

AMENDMENT TO H.R. 5089

OFFERED BY MR. SCOTT FRANKLIN OF FLORIDA

Add at the end the following:

1 TITLE VI—ARTIFICIAL INTEL-
2 LIGENCE FOR WEATHER
3 FORECASTING

4 SEC. 601. ARTIFICIAL INTELLIGENCE FOR WEATHER FORE-
5 CASTING.

6 (a) DEFINITIONS.—In this section:

7 (1) ARTIFICIAL INTELLIGENCE.—The term “ar-
8 tificial intelligence”—

9 (A) has the meaning given such term in
10 section 5002 of the National Artificial Intel-
11 ligence Initiative Act of 2020 (15 U.S.C. 9401);
12 and

13 (B) includes machine learning, neural net-
14 works, and natural language processing.

15 (2) ARTIFICIAL INTELLIGENCE WEATHER
16 MODEL.—The term “artificial intelligence weather
17 model” means a weather model based primarily on
18 artificial intelligence technology to project future
19 Earth system conditions based on machine learning
20 using weather forecasting training datasets.

1 (3) CURATE.—The term “curate”, with respect
2 to a dataset, means the following:

3 (A) To collect and maintain the dataset to
4 accomplish the following:

5 (i) Ensure and document its quality.

6 (ii) Provide metadata on its prove-
7 nance.

8 (B) To update the dataset periodically, as
9 appropriate and practicable.

10 (4) NUMERICAL WEATHER MODEL.—The term
11 “numerical weather model” means a weather model
12 based primarily on coupled Earth system processes
13 that uses numerical computation to forecast future
14 Earth system conditions.

15 (5) OBSERVATIONAL DATA.—The term “obser-
16 vational data” means data and metadata from ac-
17 tual observations of environmental conditions, in-
18 cluding remote sensing and in situ platforms.

19 (6) SYNTHETIC DATA.—The term “synthetic
20 data” means data produced from a model or statis-
21 tical method in order to fill gaps in observational
22 data.

23 (7) WEATHER FORECASTING TRAINING
24 DATASET.—The term “weather forecasting training
25 dataset”—

1 (A) means a dataset that contains contin-
2 uous global observational data and synthetic
3 data for Earth system variables relevant to
4 weather forecasting, aviation weather, marine
5 weather, and hydrology and water management;
6 and

7 (B) may include model reanalysis and fore-
8 casts initialized through a data assimilation sys-
9 tem.

10 (b) PURPOSE.—The purpose of this section is to
11 carry out the following:

12 (1) Improve accuracy and timeliness of weather,
13 water, and space weather forecasts and effective dis-
14 semination of critical information.

15 (2) Strengthen analytic capacity to inform re-
16 source deployments in response to and to mitigate
17 harm from weather, water, and space weather haz-
18 ards through the mandated exploration and use of
19 artificial intelligence by Federal agencies.

20 (3) Strengthen public-private partnerships to
21 accelerate adoption and outcomes of the use of arti-
22 ficial intelligence in response to and to mitigate such
23 harm.

1 (4) Strengthen public-private partnerships in
2 highly technical, high-risk, and high-reward fields re-
3 lated to weather, water, and space weather forecasts.

4 (c) EARTH SYSTEM FORECASTING AND INFORMA-
5 TION DELIVERY.—

6 (1) TRAINING DATASETS.—Not later than four
7 years after the date of the enactment of this Act, the
8 Under Secretary, in consultation with the Secretary
9 of Energy, the Administrator of the National Aero-
10 nautics and Space Administration, the Director of
11 the National Science Foundation, the Director of the
12 National Center for Atmospheric Research, the
13 Interagency Council on Advancing Meteorological
14 Services, other appropriate Federal advisory commit-
15 tees as determined by the Under Secretary, and such
16 other technical experts as the Under Secretary con-
17 siders appropriate, shall develop and curate com-
18 prehensive weather forecasting training datasets
19 with relevant Earth system data, quality informa-
20 tion, and metadata necessary for weather fore-
21 casting.

22 (2) USE OF EXISTING DATASETS.—In order to
23 speed the development of the weather forecasting
24 training datasets required under paragraph (1), the
25 Under Secretary shall assess, and to the greatest ex-

1 tent practicable build on, existing Earth system rea-
2 nalysis datasets of the Federal Government.

3 (3) ARTIFICIAL INTELLIGENCE WEATHER
4 MODEL.—

5 (A) GLOBAL MODEL.—In carrying out this
6 subsection, the Under Secretary, in consultation
7 with appropriate Federal advisory committees
8 as determined by the Under Secretary, may de-
9 velop and test a global weather model based on
10 artificial intelligence technologies utilizing data
11 of the National Oceanic and Atmospheric Ad-
12 ministration to the extent possible.

13 (B) REGIONAL AND LOCAL MODELS.—In
14 addition to a global weather model under sub-
15 paragraph (A), the Under Secretary may exper-
16 iment with regional and local weather models
17 based on artificial intelligence technologies.

18 (4) USE OF ARTIFICIAL INTELLIGENCE TO DIS-
19 SEMINATE INFORMATION.—In coordination with an
20 artificial intelligence weather model or models devel-
21 oped under paragraph (3), the Under Secretary may
22 explore the use of artificial intelligence to enhance
23 the dissemination of information with respect to
24 weather and evaluate the effectiveness of commu-

1 nication for improved public understanding and pre-
2 paredness.

3 (5) CONTINUED SUPPORT FOR OBSERVATIONS,
4 BASIC RESEARCH, AND NUMERICAL WEATHER MOD-
5 ELS.—Notwithstanding the requirements of this sub-
6 section, the Under Secretary shall continue to sup-
7 port and advance the activities of the National Oce-
8 anic and Atmospheric Administration to carry out
9 the following:

10 (A) Collect and acquire traditional and
11 novel observational data relevant for artificial
12 intelligence and numerical weather, water, and
13 space weather forecasting.

14 (B) Advance research on the Earth system
15 and numerical weather model forecasting.

16 (C) Develop and advance numerical Earth
17 system modeling for predictions.

18 (D) Develop weather model data post-proc-
19 essing techniques.

20 (E) Improve data assimilation techniques.

21 (6) OBSERVING SYSTEM COVERAGE.—In car-
22 rying out this subsection, the Under Secretary may
23 evaluate the use of cost functions in data-driven ma-
24 chine learning model training to balance inequities
25 in observing system coverage and data poor areas.

1 (7) UNCERTAINTY QUANTIFICATION RE-
2 SEARCH.—In carrying out this subsection, the Under
3 Secretary may develop uncertainty quantification re-
4 search for the purpose of accurate environmental
5 risk and hazard communications of probabilistic pre-
6 dictions and forecasts.

7 (8) REPORT.—Not later than two years after
8 the date of the enactment of this Act and not less
9 frequently than every two years thereafter through
10 2035, the Under Secretary shall submit to the Com-
11 mittee on Commerce, Science, and Transportation of
12 the Senate and the Committee on Science, Space,
13 and Technology of the House of Representatives a
14 report on the activities conducted under this sub-
15 section.

16 (d) ADVANCED ARTIFICIAL INTELLIGENCE APPLICA-
17 TIONS FOR WEATHER AND INFORMATION DELIVERY.—
18 The Under Secretary shall explore advanced applications
19 of artificial intelligence to improve weather forecasts and
20 information delivery, such as by carrying out the following:

21 (1) Improving data assimilation.

22 (2) Accounting for coupled Earth system proc-
23 esses.

1 (3) Using artificial intelligence weather models
2 to generate ensemble forecasts to more accurately
3 assess flow-dependent forecast uncertainties.

4 (4) Improving impact-based decision support to
5 users and communities for greater societal benefits
6 based on those forecasts.

7 (e) TECHNICAL ASSISTANCE ON USE OF ARTIFICIAL
8 INTELLIGENCE WEATHER, WATER, AND SPACE WEATH-
9 ER MODELS.—

10 (1) IN GENERAL.—The Under Secretary shall
11 provide the following:

12 (A) Technical assistance, data access, and
13 support for forecasters, scientists, social sci-
14 entists, and engineers to test and evaluate the
15 use and effectiveness of the artificial intel-
16 ligence models of the National Oceanic and At-
17 mospheric Administration, including within the
18 testbeds of the Administration.

19 (B) Best practices on providing forecasts
20 based on outputs from artificial intelligence
21 weather models and numerical weather models,
22 or a combination thereof.

23 (C) Support for emergency managers to
24 make operational decisions based on outputs
25 from artificial intelligence weather models and

1 numerical weather models, or a combination
2 thereof.

3 (2) ASSESSMENT OF WEATHER MODELS.—

4 (A) IN GENERAL.—The Under Secretary
5 shall support the development of a common
6 framework for the assessment of numerical
7 weather models and artificial intelligence weath-
8 er models by comparing model output and ob-
9 servational data over a period of time in the
10 past through the use of such methodologies as
11 the Under Secretary considers appropriate.

12 (B) BEST PRACTICES.—In carrying out
13 this paragraph, the Under Secretary may de-
14 velop and disseminate best practices in collabo-
15 ration with the following;

16 (i) The National Institute of Stand-
17 ards and Technology, the National Aero-
18 nautics and Space Administration, the Na-
19 tional Science Foundation, and the De-
20 partment of Energy.

21 (ii) Academic and research institu-
22 tions.

23 (iii) The private sector.

24 (3) TECHNICAL ASSISTANCE.—In carrying out
25 this subsection, the Under Secretary may provide

1 technical assistance, best practices, and support re-
2 quired under paragraph (1) through the National
3 Weather Service.

4 (4) INDEPENDENT STUDY ON THE IMPACTS OF
5 ARTIFICIAL INTELLIGENCE WEATHER, WATER, AND
6 SPACE WEATHER MODELS.—The Under Secretary
7 may enter into an agreement with the National
8 Academy of Sciences or another entity as determined
9 appropriate by the Under Secretary to assess the
10 impacts of artificial intelligence weather models on
11 the weather enterprise and make recommendations
12 to improve the integration of such models in oper-
13 ational forecasting.

14 (f) PARTNERSHIPS FOR TRANSFORMATIONAL INNO-
15 VATION.—

16 (1) IN GENERAL.—The Under Secretary may
17 explore novel structures for partnerships with pri-
18 vate, academic, and international entities for re-
19 search and development of transformative innovation
20 in weather forecasting and other environmental fore-
21 casts to accomplish the following:

22 (A) Further the understanding of weather,
23 water, and space weather, and their societal im-
24 pact.

1 (B) Advance the science of weather and
2 water forecasting, including seasonal and sub-
3 seasonal forecasting.

4 (C) Develop, evaluate, and transition artificial
5 intelligence weather, water, and hazard
6 forecasting applications to operations.

7 (2) CO-INVESTMENT.—Subject to applicable
8 law, the Under Secretary may consider and adopt
9 novel co-investment strategies with the private academic
10 and international sectors to carry out paragraph (1),
11 including the following:

12 (A) Non-Federal Government contributions
13 to resource and support high-risk, high-return
14 research and development in environmental
15 forecasting, data science, artificial intelligence,
16 and related fields.

17 (B) Shared rights to intellectual property
18 from research and development activities under
19 this subsection.

20 (C) Other approaches to sharing resources
21 and results under this subsection.

22 (g) AVAILABILITY OF DATASET.—

23 (1) IN GENERAL.—The Under Secretary shall
24 develop and implement a plan to make available to

1 the public, at no cost and subject to applicable law
2 and policy, the following:

3 (A) Operational artificial intelligence
4 weather models developed by the National Oce-
5 anic and Atmospheric Administration.

6 (B) Artificial intelligence weather models
7 that are not operational models, including ex-
8 perimental and developmental models, as the
9 Under Secretary determines appropriate.

10 (C) Applicable information and documenta-
11 tion for artificial intelligence weather models
12 described in subparagraphs (A) and (B), includ-
13 ing a description of intended model outputs.

14 (D) Subject to subsection (i), all data
15 owned by the Federal Government and data
16 that the Under Secretary has the legal right to
17 redistribute that are associated with artificial
18 intelligence weather models made available to
19 the public pursuant to the plan and used in
20 operational forecasting by the Administration,
21 including the following:

22 (i) Relevant metadata.

23 (ii) Data used for operational artificial
24 intelligence weather models used by the
25 Administration.

1 (2) ACCOMMODATIONS.—In developing and im-
2 plementing the plan under paragraph (1), the Under
3 Secretary may make such accommodations as the
4 Under Secretary considers appropriate to ensure
5 that the public release of any artificial intelligence
6 weather model, information, documentation, or data
7 pursuant to the plan does not jeopardize the fol-
8 lowing:

9 (A) National security.

10 (B) Intellectual property or redistribution
11 rights, including under titles 17 and 35, United
12 States Code.

13 (C) Any trade secret or commercial or fi-
14 nancial information subject to section 552(b)(4)
15 of title 5, United States Code.

16 (D) Any models or data that are otherwise
17 restricted by contract or other written agree-
18 ment.

19 (E) The mission of the Administration to
20 protect lives and property.

21 (3) REPORT.—

22 (A) IN GENERAL.—Not later than one year
23 after the date of the enactment of this Act, the
24 Under Secretary shall submit to Congress a re-
25 port, in both unclassified and classified form,

1 regarding the risks to the economic and intellec-
2 tual security of the United States from foreign
3 countries of concern through access by such
4 countries to weather data in the United States.

5 (B) ELEMENTS.—The report required
6 under subparagraph (A) shall include the fol-
7 lowing:

8 (i) A full analysis of the national, in-
9 tellectual, and economic security implica-
10 tions for the United States with respect to
11 intellectual property theft or cyber or
12 human espionage through access to weath-
13 er data.

14 (ii) Conclusions of the Under Sec-
15 retary and recommendations for legislative
16 and administrative action, if any.

17 (C) FOREIGN COUNTRY OF CONCERN DE-
18 FINED.—In this paragraph, the term “foreign
19 country of concern” has the meaning given that
20 term in section 9901 of the William M. (Mac)
21 Thornberry National Defense Authorization Act
22 for Fiscal Year 2021 (15 U.S.C. 4651).

23 (h) RETENTION OF FEDERAL GOVERNMENT EXPER-
24 TISE.—Subject to applicable law, the Under Secretary
25 may consider novel methods to recruit, retrain, and retain

1 expert personnel to support activities under this section,
2 including by carrying out the following:

3 (1) Using methods to be competitive with sala-
4 ries outside the Federal Government.

5 (2) Developing staff exchange programs and
6 training programs.

7 (3) Leveraging innovative hiring strategies.

8 (i) PROTECTION OF NATIONAL SECURITY INTER-
9 ESTS.—

10 (1) IN GENERAL.—Notwithstanding any other
11 provision of this section, the Under Secretary, in
12 consultation with the Secretary of Defense, as ap-
13 propriate, may withhold models or data used under
14 this section if the Under Secretary determines doing
15 so to be necessary to protect the national security
16 interests of the United States.

17 (2) RULE OF CONSTRUCTION.—Nothing in this
18 section may be construed to supersede any other
19 provision of law governing the protection of the na-
20 tional security interests of the United States.

