The U.S. Government Role in Scientific Research to Sustain Natural Resources

Kathie L. Olsen, PhD
Associate Director for Science
Office of Science and Technology Policy

May 18, 2004

Why does the Federal Government support Science & Technology?

- *Improve Nation's ability to:*
  - *Innovate*
  - *Enable Discoveries*
  - *Sponsor development of critical and enabling technologies*
  - *Maximize return on investments through cooperation across Federal agencies*
- *Ensure National Security*
- *Enhance the Economy*
- *Improve Health & Well-being*
- *Ensure an Educated Society*

Why Support Research?

- *"Support of basic research offers a double-whammy of a solid payback to the Treasury of between 30% and 60% per year (after a waiting period of 5 and 10 years), as well as an array of new knowledge and technologies that create wealth, add to human health and longevity, and help fulfill human potential"*
  - *Dr. Leon M. Lederman, Director Emeritus of Fermilab and 1998 Nobel Laureate in Physics*

Environment

(Sustaining our Natural Resources)

is

Global

Some Global Challenges for Sustainability

(Reference: Smalley)

- *SUSTAINABLE ENERGY*
- *WATER AVAILABILITY & QUALITY*
- *FOOD*
- *ENVIRONMENT*
- *EDUCATION*
- *NATURAL HAZARDS*
- *POVERTY*
- *TERRORISM & WAR*
- *HUMAN HEALTH/DISEASE*
- *POPULATION GROWTH*

2003	**6.3**	**Billion people**
2050	**9-10**	**Billion people**

Critical Questions for Sustaining Our Natural Resources

- *Understand processes and their relationships*
- *Predict cause-effect relationships among processes*
- *Understand science-based strategies for mitigating environmental damage and unintended consequences*
- *Communicate complex options to decision-makers*
- *Measure success or failure of management and policy decisions*

What are we doing in DC?

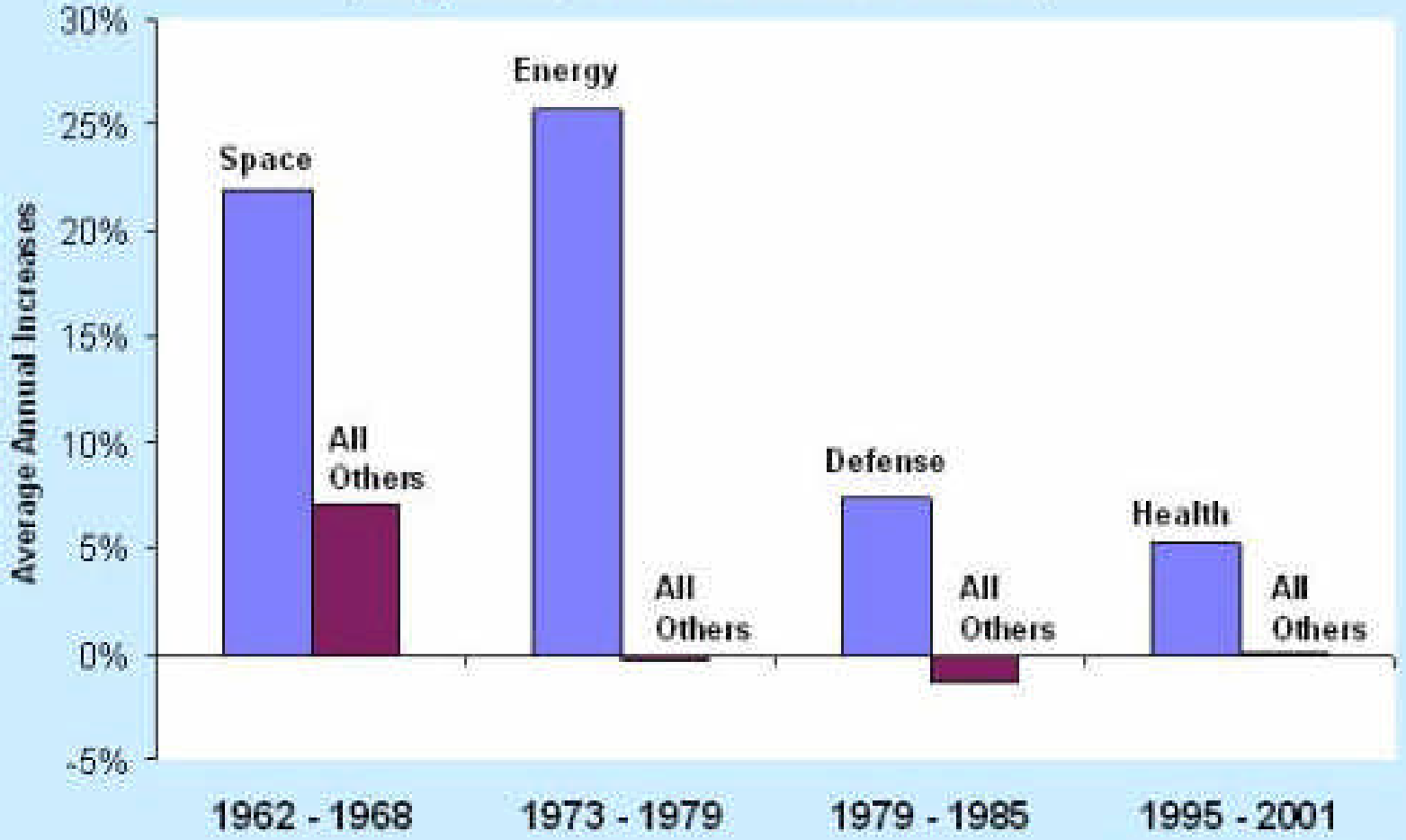
Role of White House Office of Science & Technology Policy

- *Advise the President & Offices of the President*
- *Lead the interagency effort to develop S&T policies and budgets for all areas of science*
  - *Co-chair National Science & Technology Council (NSTC)*
  - *PCAST*
- *Build strong partnerships among federal, state and local governments, other countries, industry, academia & scientific associations*
- *Develop clear, measurable goals and objectives for R&D programs*
- *Assess Federal investments relative to purposes of government*

Historical Perspective

R&D Balance Includes Setting Priorities

(obligations, in 1996 constant dollars)



Source: National Science Foundation

The Program Decision Process

Top down
(Agency management, OSTP/OMB, Congress)

- Priorities
- Budget
- Strategic Planning
- DECISIONS

- Ideas
- Concepts
- Planning
- Capability development

Bottom's up
(academia, industry, agency S&E personnel)

Establishing Program Priorities

Science Priority Criteria

- Science Return
- Benefit to Society
- Mandated Program
- Appropriate for Federal government
- Partnership Opportunity
- Technology Readiness
- Program Balance
- Cost/Budget Context

Implementation Priority Criteria

**Living on a Restless Planet: Solid Earth Science Working Group Report

NSTC: Coordination of Federal Policy

- *A Cabinet-level council of advisers to the President on Science and Technology*
- *Principal means to coordinate science and technology matters within the Federal research and development enterprise*
- *Means to establish clear national goals for Federal science and technology investments*

Current NSTC Structure

Committee on Environment & Natural Resources

WH: Olsen
DOC: Lautenbacher
EPA: Gilman

- Global Change Research
- Air Quality Research
- Disaster Reduction
- Ecosystems
- Toxics & Risks
- Water Availability & Quali
- IWG Earth Observations

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Committee on Homeland and National Security

WH: Dale
DOD: Wynne
DHS: McQueary

- National Security R&D
- Radiological/Nuclear Countermeasures
- International
- WMD Medical Countermeasures
- Standards

- Infrastructure
- Aeronautics

Health and the Environment.

Legend

Informal

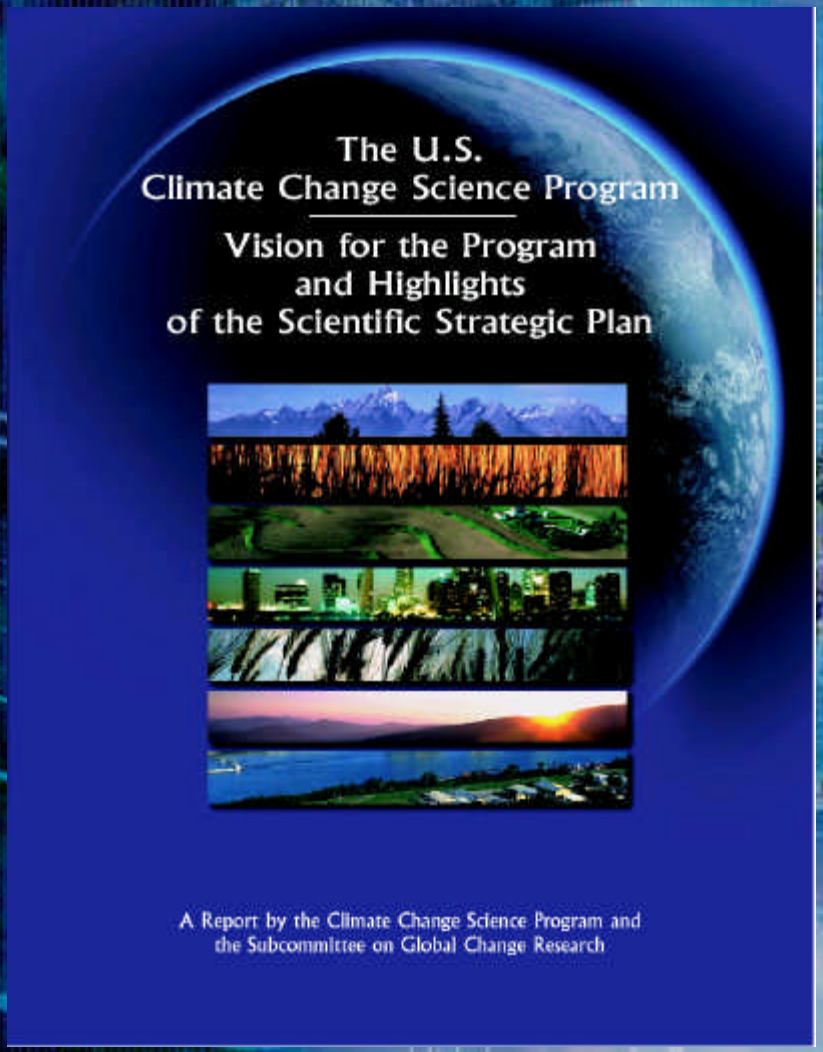
Under development

Climate Change Science Subcommittee on Global Change Research

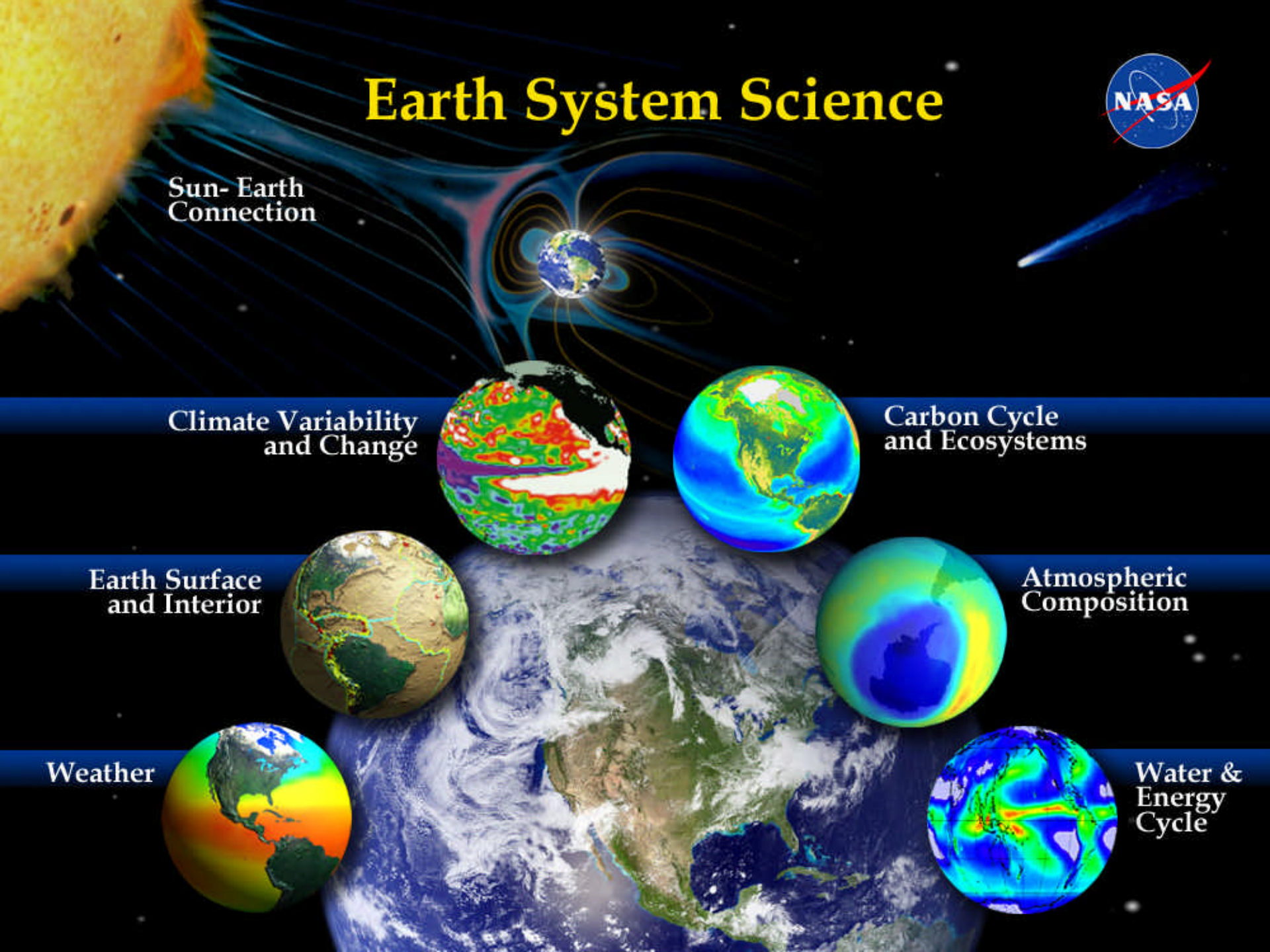
Chair: James Mahoney, NOAA
Vice Chairs: Ghassem Asrar, NASA
Margaret Leinen, NSF

Purpose: Oversee the US Climate Change Science Program

Recent Accomplishments:
- **Our Changing Planet**
- **Scientific Strategic Plan**
  - **Core Approaches**
    - **Scientific Research to Reduce Uncertainty: Atmospheric Aerosols; Global Carbon Cycle; Climate Feedback Processes**
    - **Observations**
    - **Decision Support**
      - **Climate Model Capacity**
    - **Communications**



Earth System Science



Interagency Working Group on Earth Observations

Co-Chairs: *Ghassem Asrar, NASA*
Greg Withee, NOAA
Cliff Gabriel, OSTP

Purpose: To develop the US 10-year plan in global observations and support the US participation in the intergovernmental global observations working group

Integrated Earth Observing System

Satellite Remote Sensing Data

Aircraft Remote Sensing Data

In Situ Data
- Sensors
- Aircraft
- Balloons
- Moored & drifting buoys
- Ships & Submarines

Earth Observation Summit

At the U.S. Department of State, Washington DC

July 31, 2003

Air Quality Research

Co-Chairs:

- *Dan Albritton, NOAA*
- *Jeffrey Holmstead, EPA*

Purpose: enhance the effectiveness and productivity of air quality research and to improve the information interface between the research and the policy on this issue.

- *Particulate Matter Research*
- *Air Toxics*

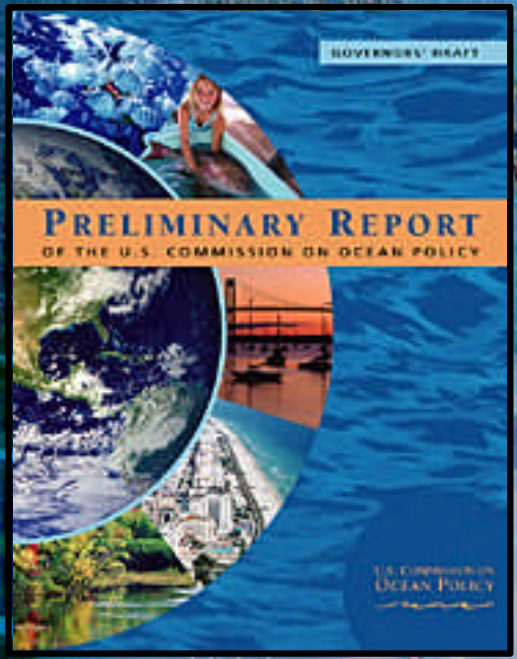
Subcommittee on Oceans

Co-Chairs:

- *Dr. Margaret Leinen, NSF*
- *Dr. Richard Spinrad, DOC/NOAA*

Purpose: contribute to the goals for Federal ocean science and technology, including development of coordinated interagency strategies.

- *Task Force developing Federal Government response to the U.S. Commission on Ocean Policy (USCOP) recommendations relevant to ocean science and technology (S&T).*



Climate change
Demographics
Allocation
Irrigation
Economics
Sustainability
Security

Fishing
Swimming
Drinking
Habitat
Recreation
Invasive species
Biological integrity

SUBCOMMITTEE ON WATER AVAILABILITY AND QUALITY

<u>Co-Chairs</u>: Robert Hirsch (USGS) & Lee Mulkey (EPA)

<u>Purpose</u>: Science issues and policy related to needed improvements in technology and research that will advance the goal of ensuring a safe and sustainable supply of water in the United States for human and ecological needs.

WATER AVAILABILITY AND QUALITY

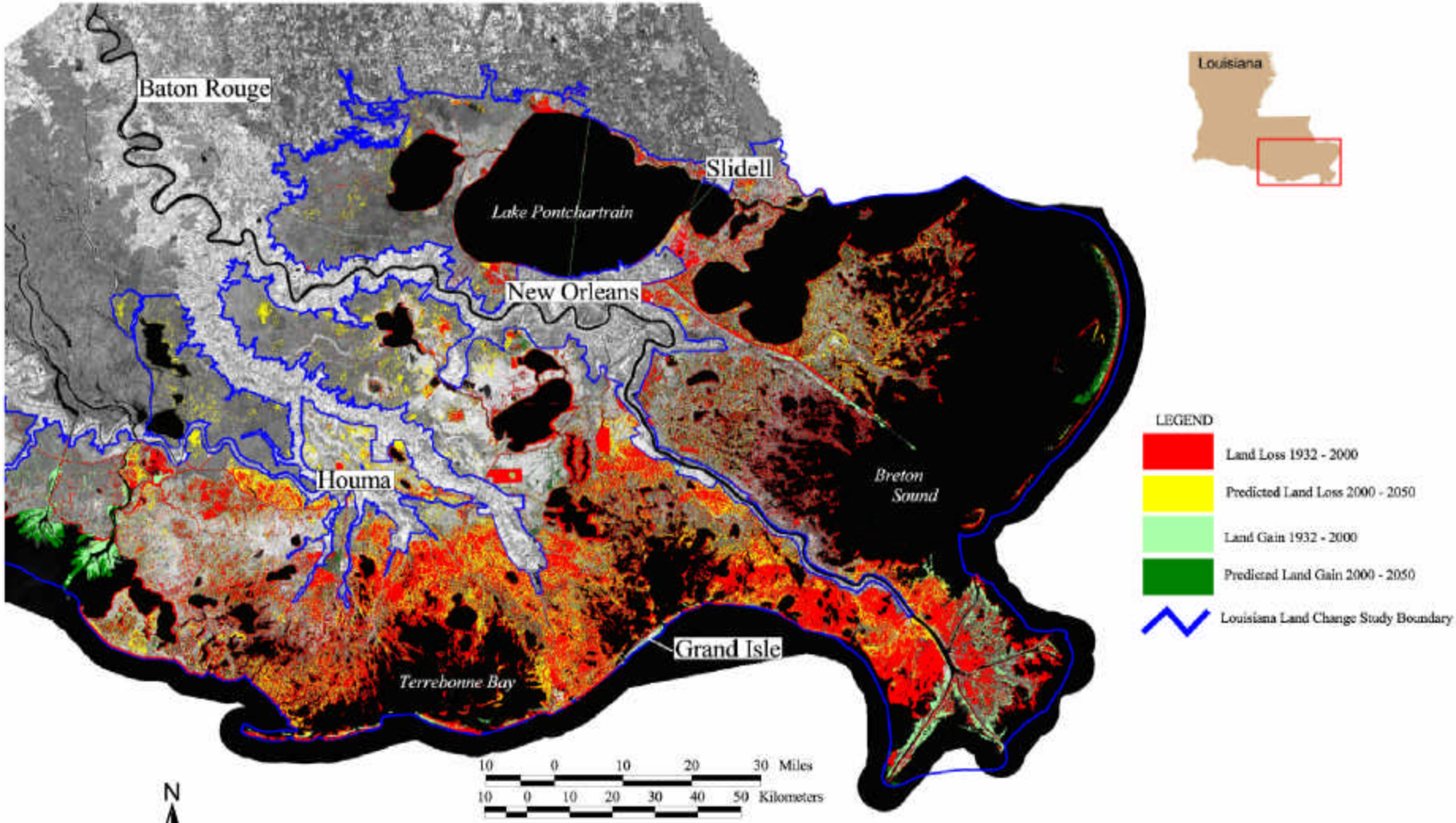
Subcommittee on Ecosystems

- *Co-Chairs:*
  - *Dr. Susan Haseltine, USGS*
  - *Dr. Ann Bartuska, USDA Forest Service*

Purpose: To build an improved foundation for conservation and sustainable use and management of ecological systems

- *UN Millennium Assessment Review*
- *Louisiana Central Wetlands*

100+ Years of Land Change for Southeast Coastal Louisiana



SUMMARY

Coastal Louisiana has lost an average of 34 square miles of land, primarily marsh, per year for the last 50 years. From 1932 to 2000, coastal Louisiana has lost 1,900 square miles of land, roughly an area the size of the state of Delaware. If nothing is done to stop this land loss, Louisiana is expected to lose another 700 square miles of land, or about equal to the size of the greater Washington D.C.-Baltimore area, in the next 50 years. Further, Louisiana accounted for an estimated 90 percent of the coastal marsh loss in the lower 48 states during the 1990s. The area shown on this map represents over 75 percent of the total land loss for coastal Louisiana.

Backdrop is 2000 TM panchromatic band.

Prepared By:
U.S. Geological Survey
National Wetlands Research Center
Lafayette, LA

NSTC/CENR

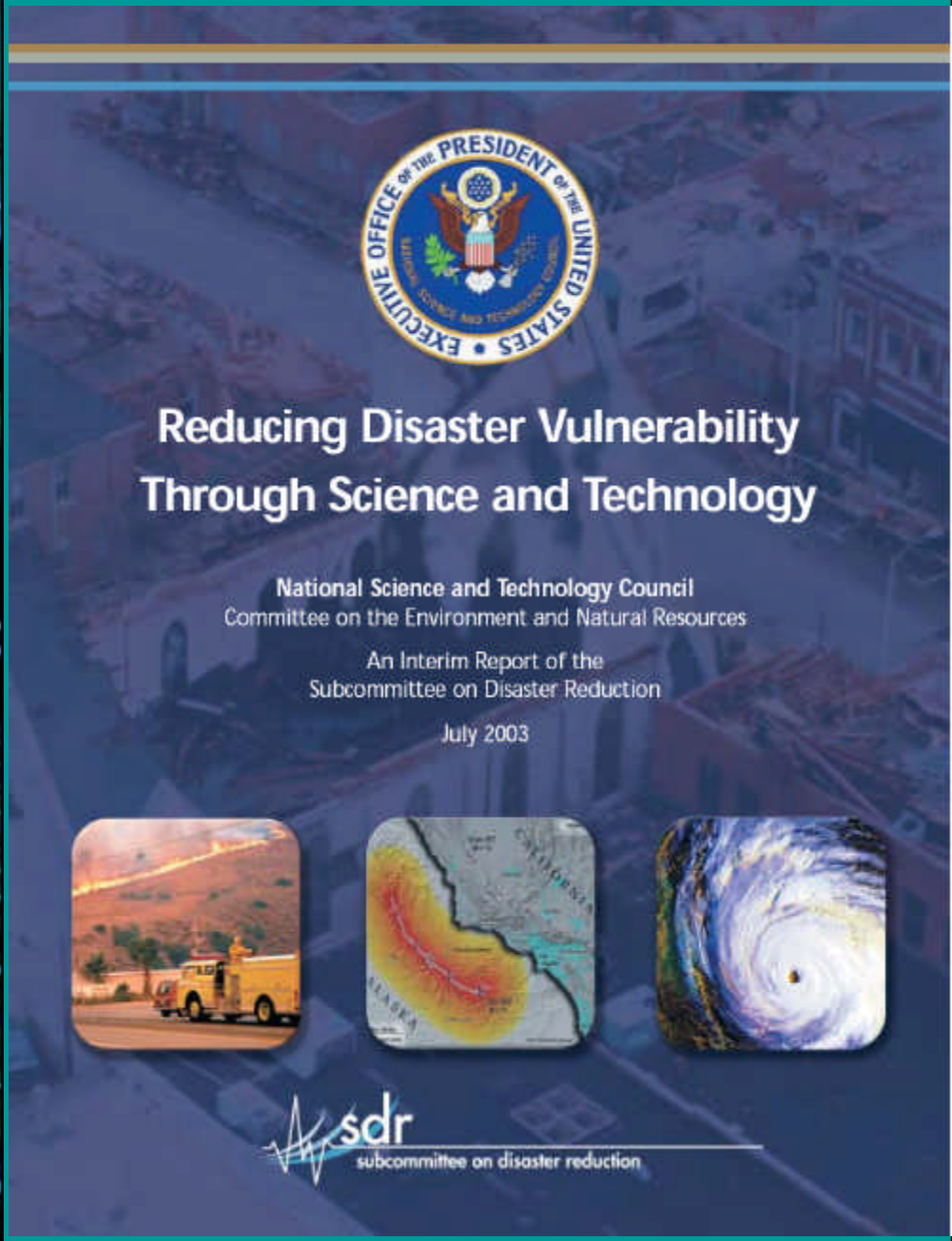
Subcommittee on Disaster Reduction

Chair: Helen Wood (NOAA)

Purpose: facilitate and promote natural and technological disaster mitigation, preparedness, response, and recovery through science & technology

2004 Emphases:

- **Earth observation for disaster prevention**
- **Risk and disaster warning/communication systems and methods**



Disaster Reduction

- Natural hazards and disasters
  - Hurricanes
  - Tornadoes
  - Floods
  - Earthquakes
  - Volcanoes
  - Wild fires
  - Droughts

- Technological hazards and disasters
  - Oil spills
  - Chemical spills
  - Large-scale industrial accidents or releases

Perchlorate and Toxics

Subcommittee on Toxics and Risks

Paul Gilman, EPA Ken Olden, NIEHS Robert Foster, DOD

- *Most of the perchlorate manufactured in the United States is used as the primary ingredient of solid rocket propellant*
- *Contamination of water and food by perchlorate is of concern because of potential developmental effects on children*
- *EPA, DoD, NASA and DOE are working together on developing and implementing appropriate cleanup levels.*
- *At the request of the Federal government, the National Academy of Science is reviewing the current underlying science on perchlorate due to be completed summer, 2004.*

Health and The Environment

Co-Chairs:

- *Chris Portier, NIEHS*
- *Hal Zenick, EPA*

Purpose: Improve policies, procedures and plans for scientific research concerning the effects on human health of the complex interactions between humans and plant, animal, and microbial species, together with the non-living components of the environment.

- *Emerging Environmental Health Threats*
- *Task Group on Infectious Disease*

Subcommittee on Education and Workforce Development

Co-Chairs:

- *Dr. Judith Ramaley, NSF*
- *William O. Berry, Ph.D.*

Purpose: The Subcommittee addresses education and workforce policy issues and research and development efforts that focus on STEM education issues at the Pre-K-12, undergraduate, graduate, postdoctoral and lifelong learning level, as well as current and projected STEM workforce needs, trends and issues.

Subcommittee Working Groups

- **Human Capacity in STEM**
- **HBCU/HIS/Tribal College/MSI Initiatives**
- **Federal R&D Workforce**
- **Evaluation**
- **Graduate and Postdoctoral Researchers**

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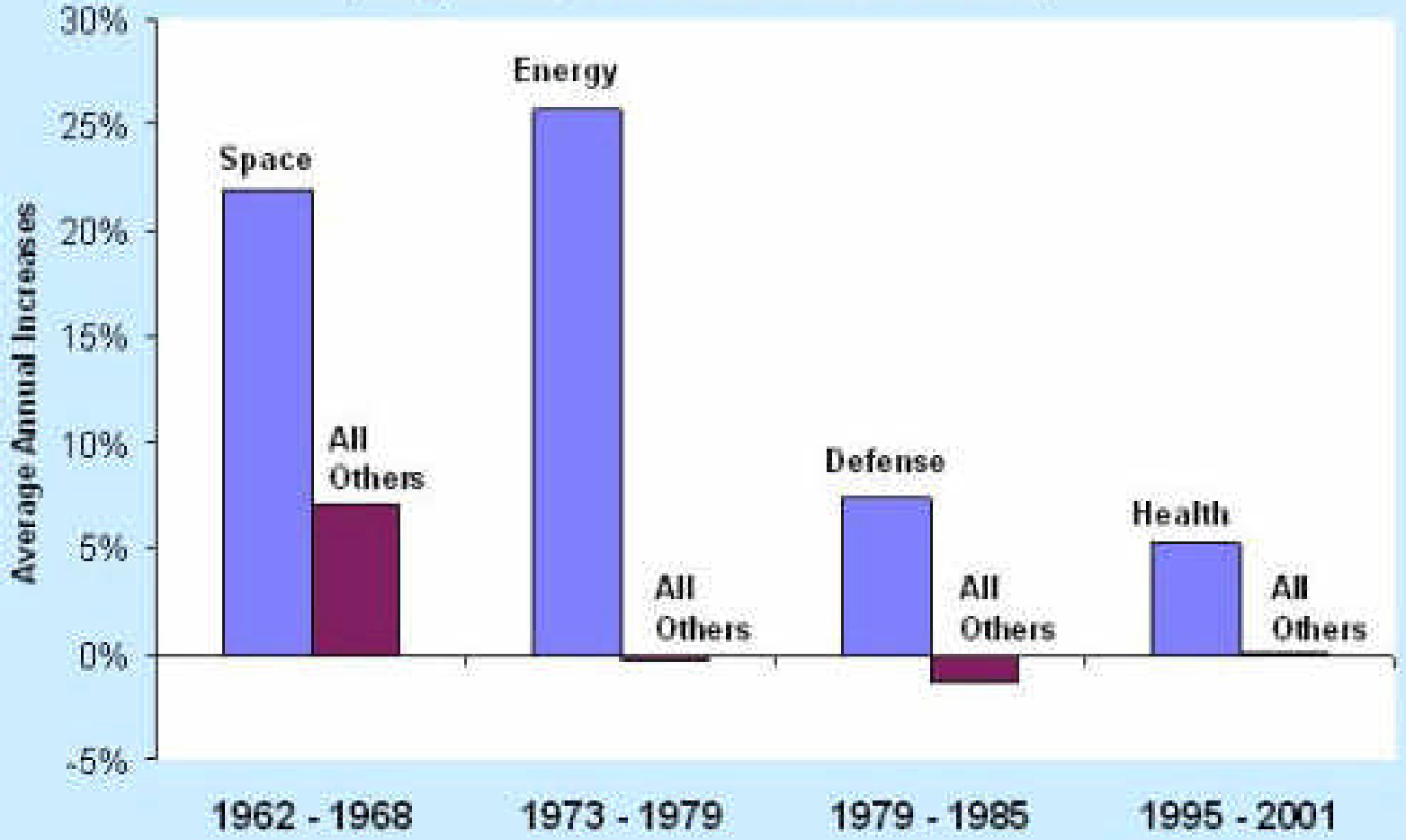

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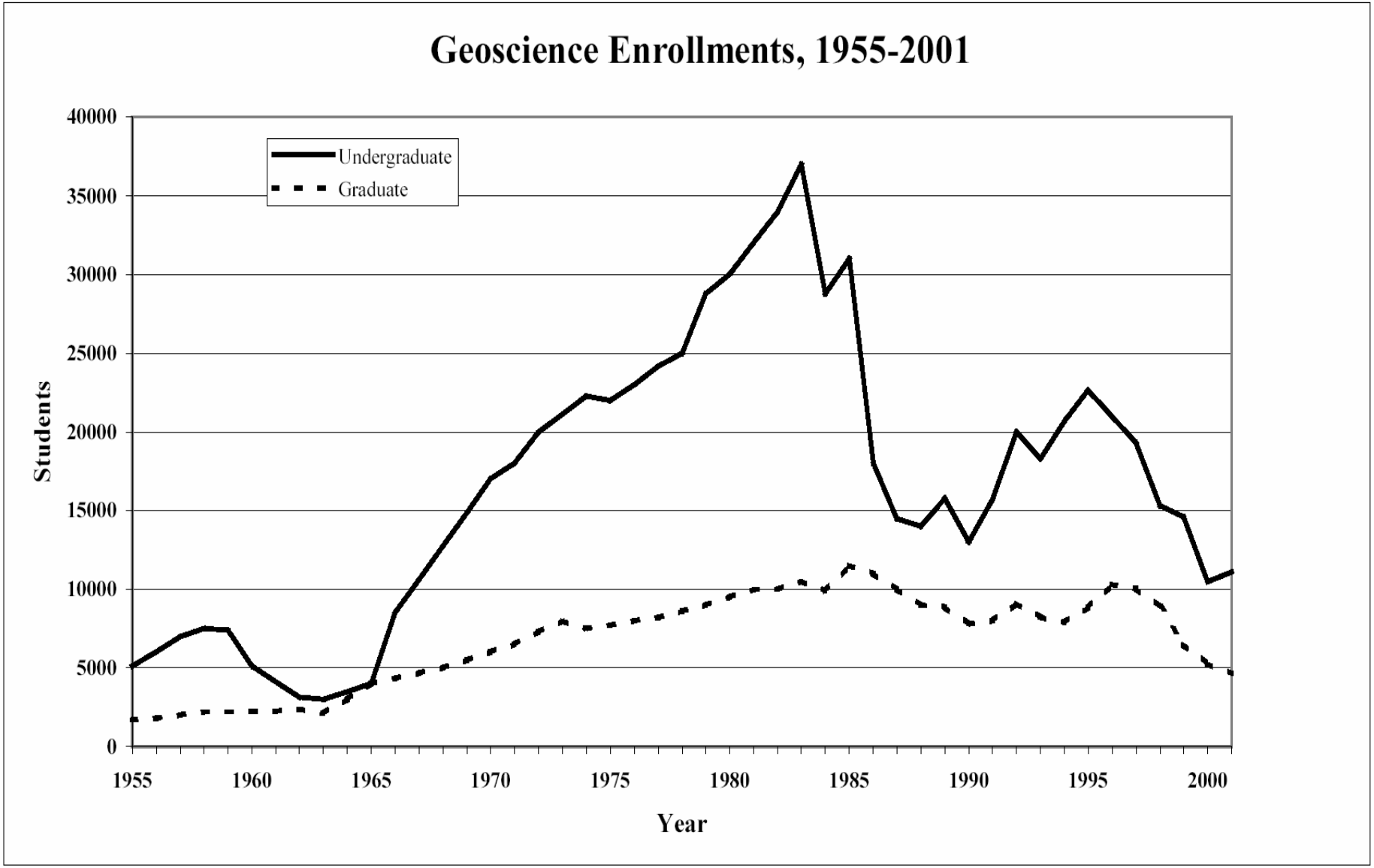

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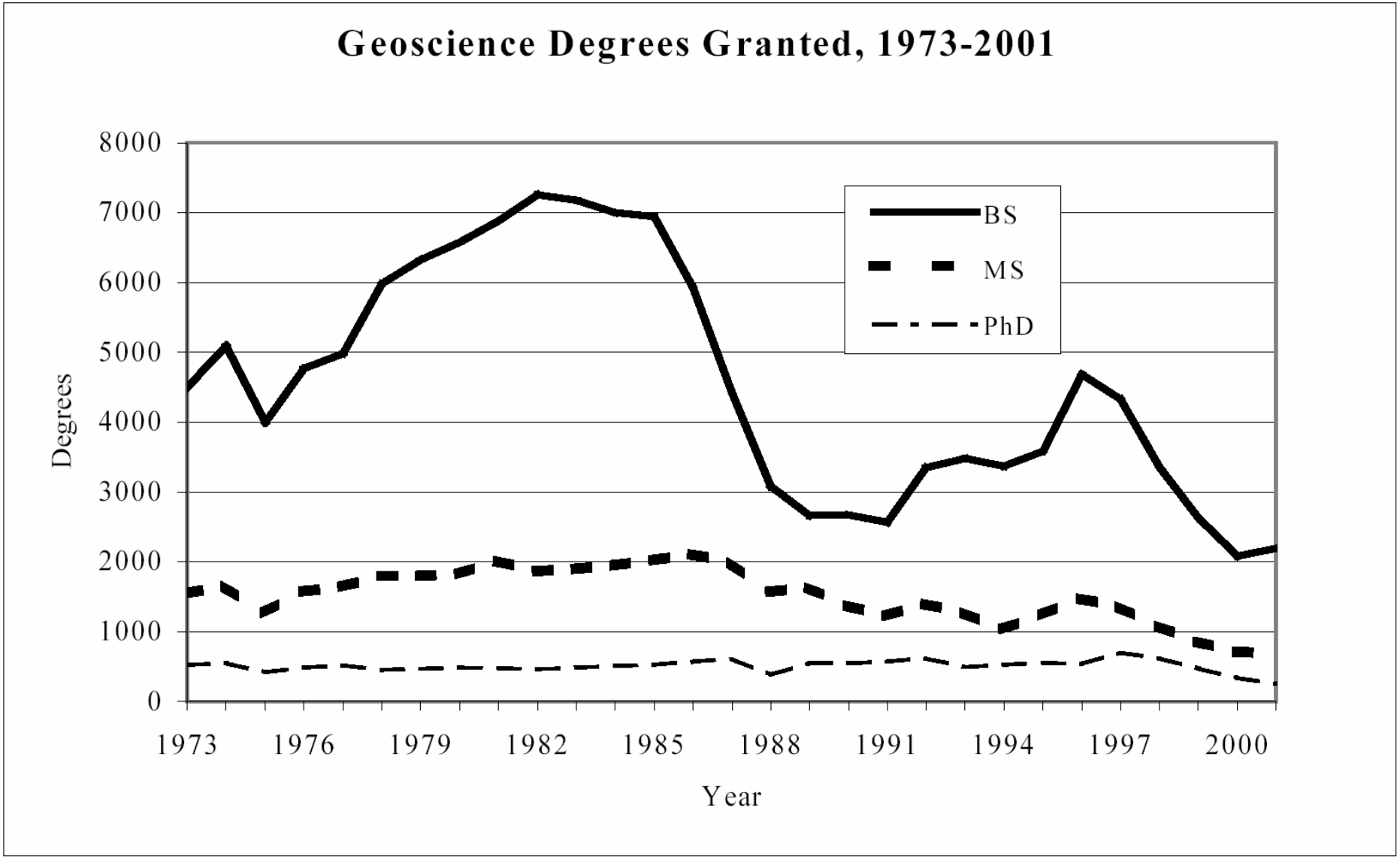

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Prioritizing Federal Research

Setting the Budget

OSTP/OMB Guidance Memorandum for FY 05

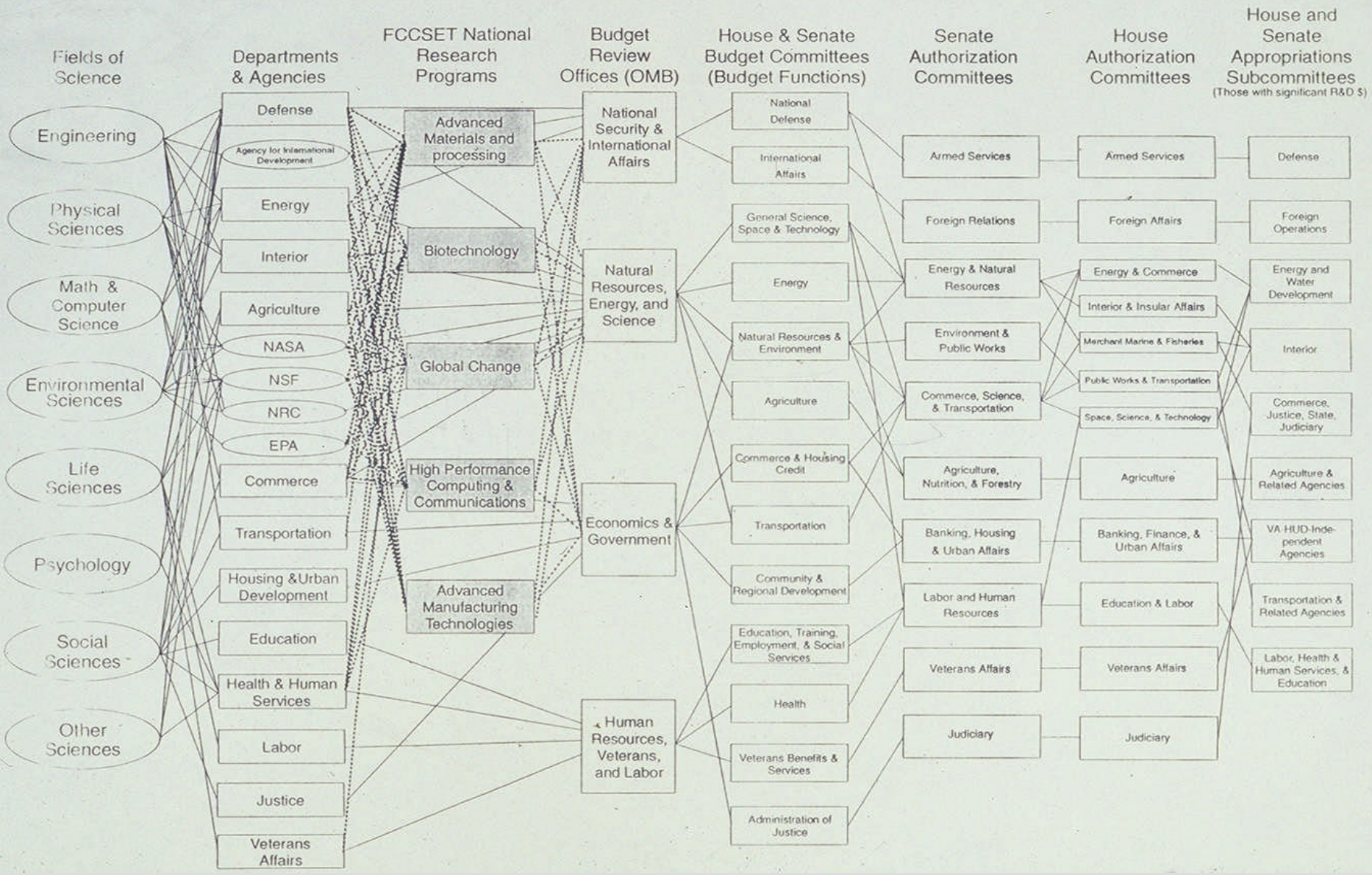
- Environment
  - Climate Change S&T
  - Global Earth Observations
  - Hydrogen Economy
- Genomics of Life Processes
- R&D for Homeland Security
- Information Technology
- Nanotechnology
- Education

**Each Agency is required to request a budget that sustains the research important for its mission

Development of the Federal R&D Budget

Showing Fields of Science and Executive and Legislative Decision Units

Connecting lines indicate loation of agency budget decisions, but not decision sequences.



Sustainability, Natural Resources, and Society

- *"The goal of life is living in agreement with nature."*

  Zeno (335 BC - 264 BC)

- *"Many difficulties which nature throws in our way, may be smoothed away by the exercise of intelligence."*

  Titus Livius (59 BC - 17 AD)

YOU ARE HERE