

8 “(c) SCIENCE MISSIONS.—The Administrator of the
9 National Aeronautics and Space Administration shall seek
10 to implement missions that meet the science objectives
11 identified in Solar and Space Physics Decadal surveys con-
12 ducted by the National Academy of Sciences.

13 “(d) RESEARCH TO OPERATIONS.—

14 “(1) IN GENERAL.—The Administrator of the
15 National Aeronautics and Space Administration, the
16 Director of the National Science Foundation, the
17 Administrator of the National Oceanic and Atmos-
18 pheric Administration, the Secretary of the Air
19 Force, and where practicable in support of the Air
20 Force, the Secretary of the Navy, shall—

21 “(A) develop a formal mechanism to tran-
22 sition National Aeronautics and Space Adminis-
23 tration, National Science Foundation, Air
24 Force, and Navy research findings, research
25 needs, models, and capabilities, as appropriate,

1 to National Oceanic and Atmospheric Adminis-
2 tration and Department of Defense space
3 weather operational forecasting centers; and

4 “(B) enhance coordination between re-
5 search modeling centers and forecasting cen-
6 ters.

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

16 “(e) TECHNOLOGY DEVELOPMENT.—

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

23 “(2) TECHNOLOGY AND INSTRUMENTATION DE-
24 VELOPMENT.—The Administrator of the National
25 Aeronautics and Space Administration and the Di-

1 rector of the National Science Foundation shall sup-
2 port the development of technologies and instrumen-
3 tation that address research priorities and improve
4 space weather forecasting lead-time and accuracy to
5 meet the needs identified by the Administrator of
6 the National Oceanic and Atmospheric Administra-
7 tion.

8 **“§ 60704. Space weather data**

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

12 “(1) make space weather related data obtained
13 for scientific research purposes available to space
14 weather forecasters and operations centers; and

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

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

21 “(c) SPACE WEATHER GOVERNMENT-INDUSTRY-UNI-
22 VERSITY ROUNDTABLE.—The Administrator of the Na-
23 tional Oceanic and Atmospheric Administration, in col-
24 laboration with the Administrator of the National Aero-
25 nautics and Space Administration and the Director of the

1 National Science Foundation, shall enter into an arrange-
2 ment with the National Academies to establish a Space
3 Weather Government-Industry-University Roundtable to
4 facilitate communication and knowledge transfer among
5 Government participants in the space weather interagency
6 working group established under section 60701(c), indus-
7 try, and academia to—

8 “(1) facilitate advances in space weather pre-
9 diction and forecasting;

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

12 “(3) improve preparedness for potential space
13 weather events.”.

14 (b) TECHNICAL AND CONFORMING AMENDMENTS.—

15 (1) REPEAL OF SECTION 809.—Section 809 of
16 the National Aeronautics and Space Administration
17 Authorization Act of 2010 (42 U.S.C. 18388) and
18 the item relating to that section in the table of con-
19 tents under section 1(b) of that Act (124 Stat.
20 2806) are repealed.

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

 “607. Space weather 60701”.

1 **SEC. 3. SPACE WEATHER METRICS.**

2 (a) DEFINITIONS.—In this section:

3 (1) SPACE WEATHER DISTURBANCE.—The term
4 “space weather disturbance” includes geo-electric
5 fields, ionizing radiation, ionospheric disturbances,
6 solar radio bursts, and upper atmospheric expansion.

7 (2) SPACE WEATHER BENCHMARK.—The term
8 “space weather benchmark” means the physical
9 characteristics and conditions describing the nature,
10 frequency, and intensity of space weather disturb-
11 ances.

12 (b) BENCHMARKS.—

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

19 (A) assess existing data, the historical
20 record, models, and peer-reviewed studies on
21 space weather; and

22 (B) develop preliminary benchmarks, based
23 on current scientific understanding and the his-
24 torical record, for measuring solar disturbances.

25 (2) FINAL.—Not later than 18 months after
26 the date the preliminary benchmarks are developed

1 under paragraph (1), the space weather interagency
2 working group shall publish final benchmarks.

3 (3) REVIEW.—The Administrator of the Na-
4 tional Aeronautics and Space Administration shall
5 contract with the National Academy of Sciences to
6 review the benchmarks established under paragraph
7 (2).

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

12 (A) the results of the review under para-
13 graph (3);

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

17 (C) the evolving needs of entities impacted
18 by solar disturbances.

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

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

1 (b) CRITICAL INFRASTRUCTURE.—The Secretary of
2 Homeland Security, in consultation with sector-specific
3 agencies, the Administrator of the National Oceanic and
4 Atmospheric Administration, and the heads of other rel-
5 evant agencies, shall—

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

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

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

19 (d) DEFINITION OF SECTOR-SPECIFIC AGENCY.—In
20 this section, the term “sector-specific agency” has the
21 meaning given the term in Presidential Policy Directive–
22 21 of February 12, 2013 (Critical Infrastructure Security
23 and Resilience), or any successor.

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

2 (a) IN GENERAL.—The National Security Council, in
3 consultation with the Office of the Director of National
4 Intelligence, the Secretary of Defense, and the heads of
5 other relevant Federal agencies, shall—

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

10 (2) develop national security mechanisms to
11 protection national security assets from space weath-
12 er threats.

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

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

20 (a) IN GENERAL.—The Administrator of the Federal
21 Aviation Administration, in consultation with the heads of
22 other relevant Federal agencies, shall—

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

1 (2) assess methods to mitigate the safety impli-
2 cations and effects of space weather on aviation
3 communication systems, aircraft navigation systems,
4 satellite and ground-based navigation systems, and
5 potential health effects of radiation exposure; and

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

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