

Originally Processed With FOIA(s):
2005-0336-F

FOIA Number:
2005-0336-F

FOIA MARKER

**This is not a textual record. This is used as an
administrative marker by the George Bush Presidential
Library Staff.**

Record Group/Collection: George H.W. Bush Presidential Records
Collection/Office of Origin: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Global Climate Change Files

OA/ID Number: 62051
Folder ID Number: 62051-002

Folder Title:
Global Change Research Program (1) [2 of 2] [1989]

Stack:

Row:

Section:

Shelf:

Position:

0

0

0

0

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, DC 20506

Office of Science and Technology Policy
U.S. Geological Survey

Mary Catherine English 202-395-3840
Donovan Kelly 703-648-4460

For release: a.m. September 1, 1989

PLAN RELEASED FOR IMPLEMENTING U.S. GLOBAL CHANGE RESEARCH PROGRAM

A comprehensive plan for implementing the Bush Administration's U.S. Global Change Research Program during the next fiscal year has been released by the White House.

President Bush has proposed spending \$191.5 million on global-change research activities during fiscal year 1990, an increase of 43 percent over the current year's appropriations.

In releasing the report, Presidential Science Adviser Allan Bromley said, "The President's 1990 budget was the first to reflect a government-wide, integrated program of research focused on global change. This document is an initial research plan to back up the Presidential initiative and commitment to understanding and responding to concerns such as the 'greenhouse effect.' The plan represents a coordinated U.S. contribution to the international effort to provide the sound scientific basis needed for national and international decision making.

"I am particularly pleased that the plan is the first report issued during my watch as Presidential science adviser," Bromley said. "It represents my own personal commitment as well as that of the President to deal with some of the Nation's pressing environmental challenges.

"Because in the coming decades global environmental change may well represent the most significant societal, environmental and economic challenges facing the United States and the world, the President has endorsed the goal of the U.S. Program to develop a predictive understanding of global change and he is encouraging similar efforts worldwide," Bromley said.

The new report lays out a strategy of how the government will continue and expand existing and new research programs for such global change issues, particularly climate change and attendant effects on such areas as increasing temperatures, changing precipitation and rising sea levels.

The strategy outlined in the 196-page report, titled "Our Changing Planet: The FY 1990 Research Plan," was developed by a federal interagency group, the Committee on Earth Science (CES) of the Federal Coordinating Council for Science, Engineering and Technology. The council is chaired by Dr. Bromley, Director of the President's Office of Science and Technology Policy. The CES is chaired by Dr. Dallas L. Peck, Director of the U.S. Geological Survey, Department of the Interior. Preparation of the report was closely coordinated with the National Academy of Sciences Committee on Global Change.

"Many global changes can have tremendous impact on the welfare of humans," the CES report says. "These events may stem from natural processes that began millions of years ago or from human influence. Responding to these changes without a strong scientific basis could be futile and very costly.

(more)

"DOCUMENT TRACKING"

DOCUMENT NO: 89

TYPE: Informational

DATE OF DOCUMENT: 9/1/89

FROM: Washington Post

TO: Bromley

SUBJECT: Global Warming Report

ASSIGNED TO:

ACTION REQUIRED:

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED: _____

COPIES TO: NEOB files

FILE: EOB

DATE RECEIVED: 9/1/89

REMARKS:



THE WASHINGTON POST
s "Land Before Time."

te sector to help it cut
with controversy.
ears Roebuck & Co.
stal Service out of 11
in the Midwest after
Postal Workers Union
ears employees were
post offices" in the
lier this year, several
plained that the ser-
federal contract-bid-
s by hiring Texas bil-
Ross Perot as a
contract with Perot
nullified.
onal staff member fa-
Postal Service's op-
the MCA advertising
estions about the ser-

ow how or where
o draw the line on
this," said the staff
asked not to be
stal Service issued a
mp; does that mean
ting a baseball movie
a tie-in too? I don't
deals like this make

Laurence, an editor
News, a stamp-col-
on, said, "Anything
collecting to the
ader audience is a
yone in the stamp-
community wants to sell
ion eventually."

Postal Service has
ines for establishing
ns, and is consider-
es. "We just thought
a nice appeal and it

U.S. Details Global Warming Study

Interagency Program Attempts to Coordinate Federal Research

By William Booth
Washington Post Staff Writer

Faced with mounting evidence that man is altering the basic chemistry of the atmosphere, the White House yesterday released details of an interagency program to study global warming.

The U.S. Global Change Research Program represents the first attempt by the Bush administration to coordinate federal research on the possible causes and effects of global warming. The program directs scientific attention at several government agencies on some of the most basic questions of earth science, of "how this magnificent planet works, of how it ticks," said Robert Corell, assistant director of geological science at the National Science Foundation.

The aim of the program is "to gain a predictive understanding of the interactive physical, geological, chemical, biological, and social processes that regulate the total Earth system," according to the report that details the White House research agenda.

In a statement accompanying the report, White House science advis-

er Allan Bromley said global change "may well represent the most significant societal, environmental and economic challenges facing the United States and the world."

The administration has proposed spending \$191 million on research on global change in fiscal 1990, an increase of 43 percent from current spending. Congress looks as if it will appropriate all the funds, if not more, said Dallas Peck, head of the U.S. Geological Survey and chairman of the Committee on Earth Sciences, which developed the research agenda in cooperation with the National Academy of Sciences Committee on Global Change.

Climate specialists using computer models have predicted that average global temperatures will increase between 3 and 10 degrees Fahrenheit by the middle of the next century as gases such as carbon dioxide and methane build up in the atmosphere. Measurements taken atop Mauna Loa in Hawaii reveal that carbon dioxide has increased steadily since the late 1950s, and in the last two years increased dramatically, though scientists are not sure why.

The climate modelers concede

that their creations are crude approximations of the complex forces that drive the Earth's climate. Better research is needed to understand them and how human activities contribute, said Corell.

The global change program calls for extensive monitoring of the planet to document temperatures, weather patterns and sea levels, which are all expected to be affected by rising levels of carbon dioxide and other gases. These gases trap heat close to the surface of the earth instead of letting it radiate back into space.

The research initiative covers not only human-influenced change, but how erupting volcanoes and solar cycles affect weather systems.

The research initiative does not direct scientists to tackle ways to mitigate predicted global warming.

"We scientists thought we should get our own house in order first. The policymakers are going to want answers and at this point we're still asking too many questions," said J. Michael Hall, director of the Office of Climatic and Atmospheric Research at the National Oceanic and Atmospheric Administration.

N.Y. Youth Hunted in Shooting Surrenders

By Laurie Goodstein
Special to The Washington Post

NEW YORK, Aug. 31—An eight-day manhunt, which investigators said stretched from Brooklyn to Italy, ended early today when Joseph Fama, suspected gunman in the shooting death of a black teenager in Brooklyn, walked into a police station in upstate New York and surrendered.

Fama, 18, his clothing wrinkled and disheveled, walked alone into the only police station in Oneonta at 2:19 a.m., telling authorities there that he was tired of running and "tired of being blamed for something he didn't do," Oneonta Police Chief John J. Donadio said.

Police said Fama told them that

he holds U.S. and Italian passports and might have fled to Italy.

Police have identified Fama as the gunman in the racially motivated attack against Yusuf Hawkins, 16, killed when he and three friends went to the predominantly white Bensonhurst neighborhood in Brooklyn Aug. 23.

The black youths, seeking to buy a used car, were chased by as many as 30 whites armed with baseball bats and at least one gun, police said. They said the whites were waiting to ambush a group of blacks and Hispanics expected to visit a neighborhood girl.

Hawkins was buried after an emotional church service Wednesday, the same day that Keith Mon-

Fama is the seventh youth to be picked up in the case.

[About 7,000 demonstrators, hurling rocks and bottles and screaming, "War! War!" smashed through police lines to shut down the Brooklyn Bridge for half an hour as a demonstration of outrage over Hawkins's death, the Associated Press reported.

[At least 21 policemen and an unknown number of demonstrators were injured. Seven people were arrested, but three were released as part of a deal police negotiated with the marchers as a way to end the demonstration.

[Mayor Edward I. Koch (D) called the violence "totally unacceptable," but march organizer Sonny

New Curbs , Industries

that because of uncertain estimates that one in 100 out the same as one in 100,000, senior attorney for Resources Defense Council, said the group, said the was not high enough. short of providing adequate health protection, in our health, noting that 300,000 people have a greater than one chance of getting cancer from emissions. Currently, 20 face such a risk, the par-

proposed for future cover benzene emissions, industrial solvent use, on, transfer operations marketing. The effect of solvent use would be costs for companies pharmaceuticals and cy said.

vice stations, the pro- could require new equip- benzene emissions are filling the dealer's a \$1 billion cost calcu- ine distribution.

By PHILIP J. HILTS
Special to The New York Times

WASHINGTON, Aug. 31 — The Bush Administration set priorities today for all Federal research on global warming, ozone depletion and other potential environmental disasters.

The Administration has asked for a 43 percent increase, to \$191 million from \$134 million, in funds for the research next year. And today the chairman of the group that listed the priorities, Dallas Peck of the United States Geological Survey, said that while future requests were confidential, "substantial increases" could also be expected for the following year.

At a news conference in Washington, officials of seven Federal agencies announced a plan to coordinate Federal climate research and jointly listed what research projects would be undertaken and in what order. Robert Corell of the National Science Foundation said the agencies were cooperating to set the priorities in a manner "virtually unprecedented."

The Clouds Get High Priority

Given the top priority was research on clouds, the "ultimate greenhouse gas," in the words of J. Michael Hall of the National Oceanic and Atmospheric Administration.

Clouds act as both a blanket to trap

Administration's first detailed plans on planet- watching.

heat near the earth and also as a reflector of the sun's rays to keep the planet cool. The balance between the two is crucial to understanding the climate.

The next priorities are the measurement of ocean currents and temperatures, and the measurement of gases like carbon dioxide, carbon monoxide and ozone.

An Administration First

The three chief aims of the research plan are to monitor the climate around the world, or to "monitor how this planet really works," as Mr. Corell of the science foundation put it; to learn how the chemical and physical systems work, and to build computer models that will predict changes in the climate caused naturally and by mankind's acts.

The report is the first time the Bush Administration has laid out detailed plans on what research it will conduct

to monitor the planet and to make predictions.

In a statement, the President's science adviser, Dr. D. Allen Bromley, said of the report: "It represents my own personal commitment as well as that of the President to deal with some of the nation's pressing environmental challenges." Dr. Bromley was absent from the briefing.

Senator Albert Gore, Democrat of Tennessee, who has criticized the Administration's policy toward the environment, said the report "is a welcome blueprint," adding, "Our research into the causes and consequences of the world's environmental crisis must be well-coordinated."

But he said the plan was "only a beginning in what must be a broader, more comprehensive effort not only to study global changes but to prevent them."

Daniel Lashof, a senior scientist at the Natural Resources Defense Council, said: "In an attempt to show that the Government is responding to the threat, it has renamed a lot of programs 'global climate.' There is not a lot of new money here. They could very usefully do a lot more."

John S. Perry, who heads the global climate study for the National Academy of Sciences, said he believed the priorities listed were good ones, although "everyone would like to see more money put into this."

The Committee on the Earth Sciences, under the President's Office of Science and Technology Policy, produced the report. Its chairman, Mr. Peck, said the group will not make policy recommendations but will gather the facts needed to make them.

What's happening in

Chicago

... or any thirteen other American cities reaches you here through full-time news bureaus of

The New York Times

CLEAR YOUR DESK OF CLUTTER!
At 40% off, these sturdy file cabinets are selling at an irresistible price!

THREAT OF GLOBAL WARMING WILL FORCE U.S. TO END USE OF FOSSIL FUELS

Faced with a potential crisis of global magnitude, the nation must rethink its energy mix and eventually turn away from fossil fuels, a key White House environmental adviser said last week.

In light of what scientists have learned about fossil fuels' contribution to global climate change, "we've simply got to ratchet back on those sources of energy," Michael DeLand, chairman of the Council on Environmental Quality, said. Conceding that the transition wouldn't take place "overnight," DeLand said coal, wood and oil will play less of a role in the nation's energy future. In the long-run, the energy mix must be redirected toward sources that won't make the problem worse, he said. Energy Secretary James Watkins is doing just that by devising a new national energy strategy, he said.

DeLand made his remarks at a half-day seminar in Washington last week sponsored by the National Energy Resources Organization and the Global Climate Coalition, a recently formed industry group.

dollars toward finding alternative forms of energy for developed countries, they will do so "more sensibly" than the U.S. did, he said. China is planning to use its huge coal reserves and historical lack of pollution controls, could double its carbon dioxide, methane and chlorofluorocarbons are the most common greenhouse gases in the earth's atmosphere.

Coal could play a role in mitigating carbon dioxide emissions, he said. "Clearly, coal is the future for coal insofar as that future exists." He said that the defense budget now that the Cold War with the Soviet Union is over, conservation efforts could pay off, too, he said. "A small part of this equation and they can come fairly cheaply. They can," he said.

Michael: I seem to have missed the boat! But this day's not appearing in the report is a real blessing. Allan

DeLand said he, Office of Management and Budget Director Richard Darman, OMB Associate Director Robert Grady and White House Chief of Staff John Sununu will be personally involved in coordinating the Bush administration's global warming policy.

A hearing on global climate change will be included in the second series of meetings DOE plans to hold around the country on the national energy strategy, DOE Deputy Under Secretary Linda Stuntz told participants at the conference. Environmental Protection Agency Administrator William Reilly already has agreed to host the meeting with Watkins, she said.

Global warming will be central to the national energy plan, which Watkins is planning to present to President Bush sometime next fall, Stuntz said. The second set of national meetings will take place toward the end of this year and early next year, she said, adding that the department is hoping to make an announcement within a week or so on the scheduling of the conferences.

DOE also is ready to go to print with a congressionally mandated report on policy options to deal with the global warming problem, Stuntz said. Department policy makers came up with about 160 options that could provide incentives to the business community to start following practices to stabilize the global climate, she said. The options aren't ranked for effectiveness, however, she said. DOE is working on a second report for Congress to calculate the amount of carbon dioxide emitted in the U.S.

There was disagreement among speakers and participants at the meeting over whether the prospect of global warming would reduce public opposition to nuclear power. Some participants suggested that the environmental movement would have to embrace nuclear power because it is running out of energy sources it considers acceptable. Stuntz cited Watkins' past statements that problems with nuclear power must be solved before it can become a viable energy alternative. Safe disposal of radioactive waste, public confidence that the technology can be managed and an overhaul of the licensing process all are necessary prerequisites, she said.

Of those three, the hardest to achieve will be convincing the public, she said. J. Clarence Davies, an assistant EPA administrator on a panel with Stuntz, agreed and added that the nuclear industry can't expect to win over the public merely by citing its safety record. Antagonism toward nuclear power is part of the public's rational assessment of risk, he said.

The meeting also pointed up indications of dissension within the administration on how to treat global warming. While EPA Administrator William Reilly has committed to attending an upcoming international conference on global climate change in the Hague, administration officials are still deciding what message he will carry, Davies said. But he played down reports of infighting within the administration, characterizing the disagreements as "different shades of opinion." — Pat Paquette

THE WHITE HOUSE
WASHINGTON

September 20, 1989

MEMORANDUM FOR THE PRESIDENT

FROM: D. ALLAN BROMLEY 

SUBJECT: HEAD OF STATE MEETING ON THE GLOBAL ENVIRONMENT

I know that you are currently considering how best to follow-up on your discussions at, and before, the Paris Economic Summit regarding a Head-of-State meeting focused on the global environment.

I recognize that you will necessarily weigh many factors in reaching your decision but want, in this memorandum, to make a few comments and a specific suggestion from my science and technology vantage point.

First, I believe that it would be a mistake to plan any such Head-of-State meeting too closely in time to the scheduled February 1990, IPCC meeting to be held here in Washington because the latter is rather focussed on global warming and this is only a part, albeit a highly public part, of the more general global environmental change question. Too close a coupling would, in my opinion, give undue emphasis to the global warming problem to the exclusion of others such as ocean pollution, biodiversity, and a whole host of other topics.

Second, I would argue that it would be important that the necessary preparatory work be done so that you would be in a position at the Head-of-State meeting to sign, with your fellow Heads of State, an agreement having very solid content.

To that end, I would propose - and have discussed very briefly with Governor Sununu - the possibility that in, say, April 1990, I host, here in Washington, a meeting of the Science Ministers or their equivalent from the seven nations involved in the Economic Summit in which we might try to agree upon a set of environmental change issues of international importance (including global warming, of course) and focus on the state of our current scientific knowledge of the phenomena underlying them. Having identified at least some of the most important gaps in such knowledge, we could then at least attempt to evolve a coherent, integrated plan, involving the scientific and technological communities of these seven nations, to address these gaps.

If we were successful, then such a plan might provide an appropriate environmental centerpiece upon which the Heads of State could formally agree and to which they might be prepared to commit their respective countries for action.

I make this suggestion, Mr. President, for the additional reason that it would allow you to maintain the strong leadership role that this country has earned and that you so effectively demonstrated at Paris.

The possibility of including a broader spectrum of nations is one that I have rejected, not because they do not have essential contributions to make but rather to keep this initial discussion within manageable bounds. To the extent that we are successful initially we certainly would wish to spread our net rather early to include much broader representation.

I would welcome your guidance and comments.

THE WHITE HOUSE

WASHINGTON

November 29, 1989

*Global
warming
file*

MEMORANDUM FOR THE PRESIDENT

FROM:

DAVID Q. BATES
D. ALLAN BROMLEY *Alan*

SUBJECT:

Recommendations of the DPC Working Group on
Global Change for President's 1990
Environmental Program

ISSUE

The Cabinet-level DPC Working Group on Global Change was first convened in October to formulate and coordinate United States policy on global warming and other selected environmental issues. The Working Group was recently assigned the task of developing options to fulfill the President's campaign pledge to host an international conference on the environment and to seize the initiative on the international environmental agenda. The group has developed a consensus recommendation for a series of three events to be held during 1990.

BACKGROUND

A. Campaign Pledge -- during the campaign you pledged to hold during your first year in office an international conference on the environment:

"In my first year in office, I will convene a global conference on the environment at the White House. It will include the Soviets, the Chinese, the developing world as well as the developed. All nations will be welcome -- and indeed, all nations will be needed..."

"The agenda will be clear. We will talk about global warming. We will talk about acid rain. We will talk about saving our oceans, and preventing the loss of tropical forests. And we will act."

B. IPCC Activity -- the U.S. participates in the U.N. Intergovernmental Panel on Climate Change (IPCC) as the principal international forum to address the issue of global warming:

-- Key working groups are chaired by Great Britain on science, the Soviet Union on effects and the United States on response strategies.

-- U.S. will host the third plenary session of the IPCC in February, 1990, in Washington. The IPCC will meet in plenary session a final time in August, 1990, at which the completed reports of the working groups will be presented, leading up to the Second World Climate Conference in November, 1990.

-- You have stated that you expect the IPCC deliberations to lead, upon completion of the IPCC reports, to the negotiation of a framework convention on climate change.

RECOMMENDATIONS

The following series of events recommended by the Working Group on Global Change was developed within the context of the U.S. commitment to the IPCC and the accomplishments of the Administration on global warming (set forth in greater detail at Appendix A).

It should be noted that you will announce your budget in the State of the Union on January 30, 1990, which will include a number of environmental initiatives related to global warming. It is strongly suggested that the package described below be announced either in the State of the Union or in a major address directly before or after the State of the Union, whichever is appropriate.

I. The President's 1990 Environmental Initiative

The three events recommended below are packaged as a 1990 Presidential environmental initiative culminating in the President's International Conference on the Conservation of Nature.

A. Address to the February, 1990 IPCC plenary session in Washington

-- speech would explain U.S. policy on global climate change and promote the enormous investment the United States has made both in understanding the scientific elements of global climate change and in beginning to take mitigating action.

-- opportunity to assert the U.S. leadership role on global climate change and reinforce the U.S. commitment to the IPCC as the principal forum for addressing the problem.

B. White House meeting on international environmental research

-- attended by international delegations composed of the chief science official, chief economics official and chief environmental official from each nation.

-- focus of the meeting would not be on any particular environmental issues but on advancing the quality and understanding of the analytical tools for confronting environmental problems. Result would be a common integrated approach for use in future negotiations on environmental problems.

-- all or any parts of the deliberations could be attended by the President.

C. President's International Conference on the Conservation of Nature

-- President to host an international conference, in the tradition of Teddy Roosevelt, focused on the twin goals of the conservation of nature and sustainable development.

-- emphasis on energy conservation, biological diversity, reforestation, wetlands and oceans, highlighting as models successful domestic programs, international ventures (e.g., the pending U.S.-Brazil agreement for assistance in the management of Brazilian national forests, banning of ivory imports, and debt-for nature swaps), and future initiatives (e.g., the reforestation initiative to be announced in the State of the Union and the America the Beautiful initiative to be included in the 1991 budget).

-- significant "thousand points of light" voluntary component to be included.

-- approach separates the volatile issues of atmosphere and global warming from the event with which you will be most closely identified.

II. Timing (see attached calendar)

A. IPCC Plenary Session: date fixed, February, 1990.

B. White House Meeting on Environmental Research: Spring, 1990, date to be determined.

C. President's Conference on the Conservation of Nature: Spring - Summer - Fall, 1990, date to be determined.

III. Additional Initiative

The Working Group also discussed the issue of hosting the first negotiating session of the international framework convention on climate change. The United States has agreed to participate in the negotiations, yet has made no decision to serve as host. The United States, in our capacity as chair of the Response Strategies Working Group under the IPCC, hosted a "workshop" to begin discussions of the likely elements of a framework convention. It is suggested that the United States may wish to host the negotiations for the framework convention, which are not scheduled to begin until after the Second World Climate Conference in November, 1990 (which for practical purposes means not until 1991), and announce that decision at an appropriate time.

PROS

- decision to host the framework convention and, by extension, an early announcement of the decision, could give the U.S. leverage and an element of control in the negotiation process, allowing the U.S. to promote concepts such as market mechanisms, emissions trading and offset policies.
- hosting the "Washington Convention" would put the U.S. in a leadership role on international environmental issues.
- concern that any delay on a decision within the U.S. government will result in the U.S. being bypassed by another nation acting faster.

CONS

- no international consensus on the legal instrument to be employed for the framework convention. The legal instrument could range anywhere from model employed to negotiate the Law of the Sea Convention to a model less intrusive on national sovereignty. Unwise to host a negotiating session for a framework convention before the U.S. knows what the convention will be.

- consensus that the framework convention will be extraordinarily difficult to negotiate and could easily result in a document that the U.S. could not sign.

- would place enormous pressure on the United States to commit to economically injurious reductions, arrived at politically, of emissions for which there are no known substitutes at this time.

- unique mix of Congressional, interest group, and media interplay that would surround a "Washington Convention" would make any discipline or control over U.S. negotiating positions all but impossible.

In the discussion of this issue within the Working Group, a majority of your advisors expressed the opinion that in the very near future, namely after the February IPCC plenary session, the United States will be in a better position to gauge the direction of the IPCC and the legal instrument to be employed in negotiating the framework convention, and that it would better serve U.S. interests to postpone a decision on hosting the convention until that time.

1990 ENVIRONMENTAL CALENDAR
(Dates and Events in Bold are Fixed)

January	State of the Union
February 5-8	IPCC Plenary Session (Presidential Address)
March-April	*White House Meeting on Environmental Research
April 22	Earth Day *President's International Conference on Conservation of Nature
May 8-16	Conference on "Action for our Future" - Bergen
May	*White House Meeting on Environmental Research
July 9-11	G-7 Economic Summit
July	*White House Meeting on Environmental Research or President's International Conference on Conservation of Nature
August	Final Plenary Session of IPCC - Stockholm
September-October	*President's International Conference on Conservation of Nature
November 12-13	Second World Climate Conference - Geneva

* Represents Alternative Dates for Events

U.S. ACTIONS ALREADY UNDERWAY TO CUT GREENHOUSE GASES

In the first 11 months of the Administration, the U.S. has already taken several actions unilaterally which, in addition to being meritorious in their own right, will reduce CO₂ emissions and address the global warming problem.

- o The Administration's proposed Clean Air Act, by significantly reducing pollution from coal-fired power plants and placing a permanent cap on emissions, creates a powerful incentive for conservation. This alone could reduce CO₂ emission by several percent a year. No other nation has adopted such an ambitious clean air strategy.
- o The Administration's action to increase required corporate average fuel efficiency (cafe) standards to 27.5 miles per gallon will cut CO₂ emissions from automobiles.
- o The Administration has not only called for a worldwide phase out of CFC's by the year 2000, but the Administration's February 9th budget included a unilateral fee on CFC emissions, which will sharply reduce U.S. production and emissions of CFC's. The CFC fee has been adopted by the Congress. Scientists believe that CFC's are responsible for 20% of the greenhouse problem. In addition, the Administration has proposed expanding the Montreal Protocol to cover additional greenhouse gases which deplete the ozone layer.
- o The Administration has sharply increased funding for global climate change research. The fiscal year 1990 budget contains almost \$1/2 billion for this effort, a 21% increase over 1989 levels. We expect another increase in the FY 1991 budget, with the amount to be determined. No other nation is spending nearly this much on research.
- o The Administration is now developing a national energy strategy, to be released in April. One of the clear goals in developing the strategy is to increase energy conservation.
- o Clean coal technologies proposed by the President in his Clean Air proposal and federally funded will reduce the production of greenhouse gases which are a by product of current, older technologies. Current technologies can add approximately 3% to greenhouse gas production per plant.
- o The President's proposed alternative fuels program for automobiles has the potential to reduce CO₂ emissions from automobiles.

- o The Administration is preparing a major reforestation initiative for possible inclusion in the State of the Union address. The initiative will include funding of approximately \$175 million annually under a program called "America the Beautiful." This program will encompass a national partnership for tree planting. We hope to work hand in hand with state and local governments, foundations, corporations, and private citizens to reforest urban and rural areas, on public and private lands.

These rules would also apply for the first time to the legislative branch.

- A **25 percent pay raise for federal judges** was proposed in the legislation submitted April 12. On July 7, the President submitted separate legislation calling for pay increases for certain specialized professionals and other senior officials in the executive branch.
- **Congressional Honoraria Ban:** On July 7, the President also sent to Congress legislation that calls for the elimination of Congressional honoraria by 1991, making the next Congress honoraria-free. This proposal is linked to the enactment by Congress of a pay increase for its Members, and the President will work with Congress toward this end.
- The extension of the federal statute that prohibits employees from taking actions that enhance their own financial interest to cover legislative and judicial branch employees (but not Members of Congress).
- The extension of the **Independent Counsel statute** to cover the Congress and the creation of an independent, non-partisan Congressional Ethics Office.
- A **ban on outside earned income** for full-time non-career Presidential appointees in the executive branch, including non-career employees in the immediate White House Office.]]

"CORRESPONDENCE TRACKING"

DOCUMENT NUMBER: 8920099

TYPE: Information DATE OF CORRESPONDENCE: 10/02/89

FROM: RUSSELL D. O'NEAL
VICE CHAIRMAN OF THE BOARD, ERIM

TO: BROMLEY

SUBJECT: THANK YOU FOR KEYNOTE ADDRESS AT THE CONFERENCE ON
EARTH OBSERVATIONS AND GLOBAL CHANGE.

ASSIGNED TO: ACTION REQUIRED:

SENDER'S DUE DATE: OSTP DUE DATE:

DATE COMPLETED: 10/09/89

COPIES TO: JUDY BOSTOCK
JACKELINE CLAWSON
NEOB files

no reply needed

FILE: EOB DATE RECEIVED: 10/05/89

REMARKS:

RUSSELL D. O'NEAL

4 LIBERTY PLACE

HILTON HEAD, S.C. 29928

(803) 671-2934

2 October 1989

Dr. D. Allan Bromley
Assistant to the President for
Science & Technology
Executive Office of the President
New Executive Office Building
Washington, DC 20506

Dear Allan:

We at ERIM appreciated very much your giving the excellent keynote address at the Conference on Earth Observations and Global Change. I was sorry I did not have a chance to talk with you, but I understood you had to take off immediately for a trip.

Your remarks served as a stimulus and got the conference off to an excellent start. There were many good comments about the conference as a whole. Indeed, I believe that it was a very useful meeting.

Sincerely,



Russell D. O'Neal
Vice Chairman of the Board, ERIM

dc

DIRECTOR
OFFICE

60001 2 VE: 31

RECEIVED

ROBERT J. DONNELLY

11/11/58

11/11/58

11/11/58

Mr. J. Edgar Hoover
Director
Federal Bureau of Investigation
Washington, D.C.

Dear Sir:

I am writing to you regarding the matter of the
... of the ... and ...
... of the ... and ...
... of the ... and ...
... of the ... and ...

Sincerely,
[Signature]

Robert J. Donnelly
Vice President

OFFICE OF THE
DIRECTOR

89 OCT 5 A6:37

RECEIVED

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

November 28, 1989

Dear Senator Stevens:

First of all, let me take this opportunity to extend a genuine and heartfelt thank you for your kind and gracious support at the Commerce Committee hearing on global warming on November 14, 1989. I know that it was an extremely busy week for you and I appreciate your taking that extra time to appear on my behalf. I regret that we have not had more time over the past few months to discuss global change as well as the other many issues of common interest. I do hope that we will be able to get together in the near future and go over these issues in detail.

I regret that my answer on the Tongass reform legislation was, in fact, inaccurate, and I appreciate your providing me the opportunity to clarify my position for the hearing record. I was very interested in the information which we obtained while researching the Tongass forestry practices. It is, indeed, a complex and interesting subject, and very relevant to recent discussions regarding responses to global change. I will be entering into the record a more accurate response to the question regarding the Tongass, and will forward a copy to you. In addition, I have enclosed answers to the questions you sent me for your comment and review.

Once again, I would like to express my appreciation to you for taking time out of such a busy week to lend support to me during the hearing, and I apologize for the confusion on the Tongass issue. You may rest assured that I now have a far better appreciation for the forestry management plan in the Tongass as well as the advantages of this type of forestry practice within the context of global warming. I look forward to talking with you on this and other matters very soon.

Sincerely yours,



D. Allan Bromley
Director

Office of Science and Technology Policy

The Honorable Ted Stevens
522 Hart Senate Office Building
Washington, D.C. 20510-0202

Enclosure

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

SUPPLEMENTAL QUESTIONS
COMMERCE COMMITTEE HEARING ON GLOBAL WARMING
Tuesday, November 14, 1989

Senator Ted Stevens

1. Is it true that a major global warming concern as it relates to forestry practices in Brazilian tropical rain forests is that the forests are cut and burned on location, the result being the release of massive amounts of carbon into the atmosphere?

Yes. The large areas of tropical forests being burned after cutting are releasing large amounts of carbon into the atmosphere. A similar result occurs from the massive burning of grasslands in Africa. However, to call the removal of tropical forests a forestry practice is not accurate. What is being done there has no relation to the practice of forestry.

2. Is it true that this technique known as "slash and burn" agriculture is not used in the Tongass?

Yes. "Slash and burn" agriculture is not used in the Tongass National Forest. The Tongass is managed to produce forest crops on a continued basis and is never converted to produce food crops. In fact, forestry is practiced on the Tongass and all National Forests.

3. Is it true that large amounts of carbon are not released into the atmosphere by burning associated with forestry practices in the Tongass?

Yes. Large amounts of carbon are not released into the atmosphere from harvesting the Tongass. Little, if any, burning is associated with harvesting of timber there.

4. Is it true that by harvesting older trees, young trees are allowed to grow more rapidly?

Yes. It is true that younger trees will grow more rapidly after the mature timber crop is harvested. This is true because the young trees receive more light, water, and nutrients after the mature trees are removed.

Supplemental Questions
page two

5. Is it true that young trees convert carbon dioxide at a greater rate than older trees?

Yes. Older stands of timber tend to begin losing limbs, foliage, etc which is broken down, releasing carbon into the atmosphere. Young stands tend to keep adding more wood as a result of tree growth, thus turning more carbon dioxide into cellulose.

6. And is it furthermore true that as a result of harvesting old trees and allowing young trees to prosper, more carbon dioxide is converted in the photosynthetic process?

Yes. The net result of harvesting old trees and fostering young trees is to change the ratio of carbon fixed/released toward the fixation side.

7. Is it true that most timber from the Tongass is used productively, not burned like timber from the Brazilian tropical rain forests?

Yes. Timber from the Tongass is used in a variety of products. It is not wasted.

8. Does any component of Tongass reform legislation currently being considered by the House or Senate help to address the global warming problem?

It is my understanding that the Tongass Reform Legislation that has been considered addresses forestry management issues. In fact, Secretary Yeutter has urged delay of any legislation until the revised Tongass National Forest Management Plan is completed next year. This will allow for the necessary professional field review and public comment period that are part of the forest planning process.

9. In light of these facts, is the Administration considering Tongass reform legislation to address the global warming problem?

No. The Administration has not proposed Tongass Reform Legislation, but instead prefers to rely on the National Forest Land Management process to address forestry management issues on the Tongass.

"CORRESPONDENCE TRACKING"

TYPE: CONGRESSIONAL PRIORITY

DOCUMENT NUMBER: 8920390

FROM: TED STEVENS
UNITED STATES CONGRESS

TO: BROMLEY

DATE OF
CORRESPONDENCE: 11/16/89

SUBJECT: INQUIRING ABOUT TONGASS REFORMS IN RELATION TO
GLOBAL WARMING ISSUES, IN PARTICULAR "SLASH AND
BURN" TECHNIQUES.

ASSIGNED TO: Nancy Maynard

ACTION REQUIRED: DRAFT RESPONSE FOR DAB SIGNATURE.

SENDER'S DUE DATE: OSTP DUE DATE: 11/28/89

DATE COMPLETED: -----

COPIES TO: D. Allan Bromley
JUDY BOSTOCK

REMARKS:

DATE RECEIVED: 11/17/89

FILE: NEOB

DANIEL K. INOUE, HAWAII
ERNEST F. HOLLINGS, SOUTH CAROLINA
J. BENNETT JOHNSTON, LOUISIANA
QUENTIN N. BURDICK, NORTH DAKOTA
PATRICK J. LEAHY, VERMONT
JIM SASSER, TENNESSEE
DENNIS DECONCINI, ARIZONA
DALE BUMPERS, ARKANSAS
FRANK R. LAUTENBERG, NEW JERSEY
TOM HARKIN, IOWA
BARBARA A. MIKULSKI, MARYLAND
HARRY REID, NEVADA
BROCK ADAMS, WASHINGTON
WYCHE FOWLER, JR., GEORGIA
J. ROBERT KERREY, NEBRASKA

MARK O. HATFIELD, OREGON
TED STEVENS, ALASKA
JAMES A. MCCLURE, IDAHO
JAKE GARN, UTAH
THAD COCHRAN, MISSISSIPPI
ROBERT W. KASTEN, JR., WISCONSIN
ALFONSE M. D'AMATO, NEW YORK
WARREN RUDMAN, NEW HAMPSHIRE
ARLEN SPECTER, PENNSYLVANIA
PETE V. DOMENICI, NEW MEXICO
CHARLES E. GRASSLEY, IOWA
DON NICKLES, OKLAHOMA
PHIL GRAMM, TEXAS

United States Senate

COMMITTEE ON APPROPRIATIONS
WASHINGTON, DC 20510-6025

JAMES H. ENGLISH, STAFF DIRECTOR
J. KEITH KENNEDY, MINORITY STAFF DIRECTOR

November 16, 1989

The Honorable Allan Bromley
Science Advisor to the President
The White House
Washington, D.C. 20500

DELIVERED BY HAND

Dear Dr. Bromley:

During the Commerce Committee hearing on global warming at which you testified this week, Mr. Kerry asked you about the Administration's position on Tongass reform legislation as a remedy to the global warming problem. The question was in the context of "slash and burn" forestry practices in Brazilian tropical rainforests. Unfortunately, I was on the floor and could not follow up on Mr. Kerry's and your remarks on the question.

I understand your answer was that Tongass reform legislation was under immediate consideration by the Administration as a means to address global warming. I do not believe that Tongass forestry practices are a cause of global warming. If anything, Tongass forestry practices help to solve the global warming problem. By harvesting old trees and allowing young trees to grow, an increased amount of carbon dioxide, one of the gases which creates the greenhouse effect, is converted in the photosynthetic process. I believe that forestry practices including sustained yield, planned harvesting in the Tongass actually help remedy the greenhouse effect.

Conversely, forestry practices in Brazil are quite different. In Brazil the "slash and burn" technique is used. As you know, this has involved clear-cutting about 5 million acres of tropical forests. After the trees are cut they are immediately burned, right where they fall. As I understand it, the burn component of this method releases massive amounts of carbon into the atmosphere. In some years as much as 1/5 of worldwide man-made carbon emissions are a result of "slash and burn" techniques. This massive amount of carbon released into the atmosphere is a significant cause of global warming.

The Honorable Allan Bromley
November 16, 1989
Page 2

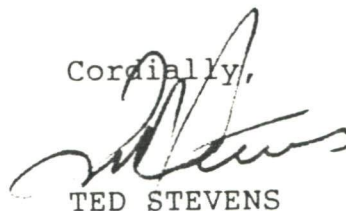
The situation is even more alarming when one realizes the fact that timber from Brazilian rainforests is not even used. By contrast, lumber from the Tongass is used for a variety of purposes including manufacturing of homes, furniture, pulp, and rayon. The Tongass is not being destroyed and burned to the ground like the rainforests of Brazil, and the Tongass is not being used in a way that substantially, if at all, contributes to global warming. The situations in each region are beyond comparison with respect to contribution to the global warming problem.

I request that you discuss this matter with the Department of Agriculture and then clarify the Administration's position for the hearing record with respect to Tongass reform legislation as a means to address global warming. If anything, the forestry management plan in the Tongass should be applauded for its positive effects in helping to solve the global warming problem.

Thank you for your consideration.

With best wishes,

Cordially,

A handwritten signature in dark ink, appearing to read "Ted Stevens", is written over the typed name. The signature is fluid and cursive.

TED STEVENS

NOV 14 1989 FAX 202 335 2011 20233532011W 2
525209
SUPPLEMENTAL QUESTIONS
COMMERCE COMMITTEE HEARING ON GLOBAL WARMING
Tuesday, November 14, 1989

Senator Ted Stevens

Questions to Dr. Bromley:

- 1) Is it true that a major global warming concern as it relates to forestry practices in Brazilian tropical rainforests is that the forests are cut and burned on location, the result being the release of massive amounts of carbon into the atmosphere?
- 2) Is it true that this technique known as "slash and burn" agriculture is not used in the Tongass?
- 3) Is it true that large amounts of carbon are not released into the atmosphere by burning associated with forestry practices in the Tongass?
- 4) Is it true that by harvesting older trees, young trees are allowed to grow more rapidly?
- 5) Is it true that young trees convert carbon dioxide at a greater rate than older trees?
- 6) And is it furthermore true that as a result of harvesting old trees and allowing young trees to prosper, more carbon dioxide is converted in the photosynthetic process?
- 7) Is it true that most timber from the Tongass is used productively, not burned like timber from the Brazilian tropical rainforests?
- 8) Does any component of Tongass reform legislation currently being considered by the House or Senate help to address the global warming problem?
- 9) In light of these facts, is the Administration considering Tongass reform legislation to address the global warming problem?

THE WHITE HOUSE
WASHINGTON

December 1, 1989

Dear Dr. Bernabo:

Many thanks for your letter of October 27 with its enclosed Congressional testimony in the matter of global change research. The point that you raise about the Committee on Earth Sciences research plan is an important one and one that I shall take up with the members of that Committee. I much appreciate your sending it to me, and it may well be that Dallas Peck or Robert Corell from the CES will be in touch with you.

With all best wishes,

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley", written in a cursive style.

D. Allan Bromley
Assistant to the President
for
Science and Technology

Dr. Chris Bernabo
President
Science and Policy Associates, Inc.
1333 H Street, N.W.
Washington, D.C. 20005

"CORRESPONDENCE TRACKING"

Bromley ①
File ②

TYPE: Information

DOCUMENT NUMBER: 8910199

FROM: Science and Policy Associates, inc.
Chris Bernabo

TO: Bromley

DATE OF
CORRESPONDENCE: 10/27/89

SUBJECT: Conducting Global Climate research to address the
growing needs of decision makers.

ASSIGNED TO:

ACTION REQUIRED: NONE

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED:

COPIES TO: James Wyngaarden
Nancy Maynard
Judith Bostock

REMARKS:

DATE RECEIVED: 11/02/89

FILE: NEOB



SCIENCE and POLICY ASSOCIATES, inc.

October 27, 1989

Dr. Allan Bromley
Director, Office of Science and Technology Policy
Old Executive Office Building #358
Washington, DC 20506

Dear Alan:

Congratulations on your appointment as head of OSTP. The nation and that institution will benefit from the leadership you bring to this important position. OSTP will play a key role as we attempt to address the global change issue.

Enclosed is a copy of my recent Congressional testimony on conducting global climate research to address the growing needs of decision makers. This is a science/policy management issue I have examined for over a decade, that now has emerged as an urgent international concern.

The main point of my statement is that although the federal Committee on Earth Sciences' (CES) proposed research plan is excellent, it lacks any viable approach for objectively translating the scientific results into a form useful for informing the policy debate. No mechanisms currently exist to synthesize and integrate the diverse technical outputs of climate research into a credible form that will assist decision makers in either the government or the private sector. Without such an assessment function to deliver usable results, political support for sustaining the needed CES long-term research effort could wither under the heated demands for policy action.

My testimony briefly covers: the emerging transition from curiosity-driven to policy-driven research, the past mismatch of science and policy needs, and a systematic approach for producing credible and useful scientific assessment for decision makers.

I would appreciate your thoughts and comments on this matter of mutual interest. Please contact me if you would like to discuss this important and timely issue further. I can be reached at (202) 789-1201.

Sincerely,

A handwritten signature in black ink that reads "Chris Bernabo".

Chris Bernabo
President

STATEMENT OF

DR. J. CHRISTOPHER BERNABO
PRESIDENT
SCIENCE AND POLICY ASSOCIATES, INC.
WASHINGTON, D.C.

BEFORE THE
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH
AND ENVIRONMENT
and the
SUBCOMMITTEE ON INTERNATIONAL COOPERATION

27 JULY 1989

Mr. Chairman, Members, Staff and guests:

Thank you for the invitation to comment on the *Global Change Research Act of 1989* and to discuss how climate research can be managed to address the growing needs of decision makers. It is a personal pleasure to appear before the House subcommittee where I worked on this issue a decade ago, while serving as a Congressional Science Fellow with Congressman George Brown.

My ideas on this subject have been shaped by many diverse experiences over the last 15 years of conducting and managing environmental research. I have worked as a climate researcher, policy analyst, interagency program manager, and consultant to industry, federal agencies, states, environmental groups, and international organizations. During my five-year tenure as the original Executive Director of the National Acid Precipitation Assessment Program (NAPAP), I served on the front line in the efforts to provide effective scientific input to a complex and divisive environmental policy issue.

My testimony covers three areas: 1) status of both the research and policy related to global change, 2) challenges and opportunities for addressing the issue, and 3) specific comments on the proposed legislation with recommendations for structuring an effective national research and assessment program.

STATUS OF THE RESEARCH AND POLICY

Global climate change is not a new subject. Scientists have known for about 100 years that carbon dioxide is a greenhouse gas and that the burning of fossil fuels could increase its atmospheric concentrations, potentially warming global climate. Modern research on the subject has been conducted for at least 50 years. We have had a U.S. National Climate Program since 1978, and in 1979 WMO, UNEP and ICSU organized international research efforts under the World Climate Programme.

Over the last ten years more than one billion dollars has been invested in U.S. climate-related research. The issue also has broadened from simply the greenhouse issue to global change and now includes the interrelated concerns on stratospheric ozone depletion and other potential global threats.

What's new is that this topic has suddenly moved from being a subject of intellectual curiosity to being an urgent policy issue. In the last two years over 35 bills have been introduced into the U.S. Congress, some with regulatory provisions that could cost society hundreds of billions of dollars. The signing of international accords such as the Montreal Protocol is further evidence that this is no longer largely an academic topic. Global change rapidly has become a top priority environmental policy concern worldwide.

This dramatic change in the policy status of an issue that had languished on the back burner for years has profound implications for the conduct and application of climate research. Tremendous new demands for relevant and useful information will challenge the old ways of organizing and conducting scientific research. We must manage these new expectations to ensure a more productive interaction between scientists and decision makers. Unfortunately, simply providing additional funds to do *good science* will not be enough. Indeed, there is an imperative need to apply to global change the most effective ways to harness technical capabilities for assisting decision makers to develop sound policies.

The National Climate Program Act of 1978 (P.L. 95-367) was pioneering legislation that first recognized the importance of climate in national affairs ranging from agriculture to transportation and defense. The political impetus for that Act was the tangible economic consequences of cold winters in the 1970's more than concern about an eventual global warming. The Act recognized the value of focusing and coordinating federal research, and the resulting national program has many accomplishments to its credit.

In 1987, an Executive Order created the Committee on Earth Sciences (CES) under the Federal Coordinating Council for Science, Engineering and Technology (FCCSET). Within CES a new interagency mechanism was established to coordinate and plan government-wide research activities. Some of the best features in the original Climate Act were incorporated into CES's plans, including the cross-cutting interagency budgeting process that also has worked effectively for the past decade in NAPAP. The present relationship between CES and the goals of the National Climate Program Act is unclear, but the intentions are compatible.

As a result of federal funding for climate research, the work by the scientific community, and the outstanding efforts by CES, the United States has a growing technical resource to address the global change issue. What is still lacking is a viable process for translating the resulting scientific information into a useful form for future policy development.

CHALLENGES AND OPPORTUNITIES

The transition from *curiosity-driven research* to *policy-driven research* will not be easy. Indeed many scientist may soon long for the "good old days" when policy demands and accountability for relevance were less important factors in shaping the federal programs. However, these new pressures are an inevitable consequence of the heightened public awareness and the resulting political activity on the global change issue.

In the absence of serious policy attention over the last decade, scientist and managers have been setting research directions and funding priorities based on their desire to understand better Earth's natural systems and man's interactions. An inadvertent mismatch has developed between science and policy needs, partly because of this policy vacuum prior to the galvanizing heat and drought in areas of the United States in 1988. Some general aspects of this mismatch are summarized in Table 1.

Table 1. Mismatch between Scientific Emphasis and Policy Information Needs on Global Climate Change

<u>Past Research Emphasis</u>	<u>Future Policy Needs</u>
Global Consequences	Regional Changes
Probable Scenarios	Alternative Options
Projecting Outcomes	Evaluating Risks
Physical Impacts	Societal Responses
Mean Conditions	Variability and Extremes
Trends	Thresholds
Cycles	Rate and Magnitude

The questions that researchers investigate to gain a fuller understanding of natural systems usually are different than the questions most relevant to formulating policy. Theoretical versus practical considerations can lead to framing very different questions for research to address. This problem is not the same as the classic split between basic and applied research -- in this case, both types of research are needed to inform policy. However, scientific information is only one component of what policymakers must consider in developing appropriate societal actions. Prevailing economic, social and political factors all influence what is an acceptable policy.

Scientific research alone does not provide objective policy answers. Policy development inherently involves subjective value judgments. Climate researchers are ill equipped to guess at what is the most valuable type and format of information for environmental decision makers. Likewise, many key policy questions cannot be effectively addressed with science. Therefore, to formulate scientific research relevant to the policy process requires an iterative, two-way dialogue between the scientific and the policymaking communities. Figure 1 illustrates the role of scientific and political information in the policy process. A systematic interagency assessment process will be required to maximize society's benefit from the Nation's ongoing investment in global change research.

The CES document, *Our Changing Planet: A U.S. Strategy for Global Change Research*, eloquently states the fundamental rationale for the research program.

"In the coming decades, global change may well represent the most significant societal, environmental, and economic challenges facing this Nation and the world. The national goal of developing a predictive understanding of global change is, in the truest sense, science in the service of mankind."

If global change research is going to serve mankind, it will require more than the best science we can produce. The traditional outputs of scientific research will have to be synthesized and integrated into reports that competently inform policymakers. The currently planned U.S. research effort in global change does not adequately address this urgent and growing need.

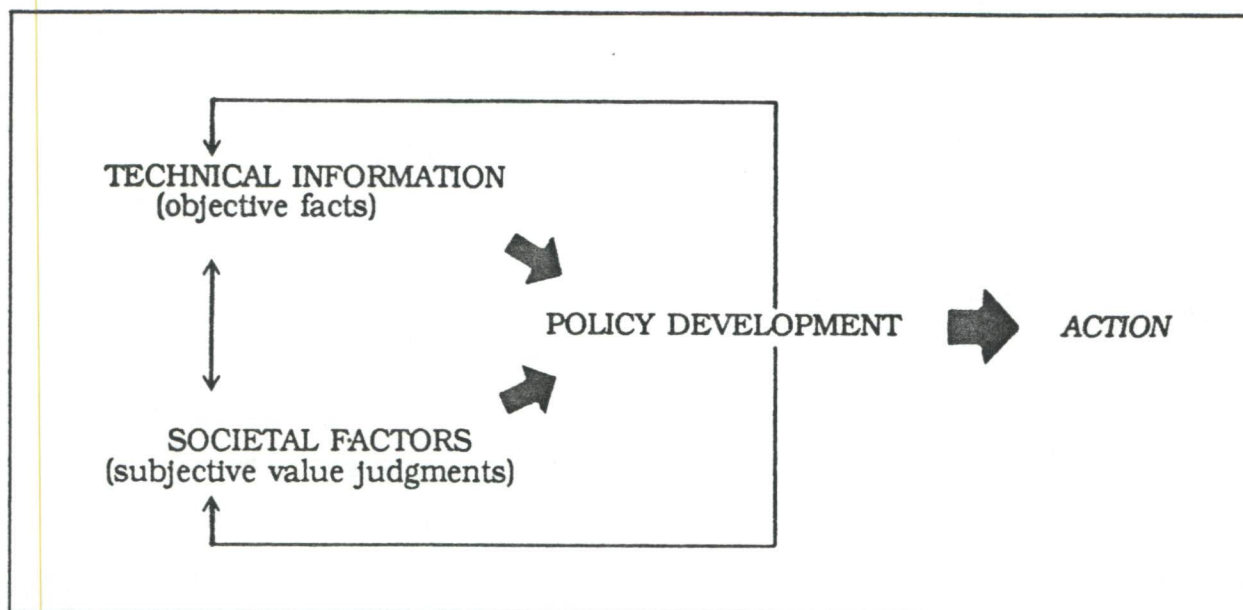


Figure 1. Political and Scientific Input to the Policy Process

Rational and systematic approaches are available to structure policy-relevant scientific assessments and these methods should be applied to the global change issue. A well-defined interagency assessment process provides the best means for objectively communicating the significance and limitations of research results for policymakers. An assessment framework is important not only for assisting the policy debate but also for maintaining long-term societal support for the expensive research program that is required.

"Assessment" is defined here as an iterative process of synthesizing and integrating technical information into a form relevant for decision making. The benefits of assessments derive from the process used to assemble them as well as the resulting products. The assessment process requires the following key components:

- development of an analytic framework for organizing the information,
- identification of key technical and policy issues,
- explicit definition of underlying assumptions, and
- building of consensus on the status of knowledge and its policy implications.

Assessments must be targeted at specific audiences to pose and address the most useful questions. They serve as an efficient vehicle for communicating the significance of complex information from diverse multidisciplinary sources. Assessments can provide both policy and technical insights not obtainable from the numerous individual sources.

The interagency assessment process is technically and organizationally difficult. Technically, meaningful statements can be limited by lack of fundamental understanding of the science, data gaps, hazards of extrapolation, and unquantifiable uncertainties. Organizationally, assessments require a clear separation of objective scientific facts from interpretations based on value judgement. The choice and use of language and the level of technical detail are important factors influencing an assessment's value to end users.

Often the term "assessment" raises expectations in the decision-making community of simple answers or unambiguous recommendations, neither of which usually results from a rigorous and objective process. Because of the relevance and weight assessments carry for decision makers, the temptation to politicize them is great. An open and external review process can guard against this problem. Conducting assessments in an interagency mode provides the needed checks and balances to maintain objectivity and avoid biases in interpretations driven by the self-interests of individual agencies.

The following key attributes of a research and assessment program on global change could effectively inform the policy debate:

- Scientifically Sound. The program should be constructed to ensure that it is technically sound. A firm scientific basis is essential for future policy development. The current efforts by CES provide an excellent start for this aspect of the program. The existing momentum should be supported and built upon with adequate peer review and scientific advisory mechanisms to keep the endeavor at the forefront of our technical capabilities.
- Policy Relevant. Structured and ongoing mechanisms are needed to provide feedback between the research and the decision making communities. The "users" of the program's information -- legislators, regulators and resource managers -- should have systematic input to the "producers" of the information -- researchers and research managers. The research agenda and priorities should be jointly developed if a successful translation of science into policy-relevant information is desired. The interface between science and policy can be accomplished with periodic assessments that objectively describe the evolving state of the science and its significance in terms applicable to decision making.
- Resource Efficient. An interagency planning and budgeting process is essential to avoid inadvertent gaps and unnecessary duplication in the program. The existing CES approach is appropriate for these purposes. Mechanisms should be created to foster cooperative research not only among federal agencies but also with private sector organizations. Regular meetings between the federal managers and other sponsors of global change research would be a first step, such as the annual coordination meetings held by NAPAP.
- Widely Credible. The program should be conducted so that the results are objective and credible to policymakers, regardless of their divergent views. Participatory processes of review and comment on the quality of technical and assessment findings are essential. The program's diverse constituencies -- including agencies, states, industries, environmental and international organizations -- should be involved in evaluating the technical soundness of the program's plans and outputs. To be objective, the program should assess the technical efficacy of policy options without making value judgments or advocating specific policies. Policy development within the Administration should be coordinated separately, while systematically taking into account the research and assessment program's findings.

The current structure of CES is very appropriate if the goal is to conduct an interagency scientific research program. CES is to be commended on the quality of the thinking that lies behind its impressive research plans. Some of the best scientific minds in the Nation have contributed to its success. However, the growing policy demands associated with global change inevitably will require a more assessment-oriented approach.

Although CES plans mention policy relevance, they do not adequately specify how this would be accomplished with the present organization and staffing scheme. Furthermore, the apparent lack of research in adaption and mitigation strategies in current CES plans will hinder the production of useful assessments for decision makers.

The demands of conducting a major assessment-oriented program may not be compatible with the existing part-time, committee approach of CES. Unless a more structured interagency approach to assessment is adopted, the result could be an ad hoc series of conflicting "assessments," loosely coordinated with the interagency research program. As the policy debate on global change develops, the risk grows that such an unfocused approach will confuse, disillusion or even alienate the decision making community. Support for global change research ultimately could diminish due to lack of a consensus-building process for developing credible assessments that are relevant to policymakers' needs.

Before the issue reaches the next more divisive phase in policy development, steps could be taken to organize formal input to the policy process and avoid the current ad hoc approach. An interagency assessment function is needed, either within CES or elsewhere in government, to augment the CES research effort. The assessment function should be closely coordinated with the scientific program to avoid a widening gap between research directions and legitimate policy information needs.

The excellent research plans of CES also could be augmented to address policy needs more adequately by establishing a dual advisory structure. Given the dual importance of this issue -- in both the scientific and policy arenas -- two advisory councils are appropriate. One would be for federal policy users of the program's outputs, and the other for external scientific experts from academia and industry. These advisory groups should be involved in reviewing plans and results for policy relevance and technical quality respectively.

COMMENTS AND RECOMMENDATIONS ON THE ACT

This bill is an important contribution toward establishing a successful research and assessment program on global change. The Act not only addresses the need for a constructive policy to ensure the health of the science; it also attempts to focus the science on the growing needs of policymakers. By building upon the excellent efforts of CES, the Act attempts to harness that momentum and provide a mandate for producing policy-relevant results. Some specific recommended changes are as follows:

1. The title of the Act and the program it creates could be modified to be the "Global Change Research and Assessment Act." This title more clearly reflects the stated purpose of the legislation and emphasizes that science-for-science sake is not the intention.

2. The chairmanship of the program could be broadened to include EPA, USDA and DOE as eligible candidates. If action is contemplated in addressing global change, the regulatory and resource management agencies will be responsible for it, not the science mission agencies. The intentional exclusion of regulatory and resource management agencies is inappropriate for an assessment-oriented effort. Also, the chairmanship should be elected annually but not be limited to one term.

3. The periodic peer reviews called for in the Act should examine not only technical quality but also the policy relevance of the research and assessment activities. Broad external participation in such reviews by industry, environmental and international organizations is warranted. Annual external coordination meetings with non-federal research sponsors also is helpful.

4. The mandated research and assessment plans of the interagency program should be subject to public review and comment by all the program's external constituencies.

5. The required assessments should be more adequately described in the Act to ensure they are policy relevant and scientifically sound, and produced through a well-defined, systematic process that renders them widely credible.

6. The Act should not be "sunset" in five years, but rather be reauthorized every five years. Continuity of the program is essential and the value of a five-year effort could be marginal. This short time frame sends the wrong signal to program participants especially if the true intent is for a longer program. Some parties could interpret the law literally as a short-term experiment destined for self destruction.

CONCLUSIONS

There is a growing need for scientific information on the global change issue to assist decision makers in developing sound policies. CES has made great strides in focusing the research on improving our understanding of natural systems and man's interactions. These well-laid research plans deserve increased funding support but lack a viable mechanism for objectively and systematically informing the policy debate.

An interagency assessment function -- closely linked to the research program -- should be established to ensure that the Nation's growing investment in global change research is of maximum benefit to society. Periodic assessments should be conducted with a well-defined and open process that includes participation by the federal agencies, industries, environmental groups, and international organizations. The outputs of such a rigorous assessment process can provide the scientifically sound, policy relevant, credible basis needed as input to the policy process. Without a carefully crafted interagency assessment function, the long-term research effort may lose support as policymakers become disillusioned with the lack of information relevant to their specific needs.

U.S. GLOBAL CHANGE RESEARCH PROGRAM
FY 1992-1996 BUDGET

*Global change
file*

PASSBACK DISCUSSIONS WITH D. ALLAN BROMLEY

- o OMB GUIDANCE : Consistent with the OMB-CEES Terms of Reference, this appeal is offered on behalf of all CEES agencies with the understanding that "Funding decisions on the USGCRP will be independent of any other program and budget issues in the CEES member agency budget requests."
- o US/GCRP IS CORNERSTONE: OMB's initial FY 1992-1996 fails to maintain the President's commitment to a U.S. Global Change Research Program as outlined in the FY 1991 President's Budget and identified as the cornerstone of the U.S. response to the issue of global environmental change.
- o PROFOUND IMPACTS: An Administration decision to pursue a funding profile for the U.S. Global Change Research Program below at least CEES Option 4 carries the following risks:
 - Insufficient information to defend a comprehensive emissions tradeoff option in international greenhouse gas deliberations;
 - Loss of foreign commitments to support complementary research programs in light of a reduced U.S. commitment (particularly critical in terms of foreign satellite programs);
 - Significant societal, economic, public policy and national security risks associated with a failure to anticipate and mitigate the impacts of change and, more importantly, failure to anticipate currently unforeseen environmental and natural resource problems by narrowly defining U.S. global change research in terms of predicting only whether and how the Earth's climate system will change.
- o PRESIDENTIAL VISIBILITY: The President has publicized and taken great pride in an aggressive, comprehensive U.S. Global Change Research Program as the centerpiece of his response to the issues of global environmental change; a reversal of that position will place the

President and the United States in a difficult (if not untenable) negotiating position during upcoming "framework convention" and related policy deliberations.

- o NATIONAL INVESTMENT: The CEES recommended Program actually represents a small investment when compared to the multi-billion, and perhaps trillion, dollar decisions associated with the major changes in U.S. and international energy policy implied by current international negotiations.

US GLOBAL CHANGE RESEARCH PROGRAM

ANALYSIS BY OMB OPTIONS AND BUDGET YEARS

ALL FEDERAL AGENCIES FUNDING US/GCRP PROGRAM

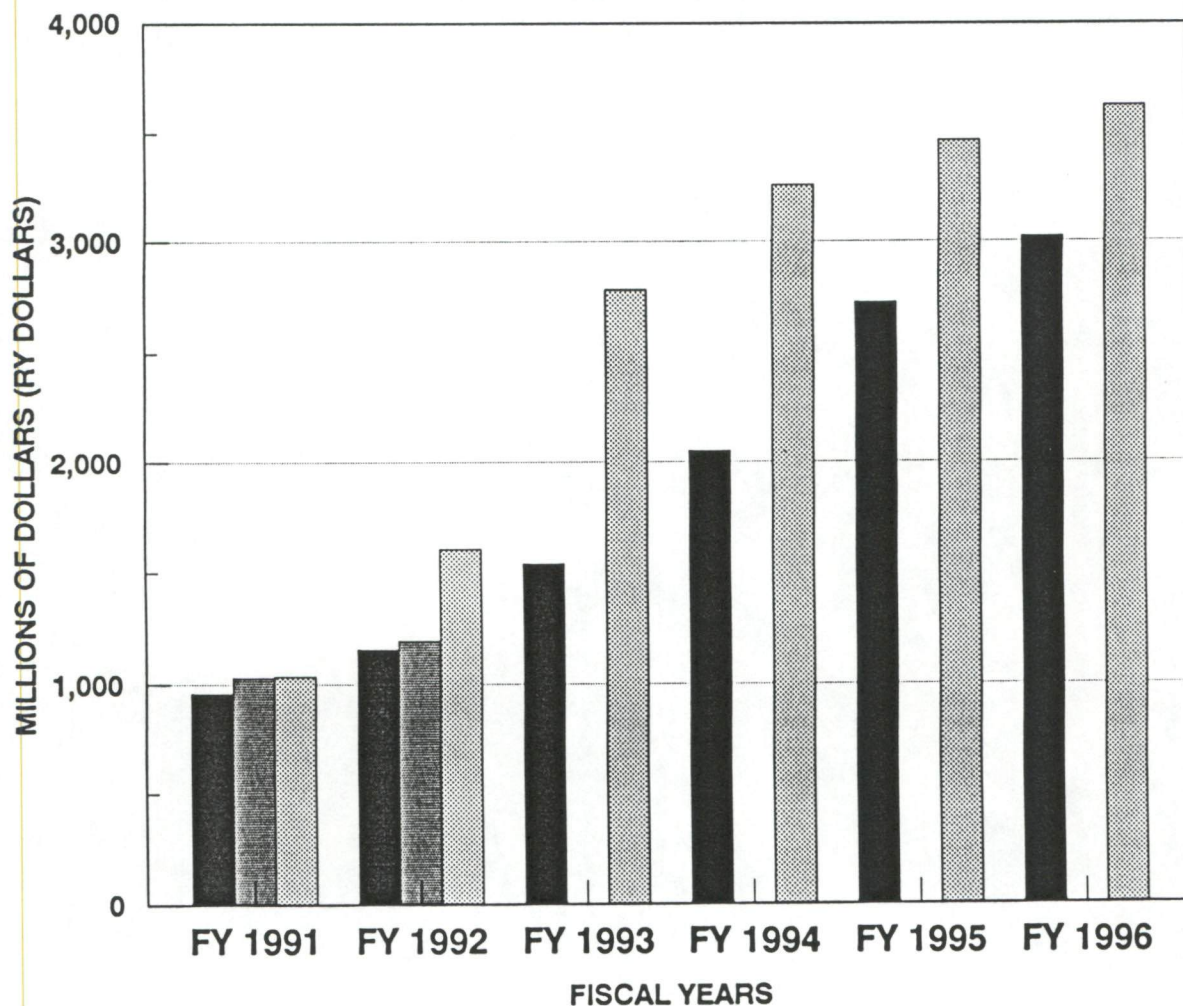


FIG. 2

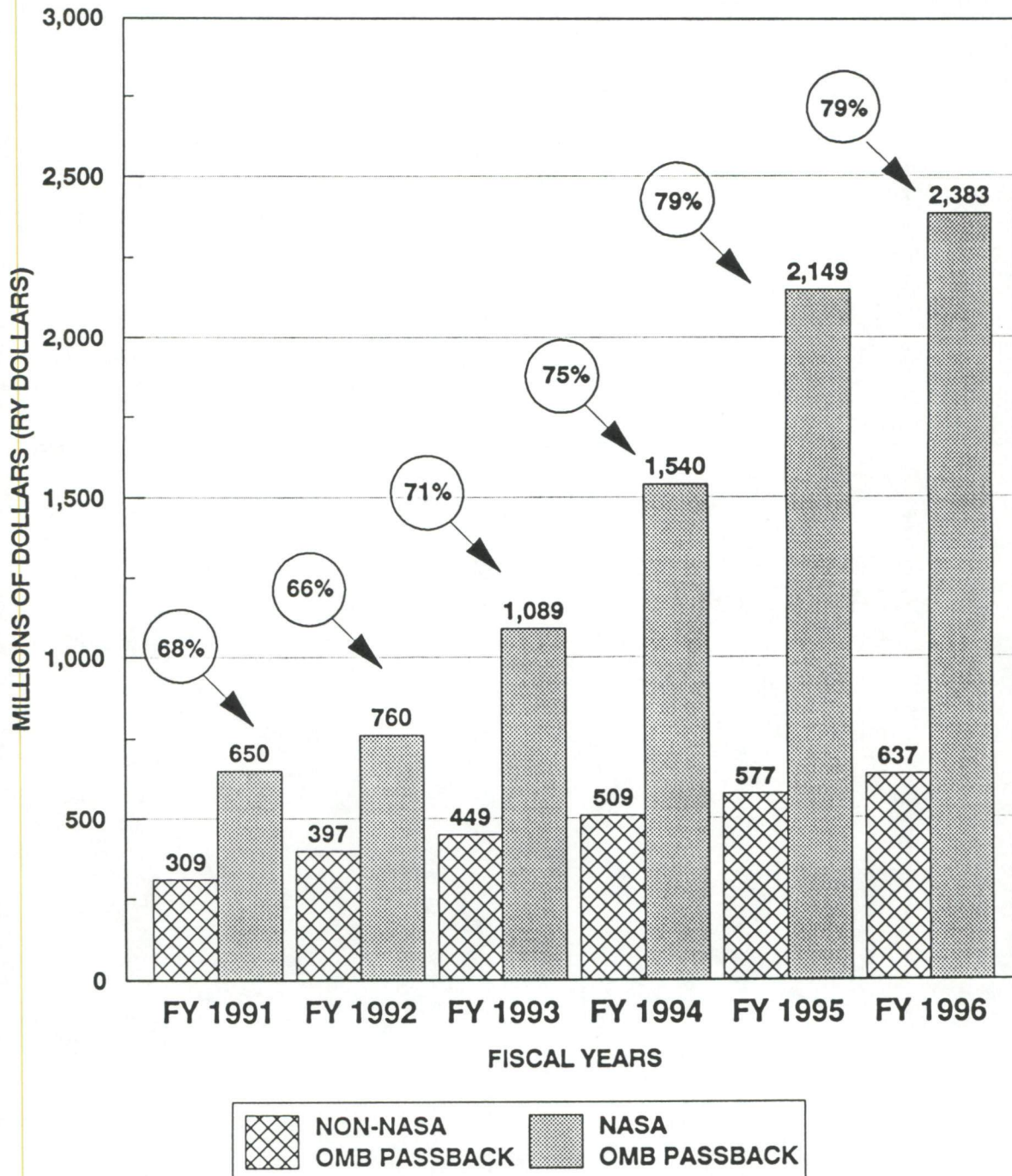
December 1990

Note: Prepared for Passback Review

US GLOBAL CHANGE RESEARCH PROGRAM

ANALYSIS OF FY 1992 OMB PASSBACK

A COMPARISON OF SPACE AND GROUND-BASED PROGRAMS



December 19, 1990

PASSBACK REVIEW		AGENCY		12/19/90			
PROGRAM SUMMARY BY AGENCY							
SUMMARY IN RY DOLLARS				US/GCRP FOCUSED PROGRAMS			
	FY91	FY92	FY93	FY94	FY95	FY96	FY92-96
1. DOC/NOAA							
OPTION 6	87.0	176.9	232.5	274.8	294.1	302.5	1280.8
OPT'N 2+	87.0	118.3					118.3
PASSBACK	47.0	78.0	90.0	104.0	119.0	137.0	1189.1
PRESIDENTIAL POLICY	87.0	87.0	87.0	87.0	87.0	N/A	485.7
FY91 Approps.	47.0						
2. DOD (FY91 Approps. is the base budget number for FY92)							
OPTION 6	0.0	6.3	6.6	6.8	7.1	7.4	34.2
OPT'N 2+	0.0	0.0					0.0
PASSBACK	6.0	6.0	7.0	7.0	7.0	7.0	34.0
PRESIDENTIAL POLICY	ment)					)	0.0
FY91 Approps.	6.0						
3. DOE							
OPTION 6	65.9	82.1	93.0	109.0	119.0	119.0	522.1
OPT'N 2+	65.9	78.0					78.0
PASSBACK	66.0	77.0	89.0	102.0	117.0	119.0	504.0
PRESIDENTIAL POLICY	66.0	68.0	70.0	72.0	75.0	N/A	285.0
FY91 Approps.	66.0						
4. DOI							
OPTION 6	43.7	118.7	164.1	192.0	216.3	225.1	916.2
OPT'N 2+	43.7	46.1					46.1
PASSBACK	40.0	46.0	46.0	46.0	46.0	46.0	230.0
PRESIDENTIAL POLICY	42.2	44.0	44.0	44.0	44.0	N/A	176.0
FY91 Approps.	36.5						
5. EPA							
OPTION 6	21.9	42.0	47.7	61.4	75.2	77.4	303.7
OPT'N 2+	21.9	27.9					27.9
PASSBACK	22.0	26.0	30.0	34.0	40.0	45.0	175.0
PRESIDENTIAL POLICY	26.0	26.0	26.0	26.0	26.0	N/A	104.0
FY91 Approps.	21.9						
6. NASA							
OPTION 6	661.0	925.6	1902.5	2240.0	2329.0	2430.0	9827.1
OPT'N 2+	661.0	744.0					744.0
PASSBACK	650.0	760.0	1089.0	1540.0	2149.0	2383.0	7921.0
PRESIDENTIAL POLICY	661.0	939.6	1782.5	2182.0	2269.0	N/A	7173.1
FY91 Approps.	676.0						

PASSBACK REVIEW (Con't)							
AGENCY				PROGRAM SUMMARY BY AGENCY			
SUMMARY IN RY DOLLARS				US/GCRP FOCUSED PROGRAMS			
	FY91	FY92	FY93	FY94	FY95	FY96	FY92-96
7. NSF							
OPTION 6	102.8	186.3	264.4	297.4	342.4	382.4	1472.9
OPT'N 2+	102.8	130.5					130.5
PASSBACK	87.0	115.0	132.0	152.0	175.0	201.0	775.0
PRESIDENTIAL POLICY	103.0	146.0	200.0	217.0	252.0	N/A	815.0
FY91 Approps.	87.1						
8. SMITHSONIAN (FY91 Approps. is the base budget number for FY92)							
OPTION 6	5.5	8.8	13.2	14.1	15.1	15.9	67.1
OPT'N 2+	0.0	0.0					0.0
PASSBACK	6.0	8.0	9.0	10.0	11.0	13.0	51.0
PRESIDENTIAL POLICY	ment)					)	0.0
FY91 Approps.	6.0						
9. USDA							
OPTION 6	47.5	59.7	62.0	64.2	66.2	68.1	320.2
OPT'N 2+	47.5	51.0					51.0
PASSBACK	35.0	41.0	47.0	54.0	62.0	68.0	272.0
PRESIDENTIAL POLICY	47.4	47.0	47.0	47.0	47.0	N/A	188.0
FY91 Approps.	39.0						
ALL AGENCY TOTALS							
OPTION 6	1035	1606	2786	3260	3464	3628	14744.3
OPT'N 2+	1030	1196	0	0	0	0	1195.8
PASSBACK	959	1157	1539	2049	2726	3019	10490.0
PRESIDENTIAL POLICY	1033	1358	2257	2675	2800	0	9089.1
FY91	986	0	0	0	0	0	0.0

US GLOBAL CHANGE RESEARCH PROGRAM

ANALYSIS BY OMB OPTIONS AND BUDGET YEARS
ALL FEDERAL AGENCIES FUNDING US/GCRP PROGRAM

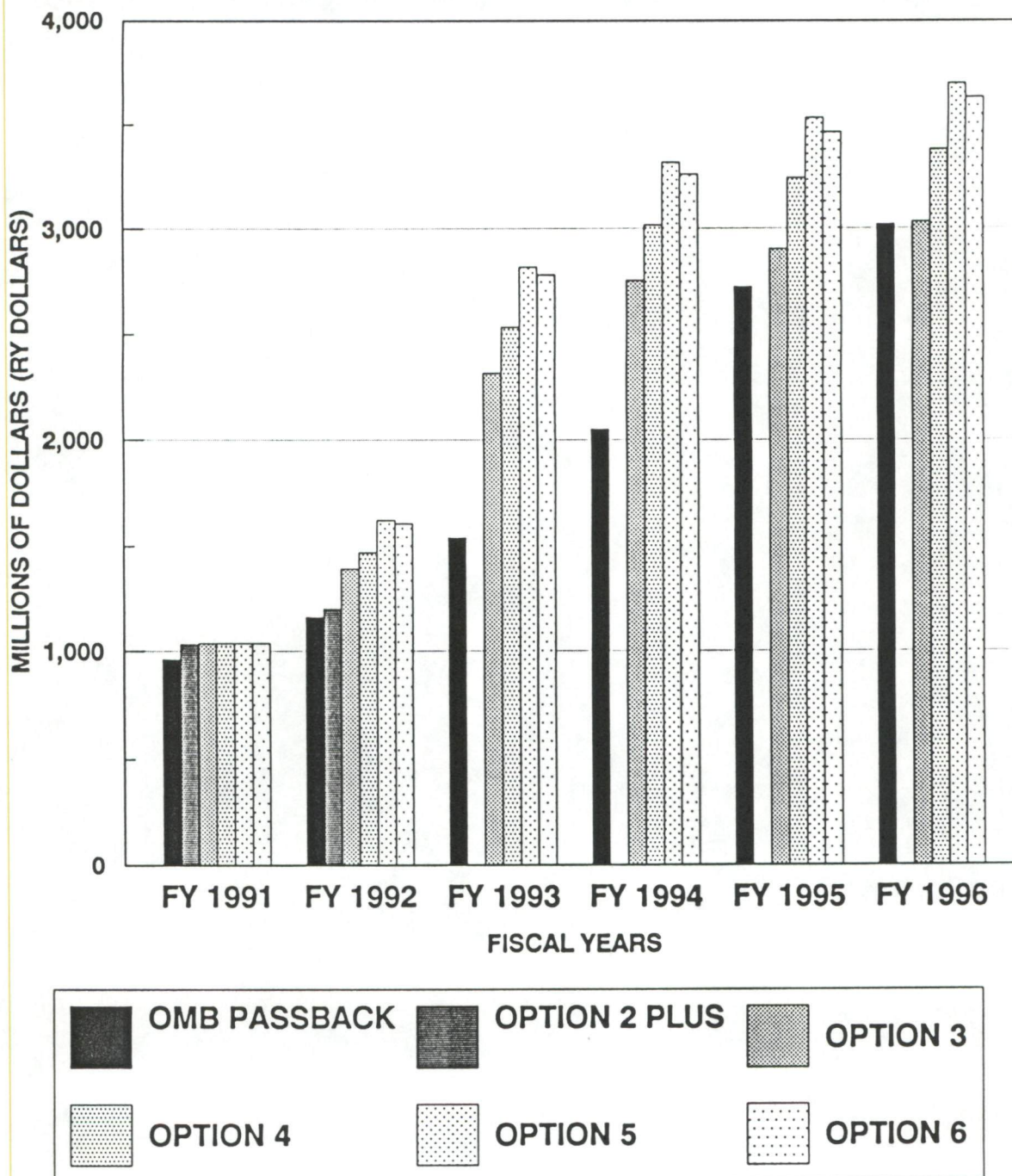


FIG. 1

December 1990

Note: Prepared for Passback Review
File = Passback

12/18/90 OMB PASSBACK

U.S. GLOBAL CHANGE RESEARCH PROGRAM GUIDANCE

- o The FY 1992 Budget Determinations provide for an overall increase of 21 percent in the budget for the U.S Global Change Research Program (USGCRP). The attached table includes your agency's contribution to the USGCRP. These amounts are to be protected (i.e., no tradeoffs may be made against these amounts) during the remainder of the FY 1992 budget formulation process.

It is intended that following actions should be completed prior to the initiation of any further funding increases above the FY 1992 funding level.

- o The FCCSET/Committee on Earth and Environmental Sciences (CEES) agencies should consider these outyear projections as the maximum possible USGCRP funding envelope for the next five years.
- o The EOS funding level assumes an external engineering review of the EOS platform configuration and launch sequence will be undertaken by a group of government, industry, and academic experts prior to proceeding with future platform development. While maintaining the NRC conclusions on data simultaneity requirements, this engineering review will include:
 - an analysis of cost, technical, and scientific trade-offs between single large platforms and smaller platforms flying in formation and an analysis of launch sequence with the objective of accelerating the instruments most directly related to global warming issues,
 - an analysis of cost and technical trade-offs of alternative approaches to the EOS instruments while ensuring no significant degradation of the current scientific objectives, and
 - an analysis of cost and technical trade-offs of using high-altitude, unmanned aircraft missions as precursors or complements to the space-based observations.
- o The CEES agencies must complete the USGCRP integrated management plan that outlines how the USGCRP goal and three scientific objectives will be accomplished. This plan must include specific data, process study, and modeling activity milestones, technical approaches, and management strategies needed to develop an integrated and predictive Earth system model. It should be clear from this plan what time and product

dependencies exist between the various agency activities, as well as provide the mechanism to evaluate the USGCRP progress and performance. This plan must be completed by May 1, 1990 and be reflected in the FY 1993 USGCRP planning process.

- o Funds have been provided in the NASA budget for remotely piloted aircraft (RPAs). The CEES shall develop a report by May 1, 1990 on the possible use of remotely piloted aircraft (RPAs) as a monitoring platform both as a precursor or complement to space observations. This report should include an analysis of the relative scientific merit (i.e., furthering of the USGCRP goal and three scientific objectives) of using these funds for RPAs or for EOS development in the FY 1992 to FY 1996 time period.

U.S. Global Change Research Program (air years - binding)
 FY 1992 Budget
 (dollars in millions)

	1991	1992	1993	1994	1995	1996	
NASA							
Budget Authority	650	760	1,089	1,540	2,149	2,383	926 (~80%)
EOS	199	338	643	1,530	2,010	1,858	
RPAS	0	5	15	20	20	20	
Precursors/Probes	451	417	431	428	423	407	
Outlays	533	686	923	1,299	1,820	2,210	
DOC/NOAA							
Budget Authority	47	78	90	104	119	137	177 (~)
Outlays	36	66	84	98	113	126	
NSF							
Budget Authority	87	115	132	152	175	201	186 (~)
Outlays	67	98	121	141	162	186	
DOI							
Budget Authority	40	46	46	46	46	46	119
Outlays	39	46	46	46	46	46	
DOE							
Budget Authority	66	77	89	102	117	119	82 (~92%)
Outlays	51	69	81	94	108	110	
EPA							
Budget Authority	22	26	30	34	40	45	42 (~)
Outlays	13	21	26	30	35	37	
USDA							
Budget Authority	35	41	47	54	62	68	60
Outlays	35	41	47	54	62	68	
SMITH							
Budget Authority	6	8	9	10	11	13	9
Outlays	5	6	8	9	11	12	
DOO							
Budget Authority	6	6	7	7	7	7	6
Outlays	6	6	7	7	7	7	
Total BA	959	1,157	1,538	2,049	2,726	3,020	
Outlays	783	1,040	1,342	1,777	2,363	2,803	

21% 24% 32% 33% 19%

43
 87
 13

19%

The answer to this question has several components: (A) general comments regarding the USGCRP and the overall scientific and political consequences of options 2 and 2+; (B) the CEES WGGC recommendations for options 2 and 2+; and (C) implementation of EOS.

A. General comments:

The U.S. Global Change Research Program is driven by carefully-established priorities associated with the key scientific questions that must be addressed to establish the scientific basis for national and international policies related to global environmental issues, particularly global climate change. The Program was developed as a Government-wide, integrated research effort and was established in cooperation with the U.S. and international scientific communities. In particular, the USGCRP responded to an evolving scientific paradigm referred to as "Earth System Science." The foundation of Earth System Science is the belief that sound scientific information on global change must be derived from a comprehensive, integrated view of the interactions among key components of the Earth system. In particular, the highest priority issue is whether, and to what extent, changes in the global climate system justify significant energy and environmental policy changes. Such a predictive understanding requires an enhanced capability to document, understand and anticipate natural and human-induced variability in the Earth's climate system, particularly on timescales of years to decades. In this context, CEES WGGC relied on the information needs delineated by the IPCC Scientific (Working Group 1) and Impacts (Working Group 2) Assessments. Specifically, the CEES WGGC adopted an FY 1992-1996 USGCRP Budget Strategy designed to:

(I) Enhance scientific research efforts, such as the World Climate Research Program and the International Geosphere-Biosphere Programme, that seek to reduce the following scientific uncertainties identified by the IPCC:

1. sources and sinks of greenhouse gases, which affect predictions of future concentrations;
2. clouds and radiative balance, which strongly influence the magnitude of climate change at global and regional scales;
3. oceans, which influence the timing and patterns of climate change;
4. land-surface hydrology, which affects regional climate change and water availability;
5. polar ice-sheets, which affect predictions of global sea level changes; and
6. ecological dynamics, which are impacted by and respond to climate change; and

(II) Enhance scientific research to support the development and implementation of a comprehensive approach for greenhouse gas emissions reductions (e.g., sources, sinks and behavior of greenhouse gases).

The CEES WGGC recommended science elements is are explicitly tied to the international research activities where the U.S. has formal or implied agreements that, if not honored, would affect the credibility of the U.S. These activities direct resources to that portion of the Earth system science where scientific understanding appears to be most advanced and can lead to rapid payoff. The CEES WGGC has adopted a program strategy that focuses agency contributions on five FY 1992-1996 Integrating Themes: (i) Climate Modelling and Prediction; (ii) the Global Water and Energy Cycles; (iii) the Global Carbon Cycle; (iv) Ecological Systems and Population Dynamics; and (v) Sea Level Change. An assumption in this regard is that the recommendations of the Ad Hoc Task Group on Economics research Needs related to Global Change are taken as being considered separately by the OMB. Regardless of funding levels, the USGCRP must apply its resources towards improving (as rapidly as possible) our ability to improve future predictive assessments of climate change in support of policy deliberations.

The scientific program embodied in the current Presidential initiative assumes a comprehensive, inclusive approach to documenting, understanding and predicting Earth System change and global implications on a regional scale. The salient feature of the EOS-based research strategy is its comprehensive global observing system: the combination of NASA EOS instruments, operational satellite missions, and the program of intensive *in-situ* measurements provided by other CEES WGGC agencies. This critical characteristic of the currently-approved Program allows the research strategy to be directed toward a "predictive understanding of the (entire) Earth system." The level of funding available under Options 2 and 2 1/2 raises first-order questions about the nature of the scientific approach to the problem. There is considerable risk in a reduced approach which directs Earth system research exclusively toward today's perceived policy problems; to do so fails to anticipate tomorrow's unforeseen problems. The CEES WGGC and the Nation met this challenge by proposing an inclusive (comprehensive) research strategy to allow the greatest flexibility in the national response to environmental questions.

In particular, the Program strategy was designed to more effectively integrate and focus scientific projects which have traditionally been developed and implemented on a more piecemeal basis. By adopting the strategy reflected in the President's FY1991 proposal, CEES WGGC and the Administration rejected the piecemeal approach because the associated risk is too great.

At the heart of distinguishing between these two approaches to the problem is the NASA Earth Observing System (EOS) program. With a comprehensive observing system based on an EOS approach, the U.S. can pursue the fully-integrated, broadly-based USGCRP currently supported by the President. Without EOS, the U.S. must formally revise its approach to the problem to a more traditional, piecemeal scientific attack on individual elements of the Earth's climate system. Given current international commitments, such a decision should be made now; additional delay will only continue to raise expectations and put the Administration in an even-more damaging political position.

With or without EOS, there are considerable risks associated with an Administration decision to pursue a funding profile for the U.S. Global Change Research that falls below at least Option 4 of the CEES WGGC Recommendation. These risks include:

- o The U.S. position to pursue a comprehensive emissions tradeoff option is only viable with a strong, comprehensive research program that provides a predictive understanding of not only the sources, sinks and behavior of key greenhouse gases but of the interactive Earth system processes that will determine the response of the Earth's climate system to changes in the concentrations of those gases;
- o The current comprehensive program demonstrates the Administration's commitment to address the scientific, technologic and public policy issues associated with global environmental change; this commitment is the principal mechanism available to forestall potentially costly or unnecessary regulatory action and provide a strong, scientific foundation for future management approaches and solutions;
- o Foreign governments and the national and international scientific communities have applauded U.S. leadership in global change research and many international commitments to support complementary observational (e.g., satellites), data exchange, research, and modelling activities are based on the anticipation of the strong U.S. support implied by the President's announcement of the USGCRP. If the U.S. reduces its commitment to a significant enhancement in its research effort, it is likely that other countries will as well, in particular the Europeans and Japanese would most likely re-examine their polar platform programs;
- o Limiting U.S. global change research to a narrowly-defined effort designed to predict only whether and how the Earth's physical climate system will change, carries significant societal,

economic, public policy and national security risks; doing so means not only failing to anticipate and mitigate the impacts of such change, but, perhaps more importantly, failing to anticipate tomorrow's unforeseen environmental and natural resource problems;

- o Reversing the current position of support for an aggressive and well-funded USGCRP would severely threaten the ability of the Administration to maintain leadership on this issue in Congressional negotiations;

- o Adopting a USGCRP funding profile below Option 4 is a significant reversal of the much-publicized Administration commitment to: (i) the run-out budget for the approved new start for the NASA Mission to Planet Earth program (EOS is a major component of Mission to Planet Earth), and (ii) approved growth within the Geosciences and Biological and Behavioral Sciences divisions within NSF.

- o Severe reductions in planned USGCRP efforts, particularly those associated with new satellite programs like EOS, eliminate a prime opportunity for the U.S. to regain the competitive edge in science and technology by eliminating an incentive for U.S. industry to invest in the development and application of state-of-the-art technologies--an incentive which currently encourages innovation and promises to strengthen the U.S. scientific and technological infrastructure;

- o The CEES WGGC recommended Program of \$1.6 billion in FY 1992 actually represents a small investment when compared to the multi-billion, and perhaps trillion, dollar decisions associated with the major changes in U.S. and international energy policy implied by current international negotiations;

- o The President has publicized and taken great pride in an aggressive, comprehensive U.S. Global Change Research Program as the centerpiece of his response to the issues raised by real and anticipated changes in the global environment; a reversal of that position will place the President and the United States in a difficult (if not untenable) negotiating position during upcoming "framework convention" and related policy deliberations;

B. CEES WGGC WGGC Recommendations for Options 2 and 2+:

Background Information:

The IPCC identified six high priority areas of research that need to be studied in order to reduce the scientific uncertainties associated with climate change (global warming). CEES WGGC carefully considered the IPCC report in formulating its FY 92 program, i.e. the CEES WGGC focussed its attention on an improved understanding of climate change (global warming), not all Earth science issues (e.g., stratospheric ozone depletion, loss of biodiversity). The following list links the high priority research areas with the CEES WGGC integrating themes:

- | | |
|---|---|
| 1. Sources and sinks of greenhouse gases: | Global carbon cycle |
| 2. Clouds and radiative balance: | Global water and energy cycles |
| 3. Oceans: | Global water and energy cycles |
| 4. Land-surface hydrology: | Global water and energy cycles |
| 5. Polar ice sheets: | Global water and energy cycles; Sea level change, and |
| 6. Ecological dynamics: | Ecological systems and population dynamics, and Global carbon cycle |

CEES WGGC also proposed an overarching integrating theme of climate modeling and prediction, consistent with the recommendation of the IPCC. The key point to note is that the CEES WGGC recommended FY 92 augmentations and new initiatives are focussed on the climate change (global warming) issue.

The CEES WGGC also considered the need to enhance the scientific research needed to support the development and implementation of a comprehensive approach for greenhouse gas emissions reductions.

Funding Levels:

The two funding levels considered for FY 92 for the USGCRP are \$1075 million (option 2) and \$1200 million (option 2+). These numbers should be compared to: (i) \$1034 million (FY 91), (ii) \$1358 million (option 3); (iii) \$1402 million (option 4); and (iv) \$1606 million (CEES WGGC recommended level). Option 2 represents a \$41 million increase over FY 91 (inflation), while option 2+ represents a \$166 million increase over FY 91.

Specific impacts of option 2+ are:

Basic investigator-initiated research on interactions among economic systems and other human, ecological and physical systems would be frozen at current levels, just as the program gathers momentum and well below the levels needed.

The opportunity to establish international projects (institutes) focused on economics, social sciences and global change could not occur. Especially critical here are the needs for transnational data.

Elimination of joint research between the socio-economic and physical/biological sciences centered at Long-term Regional Research sites, such as NSF's Long Term Ecological Research Sites, research that would deal with regional issues (e.g., water management, transportation, etc.)

Ecological research on the effects of change (change resulting from climate as well as directed management activities) to natural and managed ecosystems would be held below the levels needed to provide timely scientific input to near and intermediate term policy decisions. In the U.S. ecological research of all types is significantly underfunded, so redirecting resources from the base offers no relief.

Specifically, with respect to ecological research, option 2+ effectively cancels (or at best delays by years) the development and implementation of large scale experimental manipulations of ecological systems. These experiments are necessary to test critical system level hypotheses, the findings from which directly affect management, energy and economic policies.

While options 2 and 2+ do not allow the CEES WGGC USGCRP to proceed in a timely fashion with a comprehensive Earth Sciences program that will form the basis for informed policy formulation, they do allow for an enhanced understanding of certain aspects of the Earth system. The following discussion outlines what can be achieved with these levels of funding and what cannot.

Strategy for Options 2 and 2+:

a. Allocation between Space-based and non-space-based research:

For simplicity, we will equate the space-based program with NASA, although it should be recognized that about 24% (\$158.4 million) of the NASA program in FY 91 is non-space-based

research, and we will equate the non-space-based research with the other agencies (DOC/NOAA, DOE, DOI, EPA, NSF, and USDA). While option 2 is viewed as a budget increase to deal with inflation, the CEES WGGC does not recommend allocating the increase in proportion to the size of the FY 91 agency budgets. The CEES WGGC recommends that: (a) under option 2 NASA is allocated \$21 million (in contrast to a pro-rated inflation increase of \$26.2 million), while the other agencies are allocated \$20 million (in contrast to a prorated inflation increase of \$14.8 million), and (b) under option 2+ NASA is allocated \$83 million, while the other other agencies are allocated \$83 million. These augmentations should be compared to the CEES WGGC recommended augmentation levels of \$264.6 million for NASA, and \$233.9 million for the other agencies (reflects the current DOI position).

b Non-spaced based component of USGCRP (does not include NASA's non-spaced programs):

Option 2:

There are two approaches that can be taken under option 2 with respect to the non-space based component of the USGCRP program. The first is to allocate the budget increase across the board. The second, and CEES WGGC recommended approach, is to allocate all of the increase to initiating the three requested climate modelling and prediction initiatives.

Climate modeling and prediction

**	DOE	CHAMMP	\$2.0 million
**	NOAA	Climate Modeling and Analysis	\$11.0 million
**	NSF	ICMAP	\$7.0 million
		sub-total	\$20.0 million

Option 2 would certainly not allow the USGRCP to proceed in a timely fashion. It would likely result in the cancellation or at best a significant delay in a number of critical international scientific research projects such as WOCE, TOGA, JGOFS, and GEWEX, and would not allow for critical budget augmentations for research areas such as ecological impacts and economics.

Option 2+:

There are two approaches that can be taken under option 2+ with respect to the non-space based component of the USGCRP program. The first is to delay the initiation of all new initiatives and enhance all requested FY 92 augmentations by about 15%. The second, and CEES WGGC recommended approach, is to target a number of specific programs for the full, or close to full, FY 92 requested level (augmentations and new initiatives), and to keep all other programs at their FY 91 levels. Clearly, all agencies will re-examine their base programs to ensure that the FY 92 funds are most efficiently utilized, hence there could be some internal redistribution of budget allocations among base programs. The critical question is which augmentations and new initiatives are given highest priority.

The CEES WGGC recommendations for option 2+ are presented within the structure of the five integrating themes. The CEES WGGC recommends the following combination of augmentations and new initiatives for option 2+ (\$86 million increase above FY 91):

Climate modeling and prediction

**	DOE	CHAMMP	\$2.1 million
**	NOAA	Climate Modeling and Analysis	\$12.8 million
**	NSF	ICMAP	\$7.5 million
sub-total			\$22.4 million

The CEES WGGC recommendation of \$22.4 million for augmentations and new initiatives under option 2+ builds upon a FY 91 base of \$34.0 million, and is 84% of the requested enhancement of \$26.7 million. Under option 2+ we recommend that are:

- * Three major new initiatives in climate modeling and prediction. These are essential for developing more reliable global and regional scale predictions of climate change.

Global carbon cycle

**	DOE	Ocean Research	\$2.0 million
**	NOAA	Ocean Circulation and Biogeochemistry	\$3.0 million
**	NSF	U.S. JGOFS	\$4.3 million
**	NSF	Global Tropospheric Chemistry	\$3.8 million
**	NOAA	Atmospheric Chemistry	\$3.8 million
**	EPA	Tropospheric Chemistry	\$0.2 million
**	EPA	terrestrial	\$5.8 million
**	DOI	terrestrial	\$1.4 million
**	USDA	terrestrial	\$3.5 million
sub-total			\$27.8 million

The CEES WGGC recommendation of \$27.8 million for augmentations and new initiatives under option 2+ builds upon a FY 91 base of \$102.2 million, but is only 34% of the requested enhancement of \$81.3 million. Under option 2+ we recommend that are:

- * Three key augmentations for studies of ocean carbon. These programs will improve our understanding of the role of the oceans in the uptake and release of carbon dioxide, and will provide critical data needed for the "U.S. Comprehensive Emissions and Trading Approach". In addition, these augmentations are critical for implementation of the U.S. contribution to JGOFS, and complement the NASA SeaWiFS program that will provide global observations of ocean color (primary productivity).
- * Two augmentations for tropospheric chemistry. These programs are needed to improve our understanding of tropospheric ozone and the lifetimes of key greenhouse gases such as methane. A key uncertainty identified by IPCC is the contribution of tropospheric ozone to changes in the radiative forcing of the atmosphere (i.e., global warming). This data is needed for the "U.S. Comprehensive Emissions and Trading Approach".
- * Three augmentations for terrestrial carbon studies. The role of the terrestrial biosphere in the sequestration of anthropogenic carbon is a critical issue identified by IPCC. These programs will provide an initial modest effort towards understanding the "missing carbon". Formulation and implementation of the "U.S. Comprehensive Emissions and Trading

Approach" requires a significant improvement in our understanding of the terrestrial biosphere.

- * There are no augmentations in carbon cycle model development, or the human dimensions component of the global carbon cycle.

Global water and energy cycle

**	NOAA	TOGA	\$2.9 million
**	NSF	TOGA	\$3.5 million
**	NOAA	Ocean Circulation and Biogeochemical	\$4.2 million
**	NSF	WOCE	\$4.6 million
**	DOE	Atmospheric Radiation Measurements	\$8.0 million
**	NSF	Role of Clouds	\$1.5 million
**	NOAA	Clouds, Energy and Water Cycle	\$4.6 million
**	NSF	GEWEX	\$2.5 million
**	DOI	terrestrial	\$1.0 million
sub-total			\$32.8 million

The CEES WGGC recommendation of \$32.8 million for augmentations and new initiatives under option 2+ builds upon a FY 91 base of \$135.6 million, but is only 30% of the requested enhancement of \$108.6 million. Under option 2+ we recommend that are:

- * Two augmentations for TOGA. These augmentations are critical for the U.S. contribution to TOGA, which will lead to improvements in our understanding of the exchange of energy and chemicals between the atmosphere and the ocean.
- * Two augmentations for WOCE. These augmentations are critical for the U.S. contribution to WOCE, which will improve our understanding of ocean circulation.
- * Four augmentations for understanding the role of clouds in the climate system. Clouds are the single largest uncertainty associated with the prediction of global temperature change.
- * No augmentations or new initiatives for studying land-surface hydrological processes, which play a key role in the prediction of regional climate change, and in the management of water resources.
- * No augmentations or new initiatives for studying polar ice-sheets, which play a critical role regional climate and sea level change.
- * No augmentations or new initiatives for studying the human dimensions component of global change, which has been identified by NAS and this Administration as an area of research that must be enhanced.
- * No augmentations or new initiatives for paleo-climate studies, which are crucial for testing models and understanding natural variability.

Ecological systems and population dynamics

\$0 million

The CEES WGGC recommendation is no augmentations and new initiatives under option 2+. The FY 91 base is \$77.5 million, and the requested enhancement was \$56.1 million. Under option 2+ we recommend that are:

- * No augmentations or new initiatives for ecological systems and population dynamics studies. Current scientific uncertainties associated with these issues are unacceptably large, as noted by IPCC.

Sea level change

\$0 million

The CEES WGGC recommendation is no augmentations and new initiatives under option 2+. The FY 91 base is \$28.0 million, and is 79.1% of the requested enhancement of \$27.3 million. Under option 2+ we recommend that are:

- * No augmentations or new initiatives for studies of sea level change. Current scientific uncertainties associated with the role of polar ice sheets is large.

TOTAL

\$86.0 million

c. *Space-based Component of USGCRP (includes NASA's non-spaced-based programs):*

NASA is committed to a space-based program that is responsive to scientific and policy needs. Since the NAS review of the USGCRP and EOS, NASA has undertaken feasibility studies of different approaches to implement EOS B, and to fly CERES and SAGE earlier than EOS A (for Earth radiation budget studies). NASA and CEES WGGC believe that the currently planned EOS and Earth Probes programs are essential components of the scientific program required to provide the scientific information required for policy formulation with respect to key environmental issues. It should be noted that if EOS is descoped to focus solely on the climate change (global warming) issue it would still require the following instruments currently under consideration for EOS A (HIRIS; ITIR; MISR; MIMR; MODIS Nadir/Tilt; STIKSCAT; AIRS/AMSU; CERES; SAGE; EOSP; MOPPITT/TRACER, and HIRDLS), and the following instruments currently under consideration for EOS B (ALT; TES; and GLRS). The only instruments that cannot be justified would be instruments devoted to stratospheric ozone (it should be noted that stratospheric ozone changes could affect tropospheric climate) and secondary science. This means that all of the currently planned EOS A instruments, and a significant portion of the EOS B instruments are needed for understanding climate change, i.e., the current EOS configuration is a global warming satellite. The following list tracks EOS instruments to the areas of scientific uncertainty identified by IPCC:

1. sources and sinks of greenhouse gases, which affect predictions of future concentrations--
AIRS/AMSU; HIRDLS; HIRIS; ITIR; MIMR; MODIS-N/T; MOPPITT/TRACER; SAGE; STIKSCAT; and TES;
2. clouds and radiative balance, which strongly influence the magnitude of climate change at global and regional scales--
ACRIM; AIRS/AMSU; CERES; EOSP; MIMR; MISR; and MODIS-N.
3. oceans, which influence the timing and patterns of climate change--

ALT: CERES: MIMR: MISR: MODIS-N/T: and STIKSCAT.

4. land-surface hydrology, which affects regional climate change and water availability--

HIRIS: ITIR: MIMR: MISR: and MODIS-N.

5. polar ice sheets, which affect predictions of global sea level changes--

ALT: GGI: and GLRS: and

6. ecological dynamics, which are impacted by and respond to climate change--

AIRS/AMSU: HIRIS: ITIR: MISR: and MODIS-N/T.

In FY 91 NASA allocated \$426 million for non-EOS programs, and \$235 million for EOS. NASA would continue its non-space-based, and satellite-related programs (UARS, TOPEX, Mission Operations and Data Analysis, etc.) initiated prior to FY 91 as recommended by CEES WGGC, and would augment its Earth Probes program as requested (\$25 million in FY 91 to \$68.3 million in FY 92) under options 2 and 2+. This would mean that NASA would allocate \$463.6 million to non-EOS programs, and \$218.4 million (option 2) or \$280.4 million (option 2+) for EOS (science plus platform) in FY 92 in contrast to \$235 million in FY 91 and the requested FY 92 level of \$462.0 million.

Program	FY 91	FY 92 option 2	FY 92 option 2+	FY 92 option 6
EOS	235.0	218.4	280.4	462.0
non-EOS	426.0	463.6	463.6	463.6
Total	661.0	682.0	744.0	925.6

The option 2 budget, inflated at 15% per year thereafter, would not allow EOS to be developed. Therefore, EOS would have to be discontinued and an augmented Earth Probes line would be developed that would address specific aspects of Earth sciences but would not allow a comprehensive approach to be taken as advocated by IPCC, WCRP, or IGBP. At present it is unclear what additional Earth Probes would be flown.

If EOS were funded at the option 2 level in FY 92, and then the requested run-out profile starting in FY 93, then NASA would continue development of EOS at a minimum level in FY 92, and delay the launch of the EOS A and EOS B series by about one year.

If EOS were funded at the option 2+ level in FY 92, and then the requested run-out profile starting in FY 93, NASA would continue to develop EOSDIS and fund the scientific investigations at the planned rate, coupled with a continuation of EOS phase B instrument definition studies and platform development at a low level. This option would allow the EOSDIS to be completed in the currently planned timeframe in order to allow the scientific community to analyse and interpret existing data sets in a timely fashion. The launch of EOS would then be delayed by about one year. Without the EOS budget run-out profile EOS (even descope to only study climate change/global warming) would not be viable.

As stated earlier, EOS was given a new start in FY 91 with an approved run-out budget. Any funding level less than the CEES WGGC recommendation will be viewed by the national and international scientific and policy communities as a significant departure from President Bush's public position regarding his commitment to Mission to Planet Earth, and the need to reduce

scientific and economic uncertainties associated with climate change prior to policy formulation. The budget required for full implementation for EOS should be viewed in context of the likely growth in the total NASA budget and that share allocated to OSSA, i.e., EOS implementation could largely be accommodated within the expected growth in these budgets.

d. Summary of budget allocation for options 2 and 2+ by agency and by integrating theme:

BUDGET BY AGENCY

Agency	FY 91*	FY 92 Delta Option 2	FY 92 Delta Option 2+	FY 92 Delta Option 6
DOC/NOAA	87.0	11.0	31.3 ✓	89.9
DOE	65.9	2.0	12.1 ✓	16.2
DOI	43.7	0.0	2.4 ✓	2.4**
EPA	21.9	0.0	6.0 ✓	20.1
NASA	661.0 650	21.0	83.0 ✓	264.6
NSF	102.8	7.0	27.7	83.5
USDA	47.5	0.0	3.5	10.2
TOTAL	1029.8 1035.0	41.0	166.0 120.1	498.5**
DOD#	0.0	0	0	6.3
SMITH#.	5.5	0	0	3.3

* President's FY 91 budget submission to Congress; does not reflect recent Congressional actions.

** Reflects DOI's current position regarding no augmentations or new initiatives.

DOD and the Smithsonian were not part of the FY 91 CEES WGGC budget process, therefore CEES WGGC believes that OMB must decide how to deal with their requested FY 92 budgets. It should be noted that the Smithsonian budget requests are primarily aimed at aspects of the global carbon cycle and the ecological systems and population dynamics, which CEES WGGC is not recommending augmenting at levels 2 and 2+.

Although DoD's initial focused program is small compared to other agencies already established in the USGCRP, it represents the crucial first step toward identifying the potential of this new partner to the USGCRP. DoD's capacity to support the USGCRP must be understood and brought quickly to bear in order to optimize its role. To negate DoD involvement in FY 92 would conflict with the emerging interest and early momentum of DoD's Defense and the Environment Initiative and the Strategic Environmental Research Program for DoD and DoE. There is perhaps no better mechanism than the USGCRP in partnership with DoD to address potential national security issues driven by global change. Without such a mechanism, there appears to be no advantage for continued DoD participation in the USGCRP an event that penalizes all concerned.

1035.0
166

1157
759

BUDGET BY INTEGRATING THEME

non-space-based research*

Theme	FY 91	FY 92 Delta Option 2	FY 92 Delta Option 2+	FY 92 Delta Option 6
Climate modelling	34.0	20.0	22.4	26.7
Carbon cycle	102.2	0.0	27.8	81.3
Water and energy	135.6	0.0	32.8	108.6
Ecological systems	77.5	0.0	0.0	56.1
Sea level	28.0	0.0	0.0	27.7

* These numbers do not include the following FY 91 NASA ground-based research programs: Climate modelling--\$7.4 million; Carbon cycle--\$32.9 million; Water and energy --\$ 58.8 million; Ecological systems--\$2.9 million; Sea level--\$2.4 million;

e. Basis for CEES WGGC approach:

The CEES WGGC approach for option 2 (an enhancement of approximately \$41 million) would allow augmentation of NASA Earth Probes program, continuity in NASA's level of effort in non-space-based programs and ongoing satellite programs, but a cut-back in NASA's EOS program. The CEES WGGC approach would also allow initiation of three modelling initiatives, but no augmentations or new initiatives in any other non-space-based programs. This budget will not allow programs to be augmented or initiated that are required to reduce the key scientific uncertainties identified by IPCC in a timely manner.

The CEES WGGC approach for option 2+ (an increase above the FY 91 level of approximately \$83 million for non-space-based research and \$83 million for space-based research) would allow progress to be made in several key areas identified by IPCC, but not in others (remember CEES WGGC recommended that a comprehensive approach to reducing the key uncertainties associated with climate change (global warming) would require a budget enhancement between FY 91 and FY 92 of \$306.4 million for non-space-based research, and \$264.6 for space-based research). The recommended augmentations and new initiatives for option 2+ in the global carbon cycle and global water and energy cycle are primarily focussed on the atmosphere, oceans and ocean-atmosphere exchange, because these areas of research are more mature than those associated with the terrestrial biosphere and atmosphere-terrestrial biosphere exchange. The recommended efforts support U.S. contributions to key ongoing international programs (WOCE, TOGA, JGOFS, IGAC, and aspects of GEWEX) that have been endorsed by the IPCC as critical for reducing some of the key uncertainties associated with climate change. The non-space-based programs have also been selected because of synergism with NASA's precursor EOS space programs, i.e., TOPEX (contributes to WOCE), NSCAT (contributes to TOGA), SeaWiFS (contributes to JGOFS), TRMM (contributes to GEWEX), and the possible early flight of SAGE and CERES (feasibility studies to fly SAGE and CERES in conjunction with TRMM are underway), which will contribute to an improved understanding of clouds.

Clearly other programs could be supported under option 2+, but some of the currently recommended programs would have to be eliminated. The recommended program of no enhancements in impact studies and economics research is clearly unacceptable, but so would a program with no enhancements in the global carbon cycle or clouds.