

118TH CONGRESS
2D SESSION

S. _____

To improve weather research and forecasting by the National Oceanic and Atmospheric Administration, and for other purposes.

IN THE SENATE OF THE UNITED STATES

Mr. MARKEY (for himself and Mr. PADILLA) introduced the following bill; which was read twice and referred to the Committee on

A BILL

To improve weather research and forecasting by the National Oceanic and Atmospheric Administration, and for other purposes.

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

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Forecasting Optimiza-
5 tion for Robust Earth Climate Analysis and Subseasonal-
6 to-Seasonal Tracking Act of 2024” or the “FORECASTS
7 Tracking Act of 2024”.

1 **SEC. 2. IMPROVEMENTS TO WEATHER RESEARCH AND**
2 **FORECASTING.**

3 (a) IMPROVEMENTS TO SUBSEASONAL-TO-SEASONAL
4 FORECASTING.—Section 1762 of the Food Security Act
5 of 1985 (15 U.S.C. 8521) is amended—

6 (1) by amending subsection (c) to read as fol-
7 lows:

8 “(c) FUNCTIONS.—

9 “(1) IN GENERAL.—The Under Secretary and
10 the heads of such other programs of the National
11 Oceanic and Atmospheric Administration as the
12 Under Secretary considers appropriate, shall—

13 “(A) conduct and support fundamental re-
14 search to improve understanding of the sources
15 and limitations of season-to-season predict-
16 ability for temperature, precipitation, and other
17 Earth system variables and applications;

18 “(B) collect and utilize observational data
19 across the Earth system and other information
20 in order to make usable, reliable, and timely
21 foundational forecasts of subseasonal-to-sea-
22 sonal temperature and precipitation;

23 “(C) prioritize the advancement of multi-
24 model ensemble forecast systems and forecast
25 verification and evaluation capacity, including—

1 “(i) the development of advanced cou-
2 pled data assimilation methods using ro-
3 bust Earth system observational data;

4 “(ii) the development of improved cou-
5 pled subseasonal-to-seasonal ensemble pre-
6 diction systems;

7 “(iii) the improvement of exchanges
8 and interactions between datasets across
9 different models and Earth system obser-
10 vations to better understand local relation-
11 ships between and drivers of ocean, land,
12 snow, and ice observations;

13 “(iv) the provision of additional re-
14 sources for the research and development
15 of multi-model ensemble forecasts for pur-
16 poses of advanced forecast modeling; and

17 “(v) the development of data manage-
18 ment strategies to support operations and
19 research activities;

20 “(D) leverage existing research and models
21 from the weather and Earth system enterprises
22 to improve the forecasts under subparagraph
23 (B);

24 “(E) accelerate the operationalization of
25 emerging modeling technologies developed with-

1 in the research community, including pursuant
2 to collaborations with other agencies and enti-
3 ties, as determined appropriate through in-
4 creased funding for activities under section
5 102(b)(5) of the Weather Research and Fore-
6 casting Innovation Act of 2017 (15 U.S.C.
7 8512(b)(5)), to support and assist the cross de-
8 velopment of fully coupled subseasonal-to- sea-
9 sonal forecast systems;

10 “(F) determine and provide information on
11 how the subseasonal-to-seasonal temperature
12 and precipitation, as forecasted under subpara-
13 graph (B) may relate to—

14 “(i) the number and severity of
15 droughts, fires, tornadoes, hurricanes,
16 floods, heat waves, marine heat waves,
17 coastal inundation, winter storms, high-im-
18 pact weather, or other relevant natural dis-
19 asters;

20 “(ii) snowpack;

21 “(iii) sea ice conditions; and

22 “(iv) permafrost thaw and increased
23 microbial decomposition; and

24 “(G) develop an Internet clearinghouse to
25 provide the forecasts under subparagraph (B)

1 and the information under subparagraphs (B)
2 and (F) on both national and regional levels.

3 “(2) EARTH SYSTEM DEFINED.—In this sub-
4 section, the term ‘Earth system’ includes atmos-
5 phere, ocean, terrestrial, ice, and related processes,
6 and data that influence or drive subseasonal-to-sea-
7 sonal weather and climate.”; and

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

10 “(j) AUTHORIZATION OF APPROPRIATIONS.—

11 “(1) IN GENERAL.—There are authorized to be
12 appropriated to the Under Secretary, for each of fis-
13 cal years 2025 and 2026—

14 “(A) \$50,300,000 to carry out this section;
15 and

16 “(B) for activities under section 102(b)(5)
17 of the Weather Research and Forecasting Inno-
18 vation Act of 2017 (15 U.S.C. 8512(b)(5)) pur-
19 suant to subsection (c)(5), such sums as may be
20 necessary to carry out such subsection.

21 “(2) USE OF FUNDS.—Amounts appropriated
22 pursuant to an authorization under paragraph
23 (1)(B) shall be used for the designated responsibil-
24 ities of the modeling team of the National Oceanic
25 and Atmospheric Administration within the Earth

1 Prediction Innovation Center, including activities
2 that fall under the following focus areas:

3 “(A) High-performance computing.

4 “(B) Scientific innovation.

5 “(C) Management and planning.

6 “(D) External engagement and commu-
7 nity.”.

8 (b) WEATHER AND EARTH SYSTEM MODELING AND
9 DATA ASSIMILATION WORKFORCE INNOVATION PRO-
10 GRAM.—

11 (1) IN GENERAL.—Title IV of the Weather Re-
12 search and Forecasting Innovation Act of 2017 (15
13 U.S.C. 8541 et seq.) is amended by adding at the
14 end the following:

15 **“SEC. 415. WEATHER AND EARTH SYSTEM MODELING AND**
16 **DATA ASSIMILATION WORKFORCE INNOVA-**
17 **TION PROGRAM.**

18 “(a) IN GENERAL.—The Under Secretary shall es-
19 tablish a program, to be known as the ‘Weather and Earth
20 System Modeling and Data Assimilation Workforce Inno-
21 vation Program’ (in this section referred to as the ‘pro-
22 gram’).

23 “(b) EDUCATION AND RECRUITMENT.—In carrying
24 out the program, the Under Secretary shall support the
25 education and recruitment of personnel and establish a set

1 of new workforce development programs to develop path-
2 ways for next-generation researchers, engineers, and prac-
3 titioners who are skilled in and can operate or develop
4 weather and Earth system technologies that exploit and
5 advance emerging computing architectures, artificial intel-
6 ligence and machine learning, and next-generation data
7 assimilation and observing systems, including through fi-
8 nancial assistance for scholarships, fellowships, and re-
9 search at institutions of higher education in areas relevant
10 to improvement of data assimilation systems and weather
11 and Earth system data modeling capabilities.

12 “(c) HUMAN CAPITAL PLANNING.—

13 “(1) IN GENERAL.—In carrying out the pro-
14 gram, the Under Secretary shall develop and, on an
15 annual basis, revise a data assimilation and weather
16 and Earth system modeling workforce human capital
17 plan that identifies workforce needs to facilitate in-
18 novation in emerging weather technologies and data
19 assimilation systems, including by identifying gaps
20 in funding and expertise, hiring challenges, and poli-
21 cies to mitigate turnover that will help avoid mid-
22 project staffing changes.

23 “(2) SUBMISSION OF PLAN.—The Under Sec-
24 retary shall submit the data assimilation and weath-
25 er and Earth system modeling workforce human

1 capital plan required under paragraph (1), and any
2 revision to that plan, to the Secretary of Commerce
3 and the Director of the Office of Management and
4 Budget.

5 “(3) USE OF PLANS.—

6 “(A) IN GENERAL.—The Under Secretary
7 shall use the data assimilation and weather and
8 Earth system modeling workforce human cap-
9 ital plans required under paragraph (1) to carry
10 out the education and recruitment required
11 under subsection (b).

12 “(B) PATHWAYS TO HIRING.—In carrying
13 out the data assimilation and weather and
14 Earth system modeling workforce human cap-
15 ital plan required under paragraph (1), the
16 Under Secretary may use the pathways pro-
17 grams established under part 362 of title 5,
18 Code of Federal Regulations (or a successor
19 program), to facilitate the recruitment and hir-
20 ing of personnel for data assimilation and
21 weather and Earth system modeling activities.

22 “(4) AUTHORITY TO PROVIDE FUNDS.—If the
23 Under Secretary, in preparing the data assimilation
24 and weather and Earth system modeling workforce
25 human capital plan pursuant to paragraph (1), iden-

1 tifies workforce gaps for the data assimilation and
2 weather and Earth system modeling processes of the
3 National Oceanic and Atmospheric Administration,
4 the Under Secretary may—

5 “(A) use funds made available to the Ad-
6 ministration to carry out such plan; and

7 “(B) establish agreements and awards with
8 institutions of higher education or nonprofit en-
9 tities to facilitate the integration of innovative
10 data assimilation and weather and Earth sys-
11 tem modeling technologies and systems into the
12 larger weather enterprise.

13 “(d) UPDATES TO DIRECT HIRING AUTHORITY.—
14 The Under Secretary, acting through the Director of the
15 Office of Human Capital Services, shall make necessary
16 updates to the eligibility requirements for the direct hiring
17 authority program of the National Oceanic and Atmos-
18 pheric Administration to include the program, the Weath-
19 er Program Office Innovation for Next Generation Sci-
20 entists Dissertation Fellowship, the Consortium for Ad-
21 vanced Data Assimilation Research and Education, and
22 any other fellowship or internship programs determined
23 by the Under Secretary to be relevant to the weather en-
24 terprise.

1 “(e) REPORT.—Not later than 2 years after the ini-
2 tial date on which the Under Secretary provides funds
3 under subsection (c)(4) to an institution of higher edu-
4 cation or a nonprofit entity, the Under Secretary shall,
5 using information about the program collected from any
6 such institution or entity in receipt of those funds, 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 on the effectiveness and impact of those funds in improv-
11 ing the quality and preparedness of the weather and Earth
12 system modeling and data assimilation workforce.

13 “(f) DEFINITIONS.—In this section:

14 “(1) EARTH SYSTEM.—The term ‘Earth sys-
15 tem’ includes atmosphere, ocean, terrestrial, ice, and
16 related processes, and data that influence or drive
17 subseasonal-to-seasonal weather and climate.

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

22 “(3) NONPROFIT ENTITY.—The term ‘nonprofit
23 entity’ has the meaning given that term in section
24 9901 of the William M. (Mac) Thornberry National

1 Defense Authorization Act for Fiscal Year 2021 (15
2 U.S.C. 4651).

3 “(g) AUTHORIZATION OF APPROPRIATIONS.—There
4 are authorized to be appropriated to carry out the pro-
5 gram \$40,000,000 for each of fiscal years 2025 through
6 2030.”.

7 (2) CLERICAL AMENDMENT.—The table of con-
8 tents in section 1(b) of the Weather Research and
9 Forecasting Innovation Act of 2017 (Public Law
10 115–25; 131 Stat. 91) is amended by inserting after
11 the item relating to section 414 the following:

“Sec. 415. Weather and Earth System Modeling and Data Assimilation Work-
force Innovation Program.”.

12 (c) AUTHORIZATION OF APPROPRIATIONS.—Section
13 110(a) of the Weather Research Forecasting and Innova-
14 tion Act of 2017 (15 U.S.C. 8519(a)) is amended—

15 (1) in paragraph (4)(C), by striking “; and”
16 and inserting a semicolon;

17 (2) in paragraph (5)(C), by striking the period
18 at the end and inserting “; and”; and

19 (3) by adding at the end the following:

20 “(6) \$263,032,000 for each of fiscal years 2025
21 and 2026, of which—

22 “(A) \$171,516,000 is authorized for
23 weather laboratories and cooperative institutes;

1 “(B) \$51,516,000 is authorized for weath-
2 er and air chemistry research programs; and

3 “(C) \$40,000,000 is authorized for the
4 joint technology transfer initiative described in
5 section 102(b)(4).”.