

110TH CONGRESS  
1ST SESSION

# S. 2307

To amend the Global Change Research Act of 1990, and for other purposes.

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IN THE SENATE OF THE UNITED STATES

NOVEMBER 5, 2007

Mr. KERRY (for himself and Mrs. SNOWE) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

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## A BILL

To amend the Global Change Research Act of 1990, 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 “Global Change Re-  
5       search Improvement Act of 2007”.

6       **SEC. 2. TABLE OF CONTENTS.**

7       The table of contents for this Act is as follows:

TITLE I—AMENDMENT OF THE GLOBAL CHANGE RESEARCH ACT  
OF 1990

Sec. 101. Amendment of Global Change Research Act of 1990.

Sec. 102. Changes to findings and purpose.

Sec. 103. Changes in definitions.

- Sec. 104. Change in committee name and structure.
- Sec. 105. Change in National Global Change Research Plan.
- Sec. 106. Integrated Program Office.
- Sec. 107. Budget coordination.
- Sec. 108. Research grants.
- Sec. 109. Evaluation of information.
- Sec. 110. Repeal of obsolete provision.
- Sec. 111. Ice sheet study and report.
- Sec. 112. Hurricane frequency and intensity study and report.
- Sec. 113. Scientific communications.
- Sec. 114. Aging workforce issues program.
- Sec. 115. Authorization of appropriations.

#### TITLE II—NATIONAL CLIMATE SERVICE

- Sec. 201. Amendment of National Climate Program Act.

#### TITLE III—TECHNOLOGY ASSESSMENT

- Sec. 301. National Science and Technology Assessment Service.

#### TITLE IV—CLIMATE CHANGE TECHNOLOGY

- Sec. 401. NIST greenhouse gas functions.
- Sec. 402. Development of new measurement technologies.
- Sec. 403. Enhanced environmental measurements and standards.
- Sec. 404. Technology development and diffusion.
- Sec. 405. Authorization of appropriations.

#### TITLE V—ABRUPT CLIMATE CHANGE

- Sec. 501. Abrupt climate change research program.
- Sec. 502. Purposes of program.
- Sec. 503. Abrupt climate change defined.
- Sec. 504. Authorization of appropriations.

1 **TITLE I—AMENDMENT OF THE**  
 2 **GLOBAL CHANGE RESEARCH**  
 3 **ACT OF 1990**

4 **SEC. 101. AMENDMENT OF GLOBAL CHANGE RESEARCH**  
 5 **ACT OF 1990.**

6 Except as otherwise expressly provided, whenever in  
 7 this title an amendment or repeal is expressed in terms  
 8 of an amendment to, or repeal of, a section or other provi-  
 9 sion, the reference shall be considered to be made to a

1 section or other provision of the Global Change Research  
2 Act of 1990 (15 U.S.C. 2921 et seq.).

3 **SEC. 102. CHANGES TO FINDINGS AND PURPOSE.**

4 Section 101 (15 U.S.C. 2931) is amended to read as  
5 follows:

6 **“SEC. 101. FINDINGS AND PURPOSE.**

7 “(a) FINDINGS.—The Congress makes the following  
8 findings:

9 “(1) According to the 4th Assessment Report of  
10 the Intergovernmental Panel on Climate Change,  
11 most of the observed increase in global average tem-  
12 peratures since the mid-20th century is very likely  
13 due to the observed increase in anthropogenic green-  
14 house gas concentrations.

15 “(2) Human-induced changes, in conjunction  
16 with natural fluctuations, may lead to significant al-  
17 terations of world climate patterns. Over this cen-  
18 tury, these changes could adversely affect world ag-  
19 ricultural and marine production, coastal habit-  
20 ability, biological diversity, human health, global so-  
21 cial and political stability, and global economic activ-  
22 ity.

23 “(3) Developments in interdisciplinary Earth  
24 sciences, global observing systems, and satellite and  
25 computing technologies make possible significant sci-

1       entific understanding and prediction of global  
2       changes and their effects, and have resulted in the  
3       significant expansion of environmental data and in-  
4       formation.

5               “(4) Development and strengthening of effec-  
6       tive policies to mitigate and adapt to global change  
7       will rely on improvement in scientific understanding  
8       of global environmental and societal processes and  
9       on development of information that is of use to deci-  
10      sionmakers at the local, regional, and national levels.

11              “(5) Although significant Federal global change  
12      research efforts are underway, an effective Federal  
13      program will require improvements in interagency  
14      coordination, coordination with the activities of local,  
15      regional, State, private, and international entities,  
16      and increased levels of Federal resources.

17              “(6) Although the United States Global Change  
18      Research Program has made significant contribu-  
19      tions to understanding Earth’s climate and the an-  
20      thropogenic influences on Earth’s climate and its  
21      ecosystems, the Program also needs to produce in-  
22      formation that better meets the expressed needs of  
23      decisionmakers.

24              “(7) Better predictions of future climate condi-  
25      tions at the regional level are desirable to inform de-

1       cisions, including those related to land, water, and  
2       resource management.

3               “(8) Improved understanding of global change  
4       is needed to identify risks and vulnerabilities under  
5       plausible climate futures to assist decisionmakers in  
6       the development of policies to help ensure that eco-  
7       logical, social, and economic systems are resilient.

8               “(9) In order to more effectively meet the needs  
9       of decisionmakers and the public, the research agen-  
10      da of the United States Global Change Research  
11      Program and its implementation and products  
12      should be informed by continuous feedback from  
13      users of information generated by the Program.

14              “(b) PURPOSE.—The purpose of this title is to pro-  
15      vide for the continuation and coordination of a comprehen-  
16      sive and integrated United States observation, research,  
17      assessment, and outreach program which will assist the  
18      Nation and the world to better understand, assess, predict,  
19      mitigate, and adapt to the effects of human-induced and  
20      natural processes of global change.”.

21      **SEC. 103. CHANGES IN DEFINITIONS.**

22              Section 2 (15 U.S.C. 2921) is amended—

23                      (1) by redesignating paragraphs (1) through  
24                      (6) as paragraphs (2) through (7), respectively;

1           (2) by inserting before paragraph (2), as redesi-  
2           gnated, the following:

3           “(1) ‘climate change’ means any change in cli-  
4           mate over time, whether due to natural variability or  
5           as a result of human activity;”;

6           (3) by striking “Earth and Environmental  
7           Sciences” in paragraph (2), as redesignated and in-  
8           serting “Global Change Research”; and

9           (4) by striking paragraph (4), as redesignated,  
10          and inserting the following:

11          “(4) ‘global change’ means human-induced or  
12          natural changes in the global environment (including  
13          climate change and other phenomena affecting land  
14          productivity, oceans and coastal areas, freshwater  
15          resources, atmospheric chemistry, biodiversity, and  
16          ecological systems) that may alter the capacity of  
17          Earth to sustain life;”.

18 **SEC. 104. CHANGE IN COMMITTEE NAME AND STRUCTURE.**

19          Section 102 (15 U.S.C. 2932) is amended—

20          (1) by striking “**EARTH AND ENVIRON-**  
21          **MENTAL SCIENCES.**” in the section heading and  
22          inserting “**GLOBAL CHANGE RESEARCH.**”;

23          (2) by striking “Earth and Environmental  
24          Sciences.” in subsection (a) and inserting “Global  
25          Change Research.”;

1           (3) by redesignating paragraphs (14) and (15)  
2 of subsection (b) as paragraphs (15) and (16), re-  
3 spectively, and inserting after paragraph (13) the  
4 following:

5           “(14) the National Institute of Standards and  
6 Technology of the Department of Commerce;”;

7           (4) by striking the last sentence of subsection  
8 (b) and inserting “The representatives shall be the  
9 Deputy Secretary or the Deputy Secretary’s des-  
10 ignee (or, in the case of an agency other than a de-  
11 partment, the deputy head of that agency or the  
12 deputy’s designee).”;

13           (5) by striking subsection (d) and inserting the  
14 following:

15           “(d) SUBCOMMITTEES AND WORKING GROUPS.—The  
16 Committee may establish such additional subcommittees  
17 and working groups to carry out its work as it sees fit.”;  
18 and

19           (6) by striking “and” after the semicolon in  
20 subsection (e)(6); and

21           (7) by redesignating paragraph (7) of sub-  
22 section (e) as paragraph (8) and inserting after  
23 paragraph (6) the following:

24           “(7) work with appropriate Federal, State, re-  
25 gional, and local authorities to ensure that the Pro-

1       gram is designed to produce information needed to  
2       develop policies to reduce the impacts of global  
3       change; and”.

4   **SEC. 105. CHANGE IN NATIONAL GLOBAL CHANGE RE-**  
5                   **SEARCH PLAN.**

6       Section 104 (15 U.S.C. 2934) is amended—

7               (1) by striking the section heading and insert-  
8       ing the following:

9   **“SEC. 104. NATIONAL GLOBAL CHANGE RESEARCH AND AS-**  
10                   **SESSMENT PLAN.” ;**

11               (2) by redesignating subsections (a) through (f)  
12       as subsections (b) through (g), respectively, and in-  
13       serting before subsection (b), as redesignated, the  
14       following:

15       **“(a) STRATEGIC PLAN; REVISED IMPLEMENTATION**  
16   **PLAN.—**The Chairman of the Council, through the Com-  
17   mittee, shall develop a strategic plan for the United States  
18   Global Climate Change Research Program for the 10-year  
19   period beginning in 2008 and submit the plan to the Con-  
20   gress within 1 year after the date of enactment of the  
21   Global Change Research Improvement Act of 2007. The  
22   strategic plan shall include a detailed plan for research,  
23   assessment, information management, public participa-  
24   tion, outreach, and budget.”;

1           (3) by inserting “and Assessment” after “Re-  
2           search” in subsection (b), as redesignated;

3           (4) by striking “research.” in subsection (b), as  
4           redesignated, and inserting “research and assess-  
5           ment.”;

6           (5) by striking “this title,” in subsection (b), as  
7           redesignated, and inserting “the Global Change Re-  
8           search Improvement Act of 2007.”;

9           (6) by inserting “short-term and long-term” be-  
10          fore “goals” in paragraph (1) of subsection (c), as  
11          redesignated;

12          (7) by striking “usable information on which to  
13          base policy decisions related to” in paragraph (1) of  
14          subsection (c), as redesignated, and inserting “infor-  
15          mation relevant and readily usable by local, State,  
16          and Federal decisionmakers, as well as other end-  
17          users, for the formulation of effective decisions and  
18          strategies for measuring, predicting, mitigating, and  
19          adapting to”;

20          (8) by inserting “development of regional sce-  
21          narios, assessment of model predictability, assess-  
22          ment of climate change impacts,” after “predictive  
23          modeling,” in paragraph (2) of subsection (c), as re-  
24          designated;

1           (9) by striking “priorities;” in paragraph (2) of  
2           subsection (c), as redesignated, and inserting “prior-  
3           ities and propose measures to address gaps and  
4           growing needs for these activities;”

5           (10) by striking paragraphs (6) and (7) of sub-  
6           section (c), as redesignated, and inserting the fol-  
7           lowing:

8           “(6) make recommendations for the coordina-  
9           tion of the global change research and assessment  
10          activities of the United States with such activities of  
11          other Nations and international organizations, in-  
12          cluding—

13                 “(A) a description of the extent and nature  
14                 of international cooperative activities;

15                 “(B) bilateral and multilateral efforts to  
16                 provide worldwide access to scientific data and  
17                 information, and proposals to improve such ac-  
18                 cess and build capacity for its use; and

19                 “(C) improving participation by developing  
20                 Nations in international global change research  
21                 and environmental data collection;

22           “(7) detail budget requirements for Federal  
23           global change research and assessment activities to  
24           be conducted under the Plan;

1           “(8) include a process for identifying informa-  
2           tion needed by appropriate Federal, State, regional,  
3           and local decisionmakers to develop policies to plan  
4           for and address projected impacts of global change;

5           “(9) identify and sustain the observing systems  
6           currently employed in collecting data relevant to  
7           global and regional climate change research and  
8           prioritize additional observation systems that may be  
9           needed to ensure adequate data collection and moni-  
10          toring of global change;

11          “(10) identify existing capabilities and gaps in  
12          national, regional, and local climate prediction and  
13          scenario-based modeling capabilities for forecasting  
14          and projecting climate impacts at local and regional  
15          levels, and propose measures to address such gaps;

16          “(11) describe specific activities designed to fa-  
17          cilitate outreach and data and information exchange  
18          with regional, State, and local governments and  
19          other user communities;

20          “(12) identify and describe ecosystems and geo-  
21          graphic regions of the United States that are likely  
22          to experience similar impacts of global change or are  
23          likely to share similar vulnerabilities to global  
24          change; and

1           “(13) include such additional matter as the  
2 Committee deems appropriate.”;

3           (11) by striking paragraphs (1) and (2) of sub-  
4 section (d), as redesignated, and inserting the fol-  
5 lowing:

6           “(1) Global and regional research and measure-  
7 ments to understand the nature of and interaction  
8 among physical, chemical, biological, land use, and  
9 social processes responsible for changes in the Earth  
10 system on all relevant spatial and time scales.

11           “(2) Development of indicators, baseline data-  
12 bases, and ongoing monitoring to document global  
13 change, including changes in species distribution and  
14 behavior, changes in oceanic and atmospheric chem-  
15 istry, extent of ice sheets, glaciers, and snow cover,  
16 shifts in water distribution and abundance, and  
17 changes in sea level.”;

18           (12) by adding at the end of subsection (d), as  
19 redesignated, the following:

20           “(6) Methods for integrating information to  
21 provide predictive and other tools for planning and  
22 decisionmaking by governments, communities and  
23 the private sector.”;

24           (13) by striking “and” in paragraph (2) of sub-  
25 section (e), as redesignated;

1           (14) by striking paragraph (3) of subsection  
2 (e), as redesignated, and inserting the following:

3           “(3) combine and interpret data from various  
4 sources to produce information readily usable by  
5 local, State, and Federal policymakers, and other  
6 end-users, attempting to formulate effective deci-  
7 sions and strategies for mitigating and adapting to  
8 the effects of global change; and”;

9           (15) by adding at the end of subsection (e), as  
10 redesignated, the following:

11           “(4) establish a common assessment and mod-  
12 eling framework that may be used in both research  
13 and operations to project, predict, and assess the  
14 vulnerability of natural and managed ecosystems  
15 and of human society in the context of other envi-  
16 ronmental and social changes.”; and

17           (16) by striking “change research.” in para-  
18 graph (2) of subsection (f), as redesignated, and in-  
19 serting “and regional climate research and assess-  
20 ment.”.

21 **SEC. 106. INTEGRATED PROGRAM OFFICE.**

22 Section 105 (15 U.S.C. 2935) is amended—

23           (1) by redesignating subsections (a), (b), and  
24 (c) as subsections (b), (c), and (d), respectively; and

1           (2) by inserting before subsection (b), as redesi-  
2           gnated, the following:

3           “(a) INTEGRATED PROGRAM OFFICE.—

4           “ (1) ESTABLISHMENT.—There is established in  
5           the Office of Science and Technology Policy an Inte-  
6           grated Program Office for the Program.

7           “ (2) ORGANIZATION.—The Integrated Program  
8           Office established under paragraph (1) shall be  
9           headed by the associate director with responsibility  
10          for climate change science and technology and shall  
11          include, to the maximum extent feasible, a rep-  
12          resentative from each Federal agency participating  
13          in the Program.

14          “ (3) FUNCTION.—The Integrated Program Of-  
15          fice shall—

16                 “(A) manage, in conjunction with the  
17                 Committee, interagency coordination and pro-  
18                 gram integration of global change research ac-  
19                 tivities and budget requests;

20                 “(B) ensure that the activities and pro-  
21                 grams of each Federal agency or department  
22                 participating in the Program address the goals  
23                 and objectives identified in the strategic re-  
24                 search plan and interagency implementation  
25                 plans;

1           “(C) ensure program and budget rec-  
2           ommendations of the Committee are commu-  
3           nicated to the President and are integrated into  
4           the strategic and implementation plans for the  
5           Program;

6           “(D) review, solicit, identify, and arrange  
7           funding for partnership projects that address  
8           critical research objectives or operational goals  
9           of the Program, including projects that would  
10          fill research gaps identified by the Program,  
11          and for which project resources are shared  
12          among at least 2 agencies participating in the  
13          Program; and

14          “(E) review and provide recommendations,  
15          in conjunction with the Committee, on all an-  
16          nual appropriations requests from Federal  
17          agencies or departments participating in the  
18          Program.”;

19          (3) by striking “Committee.” in paragraph (2)  
20          of subsection (c), as redesignated, and inserting  
21          “Committee and the Integrated Program Office.”;  
22          and

23          (4) by inserting “and the Integrated Program  
24          Office” after “Committee” in paragraph (1) of sub-  
25          section (d), as redesignated.

1 **SEC. 107. BUDGET COORDINATION.**

2 Section 105 (15 U.S.C. 2935), as amended by section  
3 106, is further amended by striking subsection (d), as re-  
4 designated, and inserting the following:

5 “(d) CONSIDERATION IN PRESIDENT’S BUDGET.—

6 “(1) IN GENERAL.—Before each annual budget  
7 submitted to the Congress under section 1105 of  
8 title 31, United States Code, the President shall, in  
9 a timely fashion, provide an opportunity to the Com-  
10 mittee and the Integrated Program Office to review  
11 and comment on the budget estimate of each agency  
12 and department involved in global change research  
13 in the context of the Plan.

14 “(2) PROGRAM ITEMS.—The President shall  
15 submit, at the time of the annual budget request to  
16 Congress, an integrated budget plan that would con-  
17 solidate and highlight Program priorities and include  
18 a description of those items in each agency’s annual  
19 budget which are elements of the Program.”.

20 **SEC. 108. RESEARCH GRANTS.**

21 Section 105 (15 U.S.C. 2935), as amended by sec-  
22 tions 106 and 107, is further amended—

23 (1) by redesignating subsections (b), (c), (d),  
24 and (e) as subsections (c), (d), (e), and (f), respec-  
25 tively; and

1           (2) by inserting after subsection (a) the fol-  
2           lowing:

3           “(b) RESEARCH GRANTS.—

4           “(1) COMMITTEE TO DEVELOP LIST OF PRI-  
5           ORITY RESEARCH AREAS.—The Committee shall de-  
6           velop a list of priority areas for research and devel-  
7           opment on climate change that are not being ade-  
8           quately addressed by Federal agencies.

9           “(2) DIRECTOR OF OSTP TO TRANSMIT LIST TO  
10          NSF.—The Director of the Office of Science and  
11          Technology Policy shall transmit the list to the Na-  
12          tional Science Foundation.

13          “(3) FUNDING THROUGH NSF.—

14          “(A) BUDGET REQUEST.—The National  
15          Science Foundation shall include, as part of the  
16          annual request for appropriations for the  
17          Science and Technology Policy Institute, a re-  
18          quest for appropriations to fund research in the  
19          priority areas on the list developed under para-  
20          graph (1).

21          “(B) AUTHORIZATION.—For fiscal year  
22          2008 and each fiscal year thereafter, there are  
23          authorized to be appropriated to the National  
24          Science Foundation not less than \$30,000,000,  
25          to be made available through the Science and

1           Technology Policy Institute, for research in  
2           those priority areas.”.

3 **SEC. 109. EVALUATION OF INFORMATION.**

4           Section 106 (15 U.S.C. 2936) is amended—

5           (1) by striking “**SCIENTIFIC**” in the section  
6           heading;

7           (2) by striking “On a periodic basis (not less  
8           frequently than every 4 years), the Council, through  
9           the Committee, shall prepare and submit to the  
10          President and the Congress an assessment” and in-  
11          serting “On a periodic basis (not less frequently  
12          than every 4 years), the President shall submit to  
13          Congress a single, integrated, comprehensive assess-  
14          ment”;

15          (3) by striking “and” after the semicolon in  
16          paragraph (2); and

17          (4) by striking “years.” in paragraph (3) and  
18          inserting “years; and”;

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

20                 “(4) evaluates the information being developed  
21                 under this title, considering in particular its useful-  
22                 ness to local, State, and national decisionmakers, as  
23                 well as to other stakeholders such as the private sec-  
24                 tor, after providing a meaningful opportunity for the  
25                 consideration of the views of such stakeholders on

1 the effectiveness of the Program and the usefulness  
2 of the information.”.

3 **SEC. 110. REPEAL OF OBSOLETE PROVISION.**

4 Section 108 (15 U.S.C. 2938) is amended by striking  
5 subsection (c).

6 **SEC. 111. ICE SHEET STUDY AND REPORT.**

7 (a) STUDY.—

8 (1) REQUIREMENT.—The Director of the Na-  
9 tional Science Foundation and the Administrator of  
10 National Oceanic and Atmospheric Administration  
11 shall enter into an arrangement with the National  
12 Academy of Sciences to complete a study of the cur-  
13 rent status of ice sheet melt and movement, as  
14 caused by climate change, with implications for glob-  
15 al sea level rise.

16 (2) CONTENTS.—The study shall take into con-  
17 sideration—

18 (A) the past research completed related to  
19 ice sheet melt as reviewed by Working Group I  
20 of the Intergovernmental Panel on Climate  
21 Change;

22 (B) additional research published since the  
23 fall of 2005 that was not included in the Work-  
24 ing Group I report due to time constraints; and

1           (C) the need for an accurate assessment of  
2           changes in ice sheet spreading, changes in ice  
3           sheet flow, self-lubrication, the corresponding  
4           effect on ice sheets, and current modeling capa-  
5           bilities.

6           (3) REPORT.—Not later than 18 months after  
7           the date of enactment of this Act, the National  
8           Academy of Sciences shall transmit to the Com-  
9           mittee on Science and Technology of the House of  
10          Representatives and the Committee on Commerce,  
11          Science, and Transportation of the Senate a report  
12          on the key findings of the study conducted under  
13          subsection (a), along with recommendations for addi-  
14          tional research related to ice sheet melt and cor-  
15          responding sea level rise.

16 **SEC. 112. HURRICANE FREQUENCY AND INTENSITY STUDY**  
17 **AND REPORT.**

18          (a) STUDY.—

19           (1) REQUIREMENT.—The Administrator of the  
20          National Oceanic and Atmospheric Administration  
21          and the Director of the National Science Foundation  
22          shall enter into an arrangement with the National  
23          Academy of Sciences to complete a study of the cur-  
24          rent state of the science on the potential impacts of  
25          climate change on patterns of tropical cyclone (hur-

1       ricane and typhoon) development, including storm  
2       intensity, track, and frequency, overall destructive  
3       power, precipitation amount and intensity, runoff  
4       and flooding, and the implications for hurricane-  
5       prone and typhoon-prone coastal regions.

6               (2) CONTENTS.—The study shall take into con-  
7       sideration—

8               (A) the past research completed related to  
9       hurricane and typhoon development, track, and  
10       intensity as reviewed by Working Groups I and  
11       II of the Intergovernmental Panel on Climate  
12       Change;

13              (B) additional research completed since the  
14       fall of 2005 that was not included in the Work-  
15       ing Group I and II reports due to time con-  
16       straints;

17              (C) the need for accurate assessment of  
18       potential changes in hurricane and typhoon in-  
19       tensity, track, and frequency and of the current  
20       modeling and forecasting capabilities and the  
21       need for improvements in forecasting of these  
22       parameters; and

23              (D) the need for additional research, real-  
24       time observation, and monitoring to improve  
25       forecasting of hurricanes and typhoons and to

1 understand the relationship between climate  
2 change and hurricane and typhoon develop-  
3 ment.

4 (3) REPORT.—Not later than 18 months after  
5 the date of enactment of this Act, the National  
6 Academy of Sciences shall transmit to the Com-  
7 mittee on Science and Technology of the House of  
8 Representatives and the Committee on Commerce,  
9 Science, and Transportation of the Senate a report  
10 on the key findings of the study conducted under  
11 subsection (a).

12 **SEC. 113. SCIENTIFIC COMMUNICATIONS.**

13 The President shall establish guidelines and imple-  
14 ment a plan that requires the National Oceanic and At-  
15 mospheric Administration, the National Aeronautics and  
16 Space Administration, the Environmental Protection  
17 Agency, the National Science Foundation, and other Fed-  
18 eral agencies with scientific research programs to adopt  
19 policies that ensure the integrity of scientific communica-  
20 tions. Such policies shall include provisions that ensure  
21 that final text and communications are approved by the  
22 scientist or scientists who authored the report or commu-  
23 nication, and that enable scientists to disseminate research  
24 results and freely communicate with the Congress, the  
25 media, and colleagues in a timely fashion.

1 **SEC. 114. AGING WORKFORCE ISSUES PROGRAM.**

2 The Administrator of the National Oceanic and At-  
3 mospheric Administration shall implement a program to  
4 address aging work force issues in climate science, global  
5 change, and other focuses of NOAA research that—

6 (1) documents technical and management expe-  
7 riences before senior employees leave the Adminis-  
8 tration, including—

9 (A) documenting lessons learned;

10 (B) briefing organizations;

11 (C) providing opportunities for archiving  
12 lessons in a database; and

13 (D) providing opportunities for near-term  
14 retirees to transition out early from their pri-  
15 mary assignment in order to document their ca-  
16 reer lessons learned and brief new employees  
17 prior to their separation from the Administra-  
18 tion;

19 (2) provides incentives for retirees to return  
20 and teach new employees about their career lessons  
21 and experiences; and

22 (3) provides for the development of an award to  
23 recognize and reward outstanding senior employees  
24 for their contributions to knowledge sharing.

1 **SEC. 115. AUTHORIZATION OF APPROPRIATIONS.**

2       There are authorized to be appropriated for the pur-  
3 poses of carrying out this Act such sums as may be nec-  
4 essary for fiscal years 2008 through 2012. Of the amounts  
5 appropriated for that fiscal year period—

6           (1) \$4,000,000 shall be made available to the  
7 Office of Science and Technology Policy for each of  
8 such fiscal years; and

9           (2) such sums as may be necessary shall be  
10 made available to—

11           (A) the National Oceanic and Atmospheric  
12 Administration for each of such fiscal years;

13           (B) the National Science Foundation for  
14 each of such fiscal years;

15           (C) the National Aeronautics and Space  
16 Administration for each of such fiscal years;  
17 and

18           (D) other Federal agencies participating in  
19 the Program, to the extent funds remain avail-  
20 able after the application of paragraph (1) and  
21 subparagraphs (A), (B), and (C) of this para-  
22 graph, for each of such fiscal years.

1     **TITLE II—NATIONAL CLIMATE**  
2                     **SERVICE**

3     **SEC. 201. AMENDMENT OF NATIONAL CLIMATE PROGRAM**  
4                     **ACT.**

5             The National Climate Program Act (15 U.S.C. 2901  
6 et seq.) is amended to read as follows:

7     **“SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

8             “(a) **SHORT TITLE.**—This Act may be cited as the  
9 “National Climate Service Act of 2007”.

10            “(b) **TABLE OF CONTENTS.**—The table of contents  
11 for this Act is as follows:

“Sec. 1. Short title; table of contents.

“Sec. 2. Findings.

“Sec. 3. Purpose.

“Sec. 4. National Climate Service.

“Sec. 5. Contract and grant authority.

“Sec. 6. Annual report.

“Sec. 7. Definitions.

“Sec. 8. Authorization of appropriations.

12     **“SEC. 2. FINDINGS.**

13            “The Congress finds the following:

14                “(1) Weather, climate change, and climate vari-  
15 ability affect public safety, environmental services  
16 and security, human health, agriculture, energy use,  
17 water resources, and other factors vital to national  
18 security and human welfare.

19                “(2) The present rate of advance of national ef-  
20 forts in research and development and the applica-  
21 tion of such advances is inadequate to meet the chal-

1       lenges posed by observed and projected rates of cli-  
2       mate change and climate variability and the increas-  
3       ing demand for information to guide planning and  
4       response across all sectors.

5           “(3) The United States lacks adequate re-  
6       search, infrastructure, and coordinated outreach and  
7       communication mechanisms to meet national climate  
8       monitoring, prediction, and decision support needs  
9       for adapting to and mitigating the impacts of cli-  
10      mate change and climate variability.

11          “(4) Information regarding climate change and  
12      climate variability is not being fully disseminated or  
13      used, and Federal efforts have given insufficient at-  
14      tention to assessing and applying this information.

15          “(5) Climate change and climate variability  
16      occur on a global basis making international co-  
17      operation essential for the purpose of sharing the  
18      benefits and costs of a global effort to understand  
19      and communicate these changes.

20      **“SEC. 3. PURPOSE.**

21          “‘It is the purpose of this Act to establish a National  
22      Climate Service that will advance the national interest and  
23      associated international concerns in understanding, fore-  
24      casting, responding, adapting to, and mitigating the im-

1 pacts of natural and human-induced climate change and  
2 climate variability.

3 **“SEC. 4. NATIONAL CLIMATE SERVICE.**

4       “(a) ESTABLISHMENT.—The Secretary shall estab-  
5 lish within the National Oceanic and Atmospheric Admin-  
6 istration a National Climate Service not later than a year  
7 after the date of the enactment of the Global Change Re-  
8 search Improvement Act of 2007. The Service shall in-  
9 clude a national center and a network of regional and local  
10 facilities for operational climate monitoring and pre-  
11 diction.

12           “(1) IN GENERAL.—The Service shall produce  
13 and deliver authoritative, timely and usable informa-  
14 tion about climate change, climate variability,  
15 trends, and impacts on local, State, regional, na-  
16 tional, and global scales.

17           “(2) SPECIFIC SERVICES.—The Service, at a  
18 minimum, shall—

19           “(A) provide comprehensive and authoritative  
20 information about the state of the climate and its ef-  
21 fects, through observations, monitoring, data, infor-  
22 mation, and products that accurately reflect climate  
23 trends and conditions;

1           “(B) provide predictions and projections on the  
2 future state of the climate in support of adaptation,  
3 preparedness, attribution, and mitigation;

4           “(C) utilize appropriate research from the  
5 United States Global Change Research Program ac-  
6 tivities and conduct focused research, as needed, to  
7 enhance understanding, information and predictions  
8 of the current and future state of the climate and  
9 its impacts that is relevant to policy, planning, and  
10 decision making;

11           “(D) utilize assessments from the Global  
12 Change Research Program activities and conduct fo-  
13 cused assessments as needed to enhance under-  
14 standing of the impacts of climate change and cli-  
15 mate variability;

16           “(E) assess and strengthen delivery mecha-  
17 nisms for providing climate information to end  
18 users;

19           “(F) communicate climate data, conditions, pre-  
20 dictions, projections, indicators, and risks on an on-  
21 going basis to decision- and policy- makers, the pri-  
22 vate sector, and to the public;

23           “(G) coordinate and collaborate on climate  
24 change, climate variability, and impacts activities  
25 with municipal, state, regional, national and inter-

1 national agencies and organizations, as appropriate;  
2 and

3 “(H) support the Department of State and  
4 international agencies and organizations, as well as  
5 domestic agencies and organizations, involved in as-  
6 sessing and responding to climate change and cli-  
7 mate variability.

8 “(b) ACTION PLAN.—Within 1 year after the date of  
9 enactment of the Global Change Research Improvement  
10 Act of 2007, the Secretary shall submit to the Senate  
11 Committee on Commerce, Science, and Transportation  
12 and the House Committee on Science and Technology a  
13 plan of action for the National Climate Service. The plan,  
14 at a minimum, shall—

15 “(1) provide for the interpretation and commu-  
16 nication of climate data, conditions, predictions, pro-  
17 jections, and risks on an on-going basis to decision  
18 and policy makers at the local, regional, and na-  
19 tional levels;

20 “(2) design, deploy, and operate an adequate  
21 national climate observing system that closes gaps in  
22 existing coverage;

23 “(3) support infrastructure and ability to ar-  
24 chive and quality ensure climate data, and make fed-  
25 erally-funded model simulations and other relevant

1 climate information available from the Global  
2 Change Research Program activities and other  
3 sources (and related data from paleoclimate studies).

4 “(4) include a program for long-term steward-  
5 ship, quality control, development of relevant climate  
6 products, and efficient access to all relevant climate  
7 data, products, and model simulations;

8 “(5) establish a national coordinated modeling  
9 strategy, including a national climate modeling cen-  
10 ter to provide a dedicated capability for modeling  
11 and forecasting, scenarios and planning resources,  
12 and a regular schedule of projections on long- and  
13 short-term time horizons over a range of scales, in-  
14 cluding regional scales;

15 “(6) improve integrated modeling, assessment,  
16 and predictive capabilities needed to document and  
17 predict climate changes and impacts, and to guide  
18 national, regional, and local planning and decision  
19 making;

20 “(7) provide a system of regular consultation  
21 and coordination with Federal agencies, States,  
22 Tribes, non-governmental organizations, the private  
23 sector and the academic community to ensure—

24 “(A) that the information requirements of  
25 these groups are well incorporated; and

1           “(B) timely and full sharing, dissemination  
2           and use of climate information and services in  
3           risk preparedness, planning, decision making,  
4           and early warning and natural resources man-  
5           agement, both domestically and internationally;

6           “(8) develop standards, evaluation criteria and  
7           performance objectives to ensure that the Service  
8           meets the evolving information needs of the public,  
9           policy makers and decision makers in the face of a  
10          changing climate;

11          “(9) develop funding estimates to implement  
12          the plan; and

13          “(10) support competitive research programs  
14          that will improve elements of the Service described  
15          in this Act through the Climate Program Office  
16          within the Service headquarter function.

17          “(c) COORDINATION WITH THE USGCRP.—The  
18          Service shall utilize appropriate research from Global  
19          Change Research Program activities to enhance under-  
20          standing, information and predictions of the current and  
21          future state of the climate and its impacts that is relevant  
22          to policy and decisions. The Service shall provide appro-  
23          priate information about the current and future state of  
24          the climate and its impacts that are useful for research  
25          purposes to relevant Global Change Research Program ac-

1 tivities. The Director of the Service will serve as a liaison  
2 to the Global Change Research Program and a member  
3 of the Global Change Research Program should serve on  
4 the Advisory Council.

5       “(d) DIRECTOR.—The Administrator shall appoint a  
6 director of the Service, who shall oversee all processes as-  
7 sociated with managing the organization and executing the  
8 functions and actions described in this Title. The Director  
9 will serve as a liaison to the Global Change Research Pro-  
10 gram to ensure the transition of research into services and  
11 to provide services to meet the needs of research.

12       “(e) NATIONAL CLIMATE SERVICE ADVISORY COUN-  
13 CIL.—The Administrator shall, in consultation with the  
14 majority and minority leaders of the Senate Committee  
15 on Commerce, Science, and Transportation and the House  
16 of Representatives Committee on Science and Technology,  
17 and the National Academy of Sciences, appoint the mem-  
18 bership of a National Climate Service Advisory Council,  
19 with members serving 4-year terms and include a diverse  
20 membership from appropriate Federal, State and local  
21 government, universities, non-government and private sec-  
22 tors who use climate information and cover a range of sec-  
23 tors, such as water, drought, fisheries, coasts, agriculture,  
24 health, natural resources, transportation, and insurance.  
25 The Council shall advise the Director of the Service of key

1 priorities in climate-related issues that require the atten-  
2 tion of the Service. The Council shall be responsible for  
3 ensuring coordination across regional and national con-  
4 cerns and the assessment of evolving information needs.

5 **“SEC. 5. CONTRACT AND GRANT AUTHORITY.**

6 “Functions vested in any Federal officer or agency  
7 by this Act or under the Program may be exercised  
8 through the facilities and personnel of the agency involved  
9 or, to the extent provided or approved in advance in appro-  
10 priation Acts, by other persons or entities under contracts  
11 or grant arrangements entered into by such officer or  
12 agency.

13 **“SEC. 6. ANNUAL REPORT.**

14 “The Secretary shall prepare and submit to the  
15 President and the authorizing committees of the Congress,  
16 not later than March 31 of each year, a report on the  
17 activities conducted pursuant to this Act during the pre-  
18 ceding fiscal year, including—

19 “(1) a summary of the achievements of the Na-  
20 tional Climate Service during the previous fiscal  
21 year; and

22 “(2) an analysis of the progress made toward  
23 achieving the goals and objectives of the Service.

24 **“SEC. 7. DEFINITIONS.**

25 “In this Act:

1           “(1) ADMINISTRATOR.—The term ‘Adminis-  
2           trator’ means the Administrator of the National  
3           Oceanic and Atmospheric Administration.

4           “(2) ADVISORY COUNCIL.—The term ‘Advisory  
5           Council’ refers to the Climate Services Advisory  
6           Council.

7           “(3) CLIMATE CHANGE.—The term ‘climate  
8           change’ means any change in climate over time,  
9           whether due to natural variability or as a result of  
10          human activity.

11          “(4) CLIMATE VARIABILITY.—The term ‘climate  
12          variability’ means variations in the mean state and  
13          other statistics of the climate on all temporal and  
14          spatial scales beyond that of individual weather  
15          events.

16          “(5) DIRECTOR.—The term ‘Director’ means  
17          the Director of the National Oceanic and Atmos-  
18          pheric Administration’s National Climate Service.

19          “(6) GLOBAL CHANGE RESEARCH PROGRAM.—  
20          The term ‘Global Change Research Program’ means  
21          the United States Global Change Research Program  
22          established under section 103 of the Global Change  
23          Research Act of 1990 (15 U.S.C. 2933).

24          “(7) SECRETARY.—The term ‘Secretary’ means  
25          the Secretary of Commerce.

1           “(8) SERVICE.—The term ‘Service’ means the  
2           National Oceanic and Atmospheric Administration’s  
3           National Climate Service.

4   **“SEC. 8. AUTHORIZATION OF APPROPRIATIONS.**

5           “There are authorized to be appropriated to the Sec-  
6   retary to carry out this Act—

7           “(1) \$300,000,000 for fiscal year 2008;

8           “(2) \$350,000,000 for fiscal year 2009;

9           “(3) \$400,000,000 for fiscal year 2010;

10          “(4) \$450,000,000 for fiscal year 2011; and

11          “(5) \$500,000,000 for fiscal year 2012.”.

12                   **TITLE III—TECHNOLOGY**  
13                   **ASSESSMENT**

14   **SEC. 301. NATIONAL SCIENCE AND TECHNOLOGY ASSESS-**  
15                   **MENT SERVICE.**

16           The National Science and Technology Policy, Organi-  
17   zation, and Priorities Act of 1976 (42 U.S.C. 6601 et seq.)  
18   is amended by adding at the end the following:

19   **“TITLE VII—NATIONAL SCIENCE**  
20           **AND TECHNOLOGY ASSESS-**  
21           **MENT SERVICE**

22   **“SEC. 701. ESTABLISHMENT.**

23           “There is hereby created a Science and Technology  
24   Assessment Service which shall be within and responsible  
25   to the legislative branch of the Government.

1 **“SEC. 702. COMPOSITION.**

2 “The Service shall consist of a Science and Tech-  
3 nology Board which shall formulate and promulgate the  
4 policies of the Service, and a Director who shall carry out  
5 such policies and administer the operations of the Service.

6 **“SEC. 703. FUNCTIONS AND DUTIES.**

7 “The Service shall coordinate and develop informa-  
8 tion for Congress relating to the uses and application of  
9 technology to address current national science and tech-  
10 nology policy issues. In developing such technical assess-  
11 ments for Congress, the Service shall utilize, to the extent  
12 practicable, experts selected in coordination with the Na-  
13 tional Research Council.

14 **“SEC. 704. INITIATION OF ACTIVITIES.**

15 “Science and technology assessment activities under-  
16 taken by the Service may be initiated upon the request  
17 of—

18 “(1) the Chairman of any standing, special, or  
19 select committee of either House of the Congress, or  
20 of any joint committee of the Congress, acting for  
21 himself or at the request of the ranking minority  
22 member or a majority of the committee members;

23 “(2) the Board; or

24 “(3) the Director.

1 **“SEC. 705. ADMINISTRATION AND SUPPORT.**

2 “The Director of the Science and Technology Assess-  
3 ment Service shall be appointed by the Board and shall  
4 serve for a term of 6 years unless sooner removed by the  
5 Board. The Director shall receive basic pay at the rate  
6 provided for level III of the Executive Schedule under sec-  
7 tion 5314 of title 5, United States Code. The Director  
8 shall contract for administrative support from the Library  
9 of Congress.

10 **“SEC. 706. AUTHORITY.**

11 “The Service shall have the authority, within the lim-  
12 its of available appropriations, to do all things necessary  
13 to carry out the provisions of this section, including, but  
14 without being limited to, the authority to—

15 “(1) make full use of competent personnel and  
16 organizations outside the Office, public or private,  
17 and form special ad hoc task forces or make other  
18 arrangements when appropriate;

19 “(2) enter into contracts or other arrangements  
20 as may be necessary for the conduct of the work of  
21 the Office with any agency or instrumentality of the  
22 United States, with any State, territory, or posses-  
23 sion or any political subdivision thereof, or with any  
24 person, firm, association, corporation, or educational  
25 institution, with or without reimbursement, without

1 performance or other bonds, and without regard to  
2 section 3709 of the Revised Statutes (41 U.S.C. 51);

3 “(3) accept and utilize the services of voluntary  
4 and uncompensated personnel necessary for the con-  
5 duct of the work of the Service and provide trans-  
6 portation and subsistence as authorized by section  
7 5703 of title 5, United States Code, for persons  
8 serving without compensation; and

9 “(4) prescribe such rules and regulations as it  
10 deems necessary governing the operation and organi-  
11 zation of the Service.

12 **“SEC. 707. BOARD.**

13 “The Board shall consist of 13 members as follows—

14 “(1) 6 Members of the Senate, appointed by the  
15 President pro tempore of the Senate, 3 from the ma-  
16 jority party and 3 from the minority party;

17 “(2) 6 Members of the House of Representa-  
18 tives appointed by the Speaker of the House of Rep-  
19 resentatives, 3 from the majority party and 3 from  
20 the minority party; and

21 “(3) the Director, who shall not be a voting  
22 member.

23 **“SEC. 708. REPORT TO CONGRESS.**

24 “The Service shall submit to the Congress an annual  
25 report which shall include, but not be limited to, an eval-

1 uation of technology assessment techniques and identifica-  
2 tion, insofar as may be feasible, of technological areas and  
3 programs requiring future analysis. The annual report  
4 shall be submitted not later than March 15 of each year.

5 **“SEC. 709. AUTHORIZATION OF APPROPRIATIONS.**

6 “There are authorized to be appropriated to the Serv-  
7 ice such sums as are necessary to fulfill the requirements  
8 of this title.”.

9 **TITLE IV—CLIMATE CHANGE**  
10 **TECHNOLOGY**

11 **SEC. 401. NIST GREENHOUSE GAS FUNCTIONS.**

12 Section 2(c) of the National Institute of Standards  
13 and Technology Act (15 U.S.C. 272(c)) is amended—

14 (1) by striking “and” after the semicolon in  
15 paragraph (21);

16 (2) by redesignating paragraph (22) as para-  
17 graph (23); and

18 (3) by inserting after paragraph (21) the fol-  
19 lowing:

20 “(22) perform research to develop enhanced  
21 measurements, calibrations, standards, and tech-  
22 nologies which will enable the reduced production in  
23 the United States of greenhouse gases associated  
24 with global warming, including carbon dioxide, meth-



1           (2) by inserting after section 16 the following:

2   **“SEC. 17. CLIMATE CHANGE STANDARDS AND PROCESSES.**

3           “(a) IN GENERAL.—The Director shall establish  
4 within the Institute a program to perform and support re-  
5 search on global climate change standards and processes,  
6 with the goal of providing scientific and technical knowl-  
7 edge applicable to the reduction of greenhouse gases (as  
8 defined in section 4 of the Global Climate Change Act of  
9 2002).

10          “(b) RESEARCH PROGRAM.—

11           “(1) IN GENERAL.—The Director is authorized  
12 to conduct, directly or through contracts or grants,  
13 a global climate change standards and processes re-  
14 search program.

15           “(2) RESEARCH PROJECTS.—The specific con-  
16 tents and priorities of the research program shall be  
17 determined in consultation with appropriate Federal  
18 agencies, including the Environmental Protection  
19 Agency, the National Oceanic and Atmospheric Ad-  
20 ministration, and the National Aeronautics and  
21 Space Administration. The program generally shall  
22 include basic and applied research—

23           “(A) to develop and provide the enhanced  
24 measurements, calibrations, data, models, and

1 reference material standards which will enable  
2 the monitoring of greenhouse gases;

3 “(B) to develop and provide standards,  
4 measurements, and innovative technologies for  
5 reducing greenhouse gas emissions in existing  
6 industries;

7 “(C) to develop and provide standards,  
8 measurements, measurement tools, and calibra-  
9 tions that will enhance and promote remote  
10 sensing technologies;

11 “(D) to assist in establishing a baseline  
12 reference point for future trading in greenhouse  
13 gases and the measurement of progress in emis-  
14 sions reduction;

15 “(E) to develop and provide standards,  
16 measurements, measurement tools, calibrations,  
17 data, models, and other innovative technologies  
18 to support the validation and accreditation of a  
19 greenhouse gas trading industry;

20 “(F) to assist in developing improved in-  
21 dustrial processes designed to reduce or elimi-  
22 nate greenhouse gases, including the develop-  
23 ment of measurement tools and standards to  
24 validate and accredit a carbon offset industry;  
25 and

1           “(G) that will be exchanged internationally  
2           as scientific or technical information which has  
3           the stated purpose of developing mutually rec-  
4           ognized measurements, standards, and proce-  
5           dures for reducing greenhouse gases.

6           “(c) NATIONAL MEASUREMENT LABORATORIES.—

7           “(1) IN GENERAL.—In carrying out this sec-  
8           tion, the Director shall utilize the collective skills of  
9           the National Measurement Laboratories of the Na-  
10          tional Institute of Standards and Technology to im-  
11          prove the accuracy of measurements that will permit  
12          better understanding and control of these industrial  
13          chemical processes and result in the reduction or  
14          elimination of greenhouse gases.

15          “(2) MATERIAL, PROCESS, AND BUILDING RE-  
16          SEARCH.—The National Measurement Laboratories  
17          shall conduct research under this subsection that in-  
18          cludes—

19                 “(A) developing material and manufac-  
20                 turing processes which are designed for energy  
21                 efficiency and reduced greenhouse gas emissions  
22                 into the environment;

23                 “(B) developing environmentally-friendly,  
24                 ‘green’ chemical processes to be used by indus-  
25                 try; and

1           “(C) enhancing building performance with  
2           a focus in developing standards or tools which  
3           will help incorporate low- or no-emission tech-  
4           nologies into building designs.

5           “(3) STANDARDS AND TOOLS.—The National  
6           Measurement Laboratories shall develop standards  
7           and tools under this subsection that include software  
8           to assist designers in selecting alternate building  
9           materials, performance data on materials, artificial  
10          intelligence-aided design procedures for building sub-  
11          systems and ‘smart buildings’, and improved test  
12          methods and rating procedures for evaluating the  
13          energy performance of residential and commercial  
14          appliances and products.

15          “(d) NATIONAL VOLUNTARY LABORATORY ACCREDI-  
16          TATION PROGRAM.—The Director shall utilize the Na-  
17          tional Voluntary Laboratory Accreditation Program under  
18          this section to establish a program to include specific cali-  
19          bration or test standards and related methods and proto-  
20          cols assembled to satisfy the unique needs for accredita-  
21          tion in measuring the production of greenhouse gases. In  
22          carrying out this subsection the Director may cooperate  
23          with other departments and agencies of the Federal Gov-  
24          ernment, State and local governments, and private organi-  
25          zations.”.

1 **SEC. 404. TECHNOLOGY DEVELOPMENT AND DIFFUSION.**

2 The Director of the National Institute of Standards  
3 and Technology, through the Manufacturing Extension  
4 Partnership Program, may develop a program to support  
5 the implementation of new “green” manufacturing tech-  
6 nologies and techniques by the more than 380,000 small  
7 business manufacturers.

8 **SEC. 405. AUTHORIZATION OF APPROPRIATIONS.**

9 There are authorized to be appropriated to the Direc-  
10 tor of the National Institute of Standards and Technology  
11 to carry out this title and section 17 of the National Insti-  
12 tute of Standards and Technology Act as added by section  
13 403 of this title, \$15,000,000 for each of fiscal years 2008  
14 through 2010.

15 **TITLE V—ABRUPT CLIMATE**  
16 **CHANGE**

17 **SEC. 501. ABRUPT CLIMATE CHANGE RESEARCH PROGRAM.**

18 The Secretary of Commerce shall establish within the  
19 Office of Oceanic and Atmospheric Research of the Na-  
20 tional Oceanic and Atmospheric Administration, and shall  
21 carry out, a program of scientific research on abrupt cli-  
22 mate change.

23 **SEC. 502. PURPOSES OF PROGRAM.**

24 The purposes of the program are—

- 25 (1) to develop a global array of terrestrial and  
26 oceanographic indicators of paleoclimate in order to

1 sufficiently identify and describe past instances of  
2 abrupt climate change;

3 (2) to improve understanding of thresholds and  
4 nonlinearities in geophysical systems related to the  
5 mechanisms of abrupt climate change;

6 (3) to incorporate such mechanisms into ad-  
7 vanced geophysical models of climate change; and

8 (4) to test the output of such models against an  
9 improved global array of records of past abrupt cli-  
10 mate changes.

11 **SEC. 503. ABRUPT CLIMATE CHANGE DEFINED.**

12 In this title, the term “abrupt climate change” means  
13 a change in the climate that occurs so rapidly or unexpect-  
14 edly that human or natural systems have difficulty adapt-  
15 ing to the climate as changed.

16 **SEC. 504. AUTHORIZATION OF APPROPRIATIONS.**

17 There are authorized to be appropriated to the De-  
18 partment of Commerce for each of fiscal years 2009  
19 through 2014, to remain available until expended, such  
20 sums as are necessary, not to exceed \$10,000,000, to  
21 carry out the research program required by section 501.

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