Climate Change Science Program
Ocean Color Collaborations

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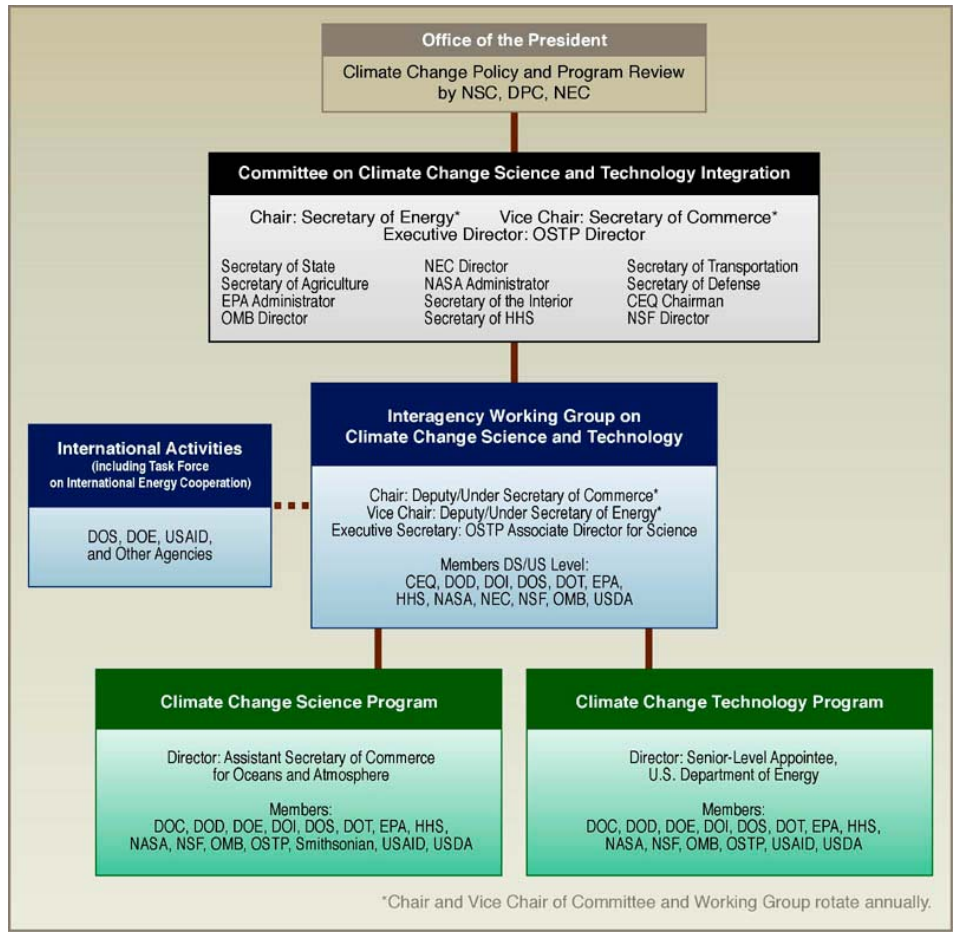
Overview of CCSP

Future Plans - Carbon cycle

CCSP and Observations

CCSP Incorporates Long-Term Global Change and Focused Climate Change Research

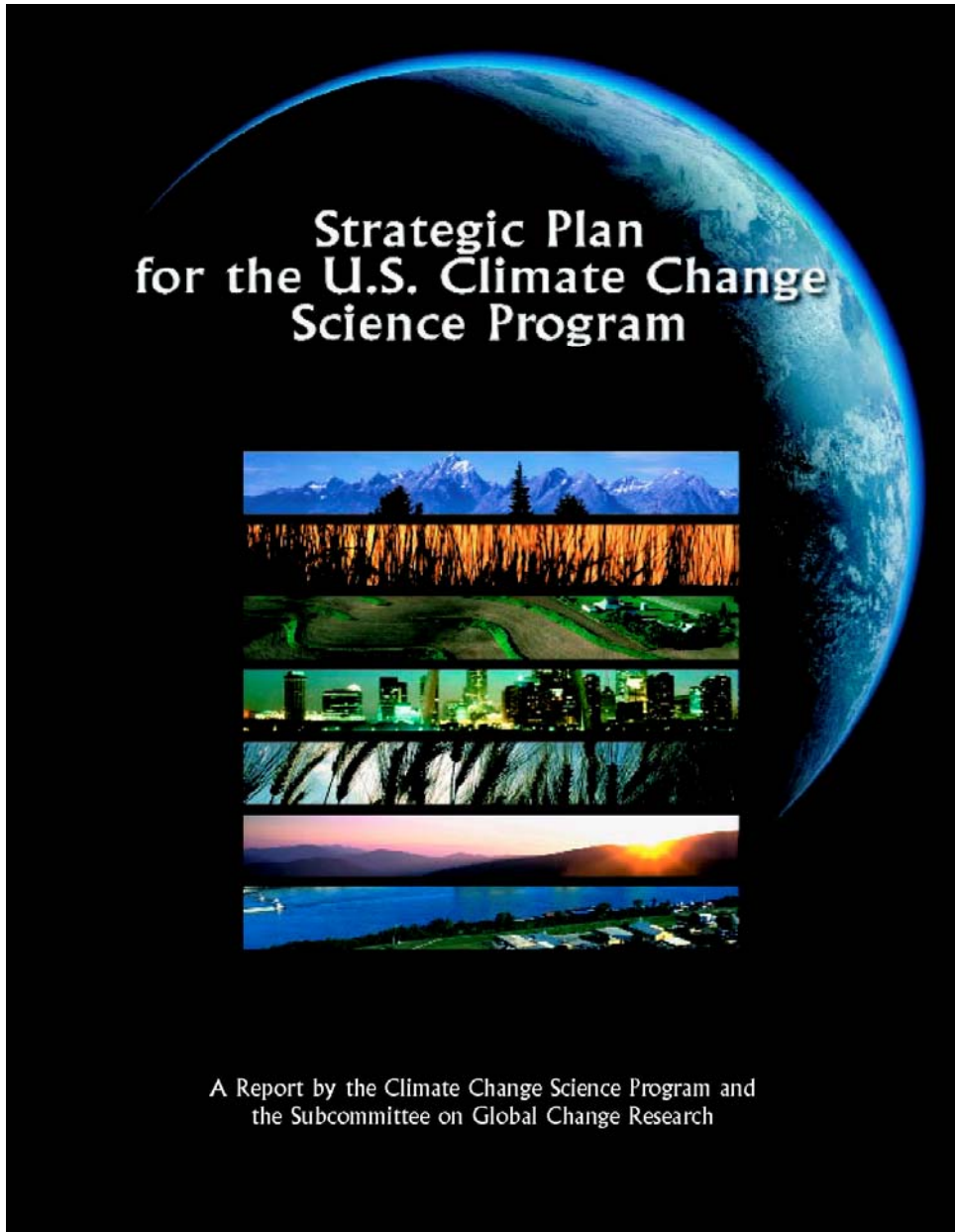
- 13 Federal Agencies/ Departments coordinate their activities through the Climate Change Science Program (CCSP)
- Works with university-based and Federal scientists
- Close coordination with energy technology programs



Strategic Plan for the U.S. Climate Change Science Program

Based on:

- Previous planning efforts (e.g., *Pathways* and other reports)
- **Comments during workshop (1300 participants)**
- 270 sets of comments during an open comment period
- **Review by the NRC and government review**



CCSP CORE APPROACHES

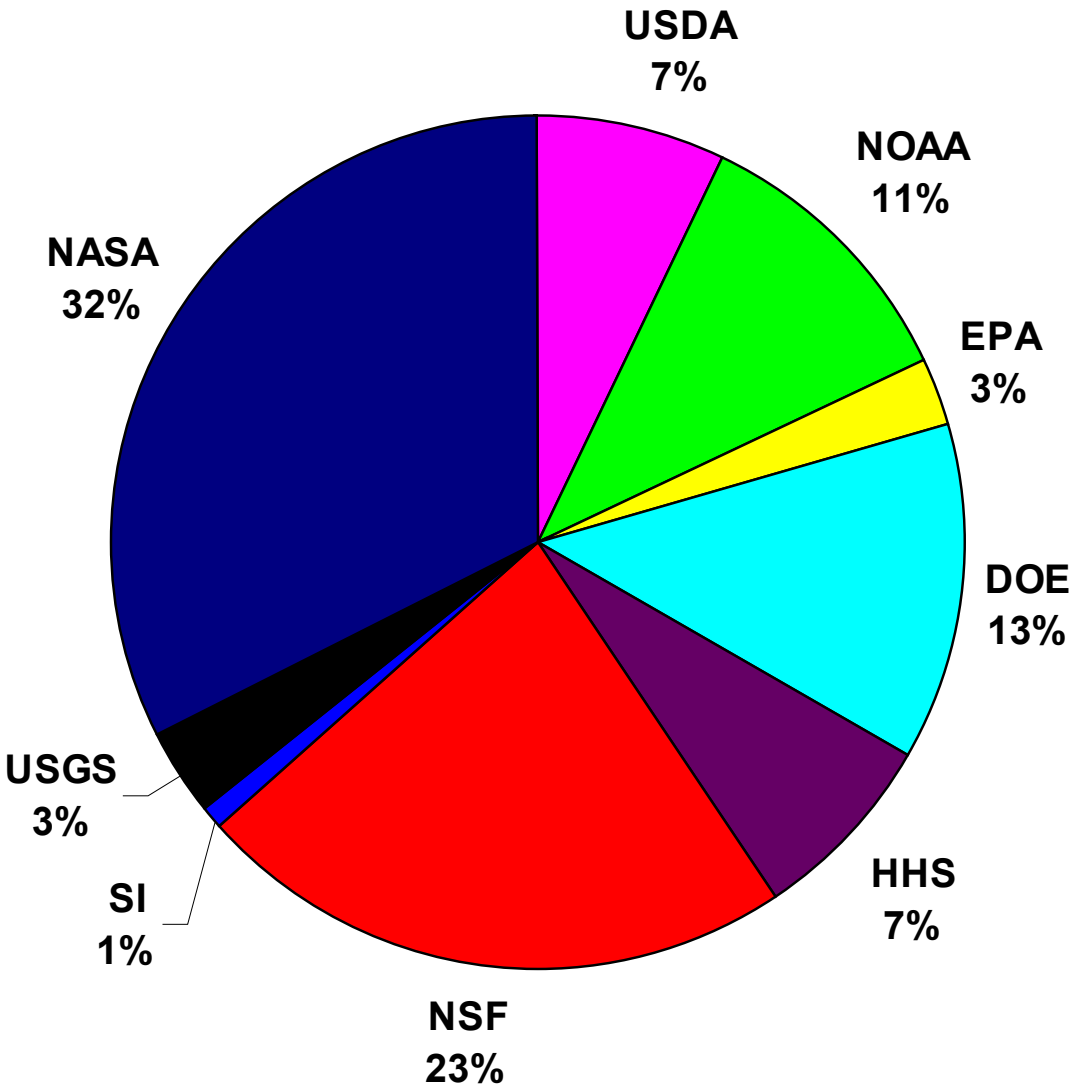
Scientific Research: Plan, Sponsor, and Conduct Research on Changes in Climate and Related Systems

Observations: Enhance Observations and Data Management Systems to Generate a Comprehensive Set of Variables Needed for Climate-Related Research

Decision Support: Develop Improved Science-Based Resources to Aid Decisionmaking

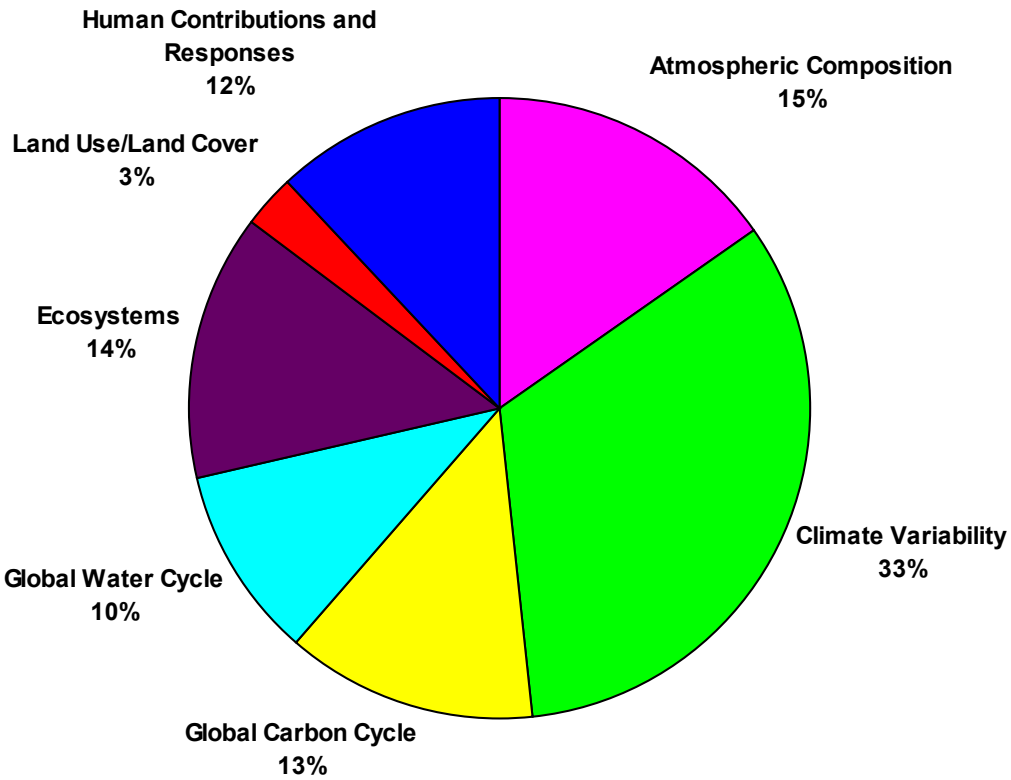
Communications: Communicate Results to Domestic and International Scientific and Stakeholder Communities, Stressing Openness and Transparency

Climate Change Science Program
USGCRP FY 2004 Budget ($M)



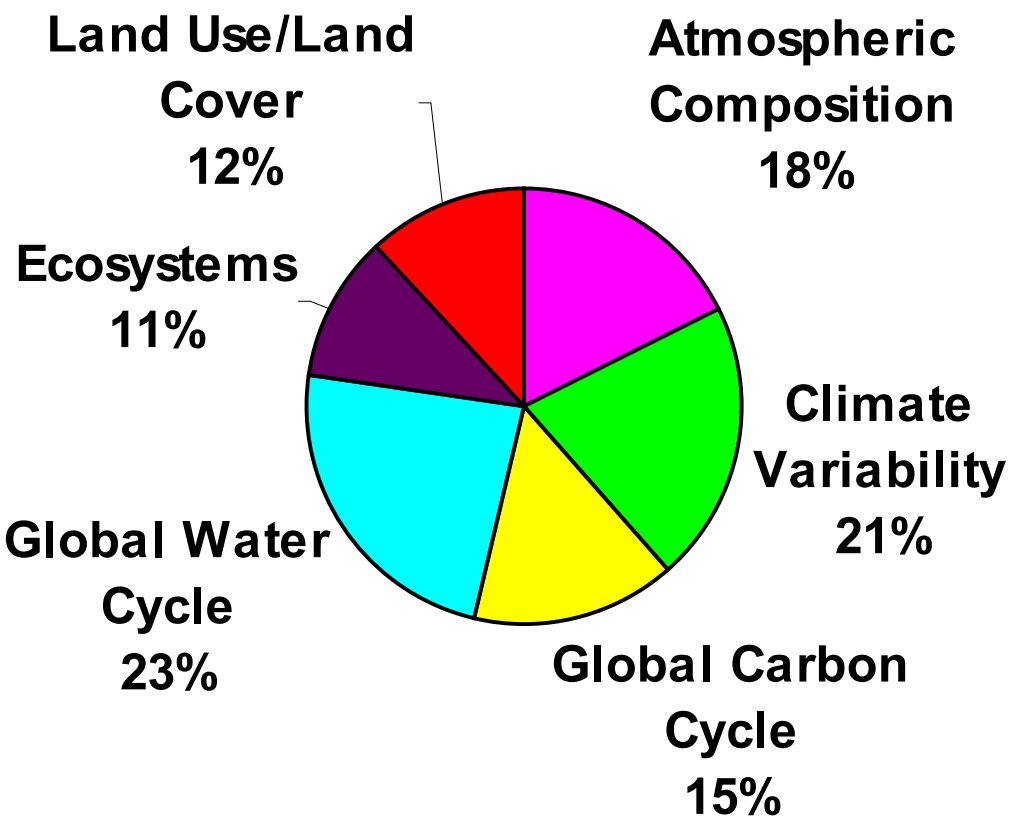
Agency	FY 2004
USDA	59
DOC/NOAA	89
EPA	22
DOE	104
HHS/NIH	61
NSF	188
SI	6
DOI/USGS	28
NASA	268
Scientific Research	**825**
NASA Space-Based Obs.	1,001
USGCRP Total	**1,826**

Climate Change Science Program - Science
USGCRP FY 2004 Budget by Research Element



Research Element	FY04
Atmospheric Composition	125
Climate Variability and Change	274
Global Carbon Cycle	106
Global Water Cycle	84
Ecosystems	113
Land Use/Land Cover Change	23
Human Contributions and Responses	99
Total	**824**

Climate Change Science Program - Observations
USGCRP FY 2004 Budget by Research Element



Research Element	FY04
Atmospheric Composition	179
Climate Variability and Change	208
Global Carbon Cycle	148
Global Water Cycle	237
Ecosystems	108
Land Use/Land Cover Change	120
Total	**1,000**

Priority Setting

- Research priorities are assessed on an annual basis using multiple information sources
- Near-term priorities are reflected in the CCRI
- Initially, the following issues will receive priority
  - Three research issues identified by NRC (aerosols, feedbacks, and carbon sources/sinks)
  - Observing systems
  - Decision support resources development

CCRI Priority - Improve understanding of the global carbon cycle (sources and sinks)

The CCRI funds will be targeted for activities to carry out the integrated North American Carbon Program, This program will improve monitoring techniques, reconcile approaches for quantifying carbon storage, and elucidate key processes and land management practices regulating carbon fluxes between the atmosphere and the land and ocean.

Carbon Cycle – FY04 and FY05 Plans

North American Carbon Program

- New satellite data products customized for analyzing PP and carbon dynamics in North America and adjacent oceans

Relationship among climate, phytoplankton, carbon, and iron in the Antarctic Ocean

- New studies on the role of iron in regulating carbon cycle processes

Seasonal to Interannual Ocean Productivity Patterns

- Measurements of chl a and PP from OCTS, SeaWiFS, and MODIS linked in an 8-year or longer time series. New data to be added as collected

Carbon Cycle – FY04 and FY05 Plans

Carbon Cycle modeling

- Improved regional and continental-scale carbon models – data assimilation, emphasis on land-atmosphere-ocean coupling

Prototype *State of the Carbon Cycle Report*

- CCSP Synthesis and Assessment product
- North American carbon budget
- Evaluation of knowledge of carbon cycle dynamics
- Scientific information for US decision support focused on key issues for carbon management and policy

Strategy for Achieving an Integrated Observing System

Base requirements on *science*, and on the need for climate-quality data products, including

- Adherence to climate monitoring principles
- Use of climate models to assist in observing system design
- Protocols for validation of data assimilation and reanalysis

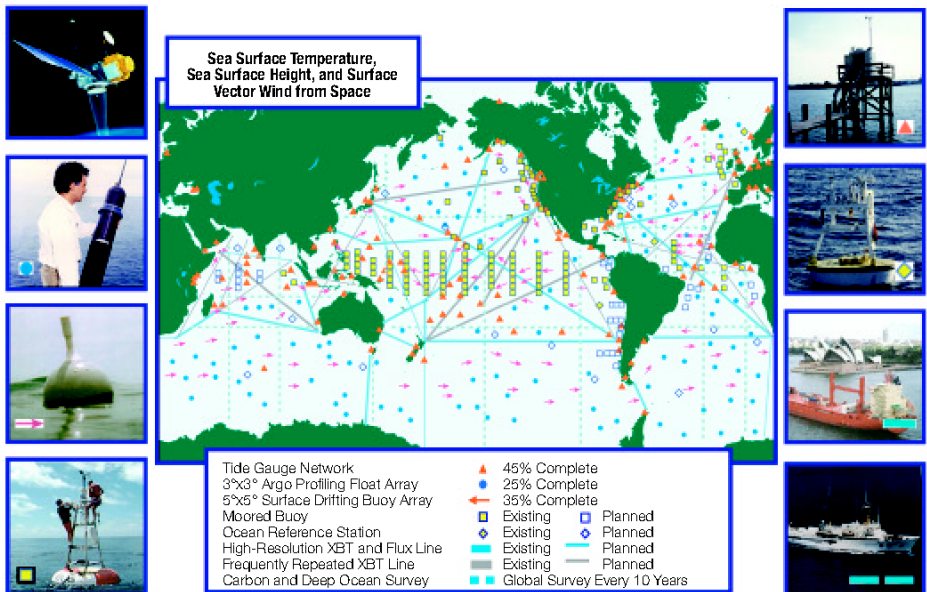
Stabilize and extend observing capabilities

- Research to operations transition for satellites
- Completing, maintaining, and updating in situ networks
- New capabilities for new observations (e.g., ecosystems) and to integrate existing components

Accelerate deployment of decision support tools

- Associated with near-term CCRI priorities and goals

Encourage international cooperation



Climate Monitoring Principles

Effective monitoring systems for climate should adhere to the following principles:

- impact of new systems or changes to existing systems should be assessed prior to implementation;

- **suitable period of overlap for new and old observing systems is required;**

- details and history of local conditions, instruments, operating procedures, data processing algorithms, and other factors pertinent to interpreting data (i.e., metadata) should be documented and treated with the same care as the data themselves;
- quality and homogeneity of data should be regularly assessed as a part of routine operations;
- Consideration of the needs for environmental and climate-monitoring products and assessments, such as IPCC assessments, should be integrated into national, regional, and global observing priorities

Satellite systems for climate monitoring should adhere to the following specific principles:

Constant sampling within the diurnal cycle (minimizing the effects of orbital decay and orbit drift) should be maintained.

A suitable period of overlap for new and old satellite systems should be ensured for a period adequate to determine inter-satellite biases and maintain the homogeneity and consistency of time-series observations.

Continuity of satellite measurements (i.e., elimination of gaps in the long-term record) through appropriate launch and orbital strategies should be ensured.

Use of functioning baseline instruments that meet the calibration and stability requirements stated above should be maintained for as long as possible, even when these exist on de-commissioned satellites.

Complementary *in situ* baseline observations for satellite measurements should be maintained through appropriate activities and cooperation.

Random errors and time-dependent biases in satellite observations and derived products should be identified.