

# Geophysical Fluid Dynamics Laboratory Review

June 30 - July 2, 2009



# Cooperative Institute for Climate Science (CICS)

Presented by  
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2



- I. Overview of CICS and AOS  
(the Atmospheric and Oceanic  
Sciences Program)**
- II. Research**
- III. Education**
- IV. CICS future**

# I. Overview of CICS & AOS

# History-1

- June 1967: A “collaborative program in geophysical fluid dynamics” was established between Princeton University and NOAA’s precursor, the Environmental Science Services Administration (ESSA)
- The collaborative program was run by the *Geophysical Fluid Dynamics Program*, later renamed the *Atmospheric and Oceanic Sciences (AOS) Program*, an academically autonomous PhD degree granting entity within the Department of Geosciences.
- Facilities: GFDL sits in a University building on Forrestal Campus, and members of the AOS Program (faculty, students, post-docs and researchers) sit in Sayre Hall or in the GFDL building.

# History-2

- October 2003: CICS was established by combining
  - the collaborative program in geophysical fluid dynamics
  - a collection of new research initiatives gathered together in the Princeton Climate Center (PCC) of the Princeton Environmental Institute (PEI)
- Rationale
  - recognized the rapidly growing role of Princeton University investigators in helping GFDL fulfill its mission
  - Leveraged a wide range of related research supported by Princeton University, other government agencies, and private sources
  - Allows us to tap into University expertise in human dimensions
  - Allows us to take advantage of the Joint Institute administrative framework, putting us on the same playing field as other Joint Institutes
- June, 2008: CICS award renewed after re-competition

# What is CICS?-1

- A grant from NOAA to PU, providing
  - TASK I: administrative support for CICS
  - TASK II: support for students and post-doc and senior scientists to be educated (via Princeton University) and get ‘hands-on’ training at GFDL.
  - TASK III: support for collaborative activities between NOAA and University scientists.

<b>Task</b>	<b>FY'06</b>	<b>FY'07</b>	<b>FY'08</b>	<b>FY'09</b>
I. Administration	50k	70k	70k	100k
II. Cooperative Research	2,860k	1,080k	2,060k	3,290k
III. Individual Projects (from NOAA program offices)	1,490k (470k)	750k (450k)	960k (380k)	870k (470k)
<b>TOTALS</b>	<b>\$4,400k</b>	<b>\$1,900k</b>	<b>\$3,090k</b>	<b>\$4,260k</b>
*To nearest 10k				

# What is CICS?-2

- **Vision:**
  - *To be the world leader in understanding and predicting climate and the environment, integrating physical, chemical, biological, technological, economic and social dimensions, and in educating the next generations to deal with the increasing complexity and importance of these issues.*

# II. Research

# Task III: Major University Contributions

*The contributions of PU and GFDL form a seamless whole. Below are important contributions that involve senior CICS scientists:*

## 1. Earth system modeling and analysis

- Land and ocean biogeochemistry model development (Pacala & Sarmiento et al.)
- Development of computational frameworks for ESMs (Balaji et al.)
- Development of ocean model core and parameterizations (Adcroft & Legg et al.)
- Developing a continental scale ice-sheet model (Sergienko et al.)

## 2. Earth system model applications

- Understanding coupled atmosphere-ocean dynamics (Vallis et al.)
- Carbon uptake and biogeochemical cycling in the ocean and land (Sarmiento & Pacala et al.)
- Hydrology (faculty from Civil and Environmental Engineering)

# Task II: The Post-Doctoral and Visiting Scientist Program

- Program details
  - A standing crop of about a 10 junior scientists (postdocs), funded by CICS.
  - Postdocs are selected by a Postdoc selection committee, which consists of University and GFDL senior scientists. Post-doc appointments are then formally made through the University.
  - Senior scientists from other Universities may visit for short periods for joint research or sabbaticals.
- A central goal is to attract and keep the brightest young people in the field
- Postdoc program has been extremely successful, with many faculty and NOAA appointments. Post-docs will discuss their projects in a poster session.

# Present Employment of AOS Post-Docs and Senior Visiting Scientists (20 currently at Princeton):

<b>TOTAL</b>	<b>241</b>	
Faculty positions	103	43%
Research in academic setting	50	21%
Government (research, etc.)	30 (17 at GFDL)	12%
Research in non-academic setting	22	9%
Unknown or other	36	15%

# CICS and GFDL Publications

## Publications:

Year	CICS (Fiscal year)	GFDL (Calendar year)	GFDL w/ Princeton co- authors
2004	22	113	46 (41%)
2005	47	116	54 (46%)
2006	53	129	46 (35%)
2007	35	126	47 (39%)
2008	28	99	41 (41%)

# III. Education

# The AOS Graduate Program

- The Atmospheric and Oceanic Sciences (AOS) Program is an autonomous Program, part of the Dept. of Geosciences.
- Typically has 12-15 faculty, of which typically about 10-12 are GFDL employees. Many courses are taught by GFDL scientists.
- About 15 students in total. Supported in their first year by the University, subsequently by GFDL as well as grants and fellowships.
- 85 Ph. D. graduates of the Program.
- One of the most successful in the country. Graduates have taken faculty or positions at U. Washington, NYU, Caltech, University of Michigan, and research positions at NASA, NOAA, NCAR, chair of U. Washington Atmospheric Science Program, etc.



# Present Employment of AOS PhD Recipients:

<b>TOTAL</b>	<b>85</b>	
Faculty positions	33	39%
Government (research, etc.)	17 (3 at GFDL)	20%
Research in academic setting	13	15%
Research in non-academic setting	11	13%
Unknown or other	11	13%

# IV. CICS Future

# Move to Main Campus

- Tremendous opportunities for synergistic research in, for example:
  - Climate: Global warming, its consequences, its mitigation, energy, policy.
  - Paleoclimate; biogeochemical cycling.
- Enhanced collaboration with Geosciences, Civil and Environmental Engineering, Ecology and Environmental Engineering, Mechanical and Aerospace Engineering, Woodrow Wilson School of Public and International Affairs, Princeton Center for Theoretical Science, etc.
- Opportunity to become the leading university/institution in the country for environmental/climate sciences.
- Intellectual problems with societal impact, well suited to PU.



# Ongoing Scientific Initiatives

- CICS has played an important role in developing initiatives in major areas such as:
  - ocean biogeochemical modeling
  - land biogeochemical modeling
  - continental ice sheet modeling
- Areas of high priority to NOAA that CICS is trying to advance include impacts of climate change on
  - fisheries
  - terrestrial and oceanic ecology
  - hydrology

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