



TRACES



US Deep Coral Projects and Opportunities

TRACES Workshop 2/28/08

A. Shepard, NURC/UNCW

- 
- Mandates related to DSCE-
international collaborations, research
(NOAA)
 - Current DSCE projects
 - Select Opportunities

Mandates for International Collaboration

- **Sigma Xi:** Recommendations for Achieving Global Competence (www.sigmaxi.org/global) -- "support involvement in multinational and multidisciplinary research by students and faculty"
- **U.S. Ocean Research Priorities Plan:** implementation strategy calls for "use of existing mechanisms for collaboration among the federal agencies and with *international*, state, local, and tribal entities, and the private sector."

International Collaboration

State Department:

- “coordination and oversight with respect to all major science or **science and technology agreements” with foreign countries**” (22 U.S.C. § 2656d).
- Bureau of Oceans and International Environmental and Scientific Affairs (**OES**)-- “matters relating to **oceans, environmental, scientific, fisheries, wildlife, and conservation affairs**”
- US Agency for International Development (**USAID**)
“**conserving biological diversity, increasing sustainable management of natural resources, and reducing the threat of global climate change.**
...key objectives under its environmental protection goal.”

BOWLES MACRO 2

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NYU Envir. Law J. Vol. 11

THE INTERNATIONAL CONSERVATION MANDATE OF THE UNITED STATES GOVERNMENT

IAN A. BOWLES* AND CYRIL F. KORMOS**

INTRODUCTION

Conservation of the world's biological diversity is a major challenge for the United States and the international community. The statistics on biodiversity loss are troubling. Current extinction rates are 100 to 1000 times higher than background rates calculated through the geological record.¹ Tropical forests, where most of terrestrial biodiversity is concentrated, were lost at approximately sixteen million hectares per year from 1990 to 2000.² The marine environment is under similar stress: in 1998, sixteen percent of the world's reefs were destroyed, and another fourteen percent are at serious risk of destruction in the next two to ten years.³

International Collaboration

Interior:

- **MMS:** offshore energy production (including alternative); **International Activities Program (IAP)** dual role as a liaison for MMS involvement in IA and policy direction for management of minerals resources on the Federal OCS
- **USGS:** provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life;
<http://international.usgs.gov/index.htm>

NSF:

- authorized and directed "to foster the interchange of scientific and engineering information between the United States and other countries"

International Collaboration

Commerce:

- Provide effective management and stewardship of our Nation's resources and assets to ensure sustainable economic opportunities."
- NOAA mission "entails environmental assessment, prediction, and stewardship."
- NMFS, OAR and NOS all have ***international program offices***

International Collaborations

NOAA International Program, Statement of International Goals

http://www.international.noaa.gov/Overarching%20International%20Goals_11-28-05-1.pdf:

- Improve free and open **exchange of data** between countries.
- Improve **stewardship** of natural resources through international cooperation.
- Promote **decision-making** based upon science & observational data.
- Increase **partnerships** in research and science.
- Increase **exchange** of expertise and knowledge between countries.
- Increase creative **application of NOAA expertise** in diverse contexts.
- Foster **cost-sharing opportunities** with other nations to carry out global scale science and stewardship programs.
- ***AND. . . “Support research and surveys of and work to protect deep-sea coral communities.”***

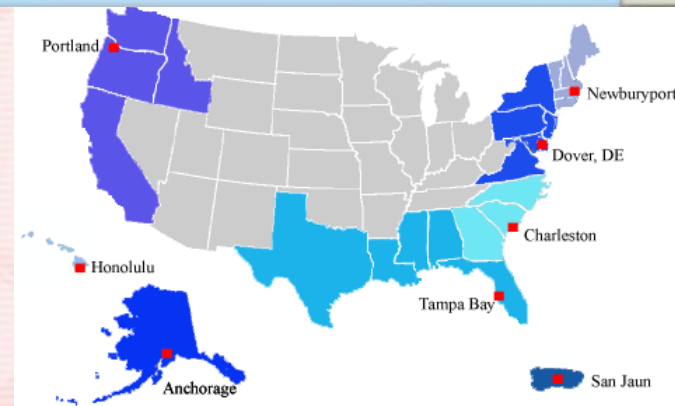
Research Mandates for NOAA

Magnuson-Stevens Fishery Conservation and Management Act:

- 1996 Sustainable Fisheries Act amendment– EFH and HAPCs
- 2007 Reauthorization- SEC. 408. Deep Sea Coral Research And Technology Program.
 - Identify existing research on, and known locations
 - Locate and map
 - Monitor activity in locations where deep sea corals are known or likely to occur
 - Conduct research

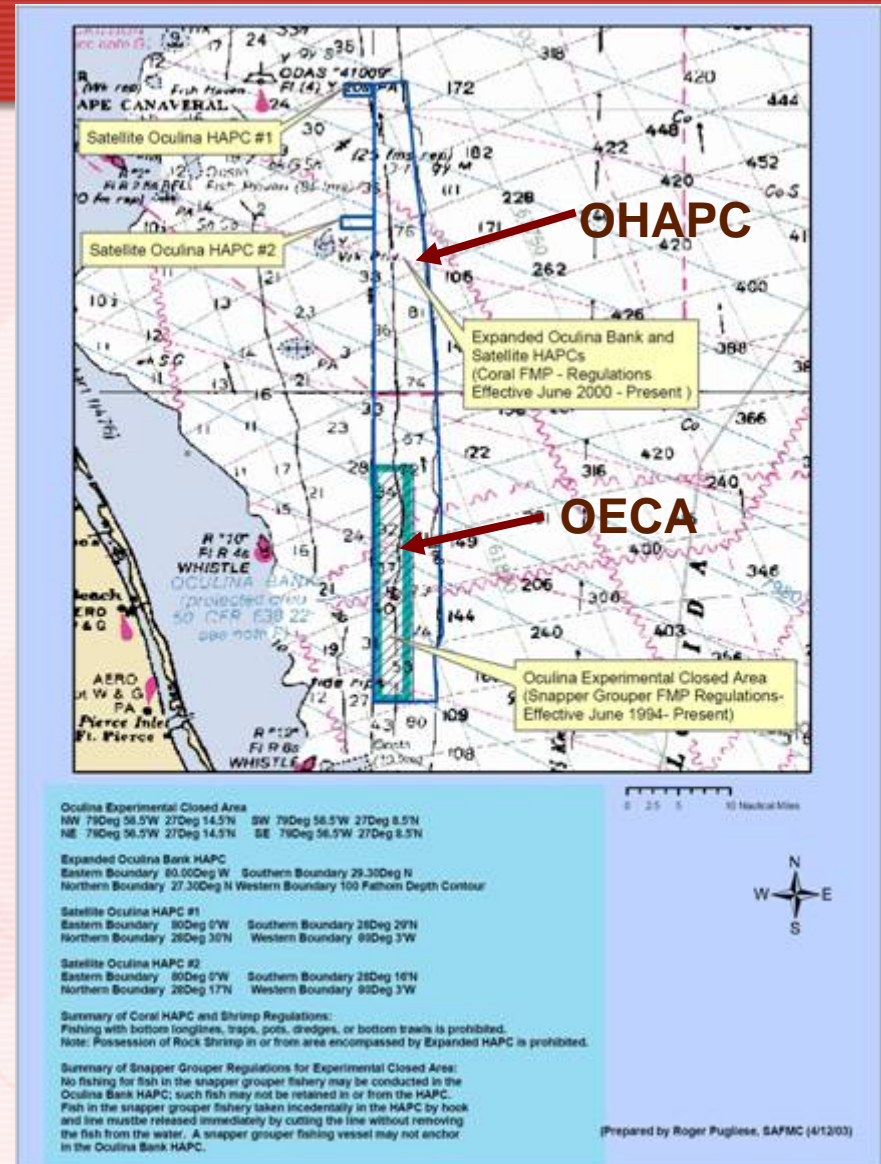
Research Mandates for NOAA

- **Regional Fishery Management Councils** (also established by MSA): “decision-making bodies and develop and recommend specific management measures in the form of *fishery management plans*”



Oculina HAPC & ECA

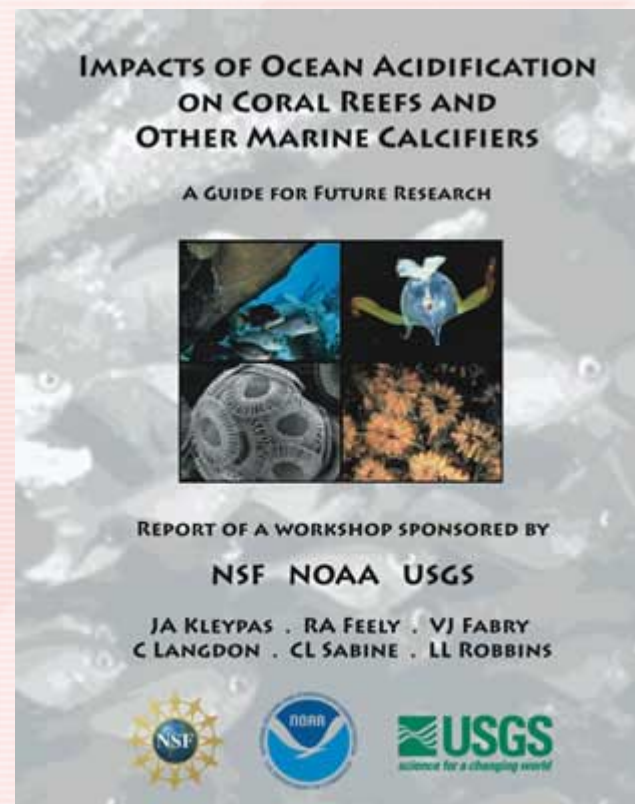
- 1984 Original OHAPC: closed to protect coral;
- 1994 area became OECA: to sustain snapper/grouper
- 2002 Shrimp FMP: no trawling in OHAPC; VMS required on shrimp fleet
- 2002 Coral FMP: no harvest; expanded OHAPC
- 2004 Snapper/Grouper FMP: OHAPC renewed until 2014
- OECA Evaluation Plan



"Fishery Ecosystem Plan will evolve from the Council's Habitat Plan. The transition from single species management to ecosystem management will involve incremental steps to better characterize the system and understand the complex relationships among humans, harvested fish and prey, all marine life and essential habitat and environmental characteristics of the South Atlantic Ecosystem."

Research Mandates for NOAA

- National Marine Sanctuaries Act
- Ocean Exploration and Research Act (pending)– authorization of NURP and OE; under one office of OER in FY2008
- Ocean Acidification Act (FOARAM Act)– S.1581, Sen. Lautenberg, NJ; HR 4174, Rep. T. Allen, ME



U.S. Atlantic Science Plans

- SAFMC– draft *Research and Monitoring Plan for DWC of the South Atlantic Region* (<http://www.safmc.net/Portals/0/Lophelia/SADWCRResMonPlanJuly07-final.pdf>), complement to new DSCE HAPCs now in debate, includes:
 - **Phase I:** Map and describe known and expected DWC ecosystems
 - **Phase II:** Determine ecological role of DWC ecosystems, especially role of deepwater coral habitats as Essential Fish Habitat, and expand the understanding of structure-forming species' biology and ecology
- NOAA– *State of Deep Sea Coral Ecosystems* report, precursor to national science plan?

Projects

Categories:

- 1 = Ecosystems-- a) Linkages and connectivity, b) Biodiversity & biogeography, c) Coral biology & reproduction
 2 = Paleo-climate—a) Proxies & chronologies, b) Temperature & ventilation history

Cat.	PI	Affil.	Project Title	Region	Sponsor/ Period
1a	Boland, Brooks et al.	MMS	Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico.	Gulf of Mexico (GoM)	MMS and OE, 2007-09
1a	Boland	MMS	Exploration and Research of Northern Gulf of Mexico Deepwater Natural and Artificial Hard Bottom Habitats with Emphasis on Coral Communities: Reefs, Rigs and Wrecks.	GoM	MMS/NOAA OE, 2008
1a	Fisher et al.	PSU	Investigations of chemosynthetic communities on the lower continental slope of the Gulf of Mexico.	GoM	MMS, 2005-09
1a	France et al.	U. LA-Lafayette	Stepping Stones Across the Atlantic: Co-evolution and Dispersal of Deep-Water Corals and Their Associates on NW Atlantic Seamounts	US N. Atlantic	NSF, 2006-08
1a	Shank, Waller	WHOI	Stepping Stones Across the Atlantic: Exploring Pathways and Barriers to the Dispersal and Evolution of Deep-Sea Corals and Associated Fauna	New England	NSF, 2005-08

• Ecosystems- biodiversity/biogeography

1b	Baco-Taylor	WHOI	Biogeography of Deep-Sea Corals from North Pacific Seamounts and Discovery of New Species Using Molecular Methods	N. Pacific	NOAA/OE, 2007-2009
1b	Shank	WHOI	Establishing a Formal Program for the DNA Barcoding of Marine Life for Seamounts	All	CoML, 2008-09
1b	France	UL-Lafayette	Development and Screening of Microsatellite Loci in Alaskan Fjord <i>Primnoa</i>	AK	NOAA Fisheries, 2008
1b	Morrison, King	USGS	Deepwater Program: Chemosynthetic and Hard Substrate Habitats, Part VI: Genetics	GoM	MMS, 2006-09
1b	Lindner	U. of Sao Paulo	Phylogeny of the hydrozoan order Anthomedusae (Stylasteridae)	Brazil	FAPESP, 2008-09
1b	Messing, Brooke, Reed	NOVA SE U.	Florida's Deep-water Oases: Exploration and Characterization of Deep Reef Ecosystems	FL OCS	NOAA/OE, 2007-2009
1b	Ross et al.	UNCW/USGS	Deepwater Program: Lophelia II: Continuing Ecological Research on Deep-Sea Corals-Benthic Ecology and Trophodynamics.	GoM	USGS, 2008-11
1b	Reed et al.	HBOI	Multibeam Mapping of Deep-water Reefs	FL, Bahamas	?, "on-going"
1b	Ross, Nizinski	UNCW	Deep Coral Habitat Mapping Along the Southeastern US Continental Slope Using an Autonomous Underwater Vehicle with Multibeam Sonar	SE US	NOAA NURP, 2007-2008
1b	Ross et al.	UNCW	Continental Slope Coral Banks of the Southeastern United States: Exploring the distributions, ecology, and biology of deep coral habitats and associated fauna	SE US	NOAA OE, USGS, 2006-2008
1b	Shepard et al.	UNCW	Oculina Bank Habitat Area of Particular Concern: Research, Monitoring, Restoration and Outreach	E. FL Shelf	NOAA NURC/ Fisheries, 2008

Ecosystems- Coral biology

1c	Koenig, Brooke	FSU	Recovery potential of damaged deep-water <i>Oculina</i> habitat and fish populations: the effect of human intervention.	E. FL shelf	NOAA NURP, 2008
1c	Jarnegren, Brooke	Norwegian Univ. of Sci. and Tech.	Reproductive biology of <i>Lophelia pertusa</i> from a Norwegian Fjord	Norway	Statoil, 2008
1c	Parrish, Roark	NMFS	Age and growth validation of gold coral (<i>Gerardia</i> sp.)	HI	State of HI, 2008

Paleoclimate- Proxies/Chronologies

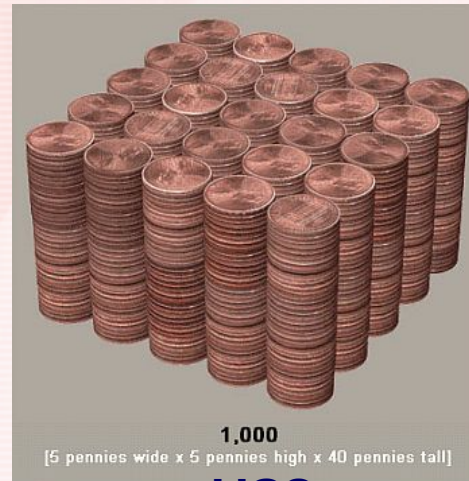
2a	Hill	UC-Davis	Records of intermediate depth ocean chemistry and climate change from deep-sea bamboo corals	CA Margin	NOAA NURP, 2005-08
2a	Dunbar et al.	UHI	Pacific ocean gyre exchange and ventilation processes: Proxy development using deep sea corals.	N. Pac.	NSF, 2008
2a	Shank, Waller	WHOI	Paleogenetics of Pleistocene Deep-Water Corals from the Mediterranean Sea: The Rise and Fall of Coral Populations within the Basin	Mediterranean	NSF, 2007-09

Paleoclimate- Temp/Ventilation

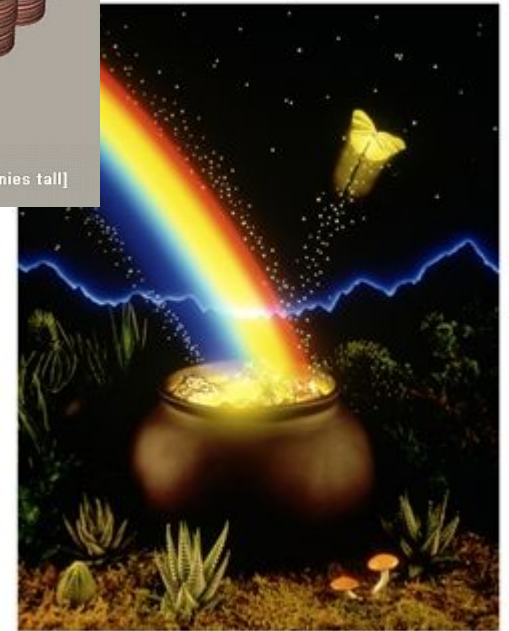
2b	Dunbar et al.	UHI	North Pacific decadal-centennial variability from deep-sea corals: A new archive for climate change detection.	N. Pac.	NOAA Global Prog., 2008
2b	Robinson, van de Flierdt	WHOI	Paired Neodymium Isotope and Radiocarbon Analyses in Deep-Sea Coral– Calibration of a Novel Ocean Ventilation Tracer	?	NSF, 2006-08
2b	Robinson, Waller	WHOI	Glacial radiocarbon constraints from Drake Passage deep-sea corals	S. Atl.	NSF, 2007-08

Opportunities- Funding

- Project table sponsors: 23 projects-- NOAA- 10, NSF- 6, MMS- 4, USGS- 2, Others (1 each)- 4

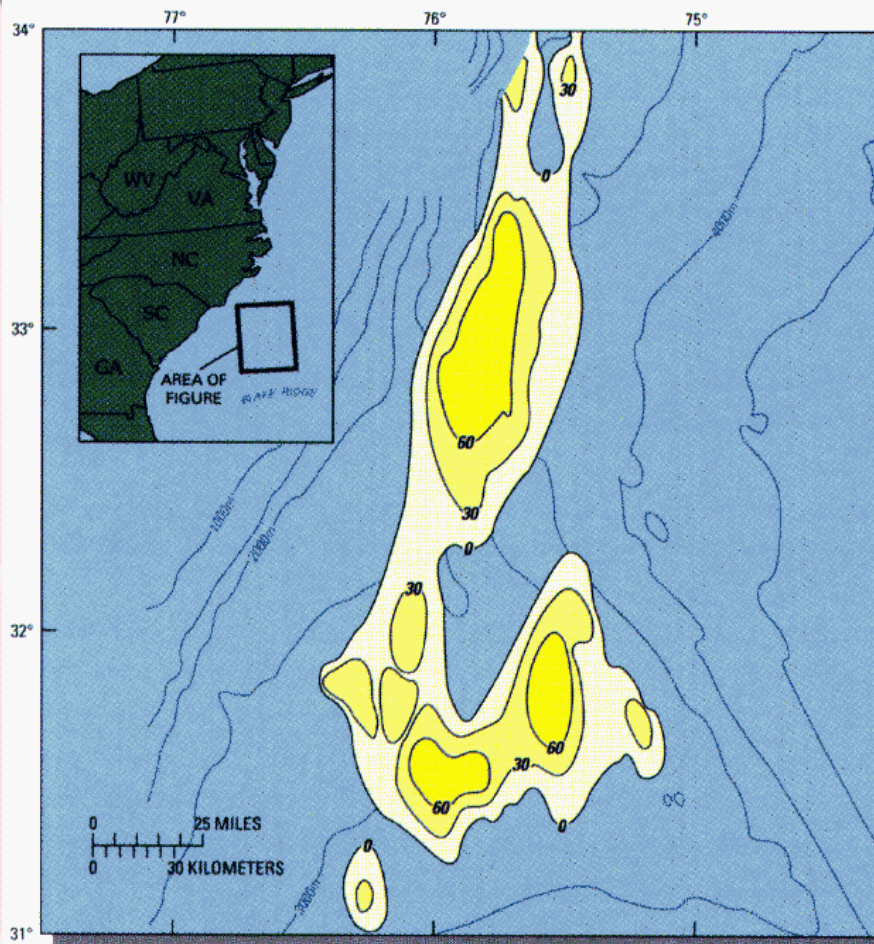


US?



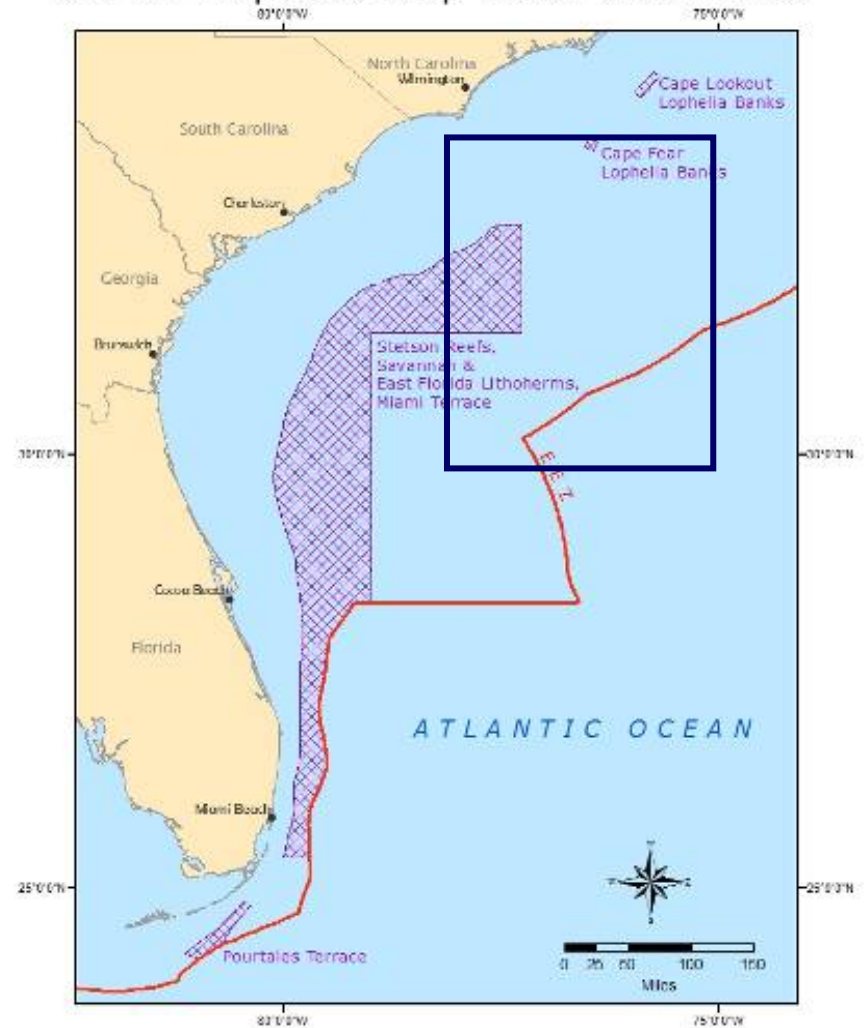
EU

MMS/USGS



Map showing location and inferred thickness (in meters) of hydrates within seafloor sediments off North Carolina and South Carolina.

SAFMC Proposed Deep Water Coral HAPCs



NSF International Science and Engineering (OISE)

"NSF support for international collaboration aims to:
Advance the FRONTIERS of Science and Engineering

- ACCESS to unique expertise, facilities, and phenomena
- LEVERAGE limited resources

Prepare a GLOBALLY ENGAGED U.S. S&E workforce

- DEVELOP understanding of science abroad
- NURTURE capable, confident, adaptable
young researchers with strong
networks overseas."

HOW?: "solicitations explicitly encourage international collaboration; discuss with managing disciplinary program officer and with relevant OISE country program officer; ask for joint review and joint consideration for funding"

Partnerships for International Research & Education (PIRE)

- Objectives:
 - Frontier research that requires international partnership
 - Unique, complementary expertise of international partners
 - Student engagement in international research
 - Institutional engagement to enable collaboration
- 5-year awards of up to \$2.5M each
- 32 active awards across all NSF disciplines
- Next competition: FY2009 (pending availability of funds)
 - Two stage process: preproposals and full proposals
 - Preproposals likely due late summer 2008

NOAA/NSF-- Comparative Analysis Of Marine Ecosystem Organization (CAMEO)

“Advancing Fundamental Understanding of Marine Ecosystem Processes as a Foundation for Living Resource and Habitat Management”

- CAMEO’s goal: “to carefully design approaches by which similarities and divergences among observed ecosystems (**comparative ecosystem analyses**) are effectively interpreted in a manner that can yield management insights. The spatial scale of comparative analyses can range from **ocean basins to local oceanic (e.g., seamounts, shelves) features**.
- NOAA and NSF will solicit proposals to initiate CAMEO research, with future funding depending on Congressional budget appropriations for FY 2009 and beyond.

NURP/OE Merger

- Extramural access to science and technology
- Same office (OER) as of FY2008; Strategic Plan in prep.
- Authorization—combined \$50M in 2010?



NOAA Deep Sea Coral Research and Technology Program

- President's FY 2009 Budget-- new *Deep Sea Coral Research and Technology Program*; initial \$1.5 million to help NOAA "increase protection of this vulnerable habitat by mapping locations of deep sea corals and monitoring fishing and other activities near these areas."

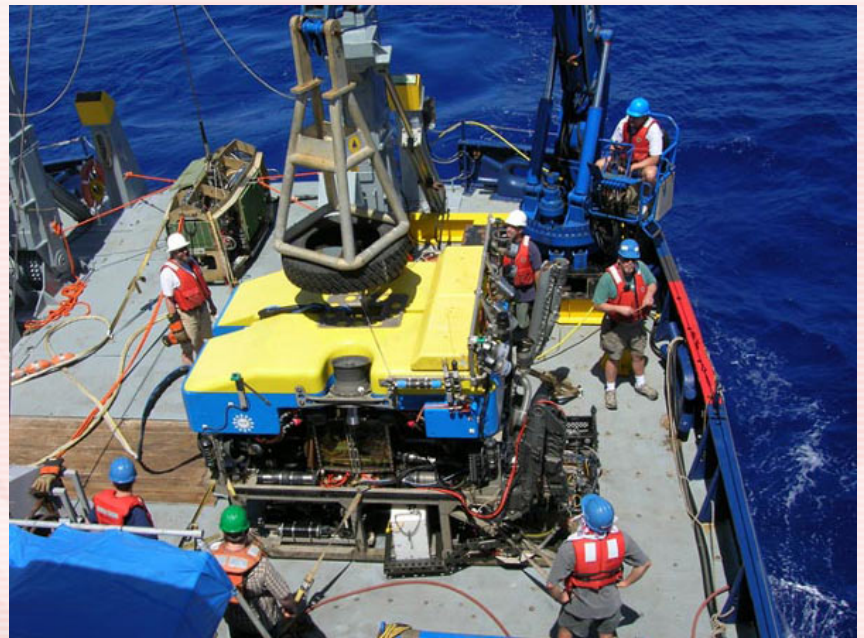
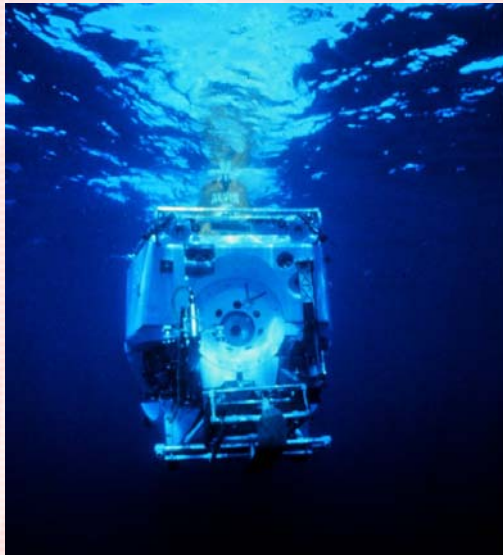


Other Partners

- Councils- SAFMC uses CRCP funds to support DWC studies
- NGOs– mostly advocacy, planning and promotion
- Foundations for projects– e.g., Pew, MacArthur
- States, Congress, fishermen/groups!!
- Education – COSEEs, Sea Grant

Technologies

- JSL sub, \$25k/d
- Jason/Alvin, \$40-50k/d



Technologies



- SeaBed AUV, academia, \$?
- Hugin AUV, \$90k/d with dedicated ship

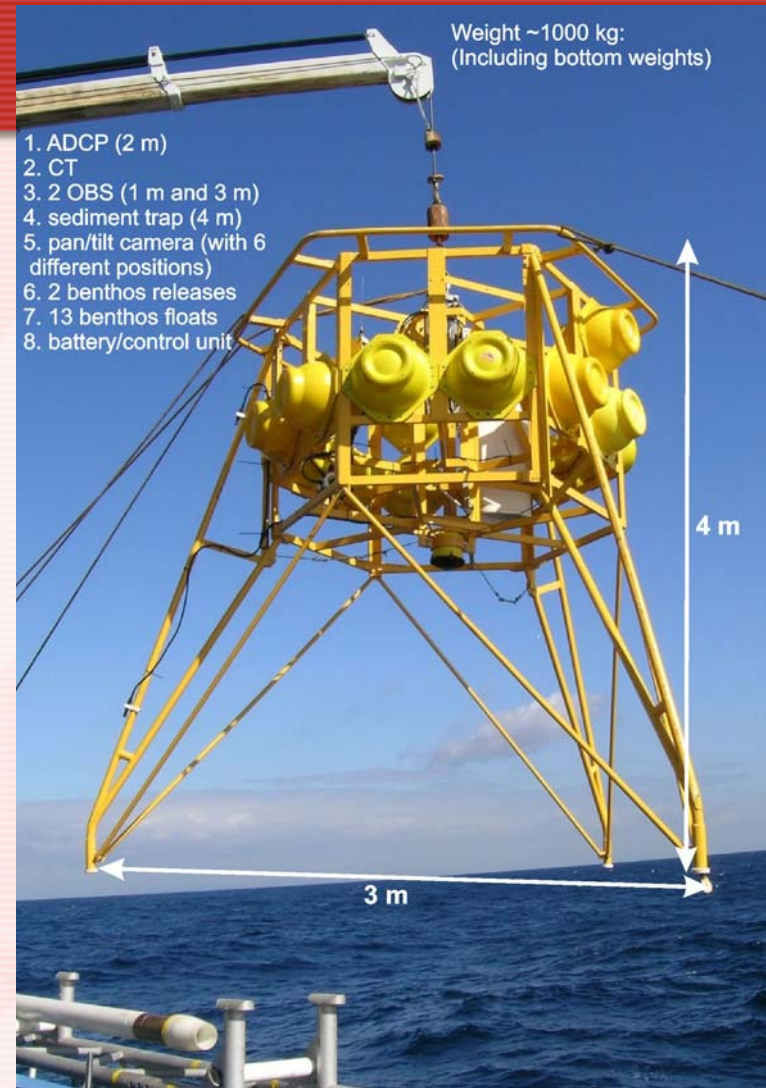
Opportunities- East Coast Technologies

- *Okeanos Explorer- OER, maybe Atlantic in 2010*
- Eagle Ray AUV- \$10k/d?
- Proteus AUV- \$4k/d



Technologies

- Observatories:
Dutch Landers
adapted by
Roberts and
Ross



Opportunities and Challenges

- Opportunities for:
 - Research and technology collaborations
 - Advocacy, education and promotion
 - National/international policy development
- Challenges are opportunities!