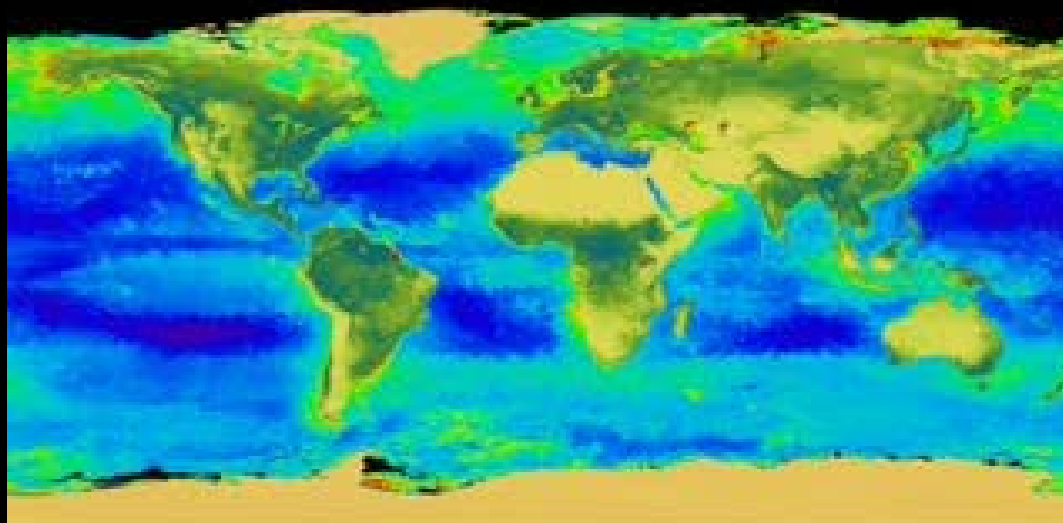
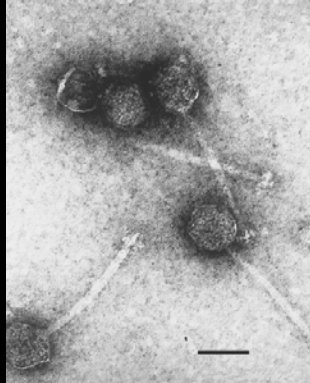


Life in the Seas

**John H. Paul, Kendra Daly, Mya
Breitbart, David Mann, Jose Torres,
Frank Muller-Karger, John Walsh**



USF UNIVERSITY OF
SOUTH FLORIDA



Mya and JP-Microbes

Microbes run the world. It's that simple.....It is the microbes that convert the key elements of life –carbon, nitrogen, oxygen and sulfur-into forms accessible to all living things. ...Digest food, clean up oil spills, produce oxygen and remove greenhouse gases

-National Academy of Sciences Report on Metagenomics-2007



Breitbart Lab

Marine Microbiology

The Good



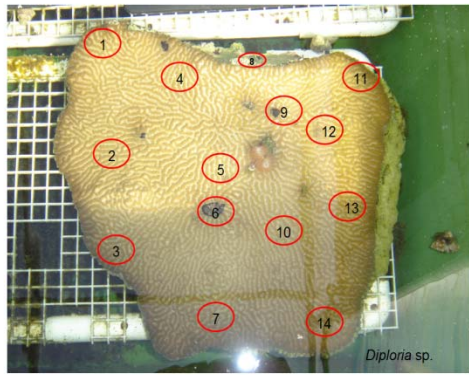
The Bad



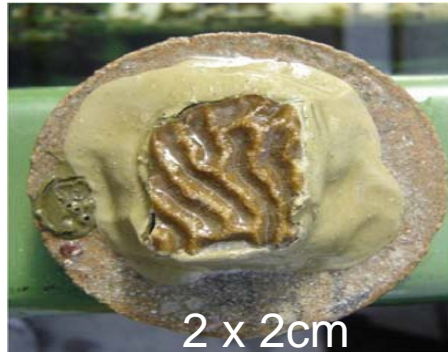
And The Ugly



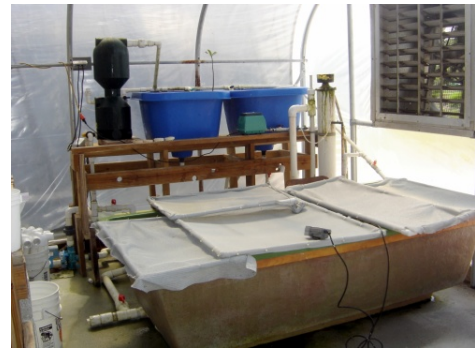
Profiling bacterial communities associated with corals in the wild and during coral restoration



Parent colonies rescued



Parent colony is cut into fragments and mounted



Fragments maintained in Aquaculture



Healthy fragments are transplanted to a restore natural reef

Understanding coral-associated microbes in health & disease

Pathogenic Viruses in Raw Sewage and Reclaimed Water



Critical for public health, and the health of our environment



Discovery of Novel Viral Pathogens in Marine Animals

- Diseases are increasing in marine animals
- The cause of these diseases is often unknown
- With viral purification and metagenomic sequencing, we can discover new viral pathogens



**Example:
Sea Turtle
Fibropapillomatosis**

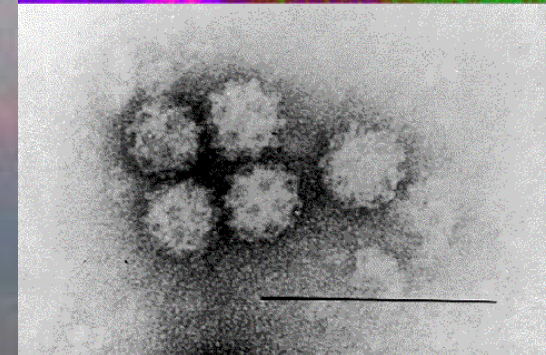
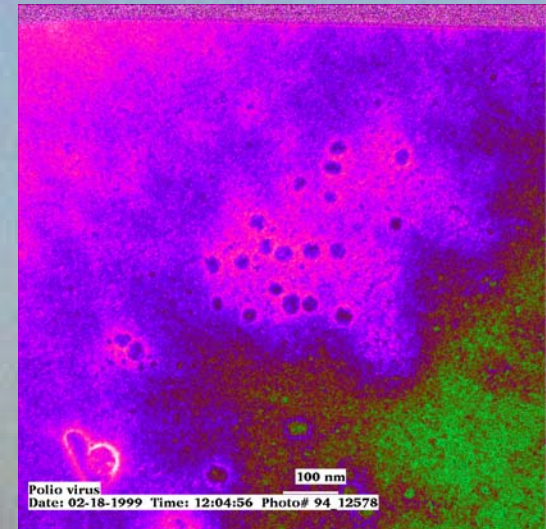
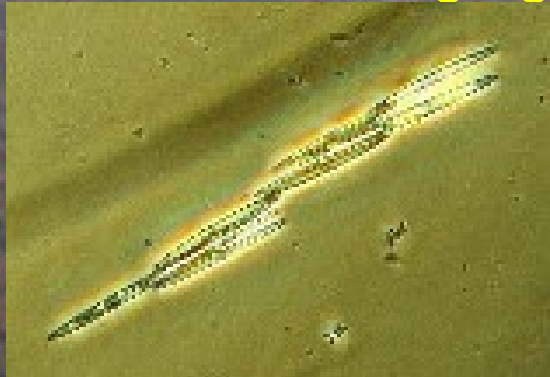
**Virus Hunting: Discovery of
Important Emerging Pathogens**

Collaboration with Mote Marine Laboratory, Univ. of Central Florida

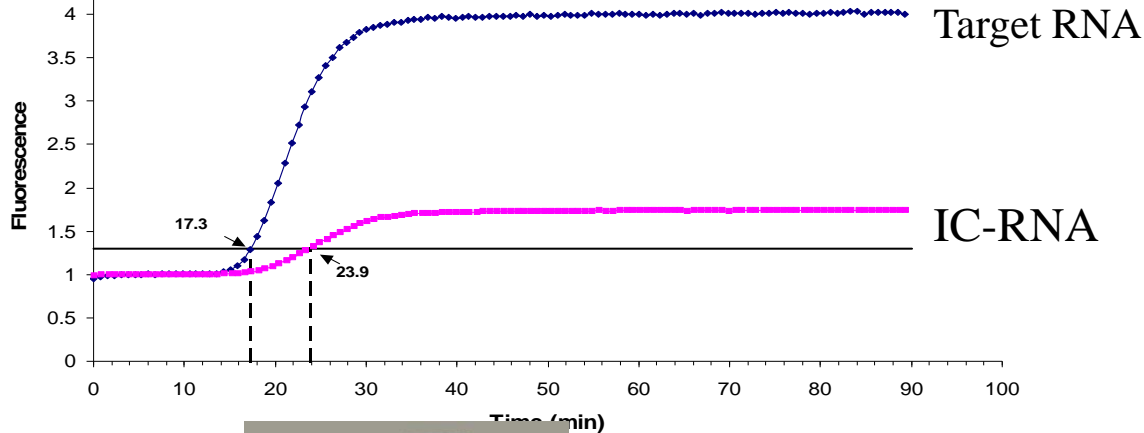
Paul Lab

Targets of Interest for sensors:

1. Enteroviruses-Coastal Water quality
2. Noroviruses-water quality, troop safety
3. *K. brevis*-Red tide in the Gulf of Mexico
4. *Pseudo-nitzschia*-emerging HAB

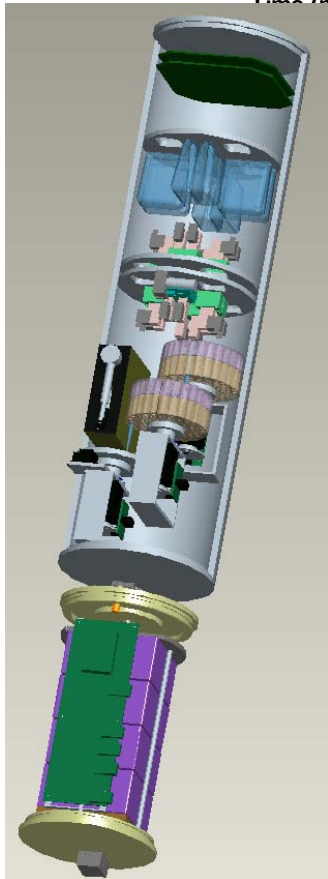


1. Develop lab-based detection assays



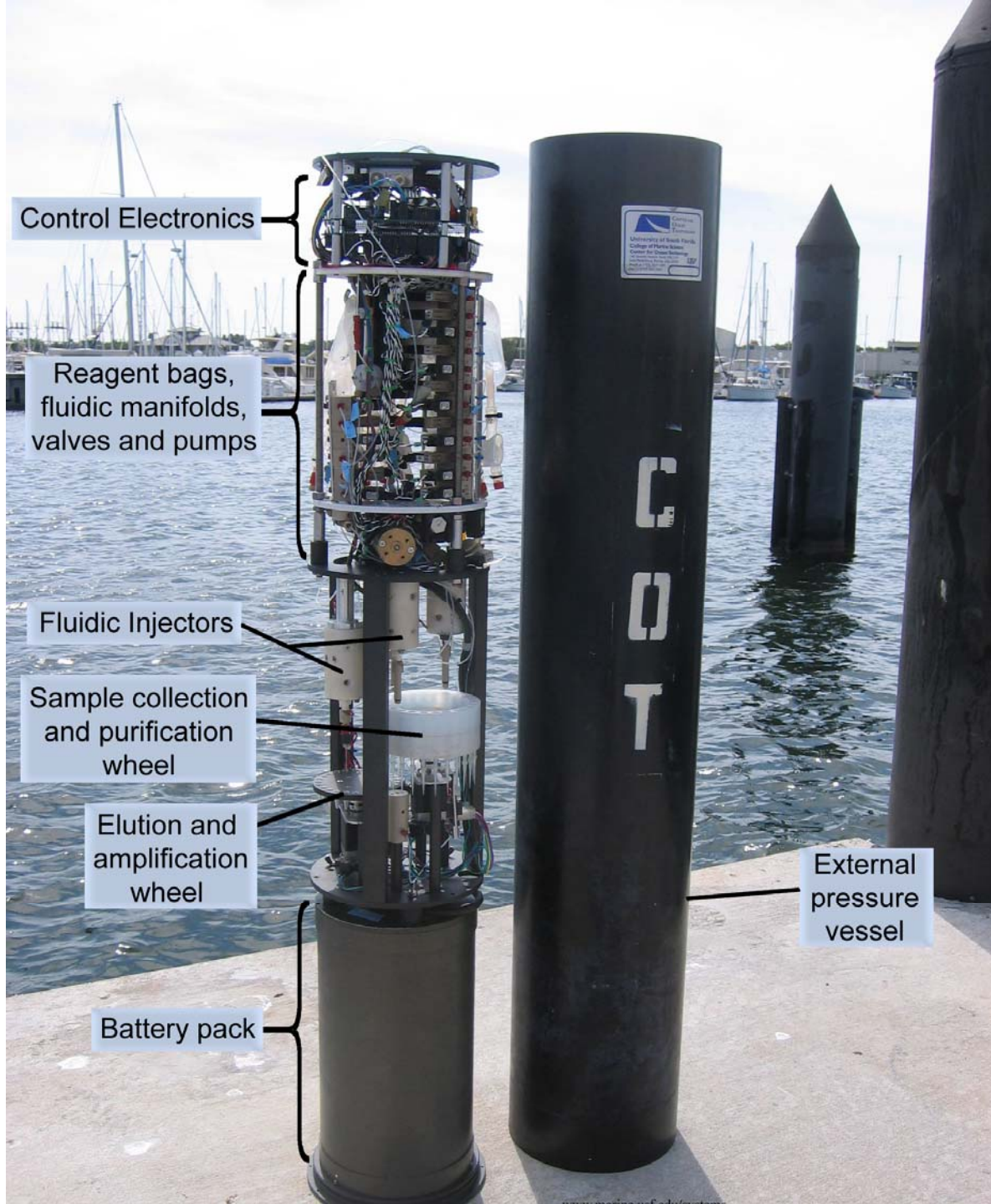
2. Develop field portable sensor hardware with engineers

3. Develop autonomous platforms for use in the oceans

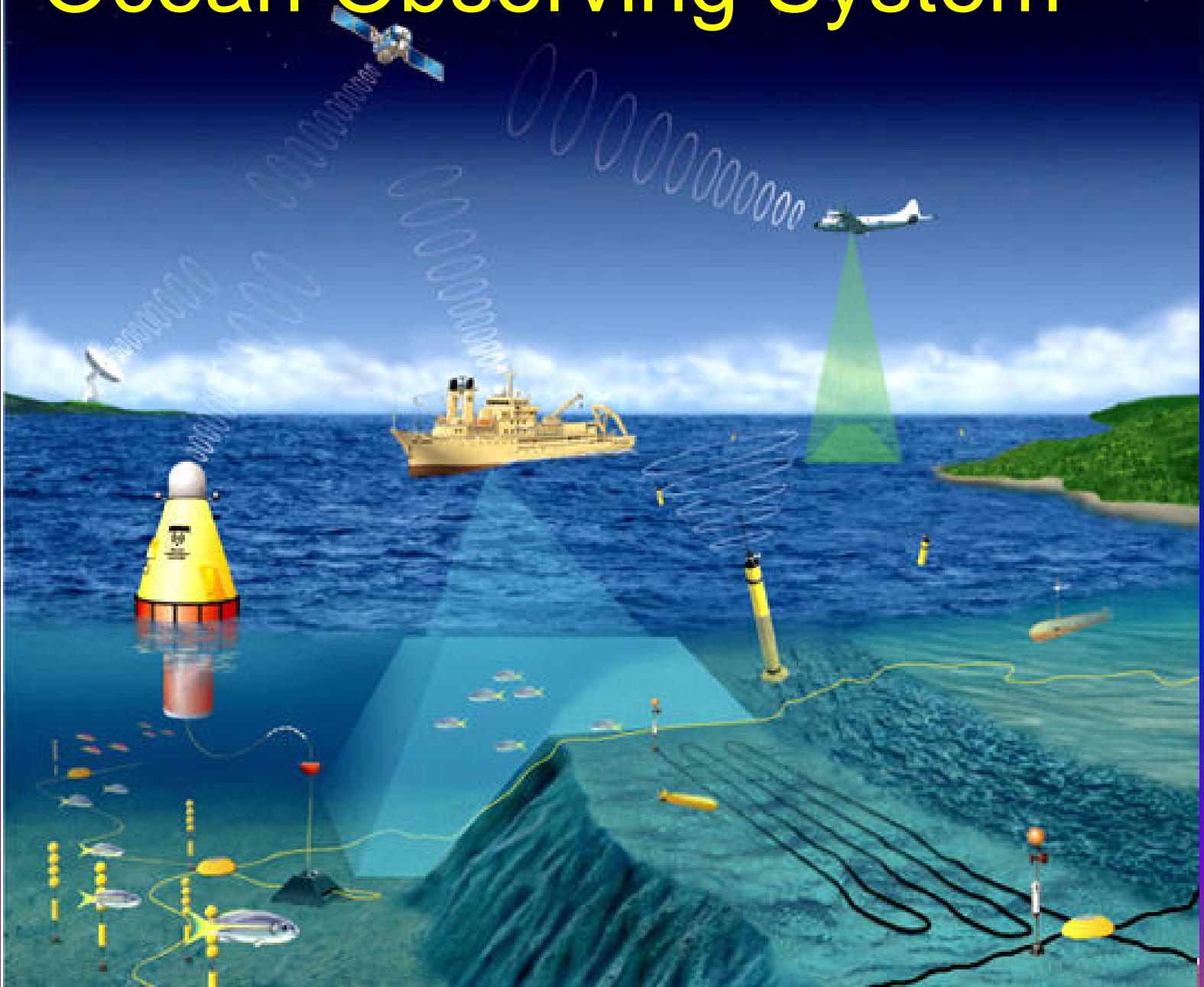


22 cm x
122 cm

The AMG-
Molecular
Biology in a can-
Applications in
Harmful algal
bloom detection,
Coastal Health,
Homeland and
Port security



Ocean Observing System



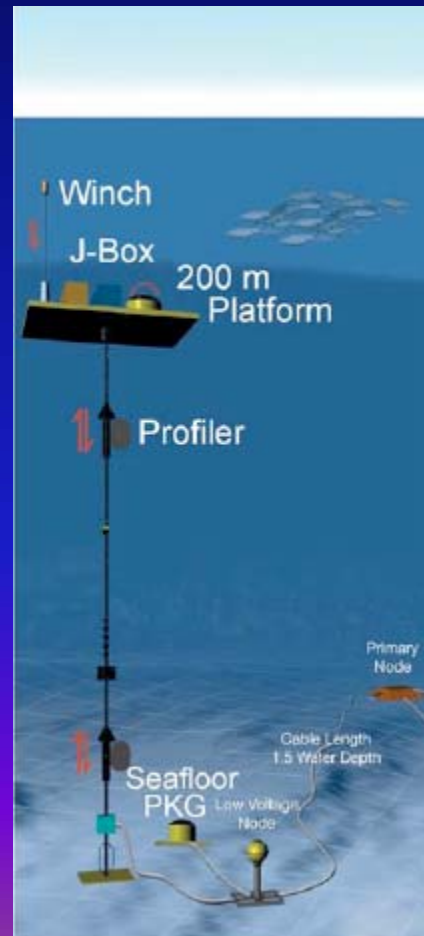
Center for Ocean Technology

SIPPER zooplankton/fish imaging system: Modifications for use in ocean observatories

- Towed system with environmental sensors



- Pumped SIPPER for deployment on observatory vertical profiling moorings



- SIPPER integrated into vertical profiling BSOPS platform



Kendra Daly

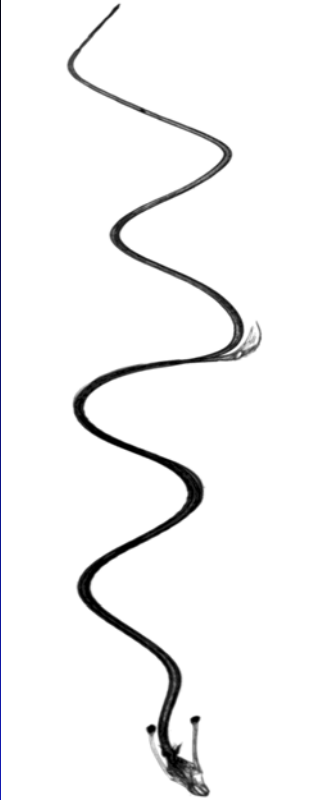


SIPPER Images

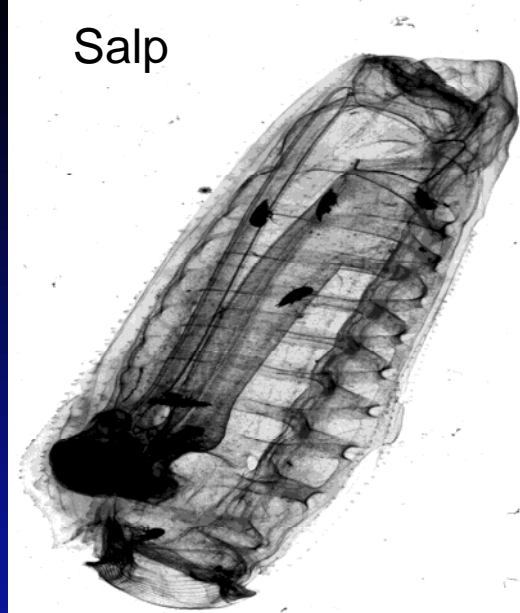


Siphonophore

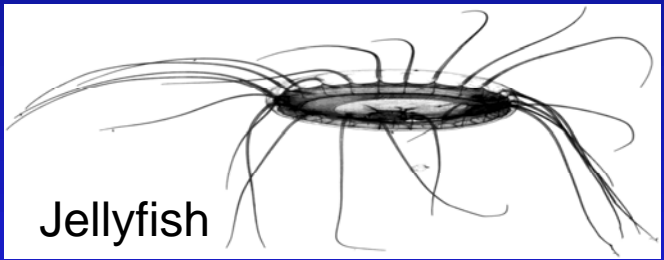
Rhizosolenia diatom mats



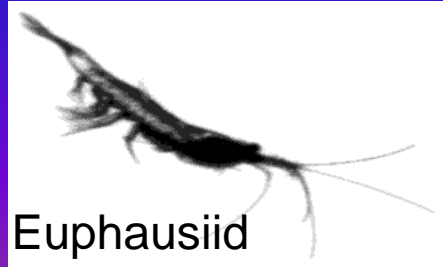
Dragon fish



Salp



Jellyfish



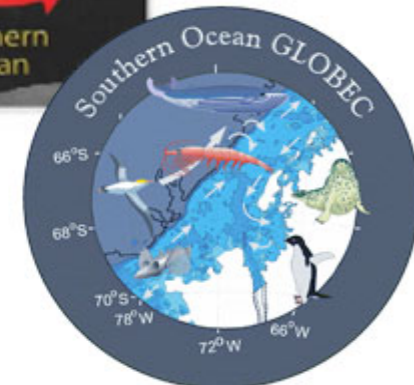
Euphausiid



Pteropod

1 mm

US GLOBEC Three Regional Programs



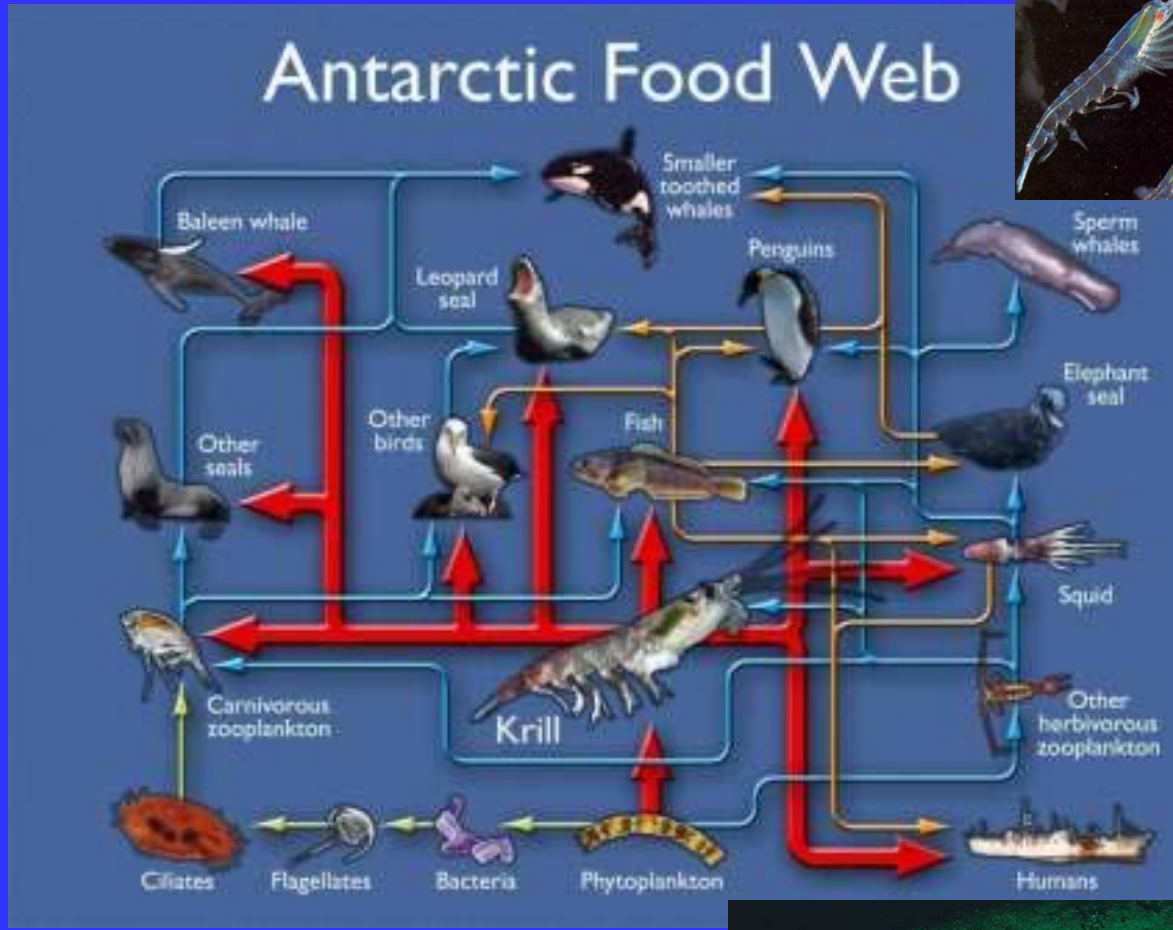
Climate variability examined through

- Retrospective data analyses
- Field process studies
- Synthesis & modeling

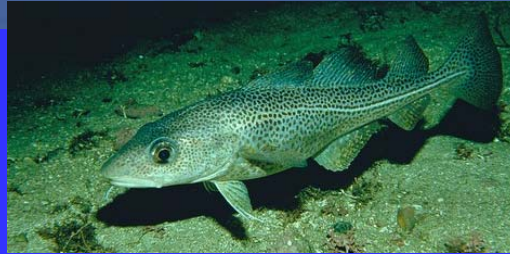
Kendra Daly **GLOBEC Synthesis & Modeling Phase: Food Web Models for Georges Bank, NE Pacific, and Southern Ocean**

Goals

- Comparative analysis of processes between regions
- Develop diagnostic measures to evaluate affects of climate variability and fishing pressure
- Transition results for ecosystem-based fisheries management



Coho salmon
NE Pacific



Atlantic cod
Georges Bank

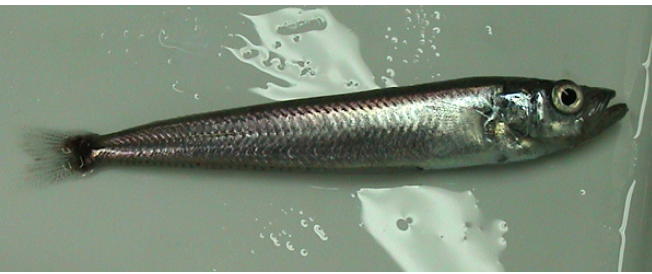
22 PIs from US academia & NOAA/NMFS, plus British Antarctic Survey

The disappearing silverfish

Victim of climate change?



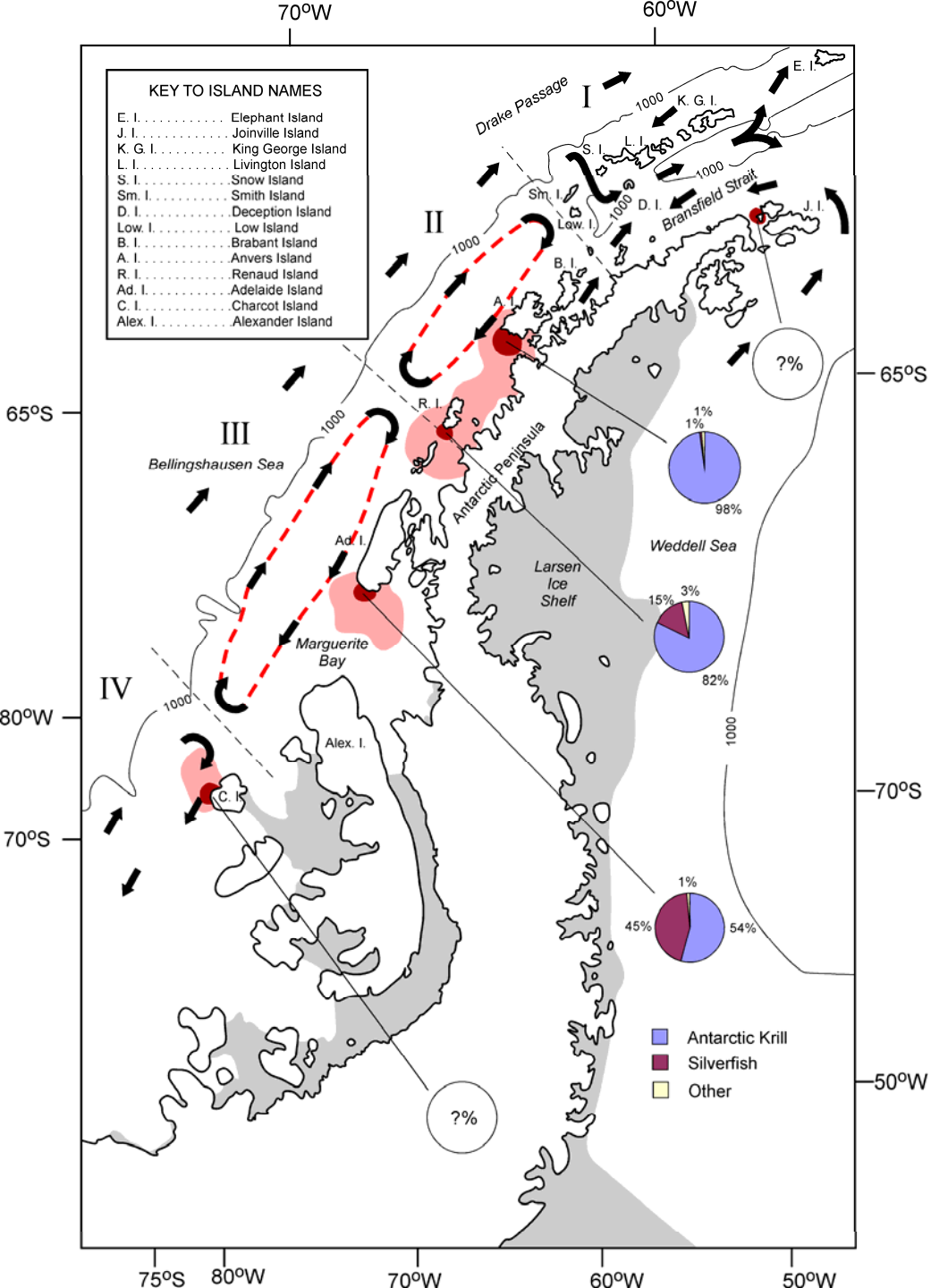
Jose Torres



Silverfish



- Formerly important in Adeline Penguin diets at Palmer
- Now restricted to south of Adelaide Island
- Why? Species disappearance?
- Increase in midwinter temp and decline in sea ice extent during larval development period may have resulted in species decline in the mid-peninsula region
- Eggs only found under sea ice



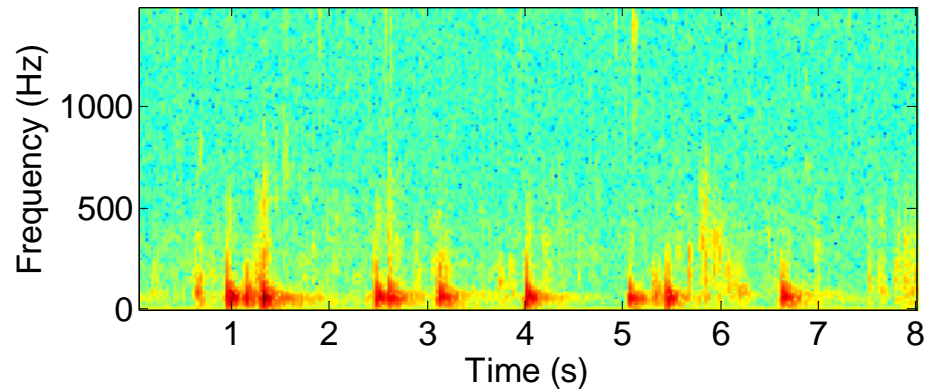
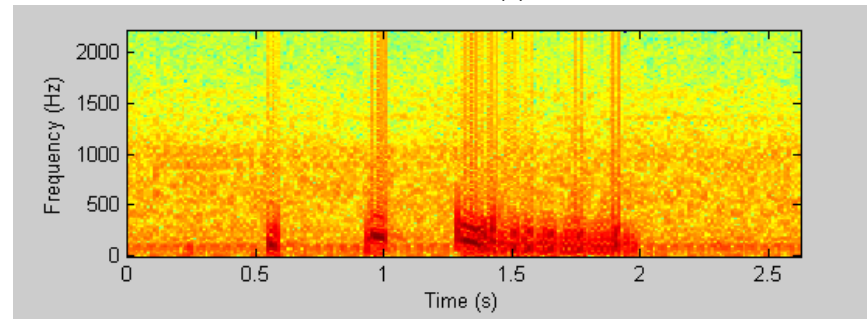
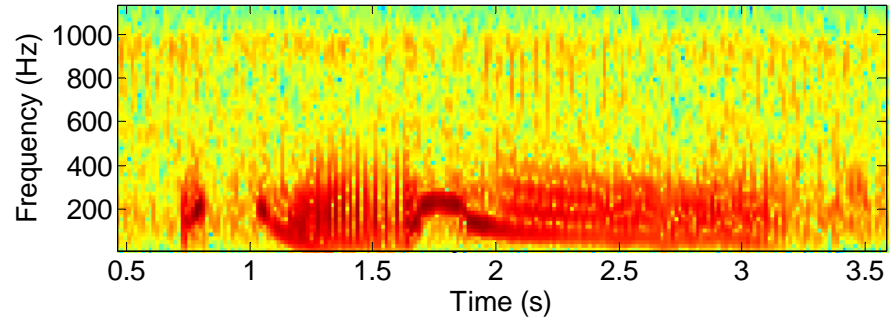
Map showing study sites and penguin diet data for Torres-Fraser 2010 NSF-funded Antarctic Silverfish study

Fisheries Oceanography



David Mann

Groupers Signature Courtship Sounds



Red Grouper



Goliath Grouper



Effects of Noise in the Marine Environment

Natural noise

Man-made noise

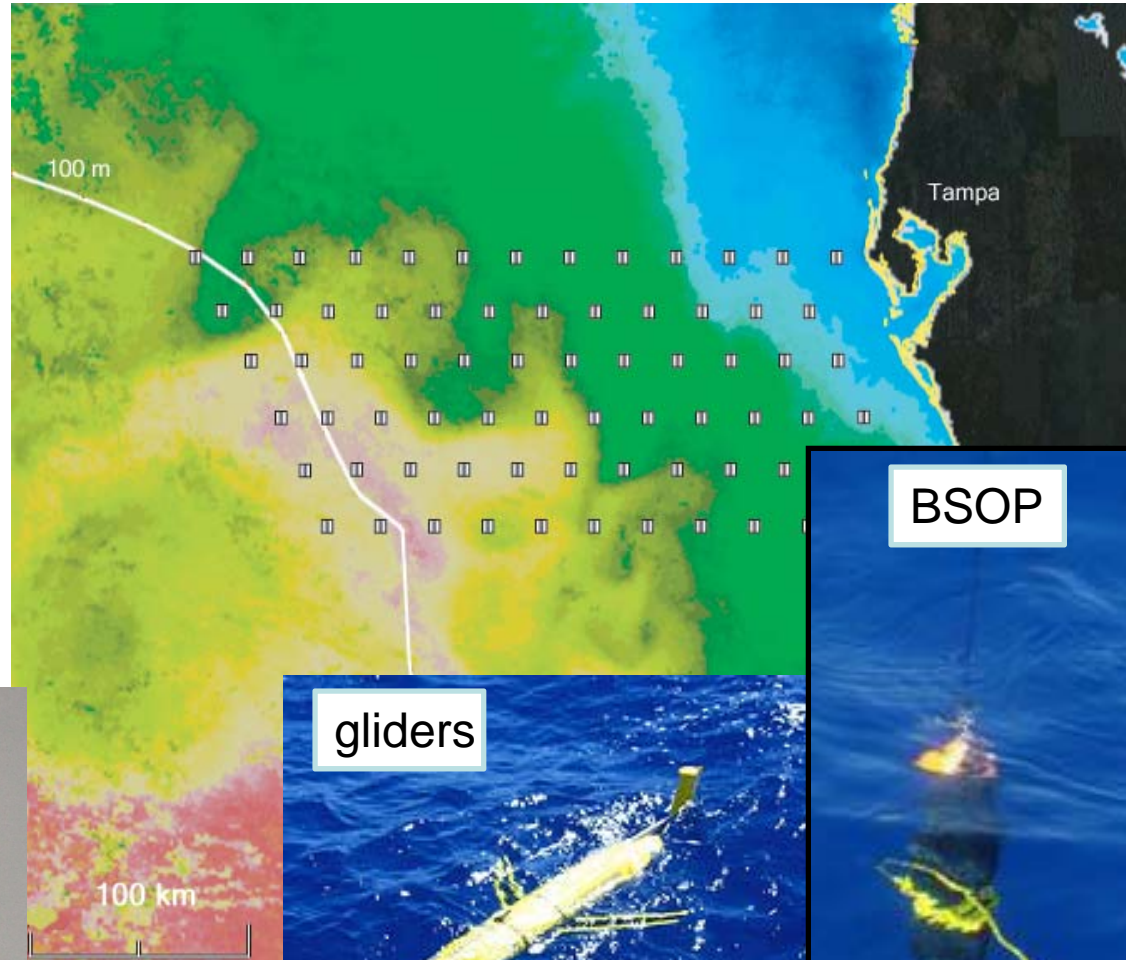
- Shipping
- Sonar
- Seismic



Hearing Measurement of Stranded Beaked Whale

West Florida Shelf Acoustic Array

- 75 Acoustic Recorders
- BSOP
- Glider Fleet
- Track responses of dolphins, whales, and fishes to oceanographic processes such as fronts and upwelling
- NOPP-funded Mann, Weisberg, Muller-Karger



The background of the slide is a photograph taken from the perspective of someone on a boat. The foreground shows the dark blue, choppy water of the ocean with white foam from the boat's wake. In the distance, a green, hilly coastline is visible under a bright blue sky with scattered white clouds. A portion of a black, curved object, likely part of the boat's equipment, is visible in the top left corner.

Themes for Potential Partnerships

- Technology development for biological processes and biodetection
- Predict food web interactions and fisheries
- Water quality, marine animal health, HABs
- Global biogeochemistry and carbon flux