

118TH CONGRESS
1ST SESSION

H. R. 6093

To improve the National Oceanic and Atmospheric Administration’s weather research, support improvements in weather forecasting and prediction, expand commercial opportunities for the provision of weather data, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

OCTOBER 26, 2023

Mr. LUCAS (for himself, Ms. LOFGREN, Mr. MILLER of Ohio, Mr. WEBER of Texas, Mr. BABIN, Mr. BAIRD, Mr. MIKE GARCIA of California, Mrs. BICE, Mr. OBERNOLTE, Mr. FLEISCHMANN, Ms. TENNEY, Mr. MCCORMICK, Mr. COLLINS, and Mr. KEAN of New Jersey) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

A BILL

To improve the National Oceanic and Atmospheric Administration’s weather research, support improvements in weather forecasting and prediction, expand commercial opportunities for the provision of weather data, 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; TABLE OF CONTENTS.**

4 (a) SHORT TITLE.—This Act may be cited as the
5 “Weather Research and Forecasting Innovation Reauthor-

1 ization Act of 2023” or the “Weather Act Reauthorization
2 Act of 2023”.

3 (b) TABLE OF CONTENTS.—The table of contents for
4 this Act is as follows:

- Sec. 1. Short title; table of contents.
- Sec. 2. Definitions.

TITLE I—REAUTHORIZATION OF THE WEATHER RESEARCH AND
FORECASTING INNOVATION ACT OF 2017

- Sec. 101. Public safety priority.
- Sec. 102. United States weather research and forecasting.
- Sec. 103. Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX).
- Sec. 104. Hurricane forecast improvement program.
- Sec. 105. Tsunami warning, education, and research.
- Sec. 106. Observing system planning.
- Sec. 107. Observing system simulation experiments.
- Sec. 108. Computing resources prioritization.
- Sec. 109. Earth prediction innovation center.
- Sec. 110. Satellite architecture planning.
- Sec. 111. Improving uncrewed activities.
- Sec. 112. Interagency Council for Advancing Meteorological Services.
- Sec. 113. Ocean observations.
- Sec. 114. Consolidation of reports.

TITLE II—ENHANCING FEDERAL WEATHER FORECASTING AND
INNOVATION

- Sec. 201. Weather innovation for the next generation.
- Sec. 202. Next generation radar.
- Sec. 203. Data voids in highly vulnerable areas of the United States.
- Sec. 204. Atmospheric rivers forecast improvement program.
- Sec. 205. Coastal flooding and storm surge forecast improvement program.
- Sec. 206. Aviation weather and data innovation.
- Sec. 207. NESDIS joint venture partnership transition program.
- Sec. 208. Advanced weather interactive processing system.

TITLE III—COMMERCIAL WEATHER AND ENVIRONMENTAL
OBSERVATIONS

- Sec. 301. Commercial Data Program.
- Sec. 302. Commercial Data Pilot Program.
- Sec. 303. Contracting authority and avoidance of duplication.
- Sec. 304. Data assimilation, management, and sharing practices.
- Sec. 305. Clerical amendment.

TITLE IV—COMMUNICATING WEATHER TO THE PUBLIC

- Sec. 401. Definitions.
- Sec. 402. Hazardous weather or water event risk communication.
- Sec. 403. Hazard communication research and engagement.

- Sec. 404. National Weather Service communications improvement.
 Sec. 405. NOAA Weather Radio modernization.
 Sec. 406. Post-storm surveys and assessments.
 Sec. 407. Government Accountability Office report on alert dissemination for hazardous weather or water events.
 Sec. 408. Data collection management and protection.

TITLE V—IMPROVING WEATHER INFORMATION FOR
 AGRICULTURE AND WATER MANAGEMENT

- Sec. 501. Weather and climate information in agriculture and water management.
 Sec. 502. National Integrated Drought Information System.
 Sec. 503. National Mesonet Program.
 Sec. 504. National Coordinated Soil Moisture Monitoring Network.
 Sec. 505. National water center.
 Sec. 506. Satellite transfers report.

1 SEC. 2. DEFINITIONS.

2 (a) IN GENERAL.—In this Act, the terms “seasonal”,
 3 “State”, “subseasonal”, “Under Secretary”, “weather en-
 4 terprise”, “weather data”, and “weather industry” have
 5 the meanings given such terms in section 2 of the Weather
 6 Research and Forecasting Innovation Act of 2017 (15
 7 U.S.C. 8501).

8 (b) WEATHER DATA DEFINED.—Section 2 of the
 9 Weather Research and Forecasting Innovation Act of
 10 2017 (15 U.S.C. 8501) is amended—

11 (1) by redesignating paragraph (5) as para-
 12 graph (6); and

13 (2) by inserting after paragraph (4) the fol-
 14 lowing new paragraph:

15 “(5) WEATHER DATA.—The term ‘weather
 16 data’ means information used to track and predict
 17 weather conditions and patterns, including forecasts,

1 observations, and derivative products from such in-
2 formation.”.

3 **TITLE I—REAUTHORIZATION OF**
4 **THE WEATHER RESEARCH**
5 **AND FORECASTING INNOVA-**
6 **TION ACT OF 2017**

7 **SEC. 101. PUBLIC SAFETY PRIORITY.**

8 Section 101 of the Weather Research and Fore-
9 casting Innovation Act of 2017 (15 U.S.C. 8511) is
10 amended by adding at the end the following new sentence:
11 “The Under Secretary shall ensure the National Oceanic
12 and Atmospheric Administration remains focused on pro-
13 viding accurate and timely weather forecasts that protect
14 lives and property and enhance the national economy by
15 disseminating to the public and core partners through
16 nimble, flexible, and mobile methods critical weather infor-
17 mation and impact-based decision support services.”.

18 **SEC. 102. UNITED STATES WEATHER RESEARCH AND FORE-**
19 **CASTING.**

20 Section 110 of the Weather Research and Fore-
21 casting Innovation Act of 2017 (15 U.S.C. 8519) is
22 amended to read as follows:

23 **“SEC. 110. AUTHORIZATION OF APPROPRIATIONS.**

24 **“(a) AUTHORIZATION OF APPROPRIATIONS.—**There
25 are authorized to be appropriated to the Office of Oceanic

1 and Atmospheric Research to carry out this title the fol-
2 lowing:

3 “(1) \$155,000,000 for fiscal year 2024, of
4 which—

5 “(A) \$90,000,000 is authorized for weath-
6 er laboratories and cooperative institutes;

7 “(B) \$30,000,000 is authorized for the
8 United States Weather Research Program;

9 “(C) \$20,000,000 is authorized for tor-
10 nado, severe storm, and next generation radar
11 research; and

12 “(D) \$15,000,000 is authorized for the
13 joint technology transfer initiative described in
14 section 102(b)(4) of this title.

15 “(2) \$156,550,000 for fiscal year 2025, of
16 which—

17 “(A) \$90,900,000 is authorized for weath-
18 er laboratories and cooperative institutes;

19 “(B) \$30,300,000 is authorized for the
20 United States Weather Research Program;

21 “(C) \$20,200,000 is authorized for tor-
22 nado, severe storm, and next generation radar
23 research; and

1 “(D) \$15,150,000 is authorized for the
2 joint technology transfer initiative described in
3 section 102(b)(4) of this title.

4 “(3) \$158,116,000 for fiscal year 2026, of
5 which—

6 “(A) \$91,809,000 is authorized for weath-
7 er laboratories and cooperative institutes;

8 “(B) \$30,603,000 is authorized for the
9 United States Weather Research Program;

10 “(C) \$20,402,000 is authorized for tor-
11 nado, severe storm, and next generation radar
12 research; and

13 “(D) \$15,302,000 is authorized for the
14 joint technology transfer initiative described in
15 section 102(b)(4) of this title.

16 “(4) \$159,697,000 for fiscal year 2027, of
17 which—

18 “(A) \$92,727,000 is authorized for weath-
19 er laboratories and cooperative institutes;

20 “(B) \$30,909,000 is authorized for the
21 United States Weather Research Program;

22 “(C) \$20,606,000 is authorized for tor-
23 nado, severe storm, and next generation radar
24 research; and

1 “(D) \$15,455,000 is authorized for the
2 joint technology transfer initiative described in
3 section 102(b)(4) of this title.

4 “(5) \$161,294,000 for fiscal year 2028, of
5 which—

6 “(A) \$93,654,000 is authorized for weath-
7 er laboratories and cooperative institutes;

8 “(B) \$31,218,000 is authorized for the
9 United States Weather Research Program;

10 “(C) \$20,812,000 is authorized for tor-
11 nado, severe storm, and next generation radar
12 research; and

13 “(D) \$15,609,000 is authorized for the
14 joint technology transfer initiative described in
15 section 8512(b)(4) of this title.

16 “(b) LIMITATION.—No additional funds are author-
17 ized to carry out this title or the amendments made by
18 this title.”.

19 **SEC. 103. VERIFICATION OF THE ORIGINS OF ROTATION IN**
20 **TORNADOES EXPERIMENT (VORTEX).**

21 (a) IN GENERAL.—Section 103 of the Weather Re-
22 search and Forecasting Innovation Act of 2017 (15 U.S.C.
23 8513) is amended to read as follows:

1 **“SEC. 103. VERIFICATION OF THE ORIGINS OF ROTATION IN**
2 **TORNADOES EXPERIMENT (VORTEX).**

3 “(a) IN GENERAL.—The Under Secretary, in collabo-
4 ration with the United States weather industry and aca-
5 demic partners, shall maintain a program for rapidly im-
6 proving tornado forecasts, predictions, and warnings, in-
7 cluding forecaster training in radar interpretation and in-
8 formation integration from new sources.

9 “(b) GOAL.—The goal of the program under sub-
10 section (a) shall be to develop and extend accurate tornado
11 forecasts, predictions, and warnings in order to reduce the
12 loss of life or property related to tornadoes, with a focus
13 on the following:

14 “(1) Improving the effectiveness and timeliness
15 of tornado forecasts, predictions, and warnings.

16 “(2) Optimizing lead time and providing action-
17 able information beyond one hour in advance.

18 “(3) Transitioning from warn-on-detection to
19 warn-on-forecast.

20 “(c) INNOVATIVE OBSERVATIONS.—The Under Sec-
21 retary shall ensure the program under subsection (a) peri-
22 odically examines, tests, and evaluates the value of incor-
23 porating innovative observations, such as novel sensor
24 technologies, observation tools or networks, crewed or
25 uncrewed systems, and hosted instruments on commercial

1 aircrafts, vessels, and satellites, with respect to the im-
2 provement of tornado forecasts, predictions, and warnings.

3 “(d) ACTIVITIES.—The Under Secretary shall award
4 grants for research, including relating to the following:

5 “(1) Implementing key goals and achieving pro-
6 gram milestones to the maximum extent practicable
7 as outlined by the National Oceanic and Atmos-
8 pheric Administration’s 2019 report, ‘Tornado
9 Warning Improvement and Extension Program
10 Plan’.

11 “(2) In coordination with the National Science
12 and Technology Council’s Social and Behavioral
13 Sciences Subcommittee, improving the social, behav-
14 ioral, risk, communication, and economic sciences re-
15 garding vulnerabilities, risk communication, and de-
16 livery of information critical for reducing the loss of
17 life or property related to tornadoes.

18 “(3) Improving the physical sciences, computer
19 modeling, and tools related to tornado formation, the
20 impacts of tornadoes on the built and natural envi-
21 ronment, and the interaction of tornadoes and hurri-
22 canes.

23 “(e) WARNINGS.—In carrying out subsection (a), the
24 Under Secretary, in coordination with the program estab-
25 lished under section 406, shall—

1 “(1) conduct and transition to operations the
2 research necessary to develop and deploy prob-
3 abilistic weather forecast guidance technology for
4 tornadoes and related weather phenomena;

5 “(2) incorporate into tornado modeling and
6 forecasting, as appropriate, social, behavioral, risk,
7 communication, and economic sciences;

8 “(3) enhance workforce training on radar inter-
9 pretation and use of tornado warning systems; and

10 “(4) expand computational resources to support
11 higher-resolution modeling to advance the capability
12 for warn-on-forecast.

13 “(f) TORNADO RATING SYSTEM.—The Under Sec-
14 retary, in collaboration with local communities and emer-
15 gency managers, shall—

16 “(1) evaluate the system used as of the date of
17 the enactment of this section to rate the severity of
18 tornadoes;

19 “(2) determine whether updates to such system
20 are required to ensure such ratings accurately reflect
21 the severity of tornados; and

22 “(3) if determined necessary, update such sys-
23 tem.

24 “(g) ANNUAL BUDGET.—The Under Secretary shall,
25 not less frequently than annually, submit to Congress a

1 proposed budget corresponding with carrying out this sec-
2 tion.”.

3 (b) CLERICAL AMENDMENT.—The table of contents
4 in section 1(b) of the Weather Research and Forecasting
5 Innovation Act of 2017 is amended by amending the item
6 relating to section 103 to read as follows:

“Sec. 103. Verification of the Origins of Rotation in Tornadoes Experiment
(VORTEX).”.

7 **SEC. 104. HURRICANE FORECAST IMPROVEMENT PRO-**
8 **GRAM.**

9 Section 104 of the Weather Research and Fore-
10 casting Innovation Act of 2017 (15 U.S.C. 8514) is
11 amended to read as follows:

12 **“SEC. 104. HURRICANE FORECAST IMPROVEMENT PRO-**
13 **GRAM.**

14 “(a) IN GENERAL.—The Under Secretary, in collabo-
15 ration with the United States weather industry and aca-
16 demic partners, shall maintain a program to improve hur-
17 ricane forecasting, predictions, and warnings.

18 “(b) GOAL.—The goal of the program under sub-
19 section (a) shall be to develop and extend accurate hurri-
20 cane forecasts, predictions, and warnings in order to re-
21 duce the loss of life or property related to hurricanes, with
22 a focus on the following:

23 “(1) Improving the understanding and pre-
24 diction of rapid intensification and projected path of

1 hurricanes, including probabilistic methods for hurri-
2 cane hazard mapping.

3 “(2) Improving the forecast and impact-based
4 communication of inland flooding, compound flood-
5 ing, and storm surges from hurricanes, in coordina-
6 tion with the program established under section 205.

7 “(3) Incorporating social, behavioral, risk, com-
8 munication, and economic sciences to clearly inform
9 response to prevent the loss of life or property, such
10 as evacuation or shelter in place.

11 “(4) Evaluating and incorporating, as appro-
12 priate, innovative observations, such as novel sensor
13 technologies, observation tools or networks, crewed
14 or uncrewed systems, and hosted instruments on
15 commercial aircrafts, vessels, and satellites.

16 “(c) ACTIVITIES.—The Under Secretary shall award
17 grants for research, including relating to the following:

18 “(1) Implementing key strategies and following
19 priorities and objectives outlined by the National
20 Oceanic and Atmospheric Administration’s 2019 re-
21 port ‘Hurricane Forecast Improvement Program’.

22 “(2) In coordination with the National Science
23 and Technology Council’s Social and Behavioral
24 Sciences Subcommittee and other relevant inter-
25 agency committees, improving the social, behavioral,

1 risk, communications, and economic sciences related
2 to vulnerabilities, risk communication, and delivery
3 of information critical for reducing the loss of life or
4 property related to hurricanes.

5 “(3) Improving the physical sciences, oper-
6 ational modeling, and tools related to hurricane for-
7 mation, the impacts of wind and water-based hurri-
8 cane hazards on the built and natural environment,
9 and the interaction of hurricanes and tornadoes.

10 “(d) WARNINGS.—In carrying out subsection (a), the
11 Under Secretary, in coordination with the program estab-
12 lished under section 406, shall—

13 “(1) conduct and transition to operations the
14 research necessary to develop and deploy prob-
15 abilistic weather forecast guidance technology relat-
16 ing to hurricanes and related weather phenomena;

17 “(2) incorporate into hurricane modeling and
18 forecasting, as appropriate, social, behavioral, risk,
19 communication, and economic sciences research; and

20 “(3) expand computational resources to support
21 and improve higher-resolution operational modeling
22 of hurricanes and related weather phenomena.

23 “(e) ANNUAL BUDGET.—The Under Secretary shall,
24 not less frequently than annually, submit to Congress a

1 proposed budget corresponding with carrying out this sec-
2 tion.”.

3 **SEC. 105. TSUNAMI WARNING, EDUCATION, AND RESEARCH.**

4 The Tsunami Warning, Education, and Research Act
5 of 2017 is amended—

6 (1) in paragraph (5) of section 804(d) (33
7 U.S.C. 3203(d))—

8 (A) in subparagraph (D), by striking
9 “and” after the semicolon;

10 (B) in subparagraph (E), by striking the
11 period and inserting “; and”; and

12 (C) by adding at the end the following new
13 subparagraph:

14 “(F) align the analytic techniques and
15 methodologies of the existing tsunami warning
16 centers supported or maintained under para-
17 graph (1) to ensure seamless continuity of oper-
18 ations and mitigate risk of operational failure
19 by prioritizing investments that include—

20 “(i) replacing end of life equipment;

21 “(ii) ensuring product consistency;

22 “(iii) enabling consistent operational
23 process for backup capabilities;

24 “(iv) mitigating existing operational
25 security risks; and

1 “(v) meeting information security re-
2 quirements specified in chapter 35 of title
3 44, United States Code.”; and

4 (2) by amending section 809 (33 U.S.C. 3207)
5 to read as follows:

6 **“SEC. 809. AUTHORIZATION OF APPROPRIATIONS.**

7 “From funds authorized to be appropriated to the
8 National Oceanic and Atmospheric Administration, there
9 are authorized to be appropriated to carry out this title
10 \$15,000,000 for each of fiscal years 2024 through 2028.”.

11 **SEC. 106. OBSERVING SYSTEM PLANNING.**

12 Section 106 of the Weather Research and Fore-
13 casting Innovation Act of 2017 (15 U.S.C. 8516) is
14 amended—

15 (1) in paragraph (3)—

16 (A) by inserting “Federal” before “observ-
17 ing capabilities”; and

18 (B) by striking “and” after the semicolon;

19 (2) in paragraph (4)—

20 (A) by inserting “, including private sector
21 partnerships or commercial acquisition,” after
22 “options”; and

23 (B) by striking the period and inserting a
24 semicolon; and

1 (3) by adding at the end the following new
2 paragraphs:

3 “(5) compare costs and schedule, including
4 cost-benefit analysis, of Federal and private sector
5 supplemental options to fill the observation data re-
6 quirements under paragraph (1) and gaps identified
7 pursuant to paragraph (3); and

8 “(6) not later than one year after the date of
9 the enactment of this paragraph, submit to Congress
10 a report that provides an analysis of the technical,
11 schedule, cost, and cost benefit analyses to place an
12 operational polar-orbiting environmental satellite ca-
13 pability in the early morning orbit to support the
14 weather enterprise and the Administration’s mis-
15 sion.”.

16 **SEC. 107. OBSERVING SYSTEM SIMULATION EXPERIMENTS.**

17 Section 107 of the Weather Research and Fore-
18 casting Innovation Act of 2017 (15 U.S.C. 8517) is
19 amended—

20 (1) in subsection (b)(3), by striking “providing
21 data” and inserting “comparison to current or ex-
22 perimental commercial system capabilities that pro-
23 vide data”;

24 (2) in subsection (c)(1), by striking “, including
25 polar-orbiting and geostationary satellite systems,”;

1 (3) by striking subsection (d); and

2 (4) by redesignating subsection (e) as sub-
3 section (d).

4 **SEC. 108. COMPUTING RESOURCES PRIORITIZATION.**

5 Section 108 of the Weather Research and Fore-
6 casting Innovation Act of 2017 (15 U.S.C. 8518) is
7 amended by striking subsection (a)(3)(C) and all that fol-
8 lows through subsection (b)(7) and inserting the following
9 new subsections:

10 “(b) COMPUTING RESEARCH INITIATIVE.—

11 “(1) IN GENERAL.—The Under Secretary, in
12 collaboration with the Secretary of Energy, shall
13 carry out an initiative, which may leverage Depart-
14 ment of Energy high performance computers, cloud
15 computing, or expertise, to run advanced coupled
16 models in order to conduct proof of concept sce-
17 narios in comparison with current issued forecasts
18 and models. The Under Secretary and Secretary of
19 Energy shall carry out the initiative through a com-
20 petitive, merit-reviewed process, and consider appli-
21 cations from Federal agencies, National Labora-
22 tories, institutions of higher education (as such term
23 is defined in section 101 of the Higher Education
24 Act of 1965 (20 U.S.C. 1001)), nonprofit institu-

1 tions, and other appropriate entities (or a consortia
2 thereof).

3 “(2) COMPONENTS.—In carrying out the initia-
4 tive under paragraph (1), the Under Secretary shall
5 prevent duplication and coordinate research efforts
6 in artificial intelligence, high performance com-
7 puting, cloud computing, quantum computing, mod-
8 eling and simulation, machine learning, data assimi-
9 lation, large scale data analytics, and predictive
10 analysis across the National Oceanic and Atmos-
11 pheric Administration, and may—

12 “(A) conduct comparative research be-
13 tween National Weather Service issued fore-
14 casts and operational models to predictions and
15 models developed to run on high performance
16 computers or with cloud computing resources;

17 “(B) share relevant modeling system and
18 applications innovations developed through such
19 initiative, including Unified Forecast System-
20 based applications, through community-based
21 activities;

22 “(C) leverage coordinating activities man-
23 aged by the National Science and Technology
24 Council, the Interagency Council for Advancing

1 Meteorological Services, and other relevant
2 interagency entities;

3 “(D) provide sufficient capacity for long-
4 term archive and access of model output to sup-
5 port research and long-term study;

6 “(E) determine computing decisions based
7 on an agile requirements framework; and

8 “(F) support the training, recruitment,
9 and retention of the next generation weather,
10 water, and climate computing workforce
11 through incentives and pathways for career de-
12 velopment and employment opportunities.

13 “(3) RESEARCH SECURITY.—The activities au-
14 thorized under this section shall be applied in a
15 manner consistent with subtitle D of title VI of the
16 Research and Development, Competition, and Inno-
17 vation Act (enacted as division B of Public Law
18 117–167; 42 U.S.C. 19231 et seq.).

19 “(4) TERMINATION.—The authority under this
20 subsection shall terminate five years after the date
21 of the enactment of this subsection.

22 “(c) ARTIFICIAL INTELLIGENCE INVESTMENTS.—
23 The Under Secretary shall leverage artificial intelligence
24 and machine learning technologies to facilitate, optimize,
25 and further leverage advanced computing to accomplish

1 critical missions of the National Oceanic and Atmospheric
2 Administration by enhancing existing and forthcoming
3 high-performance and cloud computing infrastructure or
4 systems.

5 “(d) CENTERS OF EXCELLENCE.—The Under Sec-
6 retary may establish centers of excellence to aid the adop-
7 tion of next-generation artificial intelligence and machine
8 learning enabled advanced computing capabilities. Each
9 such center may carry out activities that include the fol-
10 lowing:

11 “(1) Leveraging robust public-private partner-
12 ship models to provide access to training, experience,
13 and long-term development of workforce and infra-
14 structure.

15 “(2) Developing and optimizing tools, libraries,
16 algorithms, data structures, and other supporting
17 software necessary for specific applications on high
18 performance computing systems.

19 “(3) Applying modern artificial intelligence,
20 deep machine-learning, and advanced data analysis
21 technologies to address current and future mission
22 challenges.

23 “(4) To the maximum extent practicable, ex-
24 plore quantum computing and related application
25 partnerships with public, private, and academic enti-

1 ties to improve the accuracy and resolution of weath-
2 er predictions.

3 “(e) MULTI-YEAR CONTRACTS.—The Under Sec-
4 retary may enter into multi-year contracts in accordance
5 with section 3903 of title 41, United States Code, and
6 shall ensure compliance with all clauses provided in such
7 section to support operational research and development
8 related to high performance and cloud computing infra-
9 structure or systems.

10 “(f) REPORT.—Not later than two years after the
11 date of the enactment of this subsection, the Under Sec-
12 retary shall submit to the Committee on Science, Space,
13 and Technology of the House of Representatives and the
14 Committee on Commerce, Science, and Transportation
15 and the Committee on Energy and Natural Resources of
16 the Senate a report evaluating the following:

17 “(1) The effectiveness of the initiative required
18 under subsection (b), including applied research dis-
19 coveries and advanced modeling improvements
20 achieved.

21 “(2) A best estimate of the overall value of
22 high-resolution probabilistic forecast guidance for
23 hazardous weather or water events (as such term is
24 defined in section 406) using a next-generation
25 weather forecast and warning framework.

1 “(3) The needs for cloud computing, quantum
2 computing, or high-performance computing, visual-
3 ization, and dissemination collaboration between the
4 Department of Energy and the National Oceanic
5 and Atmospheric Administration.

6 “(4) A timeline and guidance for implementa-
7 tion of the following:

8 “(A) High-resolution numerical weather
9 prediction models.

10 “(B) Methods for meeting the cloud com-
11 puting, quantum computing, or high-perform-
12 ance computing, visualization, and dissemina-
13 tion needs identified under paragraph (3).”.

14 **SEC. 109. EARTH PREDICTION INNOVATION CENTER.**

15 Paragraph (5) of section 102(b) of the Weather Re-
16 search and Forecasting Innovation Act of 2017 (15 U.S.C.
17 8512(b)) is amended—

18 (1) in subparagraph (D), by striking “and”
19 after the semicolon; and

20 (2) by striking subparagraph (E) and inserting
21 the following new subparagraphs:

22 “(E) developing community weather re-
23 search modeling systems that—

24 “(i) are accessible by the public in ac-
25 cordance with section 10601 of the James

1 M. Inhofe National Defense Authorization
2 Act for Fiscal Year 2023 (15 U.S.C.
3 8512a) and available for archive and long-
4 term study;

5 “(ii) meet basic end-user requirements
6 for running on public computers and net-
7 works located outside of secure National
8 Oceanic and Atmospheric Administration
9 information and technology systems;

10 “(iii) utilize, whenever appropriate
11 and cost-effective, innovative strategies and
12 methods, including cloud-based computing
13 capabilities, for hosting and management
14 of part or all of the system described in
15 this subparagraph;

16 “(iv) utilize modeling systems that
17 allow for interoperability with new model
18 components, modules, and next-generation
19 software and coding languages;

20 “(v) allow for open testing and inte-
21 gration of promising operational model im-
22 provements from the broader community;

23 “(vi) access as close to a real-time
24 basis as possible operational data and
25 metadata, including commercially pur-

1 chased data for use in Earth Prediction
2 Innovation Center research and develop-
3 ment testing grounds pursuant to redis-
4 tribution restrictions, licensing agreements,
5 and applicable existing laws and regula-
6 tions; and

7 “(vii) provide supported and portable
8 versions of the unified forecast system, in-
9 cluding applications for hurricane, space
10 weather, ocean, cryosphere, air quality,
11 and coastal models, that can reproduce
12 current operational global and regional
13 model prediction; and

14 “(F) establishing a National Oceanic and
15 Atmospheric Administration Data Lake, to be
16 maintained by the Administration, a commercial
17 partner, or non-profit entity, that consolidates
18 and maintains a publicly available and continu-
19 ously updated collection of data and metadata
20 used in numerical weather prediction for use in
21 the Earth Prediction Innovation Center’s model
22 testing, pursuant to redistribution restrictions,
23 licensing agreements, and applicable existing
24 laws and regulations.”.

1 **SEC. 110. SATELLITE ARCHITECTURE PLANNING.**

2 Section 301 of the Weather Research and Fore-
3 casting Innovation Act of 2017 (15 U.S.C. 8531) is
4 amended—

5 (1) in subsection (a), by striking paragraph (1)
6 and redesignating paragraphs (2), (3), and (4) as
7 paragraphs (1), (2), and (3), respectively;

8 (2) by amending subsection (b) to read as fol-
9 lows:

10 “(b) NATIONAL OCEANIC AND ATMOSPHERIC ADMIN-
11 ISTRATION SATELLITE SYSTEMS AND DATA.—

12 “(1) IN GENERAL.—The Under Secretary shall
13 maintain a fleet of Administration space-based ob-
14 servation platforms that provide critical operations-
15 focused data and information to support the Na-
16 tional Oceanic and Atmospheric Administration’s
17 mission to monitor the global environment in order
18 to protect lives and property from extreme weather
19 and other natural phenomena.

20 “(2) COLLABORATION.—The Under Secretary
21 shall implement recommendations from the NOAA
22 Observing Systems Council to ensure an appropriate
23 mix of government, academic, commercial sector,
24 and international partnerships in the provision of
25 data and information, including a broadened effort
26 on data acquisition through the Commercial Data

1 Program under section 302 when cost effective and
2 beneficial to the Administration.

3 “(3) PRIORITY.—The Under Secretary shall en-
4 sure that Administration platforms maintained
5 under paragraph (1) prioritize the development of
6 products and services that are tailored to meet the
7 National Oceanic and Atmospheric Administration’s
8 mission.

9 “(4) NATIONAL CENTERS FOR ENVIRONMENTAL
10 INFORMATION.—The Under Secretary shall maintain
11 the National Centers for Environmental Information
12 to provide a long-term archive and access to the Ad-
13 ministration’s national and global data and
14 metadata.”; and

15 (3) in subsection (f)(1), by striking “2023” and
16 inserting “2030”.

17 **SEC. 111. IMPROVING UNCREWED ACTIVITIES.**

18 Subparagraph (G) of section 102(b)(3) of the Weath-
19 er Research and Forecasting Innovation Act of 2017 (15
20 U.S.C. 8512(b)(3)) is amended by striking “, including
21 commercial observing systems” and inserting “, including
22 stationary and mobile commercial observing systems, such
23 as uncrewed aircraft and marine systems, to provide ob-
24 servations of the atmosphere and ocean, and other obser-

1 vations, in cooperation with the Office of Marine and Avia-
2 tion Operations”.

3 **SEC. 112. INTERAGENCY COUNCIL FOR ADVANCING METE-**
4 **OROLOGICAL SERVICES.**

5 (a) IN GENERAL.—Section 402 of the Weather Re-
6 search and Forecasting Innovation Act of 2017 (15 U.S.C.
7 8542) is amended—

8 (1) in subsection (a)—

9 (A) by striking “Advancing Weather Serv-
10 ices” and inserting “Advancing Meteorological
11 Services (in this section referred to as the
12 ‘Interagency Council’)”; and

13 (B) by striking “Committee” each place it
14 appears and inserting “Council”;

15 (2) by amending subsections (b) and (c) to read
16 as follows:

17 “(b) CO-CHAIRS.—The Director of the Office of
18 Science and Technology Policy and the Under Secretary
19 shall serve as co-chairs of the Interagency Council. The
20 Under Secretary shall serve as the Federal Coordinator
21 for Meteorology.

22 “(c) FURTHER COORDINATION.—The Director of the
23 Office of Science and Technology Policy shall take such
24 steps as are necessary to coordinate the activities of the
25 Federal Government with stakeholders in the United

1 States weather industry, academic partners, State govern-
2 ments, and emergency managers, including by imple-
3 menting mechanisms to encourage and enable the partici-
4 pation of non-Federal employees in the functions of the
5 Interagency Council.”;

6 (3) by adding at the end the following new sub-
7 sections:

8 “(d) FUNCTIONS.—The Interagency Council shall be
9 the formal mechanism by which all relevant Federal de-
10 partments and agencies coordinate implementation of pol-
11 icy and practices to ensure United States global leadership
12 in meteorological services. In doing so, the Interagency
13 Council shall review programs and support relevant weath-
14 er research and forecast innovation activities, as well as
15 other related implementation activities, related to Federal
16 meteorological services, including by carrying out the fol-
17 lowing:

18 “(1) Identifying and helping prioritize meteoro-
19 logical research and service delivery needs, including
20 relating to observations, operational systems, com-
21 munications, and infrastructure.

22 “(2) Providing recommendations to streamline
23 or consolidate activities and develop greater effi-
24 ciencies in cross-agency activities.

1 “(3) Leveraging Earth system science research
2 outcomes of the National Oceanic and Atmospheric
3 Administration, the National Aeronautics and Space
4 Administration, and other relevant Federal depart-
5 ments and agencies, including research outcomes re-
6 lated to the relevant recommended key science and
7 applications questions and priorities in the National
8 Academies of Sciences, Engineering, and Medicine’s
9 2018 report ‘Thriving on Our Changing Planet: A
10 Decadal Strategy for Earth Observation from
11 Space’, to understand and predict high-impact
12 weather phenomena.

13 “(4) Facilitating the expansion and strength-
14 ening of partnerships with private sector entities to
15 advance meteorological research, communications,
16 and computing in collaboration with the Earth sys-
17 tem science, service, and stakeholder communities.

18 “(5) Sharing information regarding meteorolog-
19 ical research improvement needs and science oppor-
20 tunities across relevant Federal departments and
21 agencies.

22 “(6) Providing advice to all relevant Federal de-
23 partments and agencies regarding potential collabo-
24 rations and expected level of resources needed to
25 maintain and operate the Interagency Council.

1 “(7) Enhancing communication and coordina-
2 tion and promoting sharing within relevant Federal
3 departments and agencies and across the Inter-
4 agency Council.

5 “(8) Developing, recruiting, and sustaining a
6 professional and diverse workforce for meteorological
7 research and services.

8 “(e) DATA INVENTORY.—The Interagency Council, in
9 coordination and avoidance of duplication with the United
10 States Group on Earth Observations, shall promote data
11 and metadata access and archive activities to increase ac-
12 cessibility, interoperability, and reusability by maintaining
13 a data inventory of meteorological observations. Not less
14 frequently than annually for a period of five years begin-
15 ning on the date of the enactment of this subsection, the
16 Interagency Council shall solicit updated information from
17 private sector entities identifying current and near future
18 sources of such data. Such data shall be made available
19 to member departments and agencies under subsection
20 (a).

21 “(f) COORDINATION OFFICE.—The Interagency Me-
22 teorological Coordination Office shall provide to the Inter-
23 agency Council such administrative and logistical support
24 as the Interagency Council may require, as determined by
25 the co-chairs.

1 “(g) COST SHARE.—Member departments and agen-
2 cies of the Interagency Council under subsection (a) may
3 provide reimbursable financial support to the Interagency
4 Meteorological Coordinating Office to enhance cost-shar-
5 ing and collaboration related to weather research and fore-
6 cast innovation activities.

7 “(h) REPORT.—Not later than one year after the
8 date of the enactment of this subsection and annually
9 thereafter, the Interagency Council shall publish a report
10 which identifies among member agencies the following:

11 “(1) Federal programs that use meteorological
12 observations, data sources, and capabilities.

13 “(2) Federal programs that acquire such data
14 from private sector entities.

15 “(3) Advancements in meteorological data col-
16 lection, assimilation, and forecasting that could im-
17 prove Federal programmatic operational capabilities.

18 “(4) Barriers to acquiring meteorological obser-
19 vations, data sources, and capabilities that could be
20 used to better meet Federal programmatic needs.”.

21 (b) REFERENCES.—Any reference to the Interagency
22 Committee for Advancing Weather Services in any law,
23 rule, regulation, paper, record, map, or other such docu-
24 ment of the United States shall be deemed to be a ref-

1 erence to the Interagency Council for Advancing Meteorological Services.

3 **SEC. 113. OCEAN OBSERVATIONS.**

4 Subsection (b) of section 12304 of the Integrated Coastal and Ocean Observation System Act of 2009 (33 U.S.C. 3603) is amended by adding at the end the following new paragraph:

8 “(5) SHIPS OF OPPORTUNITY PILOT PROGRAM.—

10 “(A) IN GENERAL.—The Administrator, in
11 coordination with the heads of relevant Federal
12 departments and agencies, shall, subject to relevant regulations and certifications, establish a
13 pilot program to contract with research or commercial ship operators for data collection and
14 assess the potential costs, benefits, and viability
15 of a global network of ocean and atmospheric
16 observing instruments operating on research or
17 commercial ocean vessels, including in the Arctic, in order to supplement the Integrated
18 Coastal and Ocean Observation System in improving understanding of coastal and ocean systems and their relationships to human activities.

1 “(B) STANDARDS AND SPECIFICATIONS.—
2 The Administrator shall ensure that data ac-
3 quired through the pilot program established
4 pursuant to subparagraph (A) meets the most
5 recent standards and specifications required for
6 observation services and data as published pur-
7 suant to subsection (c) of section 302 of the
8 Weather Research and Forecasting Innovation
9 Act of 2017.

10 “(C) REPORT.—Not later than five years
11 after the date of the enactment of this para-
12 graph, the Administrator, in consultation with
13 the Secretary of Transportation, shall submit to
14 Congress a report on the requirements for a
15 global network of ocean and atmospheric instru-
16 ments operating on research or commercial
17 ocean vessels for measurement and data trans-
18 mission.

19 “(D) SUNSET.—This paragraph shall ter-
20 minate on the earlier of—

21 “(i) September 30, 2029; or

22 “(ii) one year after the date on which
23 the report required under subparagraph
24 (B) is submitted by the Administrator.”.

1 **SEC. 114. CONSOLIDATION OF REPORTS.**

2 (a) WEATHER RESEARCH AND FORECASTING INNO-
3 VATION ACT OF 2017.—

4 (1) IN GENERAL.—The Weather Research and
5 Forecasting Innovation Act of 2017 is amended—

6 (A) in section 403 (15 U.S.C. 8543)—

7 (i) in subsection (a), by inserting
8 “the” after “Director of”; and

9 (ii) by striking subsection (d); and

10 (B) by striking sections 408 through 411
11 and section 414 and redesignating sections 412
12 and 413 as sections 408 and 409, respectively.

13 (2) CLERICAL AMENDMENTS.—The table of
14 contents in section 1(b) of the Weather Research
15 and Forecasting Innovation Act of 2017 is amended
16 by striking the items relating to sections 408
17 through 414 and inserting the following new items:

“Sec. 408. Weather enterprise outreach.

“Sec. 409. Hurricane hunter aircraft.”.

18 (b) NATIONAL OCEANIC AND ATMOSPHERIC ADMIN-
19 ISTRATION AUTHORIZATION ACT OF 1992.—Section 106
20 of the National Oceanic and Atmospheric Administration
21 Authorization Act of 1992 (Public Law 102–567; 106
22 Stat. 4274) is amended by striking subsection (c) (15
23 U.S.C. 1537).

1 **TITLE II—ENHANCING FEDERAL**
2 **WEATHER FORECASTING AND**
3 **INNOVATION**

4 **SEC. 201. WEATHER INNOVATION FOR THE NEXT GENERA-**
5 **TION.**

6 (a) IN GENERAL.—Not later than 180 days after the
7 date of the enactment of this Act, the Under Secretary
8 shall establish a Research, Development, Test, and Eval-
9 uation Program (in this section referred to as the “Pro-
10 gram”) to ensure the continued performance of weather
11 radar capabilities, including systems currently being devel-
12 oped, with obstructions in the line of sight of such radar.

13 (b) REQUIREMENTS.—In carrying out the Program,
14 the Under Secretary, in consultation with the Interagency
15 Council for Advancing Meteorological Services, shall—

16 (1) partner with the private sector, academia,
17 Federal, State, and local government entities, and
18 any other entity the Under Secretary considers ap-
19 propriate;

20 (2) identify, evaluate, and test existing or near-
21 commercial technologies and solutions that improve
22 radar coverage and performance, including by miti-
23 gating the potential impact of obstructions on
24 weather radar;

1 (3) to the maximum extent practicable, research
2 additional solutions that could mitigate the effects of
3 obstructions on weather radar, such as—

4 (A) signal processing algorithms;

5 (B) short-term forecasting algorithms to
6 replace contaminated data;

7 (C) the use of dual polarization character-
8 istics in mitigating the effects of wind turbines
9 on weather radar; and

10 (D) gap filling radars to provide supple-
11 mental or replacement observations in impacted
12 areas; and

13 (4) develop, support, or partner with developers
14 to provide commercially viable technical mitigation
15 solutions for obstructions to weather radar capabili-
16 ties that are compatible with the operational require-
17 ments of the weather radar systems.

18 (c) PRIORITY.—In carrying out subsection (b), the
19 Under Secretary shall prioritize consideration of the fol-
20 lowing technology-based mitigation solutions:

21 (1) Phased array weather radar systems.

22 (2) Supplementing or replacing contaminated
23 data with commercial radar data.

1 (3) The utilization of data from private sector
2 associated meteorological towers or similar capabili-
3 ties.

4 (4) The display on local forecasting equipment
5 of wind farm boundaries and consolidated wind farm
6 areas.

7 (5) The installation and provision of access to
8 rain gauges.

9 (6) Any other technology-based mitigation solu-
10 tion the Under Secretary determines could improve
11 radar coverage by overcoming obstructions, beam
12 blockage, or ghost echoes.

13 (d) REPORT; RECOMMENDATION.—

14 (1) IN GENERAL.—Not later than two years
15 after the date of the enactment of this section and
16 annually thereafter until the Program terminates
17 pursuant to subsection (e), the Under Secretary
18 shall submit to Congress a report on the implemen-
19 tation of the Program, including an evaluation of
20 each technology-based mitigation solution identified
21 for priority consideration pursuant to subsection (e),
22 and a recommendation regarding additional identi-
23 fication and testing of new technologies based on
24 such consideration.

1 (2) FINAL RECOMMENDATION.—Not later than
2 five years after the date of the enactment of this
3 section, the Under Secretary shall provide to Con-
4 gress a recommendation on whether additional re-
5 search, testing, and development through the Pro-
6 gram established under subsection (a) is needed, and
7 a determination of whether a cessation of field re-
8 search, testing, development and evaluation is appro-
9 priate.

10 (e) TERMINATION.—The authority of the Under Sec-
11 retary to carry out the Program shall terminate on the
12 earlier of—

13 (1) September 30, 2029; or

14 (2) one year after the date on which the final
15 recommendation required under subsection (d)(2) is
16 submitted by the Under Secretary.

17 (f) DEFINITIONS.—In this section:

18 (1) BEAM BLOCKAGE.—The term “beam block-
19 age” means a signal that is partially or fully blocked
20 due to an obstruction.

21 (2) GHOST ECHO.—The term “ghost echo”
22 means radar signal reflectivity or velocity return er-
23 rors in radar data due to the proximity of an ob-
24 struction.

1 (3) OBSTRUCTION.—The term “obstruction” in-
2 cludes the following:

3 (A) a wind turbine that could limit the ef-
4 fectiveness of a weather radar system;

5 (B) any building that disrupts or limits the
6 effectiveness of a weather radar system; or

7 (C) any other natural or human built
8 structure that affects a weather radar system.

9 **SEC. 202. NEXT GENERATION RADAR.**

10 (a) IN GENERAL.—The Under Secretary shall de-
11 velop a plan to replace the Next Generation Weather
12 Radar of the National Weather Service (“NEXRAD”)
13 system in existence as of the date of the enactment of this
14 section.

15 (b) PROCUREMENT DEADLINE.—The Under Sec-
16 retary shall take such actions as may be necessary to en-
17 sure the replacement described in subsection (a) is com-
18 pleted by not later than September 30, 2040.

19 (c) ELEMENTS.—The plan developed pursuant to
20 subsection (a) shall include the following:

21 (1) Estimates of quantifiable improvements in
22 radar performance and service delivery, including
23 coverage and accuracy, to be made from replacement
24 of the NEXRAD system referred to in such sub-
25 section.

1 (2) Development of a digital phased array radar
2 test article designed to test and determine the speci-
3 fications and requirements for such replacement.

4 (3) Establishment of a weather surveillance
5 radar testbed for the following:

6 (A) Evaluation of commercial radars with
7 the potential to replace or supplement the
8 NEXRAD system.

9 (B) Providing technical assistance for com-
10 mercial replacement or supplemental radars, in-
11 cluding data void filling radars in regions where
12 geographical topography prevents full utilization
13 of conventional systems.

14 (4) Consultation and input solicited from mete-
15 orologists, emergency managers, and public safety
16 officials regarding the specifications and require-
17 ments for the replacement of the NEXRAD system
18 referred in such subsection.

19 (d) RADAR-AS-A-SERVICE.—

20 (1) IN GENERAL.—In order to supplement data
21 voids in radar coverage in existence as of the date
22 of the enactment of this section and ensure the con-
23 tinued performance of weather radar capabilities,
24 the Under Secretary may utilize and contract with
25 third party entities to fill such low-level and wide-

1 area radar data voids using diverse weather radars
2 and data assimilation technologies to better detect
3 significant precipitation and severe weather over a
4 greater area across the population.

5 (2) CONSIDERATIONS.—In carrying out the ac-
6 tivities under paragraph (1), the Under Secretary
7 may consider—

8 (A) utilizing and contracting with third-
9 party entities that have participated in the
10 testbed established in accordance with sub-
11 section (c)(3); and

12 (B) weather camera systems and services,
13 including systems and services in consultation
14 with the Federal Aviation Administration, as
15 viable technologies to supplement weather fore-
16 casting and prediction needs.

17 (e) UPDATES TO CONGRESS.—The Under Secretary
18 shall provide to the Committee on Science, Space, and
19 Technology of the House of Representatives and the Com-
20 mittee on Commerce, Science, and Transportation of the
21 Senate periodic updates on the implementation of this sec-
22 tion.

1 **SEC. 203. DATA VOIDS IN HIGHLY VULNERABLE AREAS OF**
2 **THE UNITED STATES.**

3 (a) IN GENERAL.—The Under Secretary, in coordi-
4 nation with the Director of the National Weather Service
5 and the Administrator of the Federal Emergency Manage-
6 ment Agency, in consultation with the United States
7 weather industry, academic partners, and in accordance
8 with activities implemented through existing regional at-
9 mospheric, coastal, ocean, and Great Lakes observing sys-
10 tems, shall carry out activities to ensure equitable and
11 comprehensive weather observation coverage and emer-
12 gency information sharing in the United States, including
13 relating to the following:

14 (1) Reviewing areas in the continental United
15 States and the territories that are considered under-
16 observed, underserved, or highly vulnerable for
17 weather phenomenon, including urban and offshore
18 regions, and identifying associated challenges to pro-
19 viding such coverage.

20 (2) Increasing weather observations and devel-
21 oping new weather observational capabilities, such as
22 urban heat island mapping campaigns, with respect
23 to under-observed, underserved, or highly vulnerable
24 regions.

25 (3) Establishing or supporting testbeds to de-
26 velop and integrate new weather, water, and climate

1 observation or emergency information sharing tools,
2 such as next generational radars for weather obser-
3 vations, in under-observed, underserved, or highly
4 vulnerable regions.

5 (4) To the maximum extent practicable, ad-
6 vancing weather and water forecasting and climate
7 modeling capabilities for under-observed, under-
8 served, or highly vulnerable regions.

9 (5) Undertaking workforce development efforts
10 for emergency management officials and meteorolo-
11 gists in under-observed, underserved, or highly vul-
12 nerable areas, including urban regions, of the United
13 States.

14 (6) Using data void filling observations to bet-
15 ter resolve extreme rainfall in complex topography.

16 (7) Contributing to a national integrated heat
17 health information systems.

18 (b) PILOT PROGRAM.—In carrying out this section,
19 the Under Secretary, acting through the Director of the
20 National Weather Service and the Administrator of the
21 Federal Emergency Management Agency, shall establish
22 an interagency partnership to support pilot projects that
23 accelerate coordination and use of localized weather,
24 water, and climate data and impact-based communications

1 in infrastructure and emergency management decisions by
2 Federal, State, and local officials.

3 (c) PRIORITY.—At least one pilot project under sub-
4 section (b) shall address key science challenges to using
5 mesonet data in local decision making and development
6 of new tools and training for owners and operators of crit-
7 ical infrastructure (as such term is defined in section
8 1016(e) of Public Law 107–56 (42 U.S.C. 5195c(e))),
9 such as dams, energy generation and distribution facili-
10 ties, nuclear power plants, and transportation networks.

11 **SEC. 204. ATMOSPHERIC RIVERS FORECAST IMPROVEMENT**
12 **PROGRAM.**

13 (a) IN GENERAL.—The Under Secretary, in collabo-
14 ration with the United States weather industry and aca-
15 demic partners, shall establish an atmospheric river fore-
16 cast improvement program (in this section referred to as
17 the “program”).

18 (b) GOAL.—The goal of the program shall be to re-
19 duce through the development and extension of accurate,
20 effective, and actionable forecasts and warnings the loss
21 of life or property from atmospheric rivers, including by—

22 (1) establishing quantitative atmospheric river
23 forecast skill metrics that include quantifying the
24 benefits of dynamical modeling, data assimilation,
25 and machine learning improvements in the prob-

1 abilistic forecasts of landfall location, extreme wind
2 and precipitation, and cascading impacts;

3 (2) developing an atmospheric river forecast
4 system within the unified forecast system, and ad-
5 vancing next-generation coupled modeling systems,
6 with the capability of providing seasonal to short-
7 range atmospheric river forecasts that include fore-
8 cast of snow accumulation and other hydrologic com-
9 ponents;

10 (3) advancing scientific understanding of the
11 roles of atmospheric rivers in subseasonal to sea-
12 sonal precipitation and probabilistic predictions at
13 subseasonal and seasonal scales;

14 (4) developing tools and improved forecast
15 products to predict periods of active or inactive at-
16 mospheric river landfalls and inland penetration over
17 the western United States with a focus on address-
18 ing stakeholder and public needs related to per-
19 ceiving, comprehending, and responding to atmos-
20 pheric river forecast improvements; and

21 (5) enhancing research transition to operations
22 through the Administration's testbeds, including the
23 evaluation of physical and social science, technology,
24 and other research to develop products and services
25 for implementation and use by relevant stakeholders.

1 (c) INNOVATIVE OBSERVATIONS AND MODELING.—
2 The Under Secretary shall ensure the program periodically
3 examines, tests, and evaluates the value of incorporating
4 innovative observations, such as novel sensor technologies,
5 observation networks, soil moisture monitoring systems,
6 reservoir storage data, observations from crewed or
7 uncrewed systems, and hosted instruments on commercial
8 aircrafts, vessels, and satellites, and data assimilation
9 tools, with respect to the improvement of atmospheric
10 river forecasts, predictions, and warnings.

11 (d) PROGRAM PLAN.—Not later than 180 days after
12 the date of the enactment of this Act, the Under Secretary
13 shall develop a plan that details the specific research, de-
14 velopment, data acquisition, and technology transfer ac-
15 tivities, as well as corresponding resources, limitations,
16 and timelines, necessary to achieve the goal of the pro-
17 gram under subsection (b).

18 (e) ANNUAL BUDGET FOR PLAN SUBMITTAL.—After
19 the development of the plan pursuant to subsection (d),
20 the Under Secretary shall, not less frequently than annu-
21 ally, submit to Congress a proposed budget corresponding
22 with the activities identified in such plan.

1 **SEC. 205. COASTAL FLOODING AND STORM SURGE FORE-**
2 **CAST IMPROVEMENT PROGRAM.**

3 (a) IN GENERAL.—The Under Secretary, in collabo-
4 ration with the Integrated Ocean Observing System, the
5 United States weather industry, and academic partners,
6 shall establish a coastal flooding and storm surge forecast
7 improvement program (in this section referred to as the
8 “program”).

9 (b) GOAL.—The goal of the program shall be to re-
10 duce through the development and extension of accurate,
11 effective, actionable, and probable forecasts and warnings
12 the loss of life or property from coastal flooding, including
13 high tide flooding, and storm surge events.

14 (c) PRIORITY.—In implementing the program, the
15 Under Secretary shall prioritize activities that carry out
16 the following:

17 (1) Improving understanding and capacity for
18 real-time operational prediction of the ocean’s role in
19 coastal flooding, including high tide flooding, and
20 storm surge events.

21 (2) Improving the capacity to mitigate or pre-
22 vent the impacts of coastal flooding, including high
23 tide flooding, and storm surge events, including by
24 improving the understanding and capacity of coastal
25 communities to perceive, comprehend, and respond
26 to forecast information.

1 (3) Incorporating data from in situ distributed
2 sensors into models.

3 (4) Developing probabilistic coastal flooding, in-
4 cluding high tide flooding, and storm surge esti-
5 mates to complement worst-case scenario estimates,
6 including for use in long-term planning and risk
7 management by States, Tribal governments, local-
8 ities, and emergency managers in coordination with
9 the Federal Emergency Management Agency, as ap-
10 propriate.

11 (5) Establishing skill metrics for coastal inun-
12 dation forecasting that quantify the benefits of dy-
13 namical modeling, data assimilation, and machine
14 learning improvements in the probabilistic forecast
15 of coastal flooding, including high tide flooding, and
16 storm surge risk and impacts.

17 (6) Improving operational regional storm surge
18 and wave prediction models to enhance probabilistic
19 guidance and messaging.

20 (d) INNOVATIVE OBSERVATIONS AND MODELING.—

21 The Under Secretary shall ensure the program periodically
22 examines, tests, and evaluates the value of incorporating
23 enhanced model physics, hybrid dynamical or machine
24 learning based prediction systems, and innovative observa-
25 tions, such as novel sensor technologies, observation net-

1 works, crewed or uncrewed systems, and hosted instru-
2 ments on commercial aircrafts, vessels, and satellites, with
3 respect to the improvement of coastal flooding, including
4 high tide flooding, and storm surge forecasts, predictions,
5 and warnings.

6 (e) PROGRAM PLAN.—Not later than 180 days after
7 the date of the enactment of this Act, the Under Secretary
8 shall develop a plan that details the specific research, de-
9 velopment, data acquisition, and technology transfer ac-
10 tivities, as well as corresponding resources and timelines,
11 necessary to achieve the goal of the program under sub-
12 section (b).

13 (f) ANNUAL BUDGET FOR PLAN SUBMITTAL.—After
14 the development of the plan pursuant to subsection (e),
15 the Under Secretary shall, not less frequently than annu-
16 ally, submit to Congress a proposed budget corresponding
17 with the activities identified in such plan.

18 **SEC. 206. AVIATION WEATHER AND DATA INNOVATION.**

19 (a) PROGRAM.—The Under Secretary shall maintain
20 an airborne observation program (in this section referred
21 to as the “program”) for the acquisition of atmospheric
22 sensor data and the deployment of critical atmospheric
23 sensors, including in partnership with the weather enter-
24 prise.

1 (b) ACTIVITIES.—The program shall include activi-
2 ties that carry out the following:

3 (1) Procurement of weather data available from
4 commercial aircraft, as determined by the Under
5 Secretary.

6 (2) Acquisition of additional vertical profile ob-
7 servations that provide spatial and temporal density,
8 as determined by the Under Secretary.

9 (3) Analysis of procured data when incor-
10 porated into the National Oceanic and Atmospheric
11 Administration’s unified forecast system in order to
12 provide improved forecast information for aircraft.

13 (c) BUDGET.—The Under Secretary shall, not less
14 frequently than annually, submit to Congress a proposed
15 budget corresponding with the activities described in sub-
16 section (b), including and analysis of activities that can
17 be complemented by National Oceanic and Atmospheric
18 Administration aircraft.

19 (d) AUTHORIZATION OF APPROPRIATIONS.—From
20 amounts made available to the Commercial Data Program
21 under section 302 of the Weather Research and Fore-
22 casting Innovation Act of 2017, there is authorized to be
23 appropriated up to \$10,000,000 for each of fiscal years
24 2024 through 2028 to carry out the program.

1 (e) AVIATION WEATHER AND TURBULENCE FORE-
2 CASTING.—The Director of the National Weather Service
3 shall include turbulence events, icing conditions, or other
4 phenomena in the forecasting capabilities of the National
5 Weather Service’s Aviation Weather Center, and deliver
6 operational forecasts with consistent, timely, and accurate
7 weather and turbulence information for the airspace sys-
8 tem and the protection of lives and property.

9 (f) COORDINATION.—In carrying out subsection (e),
10 the Director of the National Weather Service shall give
11 consideration to recommendations from the Administrator
12 of the Federal Aviation Administration in furtherance of
13 section 44720 of title 49, United States Code, and improve
14 weather and turbulence forecasting capabilities by—

15 (1) designating or establishing within the Fed-
16 eral Government an interagency working group to
17 determine weather and environmental data or obser-
18 vation requirements, needs, and potential solutions
19 related to aviation weather and turbulence modeling
20 or forecasting;

21 (2) identifying current and future potential
22 data gaps related to turbulence events or phenomena
23 that can—

24 (A) identify or inform route specific flight
25 planning; and

1 (B) be supplemented or filled by commer-
2 cial aviation tools;

3 (3) transitioning research initiatives and pilot
4 programs, including a pilot program of instrumenta-
5 tion for observing greenhouse gases and other at-
6 mospheric factors deployed on commercial aircraft
7 and supporting the evaluation of a sustained observ-
8 ing network using such platforms, into operations
9 that improve the forecasting missions of the Aviation
10 Weather Center;

11 (4) developing and deploying improved prob-
12 abilistic aviation weather forecast guidance tech-
13 nology; and

14 (5) updating interagency agreements as appro-
15 priate, including to address reimbursable agree-
16 ments.

17 (g) NEXT GENERATION AVIATION RESEARCH.—
18 Paragraph (3) of section 102(b) of the Weather Research
19 and Forecasting Innovation Act of 2017 (15 U.S.C.
20 8512(b)), is amended—

21 (1) by redesignating subparagraphs (F) and
22 (G) as subparagraphs (G) and (H), respectively; and

23 (2) by inserting after subparagraph (E) the fol-
24 lowing new subparagraph:

1 “(F) aviation weather phenomena, includ-
2 ing atmospheric composition and turbulence, to
3 improve scientific understanding and forecast
4 capabilities for the airspace system;”.

5 **SEC. 207. NESDIS JOINT VENTURE PARTNERSHIP TRANSI-**
6 **TION PROGRAM.**

7 (a) IN GENERAL.—The Assistant Administrator of
8 the National Environmental Satellite, Data, and Informa-
9 tion Service, in consultation with the Administrator of the
10 National Aeronautics and Space Administration, shall ad-
11 minister broad agency announcements and other trans-
12 actional authority or contracting mechanisms, on an an-
13 nual or more frequent basis, to support a joint venture
14 partnership program that allows the Service to prioritize
15 engagement with the private sector, academia, and other
16 Federal departments and agencies.

17 (b) TRANSITION PROGRAM.—To support the develop-
18 ment of next-generation technologies, missions, data sys-
19 tems, spacecraft, and instrument design, the Assistant Ad-
20 ministrator of the National Environmental Satellite, Data,
21 and Information Service, in consultation with the Admin-
22 istrator of the National Aeronautics and Space Adminis-
23 tration, shall maintain a program to transition selected
24 awards from research and study phases into demonstra-
25 tion. In selecting awardees for demonstrations, the Assist-

1 ant Administrator shall consider technologies, missions,
2 data systems, spacecraft, and instrument design that—

3 (1) improve upon the National Oceanic and At-
4 mospheric Administration’s satellite architecture;

5 (2) have a direct impact on implementing the
6 recommendations of the Administration’s 2018 Sat-
7 ellite Observing System Architecture Study, “Build-
8 ing a Plan for NOAA’s 21st Century Satellite Ob-
9 serving System”; and

10 (3) meet current or future mission require-
11 ments.

12 (c) OPERATIONAL PLANNING.—In carrying out the
13 transition program under subsection (b), the Assistant
14 Administrator of the National Environmental Satellite,
15 Data, and Information Service shall monitor demonstra-
16 tion phase progress and plan for promising results that
17 meet mission requirements to be transitioned into Na-
18 tional Oceanic and Atmospheric Administration’s oper-
19 ational satellite architecture.

20 (d) ANNUAL PLAN.—The Assistant Administrator of
21 the National Environmental Satellite, Data, and Informa-
22 tion Service shall submit to the Committee on Science,
23 Space, and Technology, and the Committee on Commerce,
24 Science, and Transportation an annual plan that outlines
25 the progress made in the joint venture partnership pro-

1 gram under subsection (a), the transition program for
2 demonstrations under section (b), and transition to oper-
3 ational architecture planning under subsection (c).

4 (e) AUTHORIZATION OF APPROPRIATIONS.—From
5 amounts authorized to be appropriated to the National
6 Environmental Satellite, Data, and Information Service,
7 there is authorized to be appropriated \$20,000,000 for fis-
8 cal years 2024 through 2028 to carry out to this section.

9 **SEC. 208. ADVANCED WEATHER INTERACTIVE PROCESSING**
10 **SYSTEM.**

11 (a) IN GENERAL.—The Under Secretary, acting
12 through the Director of the National Weather Service,
13 shall develop a strategy to transition operations of the Ad-
14 vanced Weather Interactive Processing System to an oper-
15 ational cloud-based environment in order to enable a more
16 nimble, flexible, and mobile workforce.

17 (b) SERVICES.—The Under Secretary shall ensure
18 that the Advanced Weather Interactive Processing System
19 in an operational cloud-based environment referred to in
20 subsection (a) provides impact-based decision support
21 services to emergency managers at the Federal, State,
22 local, and Tribal levels, and continues to provide the fol-
23 lowing services:

24 (1) Integrating and displaying forecast data, in-
25 cluding meteorological, hydrological, climate, ocean,

1 satellite, and radar data, for National Weather Serv-
2 ice field offices and national centers.

3 (2) Acquiring and processing observational data
4 from sensors and local sources.

5 (3) Providing an interactive communications
6 system, including the satellite broadcast network, to
7 connect relevant National Weather Service employ-
8 ees and sites.

9 (4) Initiating the dissemination of weather,
10 water, marine, ecological, climate, aviation, and
11 space warnings and forecasts in a rapid and highly
12 reliable manner.

13 (c) ELEMENTS.—The transition strategy developed
14 pursuant to subsection (a) may include the following:

15 (1) Establishment or support of testbeds, pilot
16 projects, and functional testing activities to facilitate
17 remote evaluation and automated testing.

18 (2) Coordinated training efforts needed for
19 Federal and non-Federal users and operators of the
20 Advanced Weather Interactive Processing System in
21 an operational cloud-based environment referred to
22 in subsection (a).

23 (3) Evaluation of bandwidth requirements to
24 achieve a quality user experience.

1 (4) Installation of circuits to reduce lapses in
2 network operations and support backup functions.

3 (5) Establishment of a cloud-based, remotely
4 accessible repository for data referred to in sub-
5 section (b)(2).

6 (6) Development and deployment of virtualized
7 systems to replace physical hardware at operational
8 sites.

9 (7) Evaluation of commercial cloud providers,
10 including hybrid approaches, to meet mission needs.

11 (8) Development, testing, demonstration, eval-
12 uation, and operationalization of forecast and warn-
13 ing products, consistent with the mission and sci-
14 entific expertise of the Administration.

15 (d) TRANSITION DEADLINE.—The Under Secretary
16 shall take such actions as may be necessary to ensure the
17 transition strategy described in subsection (a) is completed
18 by not later than September 30, 2030.

19 (e) UPDATES TO CONGRESS.—The Under Secretary
20 shall submit to the Committee on Science, Space, and
21 Technology of the House of Representatives and the Com-
22 mittee on Commerce, Science, and Transportation of the
23 Senate periodic updates on the implementation of this sec-
24 tion.

1 (f) CONTINUED INNOVATION.—Nothing in this sec-
2 tion may be construed as prohibiting the development of
3 new forecast capabilities, sub-systems, or implementing
4 modeling advancements on the operational computing sys-
5 tems of the Administration.

6 **TITLE III—COMMERCIAL WEATH-**
7 **ER AND ENVIRONMENTAL OB-**
8 **SERVATIONS**

9 **SEC. 301. COMMERCIAL DATA PROGRAM.**

10 The Weather Research and Forecasting Innovation
11 Act of 2017 is amended by striking section 302 (15 U.S.C.
12 8532) and inserting the following new section:

13 **“SEC. 302. COMMERCIAL DATA PROGRAM.**

14 “(a) PROGRAM ESTABLISHMENT.—The Under Sec-
15 retary, in coordination with the heads of appropriate of-
16 fices of the National Oceanic and Atmospheric Adminis-
17 tration, shall maintain a Commercial Data Program to ob-
18 tain weather and environmental data and services from
19 private sector entities for operational use.

20 “(b) PROGRAM ELEMENTS.—The Under Secretary
21 shall acquire satellite, ground-based, airborne, or marine-
22 based in situ, remote sensing, or crowd-sourced data and
23 services for operational use relating to weather and envi-
24 ronmental forecasting and modeling. The Under Secretary
25 shall ensure the Commercial Data Program coordinates,

1 collaborates, and shares data purchases and data needs
2 across the Administration, including among the following:

3 “(1) The National Mesonet Program.

4 “(2) The Aircraft Based Observation Program.

5 “(3) The U.S. Integrated Ocean Observation
6 Program, including existing regional associations.

7 “(4) The National Integrated Drought Informa-
8 tion System, including the National Coordinated Soil
9 Moisture Monitoring Network.

10 “(5) The Global Ocean Monitoring and Observ-
11 ing Program.

12 “(6) The National Data Buoy Center.

13 “(7) The Uncrewed Systems Operation Center.

14 “(8) The Ocean Exploration Program.

15 “(9) Any other program or office the Under
16 Secretary determines appropriate.

17 “(c) STANDARDS AND SPECIFICATIONS.—Not later
18 than 180 days after the date of the enactment of this sec-
19 tion and on a continuous basis thereafter, the Under Sec-
20 retary shall publish data, metadata, and service standards
21 and specifications required for acquired observation serv-
22 ices and data for use, licensing, and attribution to ensure
23 quality, impact, and compatibility of such services and
24 data with National Oceanic and Atmospheric Administra-

1 tion modeling capabilities, meteorological situational
2 awareness, and forecasting.

3 “(d) PRIORITIZATION.—The Under Secretary shall
4 prioritize obtaining surface-based, airborne-based, space-
5 based, and coastal- and ocean-based data, metadata, and
6 services for operational use that participate in the Com-
7 mercial Data Pilot Program of the National Oceanic and
8 Atmospheric Administration.

9 “(e) OBSERVING SYSTEMS COUNCIL.—

10 “(1) IN GENERAL.—The Under Secretary shall
11 maintain the National Oceanic and Atmospheric Ad-
12 ministration Observing Systems Council (in this sub-
13 section referred to as the ‘Council’) to provide stra-
14 tegic recommendations, guidance, and consent re-
15 garding the prioritization, design, development, ac-
16 quisition, upgrading, lifecycle, performance moni-
17 toring, and retiring of major observing systems port-
18 folio components, including related to the acquisition
19 of commercial weather and environmental data and
20 services.

21 “(2) LINE OFFICE COORDINATION.—All line of-
22 fices and programs of the National Oceanic and At-
23 mospheric Administration engaged in observing sys-
24 tems portfolio design, technology, development, exe-
25 cution, and operation shall seek guidance and con-

1 sent from the Council to ensure coordination and ad-
2 herence to uniform policies.

3 “(3) DATA GOVERNANCE COMMITTEE.—The
4 Under Secretary shall maintain a Data Governance
5 Committee within the Council. The Committee shall
6 develop and approve procedural directives, guides, or
7 handbooks relevant to management of data and in-
8 formation, including commercial data, and coordi-
9 nate data governance and management practices
10 across the National Oceanic and Atmospheric Ad-
11 ministration to promote consistent processes.

12 “(f) AUTHORIZATION OF APPROPRIATIONS.—

13 “(1) IN GENERAL.—There are authorized to be
14 appropriated \$100,000,000 for each of fiscal years
15 2024 through 2028 to carry out this section.

16 “(2) SENSE OF CONGRESS.—It is the sense of
17 Congress that the Under Secretary should seek to
18 enter into contracts or other appropriate agreements
19 that enable the expenditure, to the maximum extent
20 practicable, of amounts authorized to be appro-
21 priated or otherwise made available in a fiscal year
22 to carry out this section.

23 “(g) DATA AND HOSTED PAYLOADS.—Notwith-
24 standing any other provision of law, the Secretary of Com-
25 merce may enter into agreements relating to the following:

1 “(1) The purchase of weather and environ-
2 mental data and services through contracts with
3 commercial data and service providers.

4 “(2) The placement of weather instruments on
5 co-hosted Federal, international, or private space,
6 airborne, maritime, or ground platforms.

7 “(h) OMBUDSMAN.—The Under Secretary shall es-
8 tablish or designate at least one Ombudsman position
9 within the Office of Research, Transition, and Applica-
10 tions to implement the recommendations of the Observing
11 System Council under subsection (e) related to commercial
12 weather and environmental data and services acquisitions.
13 Such an Ombudsman shall act as the liaison between com-
14 mercial data and service providers and the National Oce-
15 anic and Atmospheric Administration with respect to re-
16 ceiving recommendations and resolving issues related to
17 engagement, testing, contracting, or other areas related
18 to the Administration’s efforts to acquire commercial
19 weather and environmental data and services.

20 “(i) REPORT.—Not later than two years after the
21 date of the enactment of this section, the Under Secretary
22 shall submit to the Committee on Science, Space, and
23 Technology of the House of Representatives and the Com-
24 mittee on Commerce, Science, and Transportation of the
25 Senate a report evaluating the activities and needed au-

1 thorities related to data governance and management
2 practices, including acquisition, collection, documentation,
3 quality control, validation, reprocessing, storage, retrieval,
4 dissemination, and long-term preservation activities across
5 all National Oceanic and Atmospheric Administration line,
6 staff, and corporate offices.”.

7 **SEC. 302. COMMERCIAL DATA PILOT PROGRAM.**

8 The Weather Research and Forecasting Innovation
9 Act of 2017 is amended by striking section 303 (15 U.S.C.
10 8533) and inserting the following new section:

11 **“SEC. 303. COMMERCIAL DATA PILOT PROGRAM.**

12 “(a) PROGRAM ESTABLISHMENT.—Within the Com-
13 mercial Data Program under section 302, there shall be
14 a Commercial Data Pilot Program to engage with external
15 partners and providers to test and develop shared stand-
16 ards and methodologies for quality, use, licensing, and at-
17 tribution of observation services and data, and to ensure
18 quality, impact, and compatibility of such services and
19 data with National Oceanic and Atmospheric Administra-
20 tion modeling capabilities, meteorological situational
21 awareness, and forecasting. The Program is authorized to
22 test and evaluate all sources and types of observation serv-
23 ices, imagery, products, and data from private sector enti-
24 ties, including new and innovative surface-based, airborne-

1 based, space-based, and coastal- and ocean-based data,
2 metadata, and model components.

3 “(b) CRITERIA.—The Under Secretary shall ensure
4 that data acquired through the Commercial Data Pilot
5 Program described in subsection (a) meets the most recent
6 standards and specifications required for observation serv-
7 ices and data as published pursuant to section 302(c).

8 “(c) PILOT CONTRACTS.—The Under Secretary shall,
9 through an open competition, regularly enter into pilot
10 contracts with private sector entities capable of providing
11 observation services and data referred to in subsection (a)
12 that meet the standards and specifications published pur-
13 suant to section 302(c) for so providing such services and
14 data in a manner that allows the Under Secretary to cali-
15 brate and evaluate such services and data for use in Na-
16 tional Oceanic and Atmospheric Administration activities.

17 “(d) ASSESSMENT OF VIABILITY.—The Under Sec-
18 retary shall annually assess and submit to the Committee
19 on Commerce, Science, and Transportation of the Senate
20 and the Committee on Science, Space, and Technology of
21 the House of Representatives a summary of the pilot con-
22 tracts entered into pursuant to subsection (c), the extent
23 to which such contracts meet the standards and specifica-
24 tions published pursuant to section 302(c), and any addi-

1 tional information determined necessary related to the fol-
2 lowing:

3 “(1) The viability of assimilating observation
4 services and data from private sector entities into
5 National Oceanic and Atmospheric Administration
6 forecasts and models.

7 “(2) The expected value added or improvements
8 from such services and data so assimilated into Na-
9 tional Oceanic and Atmospheric Administration fore-
10 casts and models.

11 “(3) The accuracy, quality, timeliness, validity,
12 reliability, usability, information technology security,
13 and cost-effectiveness of obtaining observation serv-
14 ices and data from private sector entities.

15 “(4) Steps to integrate within one year such
16 services and data into operational use by the Na-
17 tional Oceanic and Atmospheric Administration or
18 any associated challenges in doing so.

19 “(e) OBTAINING FUTURE DATA.—If an assessment
20 under subsection (d) demonstrates the ability of commer-
21 cial services and data to meet the standards and specifica-
22 tions published pursuant to section 302(c), the Under Sec-
23 retary shall—

24 “(1) when cost-effective and feasible, obtain ob-
25 servation services and data from private sector enti-

1 ties through the Commercial Data Program under
2 section 302;

3 “(2) as early as possible in the acquisition proc-
4 ess for any future National Oceanic and Atmos-
5 pheric Administration satellite system, determine
6 whether there is a suitable, cost-effective, commer-
7 cial capability available or that will be available to
8 meet applicable instrument, spacecraft, or system re-
9 quirements before completion of the critical design
10 phase of such planned satellite system;

11 “(3) if a suitable, cost-effective, commercial ca-
12 pability is or will be available as described in para-
13 graph (2), determine whether and how such capa-
14 bility is in the national interest if developed as a
15 solely governmental system; and

16 “(4) submit to the Committee on Commerce,
17 Science, and Transportation of the Senate and the
18 Committee on Science, Space, and Technology of the
19 House of Representatives a report detailing any de-
20 terminations made under paragraphs (2) and (3).

21 “(f) AUTHORIZATION OF APPROPRIATIONS.—From
22 amounts authorized to be appropriated pursuant to sec-
23 tion 302 to carry out such section, not less than 15 per-
24 cent of such amounts each fiscal year are authorized to
25 be appropriated to carry out this section.”.

1 **SEC. 303. CONTRACTING AUTHORITY AND AVOIDANCE OF**
2 **DUPLICATION.**

3 Title III of the Weather Research and Forecasting
4 Innovation Act of 2017 is amended by adding at the end
5 the following new section:

6 **“SEC. 304. CONTRACTING AUTHORITY AND AVOIDANCE OF**
7 **DUPLICATION.**

8 “(a) IN GENERAL.—Consistent with other Federal
9 agencies that contract and partner with private sector en-
10 tities, the Under Secretary is authorized to use con-
11 tracting mechanisms and enter into agreements that uti-
12 lize multiyear contract options. In carrying out sections
13 302 and 303, the Under Secretary shall, to the greatest
14 extent possible—

15 “(1) enter into year-long or multiyear contract
16 options using contracting mechanisms that foster re-
17 siliency of datatypes purchased;

18 “(2) partner and contract with multiple obser-
19 vation service and data providers simultaneously to
20 reduce risks of data gaps and improve mission
21 robustness; and

22 “(3) utilize authorities, such as additional
23 forms of transaction agreements under section 301,
24 that allow for innovative partnerships with private
25 sector entities.

1 “(b) SAVINGS CLAUSE.—Nothing in this title may be
2 construed as infringing on the acquisition authority or
3 strategy of Federal entities authorized under title 10,
4 United States Code.

5 “(c) UNNECESSARY DUPLICATION.—In meeting the
6 requirements under this title, the Under Secretary shall
7 avoid unnecessary duplication between the National Oce-
8 anic and Atmospheric Administration, the National Aero-
9 nautics and Space Administration, other Federal depart-
10 ments and agencies, and private sector entities, including
11 relating to corresponding expenditures of funds and em-
12 ployment of personnel by—

13 “(1) coordinating existing activities with other
14 civilian Federal departments and agencies which
15 provide, contract, or partner with private sector enti-
16 ties to acquire, weather and environmental observa-
17 tions and data; and

18 “(2) coordinating and soliciting weather and en-
19 vironmental observations and data requirements and
20 needs from other civilian Federal departments and
21 agencies to be acquired by the Commercial Data
22 Program under section 302.

23 “(d) FAIR COMPENSATION FOR INTERAGENCY
24 NEEDS.—The Under Secretary, to the maximum extent
25 practicable, shall ensure that Federal departments and

1 agencies utilizing services and data under sections 302
2 and 303 fairly compensate the National Oceanic and At-
3 mospheric Administration, or the non-Federal entities pro-
4 viding such services or data, as appropriate, for use.”.

5 **SEC. 304. DATA ASSIMILATION, MANAGEMENT, AND SHAR-**
6 **ING PRACTICES.**

7 Title III of the Weather Research and Forecasting
8 Innovation Act of 2017, as amended by section 303 of this
9 Act, is further amended by adding at the end the following
10 new section:

11 **“SEC. 305. DATA ASSIMILATION, MANAGEMENT, AND SHAR-**
12 **ING PRACTICES.**

13 “(a) DATA STANDARDS.—The Under Secretary, in
14 collaboration with the weather enterprise, shall seek to es-
15 tablish consistent and open data and metadata standards
16 to support open science, including simple cloud-optimized
17 data formats and application programming interfaces that
18 support findability, accessibility, usability, and
19 preservability.

20 “(b) DATA INFRASTRUCTURE.—

21 “(1) IN GENERAL.—The Under Secretary, in
22 consultation with the Chief Information Officer and
23 appropriate program heads, shall consolidate and ar-
24 range data infrastructure needs to ensure efficient
25 and effective data transfer between National Oceanic

1 and Atmospheric Administration offices by consid-
2 ering the use of commercial cloud technologies, or
3 similar hybrid structures, to host and transmit data
4 and metadata.

5 “(2) FEDERAL PARTNERSHIPS.—In carrying
6 out paragraph (1), the Under Secretary may partner
7 with the heads of other Federal departments and
8 agencies, including the National Aeronautics and
9 Space Administration, the Department of Energy,
10 the United States Space Force, the United States
11 Coast Guard, the United States Navy, the Federal
12 Aviation Administration, the United States Forest
13 Service, the Environmental Protection Agency, the
14 National Science Foundation, and the United States
15 Geological Survey, to collocate data with joint utility
16 and support a transition to cloud architectures, in-
17 cluding commercial cloud networks.

18 “(3) LONG TERM DATA ARCHIVE.—The Under
19 Secretary shall ensure the long-term management,
20 maintenance, and stewardship of archival data and
21 metadata acquired through the Commercial Data
22 Program under section 302 is conducted within the
23 National Centers for Environmental Information.

24 “(c) DATA SHARING WITH THE WEATHER ENTER-
25 PRISE.—To the greatest extent practicable, the Under

1 Secretary shall make accessible to members of the weather
2 enterprise that are United States persons data not subject
3 to redistribution contract permissions and purchased
4 through the Commercial Data Program under section 302
5 or shared through international government partners. If
6 purchased data must be assimilated into numerical weath-
7 er prediction models or automated forecast guidance to
8 satisfy redistribution contract permissions, the Under Sec-
9 retary shall make accessible without delay to members of
10 the weather enterprise that are United States persons the
11 numerical weather prediction model or automated forecast
12 guidance output, as the case may be.

13 “(d) DATA ASSIMILATION.—

14 “(1) IN GENERAL.—The Under Secretary, in
15 coordination with the Commercial Data Program
16 under section 302, the National Centers for Envi-
17 ronmental Information, and any other offices within
18 the Administration, shall establish a program to
19 test, advance, and implement data assimilation
20 methods, which may include artificial intelligence,
21 machine learning, data pre- and post-processing, ef-
22 ficient input and output, and next-generation algo-
23 rithms.

24 “(2) DATA ASSIMILATION UNIVERSITY CONSOR-
25 TIUM.—Through the program established pursuant

1 to paragraph (1), the Under Secretary shall estab-
2 lish a consortium consisting of institutions of higher
3 education (as such term is defined in section 101 of
4 the Higher Education Act of 1965 (20 U.S.C.
5 1001)) to address critical research challenges for
6 data assimilation and foster a growing data assimi-
7 lation workforce. The consortium shall seek to—

8 “(A) solve critical research issues for data
9 assimilation through innovative research;

10 “(B) increase significantly the number of
11 students, including graduate level and Ph.D.
12 candidates, in data assimilation;

13 “(C) utilize modern software and frame-
14 works, such as the Joint Effort for Data As-
15 similation Integration, to conduct data assimila-
16 tion research and development and facilitate re-
17 search to operations efforts;

18 “(D) identify and prioritize critical re-
19 search areas in data assimilation and facilitate
20 operations to research efforts;

21 “(E) establish and enable an effective col-
22 laboration infrastructure between National Oce-
23 anic and Atmospheric Administration facilities,
24 such as labs, centers, or joint agency institutes,
25 and the research community, including a mech-

1 anism for external partners to host Administra-
2 tion employees; and

3 “(F) establish mechanisms to enable all
4 members of the consortium to archive and ac-
5 cess data required to support the work under
6 this subsection.

7 “(3) COORDINATION.—In carrying out this sub-
8 section, the Under Secretary shall ensure the Na-
9 tional Oceanic and Atmospheric Administration and
10 its associated activities focus on research to oper-
11 ations and operations to research, including by co-
12 ordinating and collaborating with the Joint Center
13 for Satellite Data Assimilation.

14 “(e) STUDY ON DATA MANAGEMENT.—

15 “(1) IN GENERAL.—Not later than 90 days
16 after the data of the enactment of this section, the
17 Under Secretary shall seek to enter into an agree-
18 ment with a non-Federal entity to conduct a study
19 on matters concerning data practices and manage-
20 ment needs at the National Oceanic and Atmos-
21 pheric Administration. In conducting the study, the
22 outside entity shall—

23 “(A) assess the costs and benefits of cur-
24 rent data management needs for observational
25 and operational mission requirements;

1 “(B) develop recommendations regarding
2 how to make more robust and cost-effective the
3 data portfolio of the Administration;

4 “(C) identify data infrastructure tech-
5 nologies and needs that are essential to the per-
6 formance of modeling systems of the Adminis-
7 tration;

8 “(D) assess the sharing needs and prac-
9 tices of the Administration for both internal
10 and external sharing dissemination; and

11 “(E) develop recommendations for methods
12 of data infrastructure sharing, including data
13 purchased from the commercial sector.

14 “(2) AUTHORIZATION OF APPROPRIATIONS.—
15 From amounts authorized to be appropriated to the
16 Commercial Data Program under section 302, there
17 are authorized to be appropriated to carry out the
18 study under paragraph (1) \$1,000,000, to remain
19 available until expended.”.

20 **SEC. 305. CLERICAL AMENDMENT.**

21 The table of contents in section 1(b) of the Weather
22 Research and Forecasting Innovation Act of 2017 is
23 amended by striking the items relating to sections 302 and
24 303 and inserting the following new items:

“Sec. 302. Commercial Data Program.

“Sec. 303. Commercial Data Pilot Program.

“Sec. 304. Contracting authority and avoidance of duplication.

“Sec. 305. Data assimilation, management, and sharing practices.”.

1 **TITLE IV—COMMUNICATING**
2 **WEATHER TO THE PUBLIC**

3 **SEC. 401. DEFINITIONS.**

4 In this title:

5 (1) HAZARDOUS WEATHER OR WATER
6 EVENTS.—The term “hazardous weather or water
7 events” has the meaning given such term in section
8 406 of the Weather Research and Forecasting Inno-
9 vation Act of 2017 (Public Law 115–25; 131 Stat.
10 109), as amended by section 402 of this Act.

11 (2) INSTITUTION OF HIGHER EDUCATION.—The
12 term “institution of higher education” has the
13 meaning given such term in section 101 of the High-
14 er Education Act of 1965 (20 U.S.C. 1001).

15 (3) NOAA WEATHER RADIO.—The term
16 “NOAA Weather Radio” means the National Oce-
17 anic and Atmospheric Administration Weather Radio
18 All Hazards network.

19 (4) PUBLIC CLOUD.—The term “public cloud”
20 means an information technology model in which
21 service providers make computing services, including
22 compute and storage and develop-and-deploy envi-
23 ronments and applications, available on-demand to
24 organizations and individuals over the public inter-

1 net or other means that allows for the widest dis-
2 semination of information.

3 (5) WATCH; WARNING.—The terms “watch”
4 and “warning” have the meanings given such terms
5 in section 406 of the Weather Research and Fore-
6 casting Innovation Act of 2017 (Public Law 115–25;
7 131 Stat. 109), as amended by section 402 of this
8 Act.

9 **SEC. 402. HAZARDOUS WEATHER OR WATER EVENT RISK**
10 **COMMUNICATION.**

11 (a) IN GENERAL.—Section 406 of the Weather Re-
12 search and Forecasting Innovation Act of 2017 (Public
13 Law 115–25; 131 Stat. 109) is amended to read as fol-
14 lows:

15 **“SEC. 406. HAZARDOUS WEATHER OR WATER EVENT RISK**
16 **COMMUNICATION.**

17 “(a) DEFINITIONS.—In this section:

18 “(1) HAZARDOUS WEATHER OR WATER
19 EVENTS.—The term ‘hazardous weather or water
20 events’ means weather or water events that have a
21 high risk of loss of life or property, including the fol-
22 lowing:

23 “(A) Severe storms, such as hurricanes
24 and short-fused, small-scale hazardous weather
25 or hydrologic events produced by thunder-

1 storms, including large hail, damaging winds,
2 tornadoes, and flash floods.

3 “(B) Winter storms, such as freezing or
4 frozen precipitation (including freezing rain,
5 sleet, and snow), or combined effects of freezing
6 or frozen precipitation and strong winds.

7 “(C) Other weather hazards, such as ex-
8 treme heat or cold, wildfire, drought, dense fog,
9 high winds, and river, coastal, or lakeshore
10 flooding.

11 “(2) INSTITUTION OF HIGHER EDUCATION.—
12 The term ‘institution of higher education’ has the
13 meaning given such term in section 101 of the High-
14 er Education Act of 1965 (20 U.S.C. 1001).

15 “(3) WATCH; WARNING.—

16 “(A) IN GENERAL.—The terms ‘watch’ and
17 ‘warning’, with respect to a hazardous weather
18 or water event, mean products issued by the
19 National Oceanic and Atmospheric Administra-
20 tion, intended for consumption by the general
21 public, to alert the general public to the poten-
22 tial for or presence of such event and to inform
23 action to prevent loss of life or property.

24 “(B) EXCEPTION.—The terms ‘watch’ and
25 ‘warning’ do not include technical or specialized

1 meteorological or hydrological forecasts, out-
2 looks, or model guidance products.

3 “(b) SYSTEM COMMUNICATIONS.—The Under Sec-
4 retary shall maintain and improve the system of the Na-
5 tional Oceanic and Atmospheric Administration by which
6 the risks of hazardous weather or water events are com-
7 municated to the general public, with the goal of informing
8 response to prevent loss of life or property.

9 “(c) HAZARD RISK COMMUNICATION IMPROVEMENT
10 AND SIMPLIFICATION.—

11 “(1) IN GENERAL.—To carry out subsection
12 (b), the Under Secretary shall maintain a social, be-
13 havioral, risk, communication, and economic sciences
14 program (in this section referred to as the ‘Pro-
15 gram’), for the purpose of simplifying and improving
16 the communication of hazardous weather or water
17 events.

18 “(2) TERMINOLOGY.—The Program, in coordi-
19 nation with social, behavioral, risk, communication,
20 and economic science community and user feedback,
21 shall identify, eliminate, or modify unnecessary, re-
22 dundant, or confusing terms for communications re-
23 garding hazardous weather or water events and add
24 new terminology, as appropriate.

1 “(3) COMMUNICATIONS IMPROVEMENT.—The
2 Program shall improve the form, content, and meth-
3 ods of communications regarding hazardous weather
4 or water events and associated risks to more clearly
5 inform response to prevent the loss of life or prop-
6 erty.

7 “(4) EVALUATIONS.—The Program, in coordi-
8 nation with the performance and evaluation
9 branches of the National Weather Service and Oce-
10 anic and Atmospheric Research, shall develop
11 metrics for such branches to track and evaluate the
12 degree to which communications regarding haz-
13 ardous weather or water events inform response.

14 “(5) SUPPORT PLAN.—The Program shall de-
15 velop a plan for the purpose of carrying out para-
16 graph (3). Such plan shall be periodically updated
17 and informed by internal and extramural research
18 and the results of the evaluation of communications
19 regarding hazardous weather or water events and as-
20 sociated risks under paragraph (4).

21 “(6) METHODS.—In carrying out this section,
22 the Program shall develop and implement rec-
23 ommendations that—

24 “(A) are based on the best and most re-
25 cent understanding from social, behavioral, eco-

1 nomic, risk, and communications science re-
2 search;

3 “(B) are validated by social, behavioral,
4 risk, and communications science, taking into
5 account the importance of methods that support
6 reproduction and replication of scientific stud-
7 ies, use of rigorous statistical analyses, and, as
8 applicable, data analysis supported by artificial
9 intelligence and machine learning technologies;

10 “(C) account for the needs of various de-
11 mographics, vulnerable populations, and geo-
12 graphic regions;

13 “(D) account for the differences between
14 various types of hazardous weather or water
15 events;

16 “(E) respond to the needs of Federal,
17 State, and local government partners and media
18 partners; and

19 “(F) account for necessary changes in the
20 infrastructure, technology, and protocols for de-
21 veloping and disseminating watches and warn-
22 ings.

23 “(7) COORDINATION.—In carrying out this sec-
24 tion, the Program shall coordinate with the fol-
25 lowing:

1 ther amended by adding at the end the following new sub-
2 section:

3 “(d) HAZARD COMMUNICATION RESEARCH AND EN-
4 GAGEMENT.—

5 “(1) IN GENERAL.—The Under Secretary shall
6 maintain, as appropriate, a program to—

7 “(A) modernize the development and com-
8 munication of risk-based, statistically reliable,
9 probabilistic hazard information, with the goal
10 of informing appropriate responses to haz-
11 ardous weather or water events; and

12 “(B) improve the fundamental social, be-
13 havioral, economic, risk, and communication
14 science relating to communications, including
15 by means of collecting voluntary data, regarding
16 hazardous weather or water events.

17 “(2) COORDINATION.—In carrying out the pro-
18 gram under paragraph (1), the Under Secretary
19 shall coordinate and communicate with States, Trib-
20 al governments, localities, and emergency managers
21 regarding research priorities and results.

22 “(3) PILOT PROGRAM FOR TORNADO HAZARD
23 COMMUNICATION REQUIRED.—To further research
24 into communications regarding hazardous weather
25 or water events, the Under Secretary, in coordina-

1 tion with the VORTEX program under section 103
2 and in collaboration with one or more eligible insti-
3 tutions (or a consortia thereof), shall establish a
4 pilot program for tornado hazard communication to
5 test the effectiveness of implementing research into
6 operations with respect to tornadoes.

7 “(4) ELIGIBLE INSTITUTION DEFINED.—In this
8 subsection, the term ‘eligible institution’ means any
9 of the following:

10 “(A) An institution of higher education,
11 nonprofit organization, or other institution lo-
12 cated in a jurisdiction eligible to participate in
13 the program under section 113 of the National
14 Science Foundation Authorization Act of 1988
15 (42 U.S.C. 1862g).

16 “(B) An institution of higher education,
17 nonprofit organization, or other institution lo-
18 cated in proximity to a Weather Forecast Office
19 of the National Weather Service.”.

20 **SEC. 404. NATIONAL WEATHER SERVICE COMMUNICATIONS**
21 **IMPROVEMENT.**

22 (a) IMPROVEMENT OF NWS INSTANT MESSAGING
23 SERVICE.—The Director of the National Weather Service
24 shall improve the instant messaging service used by per-
25 sonnel of the National Weather Service by implementing,

1 not later than October 1, 2027, a commercial off-the-shelf
2 communications solution that replaces the instant mes-
3 saging service commonly referred to as “NWSChat”.

4 (b) REQUIREMENTS.—The communications solution
5 implemented under this section shall—

6 (1) be hosted on the public cloud; and

7 (2) satisfy requirements set forth by the Direc-
8 tor to ensure such solution—

9 (A) best accommodates future growth;

10 (B) performs successfully with increased
11 numbers of users;

12 (C) is easy to use for the majority of users;
13 and

14 (D) is similar to systems already in com-
15 mercial use.

16 (c) FUNDING.—From amounts made available for
17 Operations, Research, and Facilities, the Director of the
18 National Weather Service shall allocate up to \$3,000,000
19 for each of fiscal years 2024 through 2027 to carry out
20 this section.

21 **SEC. 405. NOAA WEATHER RADIO MODERNIZATION.**

22 (a) IN GENERAL.—The Under Secretary shall, to the
23 maximum extent practicable, expand coverage of the
24 NOAA Weather Radio and ensure its reliability. In car-
25 rying out this subsection, the Under Secretary shall—

1 (1) maintain support for existing systems serv-
2 ing areas not covered by or having poor quality cel-
3 lular service;

4 (2) ensure consistent maintenance and oper-
5 ations monitoring, with timely repairs to broadcast
6 transmitter site equipment and antennas;

7 (3) enhance the ability to amplify Non-Weather
8 Emergency Messages via NOAA Weather Radio as
9 necessary; and

10 (4) acquire additional transmitters as required
11 to expand coverage to rural and underserved com-
12 munities, units of the National Park System, and
13 National Recreation Areas.

14 (b) MODERNIZATION INITIATIVE.—To the maximum
15 extent practicable, the Under Secretary shall enhance
16 NOAA Weather Radio to ensure its capabilities and cov-
17 erage remain valuable to the public. In carrying out this
18 section, the Under Secretary shall—

19 (1) upgrade telecommunications infrastructure
20 to accelerate the transition of broadcasts to internet
21 protocol-based communications over non-copper
22 media;

23 (2) accelerate software upgrades to the Ad-
24 vanced Weather Interactive Processing System, or

1 the relevant system successors, to implement partial
2 county notifications and alerts;

3 (3) consult with relevant stakeholders, including
4 the private sector, to enhance accessibility and
5 usability of NOAA Weather Radio data and feeds;

6 (4) develop options, including satellite backup
7 capability and commercial provider partnerships, for
8 NOAA Weather Radio continuity in the event of
9 Weather Forecast Office outages;

10 (5) research and develop alternative options, in-
11 cluding microwave capabilities, to transmit NOAA
12 Weather Radio signals to transmitters that are re-
13 mote or do not have internet protocol capability; and

14 (6) transition critical applications to the Inte-
15 grated Dissemination Program, or the relevant pro-
16 gram successors.

17 (c) PRIORITY.—In carrying out subsection (b), the
18 Under Secretary shall prioritize practices, capabilities, and
19 technologies recommended in accordance with the assess-
20 ment under subsection (d) to maximize accessibility, par-
21 ticularly in remote and underserved areas of the United
22 States.

23 (d) ASSESSMENT FOR MANAGEMENT AND DISTRIBUTION.—Not later than one year after the date of the enact-
24 tion.—Not later than one year after the date of the enact-
25 ment of this Act, the Under Secretary shall complete an

1 assessment of access to NOAA Weather Radio. In con-
2 ducting such assessment, the Under Secretary shall take
3 into consideration and provide recommendations regarding
4 the following:

5 (1) The need for continuous, adequate, and
6 operational real-time broadcasts of the NOAA
7 Weather Radio in both urban and rural areas.

8 (2) Solicited inputs from relevant stakeholders
9 on the compatibility of NOAA Weather Radio data
10 for third party platforms that provide online serv-
11 ices, such as websites and mobile device applications,
12 or deliver NOAA Weather Radio access.

13 (3) Existing or new management systems that
14 promote consistent, efficient, and compatible access
15 to NOAA Weather Radio.

16 (4) The ability of NOAA to aggregate real time
17 broadcast feeds at one or more central locations.

18 (5) Effective interagency coordination.

19 (6) The potential effects of an electromagnetic
20 pulse or geomagnetic disturbance on NOAA Weather
21 Radio.

22 (7) Any other function the Under Secretary de-
23 termines necessary.

1 **SEC. 406. POST-STORM SURVEYS AND ASSESSMENTS.**

2 (a) IN GENERAL.—The Under Secretary shall con-
3 tinue to perform one or more post-storm surveys and as-
4 sessments following every hazardous weather or water
5 event determined by the Under Secretary to be of suffi-
6 cient societal importance to warrant a post-event survey
7 and assessment.

8 (b) COORDINATION.—The Under Secretary shall co-
9 ordinate with Federal, State, local and Tribal govern-
10 ments, private entities, and relevant institutions of higher
11 education (or a consortia thereof) when conducting post-
12 storm surveys and assessments under this section to opti-
13 mize data collection, sharing, integration, archiving, and
14 access, as appropriate for research needs.

15 (c) DATA AVAILABILITY.—The Under Secretary shall
16 make the appropriate data obtained from each post-storm
17 survey and assessment conducted under this section avail-
18 able to the public as soon as practicable after conducting
19 each such survey and assessment.

20 (d) IMPROVEMENT.—In carrying out this section, the
21 Under Secretary shall—

22 (1) examine the role of uncrewed aerial and ma-
23 rine systems in data collection during post-storm
24 surveys and assessments conducted under this sec-
25 tion;

1 (2) identify gaps in and update tactics and pro-
2 cedures to enhance the efficiency and reliability of
3 data obtained from post-storm surveys and assess-
4 ments;

5 (3) to the maximum extent practicable, increase
6 the number of post-storm community impact studies,
7 including—

8 (A) surveying-individual responses;

9 (B) conducting review of the accuracy of
10 prior risk evaluations;

11 (C) evaluating the efficacy of prior mitiga-
12 tion activity; and

13 (D) gathering survivability statistics; and

14 (4) as appropriate, integrate community-based,
15 social, behavioral, risk, communication, and eco-
16 nomic sciences elements into existing post-storm sur-
17 veys and assessments, including relating to efficacy
18 of forecast and warning information, barriers to ac-
19 tion, and messaging challenges.

20 (e) SUPPORT FOR EMPLOYEES.—The Under Sec-
21 retary shall provide training, resources, and access to pro-
22 fessional counseling to support the emotional and mental
23 health and well-being of employees conducting post-storm
24 surveys and assessments under this section.

1 (f) EXEMPTION.—Subchapter I of chapter 35 of title
2 44, United States Code, shall not apply to the collection
3 of information during the conduct of a survey or assess-
4 ment authorized under subsection (a).

5 **SEC. 407. GOVERNMENT ACCOUNTABILITY OFFICE REPORT**
6 **ON ALERT DISSEMINATION FOR HAZARDOUS**
7 **WEATHER OR WATER EVENTS.**

8 (a) IN GENERAL.—Not later than 540 days after the
9 date of the enactment of this Act, the Comptroller General
10 of the United States shall submit to the Committee on
11 Commerce, Science, and Transportation of the Senate and
12 the Committee on Science, Space, and Technology of the
13 House of Representatives a report that examines the infor-
14 mation technology infrastructure of the National Weather
15 Service of the National Oceanic and Atmospheric Adminis-
16 tration, specifically regarding the system for timely public
17 notification via alerts and updates regarding hazardous
18 weather or water events.

19 (b) ELEMENTS.—The report required by subsection
20 (a) shall include the following:

21 (1) An analysis of the information technology
22 infrastructure of the National Weather Service, in-
23 cluding software and hardware capabilities and limi-
24 tations, including an examination of server and data

1 storage methods, broadband, data management, and
2 data sharing.

3 (2) An identification of secondary and tertiary
4 fail-safes for the timely distribution to the public of
5 notifications via alerts and updates regarding haz-
6 ardous weather or water events.

7 (3) A process analysis to determine the source
8 and extent to which public notifications via alerts
9 and updates regarding hazardous weather or water
10 events have been delayed and an identification of
11 possible improvements or corrective measures to ad-
12 dress latency in the notification process.

13 (4) An assessment of whether collaboration with
14 other Federal offices, States, or private entities
15 could reduce delays in notifications to the public.

16 (5) A description of actions being undertaken to
17 better identify critical steps in public notification via
18 alerts and updates for hazardous weather or water
19 events that may be vulnerable to disruption or fail-
20 ure in the event of communication, technologic, or
21 computational failure.

22 (6) The geographical differences in availability
23 and effectiveness of rural systems, including an esti-
24 mated number of rural areas affected by unreliable

1 or unavailable accurate systems and barriers to ob-
2 tain or upgrade such systems.

3 **SEC. 408. DATA COLLECTION MANAGEMENT AND PROTEC-**
4 **TION.**

5 (a) DATA COLLECTION.—The Under Secretary may
6 collect social, behavioral, and economic data, including
7 Federal communication and related public response to
8 hazardous weather or water events. Where appropriate,
9 the Under Secretary shall encourage use of secondary
10 data, purchase data, or partner with the private sector.

11 (b) DATA MANAGEMENT.—The Under Secretary
12 shall establish a central repository system for the National
13 Oceanic and Atmospheric Administration for social, be-
14 havioral, and economic data related to the communication
15 of and related public response to hazardous weather or
16 water events, including data developed or received pursu-
17 ant to this title.

18 (c) PROTECTION OF DATA.—The Under Secretary
19 shall ensure that all data collected and managed by the
20 Administration is done within with all legal, regulatory,
21 and contractual obligations and in accordance with chap-
22 ter 31 of title 44, United States Code, and the Federal
23 Evidence-Based Policymaking Act of 2018 (Public Law
24 115–435).

1 (d) DIGITAL WATERMARKING.—The Under Secretary
2 shall develop methods to reduce the likelihood of unauthor-
3 ized tampering with online public notifications of haz-
4 ardous weather or water events, such as developing digital
5 watermarks.

6 **TITLE V—IMPROVING WEATHER**
7 **INFORMATION FOR AGRICULTURE AND WATER MAN-**
8 **AGEMENT**
9

10 **SEC. 501. WEATHER AND CLIMATE INFORMATION IN AGRICULTURE AND WATER MANAGEMENT.**
11

12 Section 1762 of the Food Security Act of 1985 (15
13 U.S.C. 8521) is amended—

14 (1) by amending subsection (h) to read as fol-
15 lows:

16 “(h) SUBSEASONAL TO SEASONAL FORECASTING
17 PILOT PROJECTS.—

18 “(1) ESTABLISHMENT.—The Under Secretary
19 shall establish not fewer than two pilot projects, in
20 accordance with paragraph (2), within the U.S.
21 Weather Research Program of the Oceanic and At-
22 mospheric Research office of the National Oceanic
23 and Atmospheric Administration to support im-
24 proved subseasonal to seasonal precipitation fore-
25 casts for the following:

1 “(A) Water management in the western
2 United States.

3 “(B) Agriculture in the central United
4 States.

5 “(2) OBJECTIVES.—In carrying out this sub-
6 section, the Under Secretary shall ensure the fol-
7 lowing:

8 “(A) A pilot project under subparagraph
9 (A) of paragraph (1) addresses key science
10 challenges to improving forecasts and devel-
11 oping related products for water management
12 in the western United States, including the fol-
13 lowing:

14 “(i) Improving operational model reso-
15 lution, both horizontal and vertical, to re-
16 solve issues associated with mountainous
17 terrain, such as intensity of precipitation
18 and relative fraction of rain versus snow
19 precipitation.

20 “(ii) Improving fidelity in the oper-
21 ational modeling of the atmospheric bound-
22 ary layer in mountainous regions.

23 “(iii) Resolving challenges in pre-
24 dicting winter atmospheric circulation and
25 storm tracks, including periods of blocked

1 versus unblocked flow over the eastern
2 North Pacific Ocean and western United
3 States.

4 “(iv) Utilizing outcomes from the At-
5 mospheric Rivers Forecast Improvement
6 Program as authorized in section 204 of
7 the Weather Act Reauthorization Act of
8 2023 to produce operational tools and
9 services.

10 “(v) Improving the quality and tem-
11 poral and spatial resolution of observations
12 and accurate operational modeling of air-
13 sea interactions, and the influence of
14 oceans on subseasonal and seasonal fore-
15 casting.

16 “(B) A pilot project under subparagraph
17 (B) of paragraph (1) addresses key science
18 challenges to improving forecasts and devel-
19 oping related products for agriculture in the
20 central United States, including the following:

21 “(i) Improving the quality and tem-
22 poral and spatial resolution of observations
23 and accurate operational modeling of the
24 land surface and hydrologic cycle, includ-

1 ing soil moisture and flash drought proc-
2 esses.

3 “(ii) Improving fidelity in the oper-
4 ational modeling of warm season precipita-
5 tion processes.

6 “(iii) Understanding and predicting
7 large-scale upper-level dynamical flow
8 anomalies that occur in spring and sum-
9 mer.

10 “(3) ACTIVITIES.—A pilot project under this
11 subsection shall include activities that carry out the
12 following:

13 “(A) Best implement recommendations of
14 the National Weather Service’s 2020 Report,
15 entitled ‘Subseasonal and Seasonal Forecasting
16 Innovation: Plans for the Twenty-First Cen-
17 tury’.

18 “(B) Achieve measurable objectives for
19 operational forecast improvement.

20 “(C) Engage with, and leverage the re-
21 sources of, institutions of higher education (as
22 such term is defined in section 101 of the High-
23 er Education Act of 1965 (20 U.S.C. 1001)), or
24 a consortia thereof, and entities within the Na-
25 tional Oceanic and Atmospheric Administration

1 in existence as of the date of the enactment of
2 this subsection, including Regional Climate
3 Centers and the National Centers for Environ-
4 mental Information.

5 “(D) Are carried out in coordination with
6 the Assistant Administrator for the Office of
7 Oceanic and Atmospheric Research and the Di-
8 rector of the National Weather Service.

9 “(4) SUNSET.—The authority under this sub-
10 section shall terminate on the date that is five years
11 after the date of the enactment of this subsection.”;
12 and

13 (2) by amending subsection (j) to read as fol-
14 lows:

15 “(j) AUTHORIZATION OF APPROPRIATIONS.—There
16 are authorized to be appropriated \$45,000,000 for each
17 of fiscal years 2024 through 2028 to carry out the activi-
18 ties under this section.”.

19 **SEC. 502. NATIONAL INTEGRATED DROUGHT INFORMATION**
20 **SYSTEM.**

21 (a) IN GENERAL.—Section 3 of the National Inte-
22 grated Drought Information System Act of 2006 (15
23 U.S.C. 313d) is amended—

24 (1) in subsection (b)—

25 (A) in paragraph (1)—

1 (i) in subparagraph (A), by striking
2 “and” after the semicolon;

3 (ii) in subparagraph (B), by inserting
4 “and” after the semicolon; and

5 (iii) by adding at the end the fol-
6 lowing new subparagraph:

7 “(C) incorporates flash drought research
8 and tools to enhance timely response;”;

9 (B) in paragraph (5), by striking “and”
10 after the semicolon;

11 (C) in paragraph (6)—

12 (i) by inserting “(including ecological
13 drought)” after “drought” each place it
14 appears; and

15 (ii) by striking the period and insert-
16 ing a semicolon; and

17 (D) by adding at the end the following new
18 paragraphs:

19 “(7) advance and deploy next generation tech-
20 nologies related to drought and related publicly
21 available data, such as monitoring, preparedness,
22 and forecasting capabilities utilizing artificial intel-
23 ligence, machine learning, and cloud technologies;
24 and

1 “(8) utilize observational networks, including
2 the National Weather Service cooperative observer
3 program, and refine drought indicators across a va-
4 riety of spatial and temporal scales for decision-sup-
5 port products by optimizing data and resources from
6 across the Federal Government, including snowpack,
7 soil moisture, groundwater, and rapid intensification
8 data.”;

9 (2) in subsection (c)—

10 (A) in paragraph (2), by striking “and”
11 after the semicolon;

12 (B) in paragraph (3), by striking the pe-
13 riod and inserting “; and”; and

14 (C) by adding at the end the following new
15 paragraph:

16 “(4) in partnership with the National Mesonet
17 Program, establish memoranda of understanding to
18 provide coordinated, high-quality, nationwide
19 drought information for the public good, including
20 integrated soil moisture information in accordance
21 with the 2021 report, ‘A Strategy for the National
22 Coordinated Soil Moisture Monitoring Network.’”;
23 and

24 (3) by amending subsection (f) to read as fol-
25 lows:

1 “(f) MODELING UPDATE.—The Under Secretary, in
2 partnership with National Integrated Drought Informa-
3 tion System and the Climate Prediction Center of the Na-
4 tional Weather Service, shall undertake an effort to transi-
5 tion existing drought products to probabilistic forecasts
6 and incorporate new and improved dynamical and statis-
7 tical forecast modeling tools.”.

8 (b) AUTHORIZATION OF APPROPRIATIONS.—Section
9 4 of the National Integrated Drought Information System
10 Act of 2006 (15 U.S.C. 313d note) is amended to read
11 as follows:

12 “(d) AUTHORIZATION OF APPROPRIATIONS.—From
13 amounts made available to Operations, Research, and Fa-
14 cilities of the National Oceanic and Atmospheric Adminis-
15 tration, there are authorized to be appropriated to carry
16 out this section the following:

17 “(1) \$15,000,000 for fiscal year 2024.

18 “(2) \$15,500,000 for fiscal year 2025.

19 “(3) \$16,000,000 for fiscal year 2026.

20 “(4) \$16,500,000 for fiscal year 2027.

21 “(5) \$17,000,000 for fiscal year 2028.”.

22 **SEC. 503. NATIONAL MESONET PROGRAM.**

23 (a) PROGRAM.—The Under Secretary shall maintain
24 the National Mesonet Program (in this section referred
25 to as the “Program”). The Program shall—

1 (1) obtain observations in all geographic envi-
2 ronments to improve understanding of and forecast
3 capabilities for atmospheric and water events, with
4 a prioritization on leveraging available commercial,
5 academic, and other non-Federal environmental data
6 to enhance coordination across the private, public,
7 and academic sectors of the United States weather
8 enterprise; and

9 (2) establish memoranda of understanding with
10 networks outside of the scope of the Program.

11 (b) PROGRAM ELEMENTS.—The Program shall carry
12 out the following activities:

13 (1) Improve environmental observations used by
14 the National Oceanic and Atmospheric Administra-
15 tion and the National Weather Service to support
16 baseline forecasts, including nowcasts, and warnings
17 that protect the Nation’s citizens, businesses, mili-
18 tary, and government agencies, and enable such in-
19 dividuals and entities to operate in safe, efficient,
20 and orderly manners.

21 (2) When demonstrably cost effective and meet-
22 ing or exceeding agency data quality standards, le-
23 verage existing networks of environmental moni-
24 toring stations, including supplemental radar sys-
25 tems, to increase the quantity and density of envi-

1 ronmental observations and data available to the Ad-
2 ministration.

3 (3) Establish means to integrate greater density
4 and type of environmental observations into the Pro-
5 gram on an annual basis, including by encouraging
6 local and regional networks of environmental moni-
7 toring stations, in situ sensor networks and satellite
8 constellations to participate in the Program.

9 (4) Yield increased quantities of boundary-layer
10 data to improve numerical weather prediction per-
11 formance, including regarding subseasonal to sea-
12 sonal timescales.

13 (5) Provide the critical technical and adminis-
14 trative infrastructure needed to facilitate rapid inte-
15 gration and sustained use of new and emerging net-
16 works of environmental monitoring stations antici-
17 pated in coming years from non-Federal sources.

18 (6) Expand and enhance environmental obser-
19 vational networks in the roadway environment to
20 provide real-time road weather and surface condi-
21 tions for surface transportation and related eco-
22 nomic sectors.

23 (7) Identify available terrestrial or marine envi-
24 ronmental data, or quantifiable gaps in such data, to
25 improve the understanding of air-sea interactions.

1 (8) Support the National Weather Service in
2 reaching its target of a 30-minute warning time for
3 severe weather through better predictive model algo-
4 rithms driven by increasingly effective observations.

5 (9) Coordinate with existing Administration
6 data used for forecasts, including data from the Na-
7 tional Environmental Satellite, Data, and Informa-
8 tion Service, the Integrated Ocean Observing Sys-
9 tem, the Global Ocean Monitoring and Observing
10 Program, the National Data Buoy Center, and the
11 National Ocean Service.

12 (10) Identify and communicate to the Office of
13 Oceanic and Atmospheric Research and other part-
14 ners priorities of research and development needed
15 to advance observations in the Program.

16 (11) Support the National Coordinated Soil
17 Moisture Monitoring Network in acquiring soil mois-
18 ture and related data to support the development of
19 decision-support products and other information
20 services.

21 (c) FINANCIAL AND TECHNICAL ASSISTANCE.—

22 (1) IN GENERAL.—In furtherance of the Pro-
23 gram, the Under Secretary may, to the extent
24 amounts are made available, award up to 15 percent
25 of the Program’s annual appropriations for financial

1 assistance to State, Tribal, private, and academic
2 entities seeking to build, expand, or upgrade equip-
3 ment and capacity of mesonet systems. Financial as-
4 sistance under this subsection may be made in co-
5 ordination with and in addition to awards from
6 other Federal agencies.

7 (2) AGREEMENTS.—Before receiving financial
8 assistance under paragraph (1), the State, Tribal,
9 private, or academic entity seeking financial assist-
10 ance under this subsection shall enter into an agree-
11 ment with the Under Secretary to provide data to
12 the Program, subject to verification by the Program
13 of the relative operational value and evaluation of
14 the cost of such data, for use in weather prediction,
15 severe weather warnings, and emergency response.

16 (3) ASSISTANCE AND OTHER SUPPORT.—The
17 Under Secretary may provide technical assistance,
18 project implementation support, and guidance to
19 State, Tribal, private, and academic entities seeking
20 financial assistance under this subsection. The
21 Under Secretary may provide technical and financial
22 assistance for maintenance of monitoring stations in
23 underrepresented or remote areas of the country
24 where it is financially unfeasible for one entity to op-
25 erate such stations without such assistance.

1 (4) TERMS.—In providing financial assistance
2 under this subsection, the Under Secretary shall es-
3 tablish terms to ensure that each State, Tribal, pri-
4 vate, or academic entity that receives financial as-
5 sistance under this subsection receives a level of
6 Federal support commensurate with the quality and
7 other characteristics of the data to be provided.

8 (5) DETERMINATION.—A State, Tribal, private,
9 or academic entity may receive financial assistance
10 under this subsection only if the Under Secretary
11 determines such entity shall provide sufficient non-
12 Federal financial support and full maintenance to
13 maintain the quality of the mesonet system and as-
14 sociated data standards required by the Program for
15 a period of not less than five years.

16 (6) PRIORITY.—The Under Secretary shall
17 prioritize providing assistance under paragraph (1)
18 to at least one entity in an underrepresented or re-
19 mote area.

20 (d) ADVISORY COMMITTEE.—

21 (1) IN GENERAL.—The Under Secretary shall
22 ensure the Program has an active advisory com-
23 mittee of subject matter experts to make rec-
24 ommendations to the National Oceanic and Atmos-
25 pheric Administration on the identification, imple-

1 mentation, procurement, and tracking of data need-
2 ed to supplement the Program, and recommend im-
3 provements, expansions, and acquisitions of available
4 data. The Under Secretary may designate an exist-
5 ing Federal advisory committee, subcommittee, or
6 working group, including, if appropriate, the Science
7 Advisory Board of the National Oceanic and Atmos-
8 pheric Administration, to carry out this subsection.

9 (2) ACADEMIC EXPERTISE.—The advisory com-
10 mittee under paragraph (1), in consultation with the
11 Program, shall include expertise from one or more
12 institutions of higher education (as such term is de-
13 fined in section 101 of the Higher Education Act of
14 1965 (20 U.S.C. 1001)) to assist the advisory com-
15 mittee to identify, evaluate, and recommend poten-
16 tial partnerships, regional or subregional consortia,
17 and collaborative methods that would expand the
18 number of participants and volume of data in the
19 Program.

20 (e) REGULAR REPORTING.—The Under Secretary
21 shall provide regular briefings, not less than twice annu-
22 ally, to the Committee on Science, Space, and Technology
23 of the House of Representatives and the Committee on
24 Commerce, Science, and Transportation of the Senate on

1 all Program activities. Such briefings shall include infor-
2 mation relating to the following:

3 (1) Efforts to implement the activities described
4 in subsection (b).

5 (2) Any financial or technical assistance pro-
6 vided pursuant to subsection (c).

7 (3) Efforts to address recommendations re-
8 ceived from the advisory committee under subsection
9 (d).

10 (4) The potential need and associated benefits
11 of a coastal and ocean mesonet, or other emerging
12 areas of weather data needs.

13 (5) Progress toward eliminating gaps in weath-
14 er observation data by States and regions of the
15 United States.

16 (6) Any other topic the Under Secretary deter-
17 mines relevant.

18 (f) AUTHORIZATION OF APPROPRIATIONS.—From
19 amounts made available to the National Weather Service,
20 the Under Secretary, to carry out this section, shall allo-
21 cate up to the following amounts for each specified fiscal
22 year:

23 (1) \$50,000,000 for fiscal year 2024.

24 (2) \$55,000,000 for fiscal year 2025.

25 (3) \$61,000,000 for fiscal year 2026.

1 (4) \$68,000,000 for fiscal year 2027.

2 (5) \$70,000,000 for fiscal year 2028.

3 **SEC. 504. NATIONAL COORDINATED SOIL MOISTURE MONI-**
4 **TORING NETWORK.**

5 (a) IN GENERAL.—The Under Secretary, in collabo-
6 ration with the Secretary of Agriculture, the Director of
7 the United States Geological Survey, the Administrator of
8 the National Aeronautics and Space Administration, and
9 the heads of other relevant Federal agencies and depart-
10 ments, shall support the development, deployment, and
11 maintenance of soil moisture monitoring networks by man-
12 aging the National Coordinated Soil Moisture Monitoring
13 Network (in this section referred to as the “Network”)
14 within the National Integrated Drought Information Sys-
15 tem.

16 (b) ACTIVITIES.—The Under Secretary shall ensure
17 the Network includes activities that carry out the fol-
18 lowing:

19 (1) Establishing a visible, user-friendly website.

20 (2) Developing a set of criteria for high-quality
21 data sources.

22 (3) Supporting research necessary to develop or
23 improve soil moisture monitoring products at a na-
24 tional scale.

1 (4) Increasing the number of long-term, high-
2 quality, in situ and remote sensing soil moisture
3 monitoring stations across the United States.

4 (5) Sharing methodologies and validation proto-
5 cols with the private sector.

6 (6) Engaging with the citizen science commu-
7 nity.

8 (7) Developing, releasing, and promoting new,
9 nationwide point-based and gridded soil moisture
10 data products that meet the needs of diverse end-
11 user groups.

12 (8) Supporting community building and out-
13 reach to the network of individuals engaged with soil
14 moisture information delivery, from data provision to
15 end-user decision making.

16 **SEC. 505. NATIONAL WATER CENTER.**

17 Section 301 of the Coordinated Ocean Observations
18 and Research Act of 2020 (42 U.S.C. 10371) is amend-
19 ed—

20 (1) in subsection (a)—

21 (A) in paragraph (1)(A)—

22 (i) in the matter preceding clause (i),
23 by inserting “as a component of the Na-
24 tional Centers for Environmental Pre-
25 diction” after “center”;

1 (ii) in clause (i), by striking “and”
2 after the semicolon;

3 (iii) in clause (ii), by striking the pe-
4 riod and inserting “; and”; and

5 (iv) by adding at the end the following
6 new clause:

7 “(iii) to provide service backup capa-
8 bilities and additional mission support
9 services for River Forecast Centers.”.

10 (v) in paragraph (2), by adding at the
11 end the following new subparagraph:

12 “(F) Serving as the primary Center for
13 collaboration and coordination of the National
14 Oceanic and Atmospheric Administration’s
15 water research and operational activities with
16 existing Federal centers and networks, includ-
17 ing the Department of Agriculture, the Army
18 Corps of Engineers, the Bureau of Reclamation,
19 the United States Geological Survey, and the
20 Federal Emergency Management Agency.”;

21 (2) by striking subsection (b) and redesignating
22 subsections (c) through (e) as subsections (b)
23 through (d) respectively; and

24 (3) by amending subsection (c), as so redesign-
25 nated, to read as follows:

1 “(c) AUTHORIZATION OF APPROPRIATIONS.—There
2 is authorized to be appropriated \$46,000,000 for each of
3 fiscal years 2024 through 2028 to carry out this section.”.

4 **SEC. 506. SATELLITE TRANSFERS REPORT.**

5 Not later than 180 days after the date of the enact-
6 ment of this Act, the Secretary of Commerce shall submit
7 to the Committee on Commerce, Science, and Transpor-
8 tation of the Senate and the Committee on Science, Space,
9 and Technology of the House of Representatives a report
10 describing the Department of Commerce’s authorities,
11 policies, and Federal Government-wide policies related to
12 transferring any portion of the weather satellite systems
13 operated by the Department of Commerce to any other
14 Federal department or agency. The report shall also in-
15 clude the following:

16 (1) A description of the process for decommis-
17 sioning a Department of Commerce operational
18 weather satellite, any existing agreements related to
19 transfers of weather satellites, whether decommis-
20 sioned or not, and any reimbursable agreements re-
21 lated to the transfer of physical property or the op-
22 eration of Department of Commerce weather sat-
23 ellites on behalf of any other Federal department or
24 agency.

1 (2) A summary of any Department of Com-
2 merce plans for potential transfer of existing or fu-
3 ture weather satellite systems to any other Federal
4 department or agency.

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