

# ***CENSUS OF MARINE LIFE***

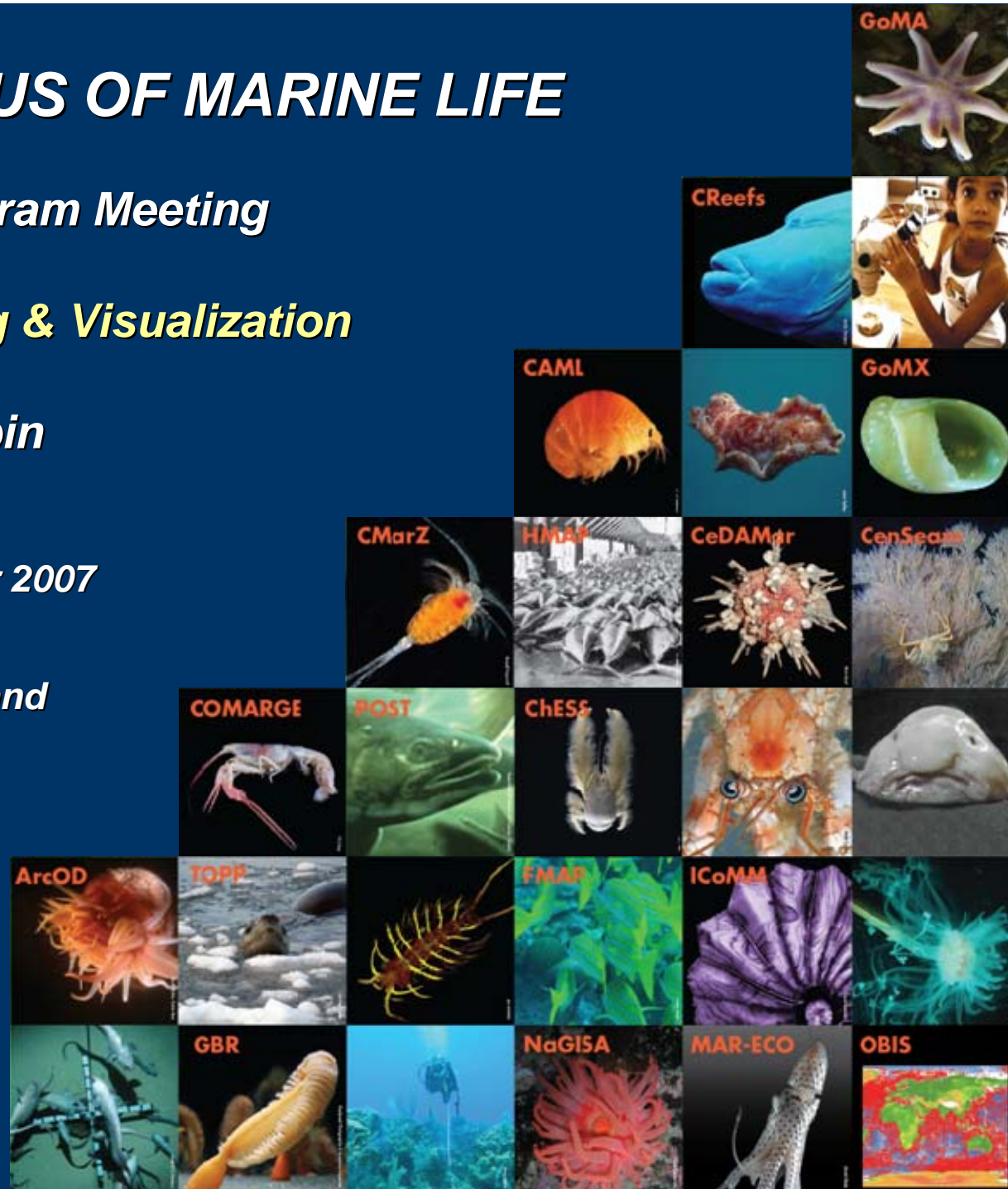
*All Program Meeting*

*Mapping & Visualization*

*Pat Halpin*

*November 2007*

*Auckland,  
New Zealand*



# Background

In preparation for the public presentation of the “First Census of Marine Life” in **2010**, a series of planning and management efforts were initiated in 2006-2007.

A “**Framework**” **committee** was formed to explore directions and help set priorities for the culmination of the first Census efforts in 2010.

The development of **consistent, high-impact mapping and visualization products and media across all census programs and projects** was a significant and recurring priority of the Framework Committee’s findings.



# Background *(continued)*

The final report of the Framework Committee stated that:

*“Through a combination of an **internal mapping and visualization development program** and the nurturing of **new partnerships**, the Census can move to more proactively **advance our mapping and visualization capabilities**. By developing a mapping and visualization development program we will encourage **shared tool development, the establishment of standards, protocols, training workshops and ongoing support services**.”*

*(From Seven Seas, One Ocean: Final Report from the Census of Marine Life Framework Committee - A summary report from the working group tasked with developing the reporting framework for the 2010 Census of Marine Life)*



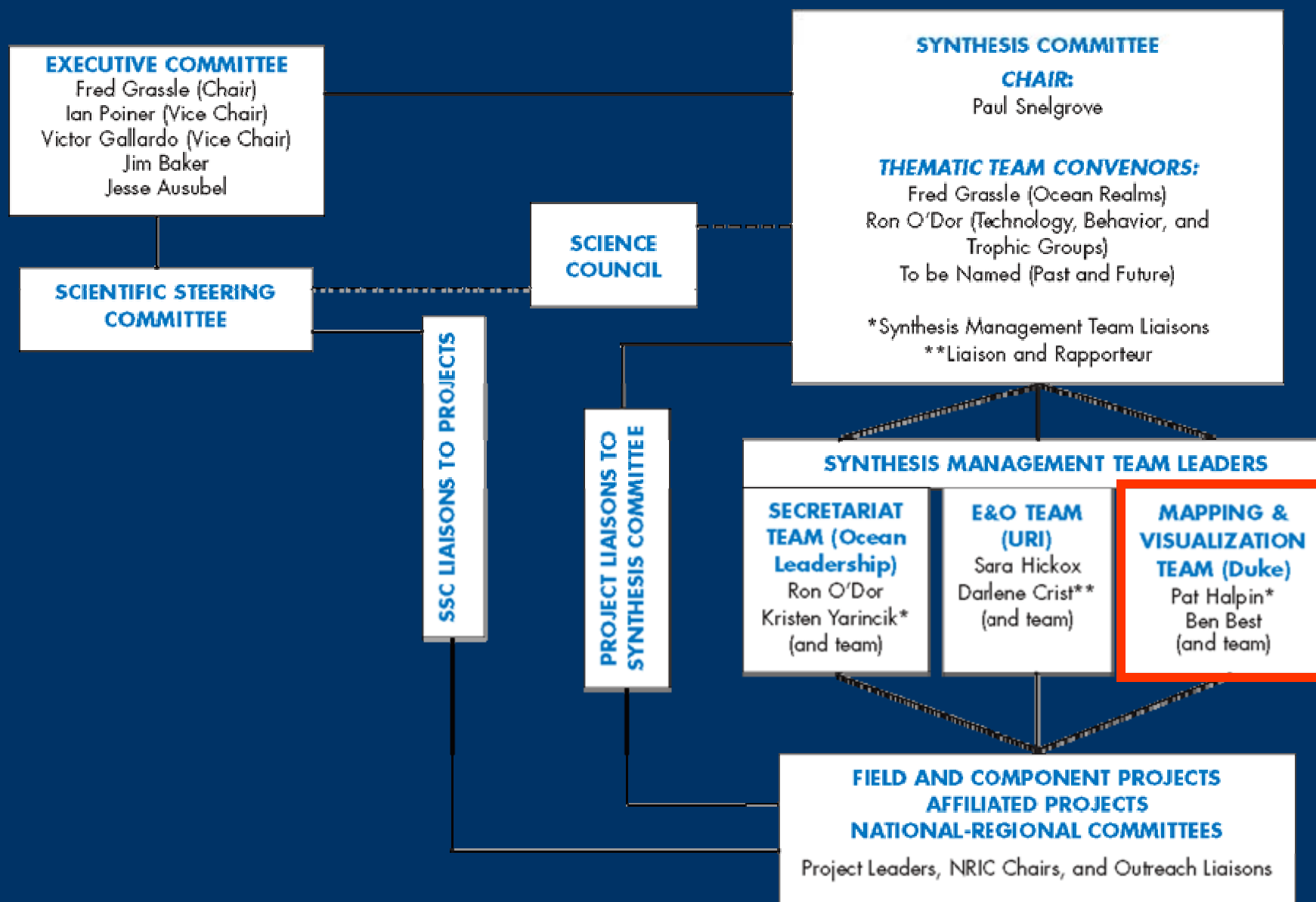
# Mission

- The need to **communicate effectively to a wide range of audiences** is a fundamental goal of the Census of Marine Life.
- Creating **compelling, intuitive, accurate and consistent** mapping and visualization products is essential to communicating the message of each Census project to the scientific and popular media.
- To better achieve these fundamental goals we need to proactively develop and implement **common geographic and visualization tools and methods** as we prepare for the public presentation of the first Census of Marine Life in 2010.

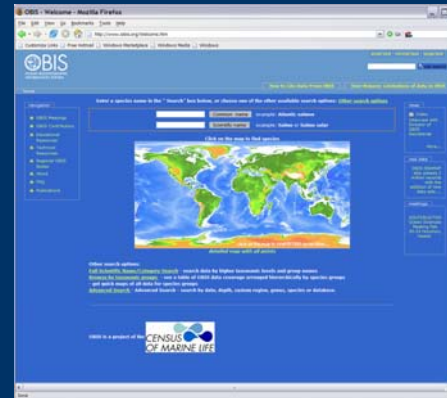




## TOWARD THE 2010 "FIRST CENSUS OF MARINE LIFE" Synthesis Phase Committee and Team Structure

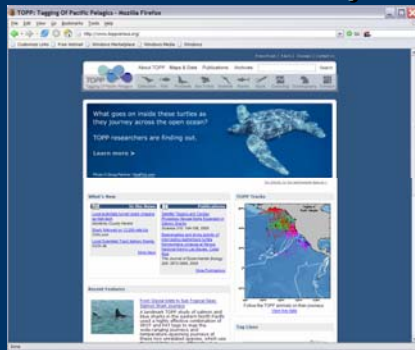


## iOBIS data portal



field project data

## CoML Field Projects



synthesis data

map,  
visualization,  
internet...  
**Products**

## Mapping & Visualization team

technical  
facilitation





# Methods

- The Mapping and Visualization effort is designed primarily as a **facilitation and capacity building process**.
- Common tools, methods, training and direct assistance will be provided to Census project to help each project both individually and as a cohesive group communicate their findings in the scientific and popular media.
- The **success of this process is based on active participation** and buy-in from each Census team.



# Roles and Partnerships

The primary clients during this project are the **scientific and technical staff from within the Census**, working on visual products that communicate to a wider audience.

Technical expertise and promotional capabilities will be drawn from partnerships with **industry partners**, including Google, National Geographic and ESRI.

The CoML M&V team will act as **technical liaison** for visual data exchange between the various CoML field projects, higher level CoML synthesis teams, and industry partners





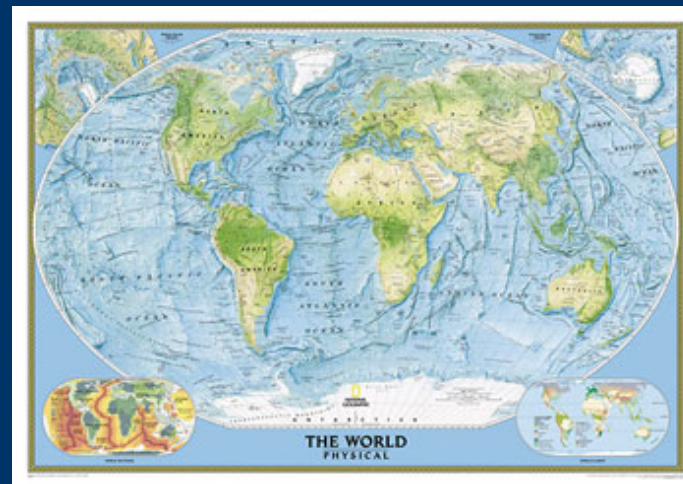
# Partner: National Geographic Society



## Print Publications



## Print Mapping



## Internet Mapping



# NGS: Wall Map of Census Activities

The National Geographic Society



## Product 1

Title:

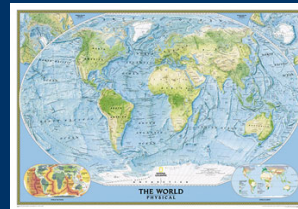
*Census of Marine Life: Exploring Ocean Life, Past, Present, and Future*

Format:

Wall map – 2 x 3 feet

Release date:

Late 2008



Description: Double-sided World map depicting the survey extents and technologies used by different research groups to census the oceans in the past and present and to model future ocean life. The map will show the spatial footprints of the surveys with text and photos of the species surveyed and the technologies employed, with inset maps and graphs of major findings. Reverse side describes the Census effort, with profiles of the research programs and sponsors, additional photographs, logos and web links.

Distribution: ~100,000 copies the Society's geography education alliance network; local language editions of *National Geographic* magazine; future editions of *EarthPulse*



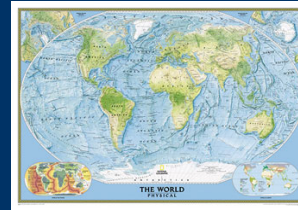
# NGS: Wall Map of Census Discoveries

The National Geographic Society



## Product 2

Title: *Biodiversity of the Oceans: Past, Present, and Future*  
Format: Wall map – 2 x 3 feet  
Release date: October 2010



Description: Double-sided World map depicting the most charismatic species that were discovered, tracked, and modeled in the Census, along with the major findings regarding past, present, and future populations. The map will show Large Marine Ecosystems (LME) or Marine Ecoregions of the World (MEOW), with photographs of the species inhabiting them. Reverse side tells stories of the ecosystem services provided by marine biota, population and ecosystem trends, and threats to marine species and ecosystem services.

Distribution: ~100,000. *A major corporate sponsorship could potentially enable distribution of the map or maps to all 113,000 K-12 schools in the U.S.*

# NGS: Internet Atlas of Marine Life

The National Geographic Society



## Product 3

Title:

*Atlas of Marine Life*

Format:

Rich Internet Application

Launch date:

October 2010, with *Biodiversity of the Oceans* wall map

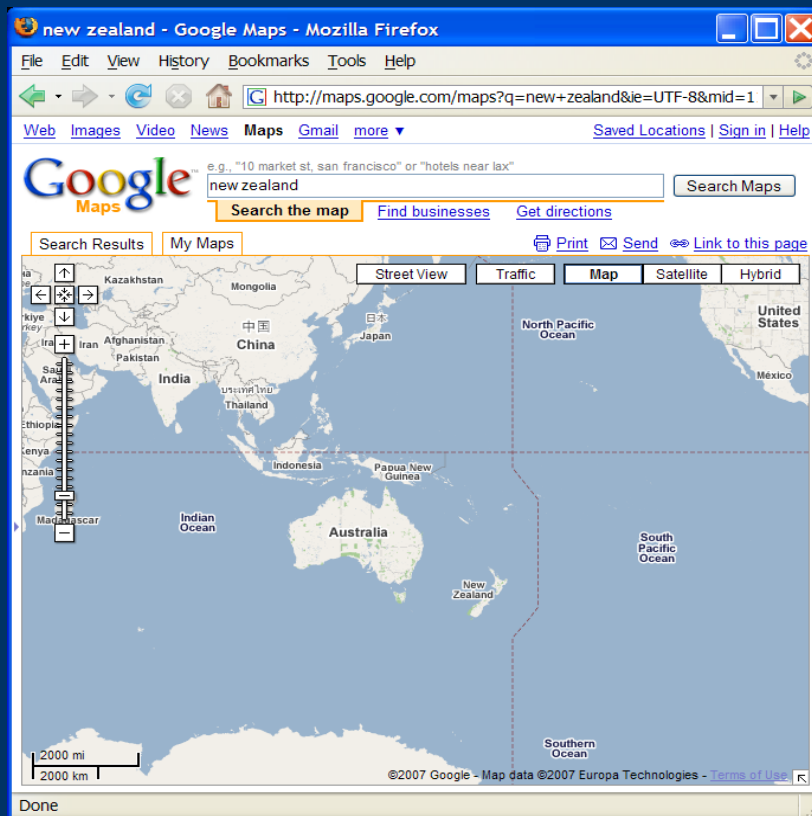


**Description:** Map-centric website allowing users to zoom to any place on Earth and switch map themes between physical oceanographic variables, large marine ecosystems, marine ecoregions, species diversity, CoML surveys and findings (grouped by past, present, and future), marine protected areas, threats, ecosystem services values, etc. Maps are clickable to provide descriptions, stories, photos, video, audio, and graphs associated with map features. There will be links to CoML programs, sponsors, Encyclopedia of Life, and NG.com content.

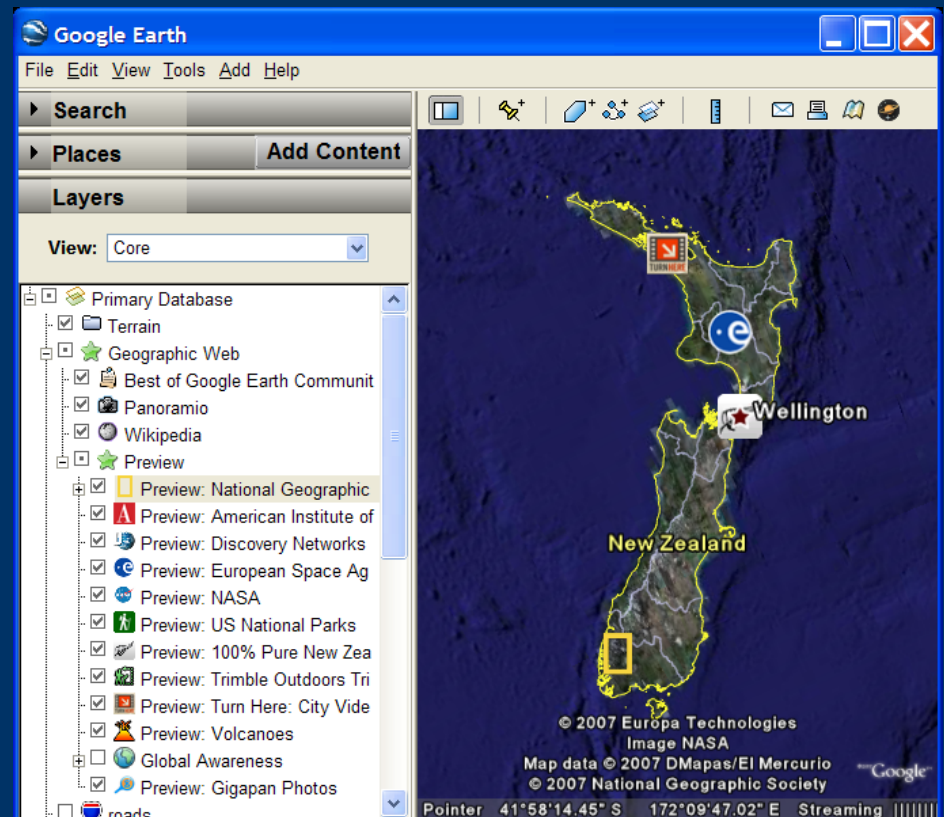
**Distribution:** The website would be accessible to a worldwide audience, and could be promoted, linked to, and/or hosted by National Geographic, the Census of Marine Life, or other partner organizations.



# Partner: Google



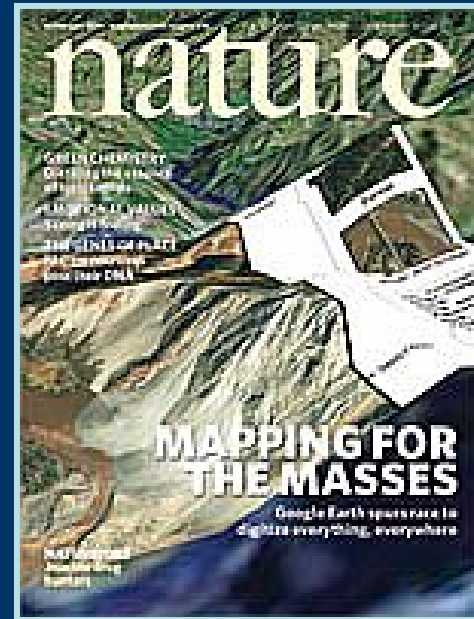
Google Maps (browser)



Google Earth (application)

# Google Oceans

- Goals: to develop a better mapping media for ocean applications
- Process: An advisory Council was formed to communicate needs and ideas to the Google team.
- CoML representation
  - Sylvia Earle (lead)
  - Fred Grassle (CoML/OBIS)
  - Pat Halpin (CoML Map&Viz)
  - Barb Block (TOPP)
  - Wes Tunnell (US-NC, GoMEX)...

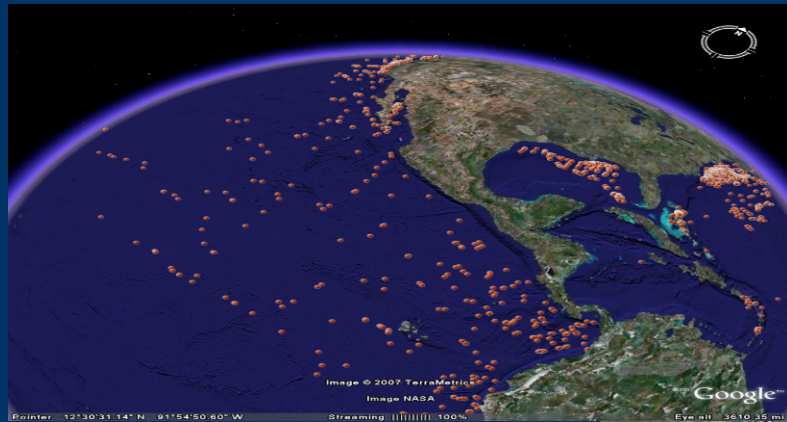




# Google Earth / Google Oceans

*Most Census data & activities are mappable on Google Earth*

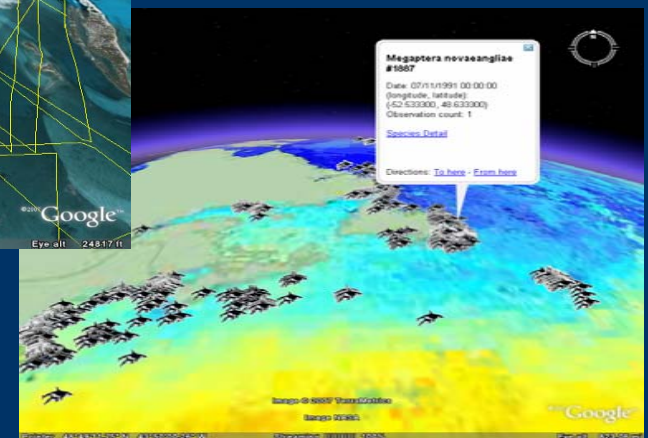
- Data
- Expeditions
- Stories



*Observations*



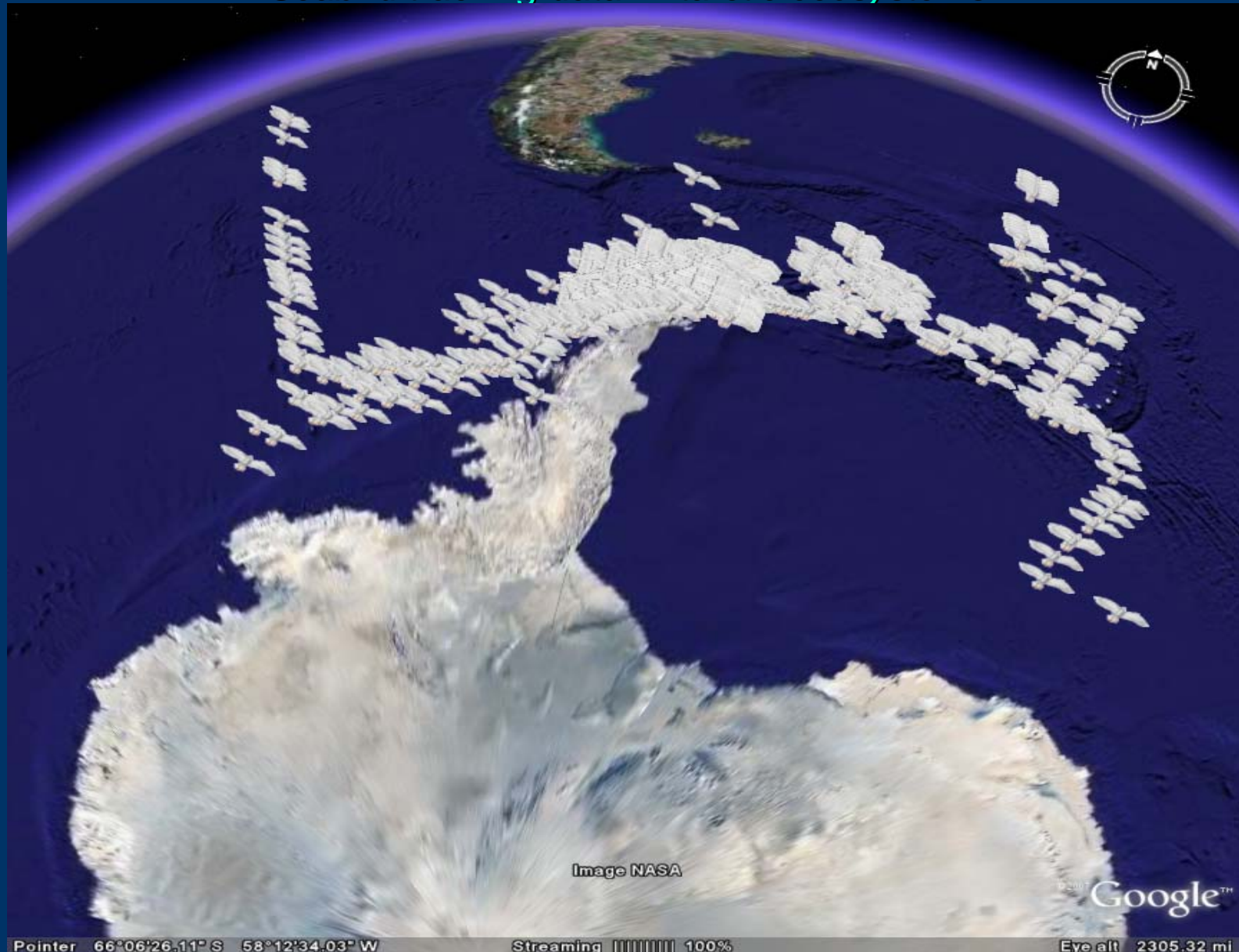
*Tracklines*



*Oceanographic data*

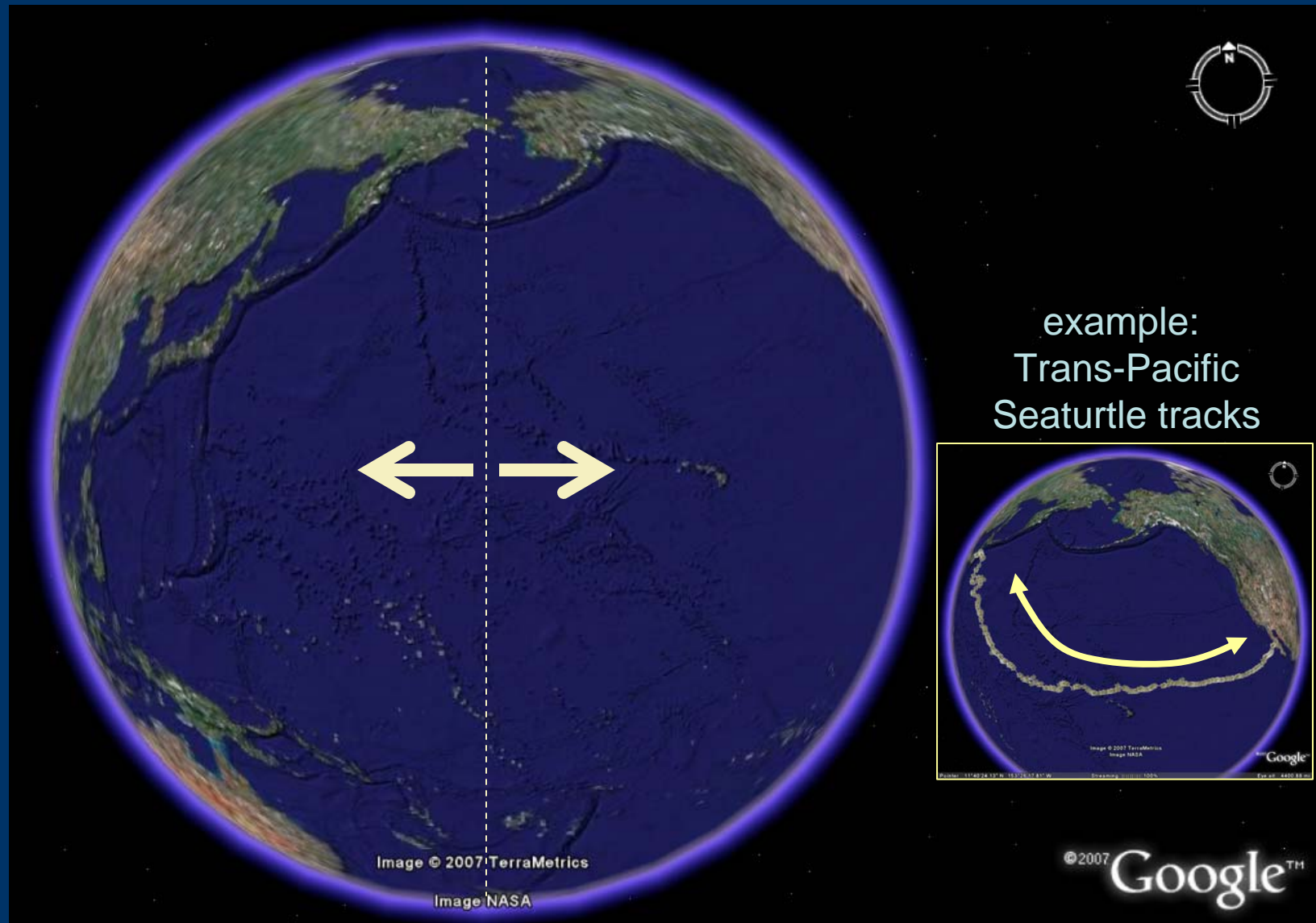
# Google Earth: Polar Projections

- *Seabird tracking data Antarctic ecosystems* -



# Google Earth: Seamless Oceans

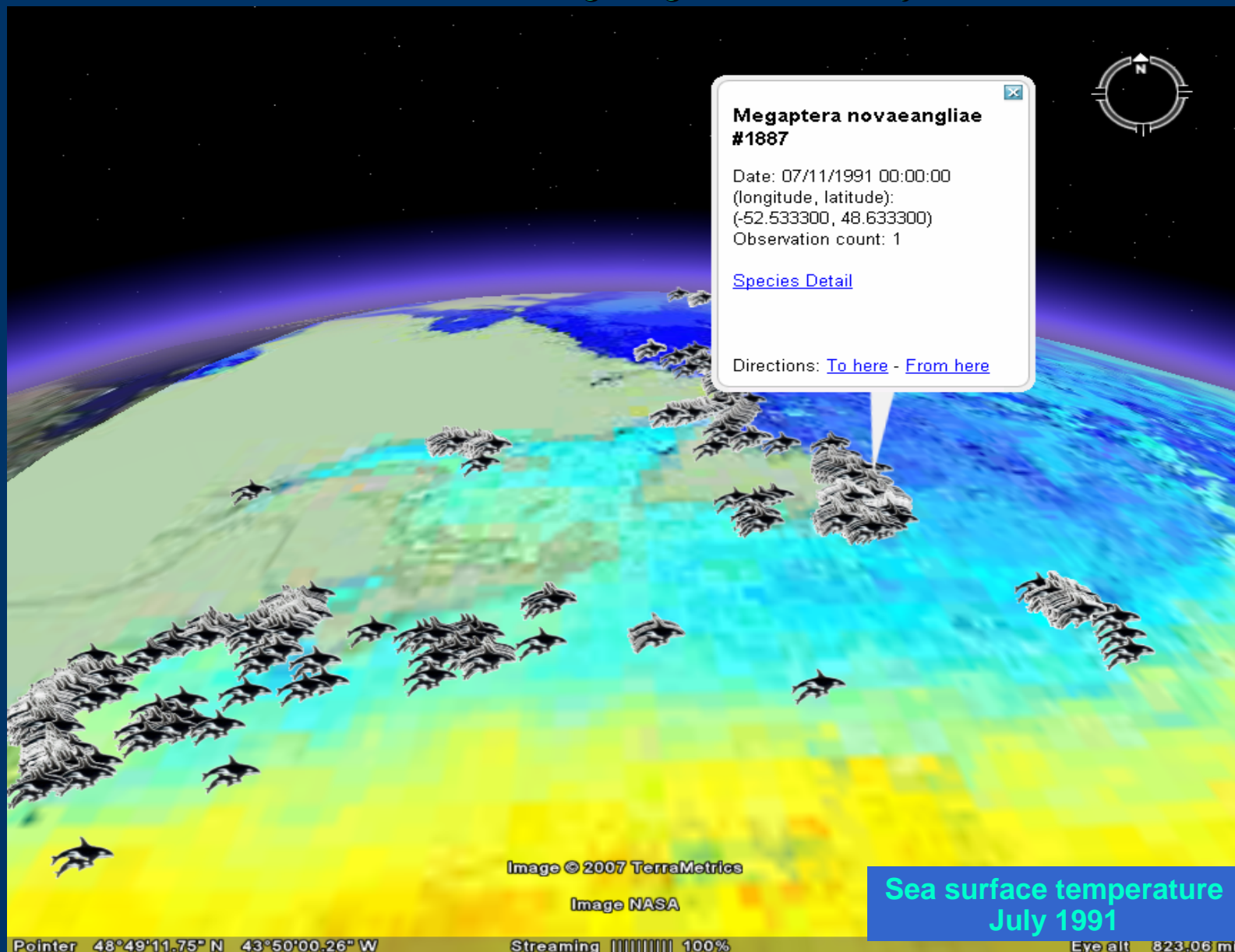
*Ability to seamlessly cross 180° breaks*



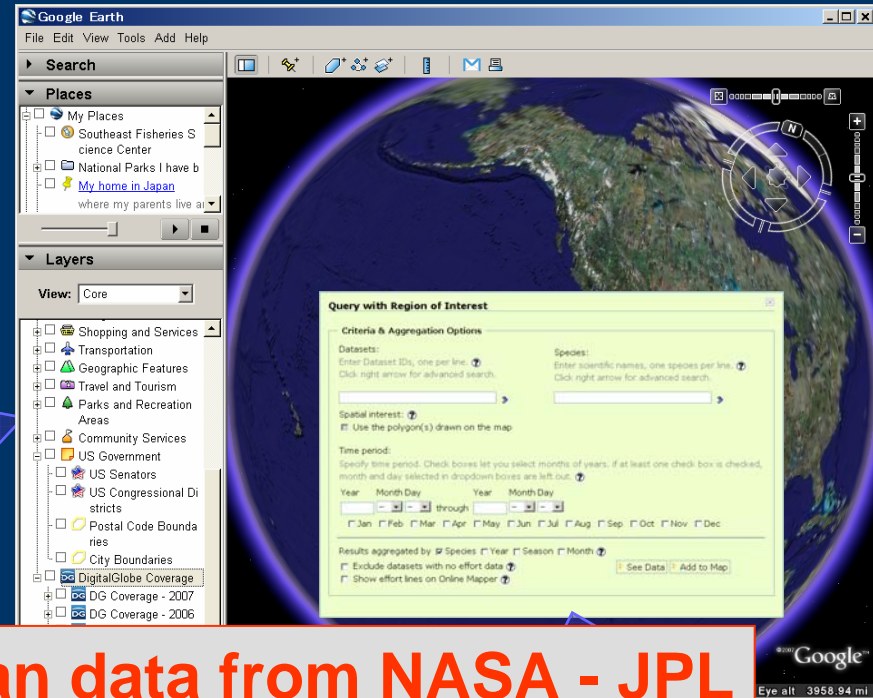
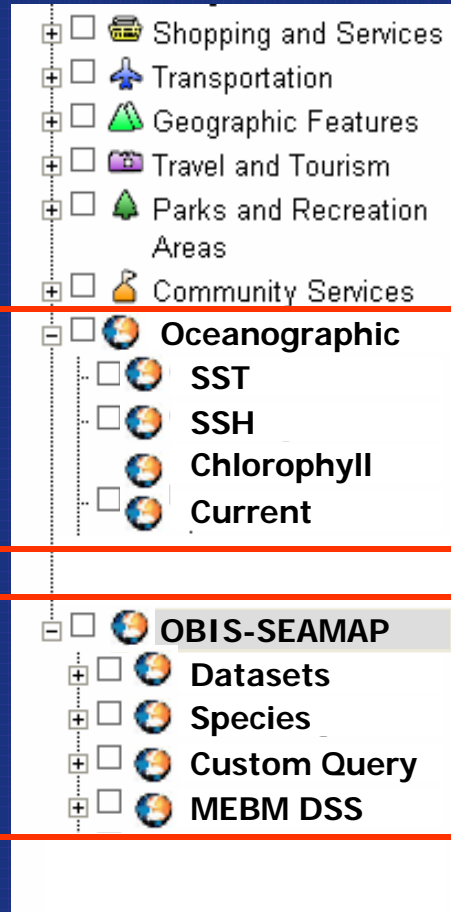


# Ocean Environmental Data

- Marine mammal sightings with SST layers -



Listed in Layers box with custom query popup windows



**Ocean data from NASA - JPL**

**Marine animal data from SEAMAP**

Sample popup window from SEAMAP Online Mapper (under development) at  
[http://seamap.env.duke.edu/prod/mapservice/googlemaps/seamap\\_gm.shtml](http://seamap.env.duke.edu/prod/mapservice/googlemaps/seamap_gm.shtml)


# Sampling site location data


- WIDECAST Nesting sites in St. Eustatius with data and photo in popup -


**Zeelandia Beach**

Zeelandia Beach, St. Eustatius (ANE1)

**Data provider(s)**

 Nicole Esteban ([manager@statiapark.org](mailto:manager@statiapark.org))  
Manager  
St. Eustatius National and Marine Parks (<http://www.statiapark.org>)

 Arturo Herrera ([research@statiapark.org](mailto:research@statiapark.org))  
Marine Turtle Program Coordinator  
St. Eustatius National and Marine Parks (<http://www.statiapark.org>)



**Nesting Activity**

Species	Year data collected	#Crawls/year
Green	2006	25-100
Loggerhead	2006	N/A
Hawksbill	2006	<25
Leatherback	2006	<25
Olive Ridley	2006	N/A
Kemp's Ridley	2006	N/A

**Nesting Site Attributes**

Beach Name Zeelandia Beach

Long/Lat -62.9793, 17.5059

Length (m) 1200

Beach Status Active

Monitoring Status 2002 - 2006: March - November: Nightly patrols (March - October) and morning crawl counts

Confidence High

Comments

Image © 2007 DigitalGlobe

©2007 Google™

Pointer 17°30'08.51" N 62°58'36.09" W elev 67 ft Streaming 100%

Eye alt 1931 ft





# Sampling site location data: NaGISA?

Caribbean Sea (CS) — NaGISA - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.nagisa.coml.org/region/cs/caribbean

CoML NAGISA Search

**NaGISA** Discovering the Worlds Near Shore

Log in Join us EN JP

You are here: Home → Regional pages → CS


**Caribbean Sea (CS)**

Run by Dr J. J. Cruz with the help of Elizabeth Huck of the Laboratorio de Biología Marina, Departamento de Estudios Ambientales, [Universidad Simon Bolívar](#) in Caracas, Venezuela.

NaGISA Caribbean Sea (CS) includes the coastlines of the Caribbean Sea and its environs (Gulf of Mexico etc.). NaGISA CS started in 2005 and currently has seven (7) sites. NaGISA sites in the Caribbean Sea are shown here in yellow. Click on the alphabet bubble to find out more about a particular site.

CS Activities: [Workshops](#) and [Meetings](#)

**Map of Current Sampling Sites in Caribbean Sea**



Discovery Bay  
Jamaica

A. USA, Florida Destin's East Pass (High School Sandy Beach site) coordinated by Hernandez, Richard

B. Cuba, La Habana coordinated by Ortiz, Manuel

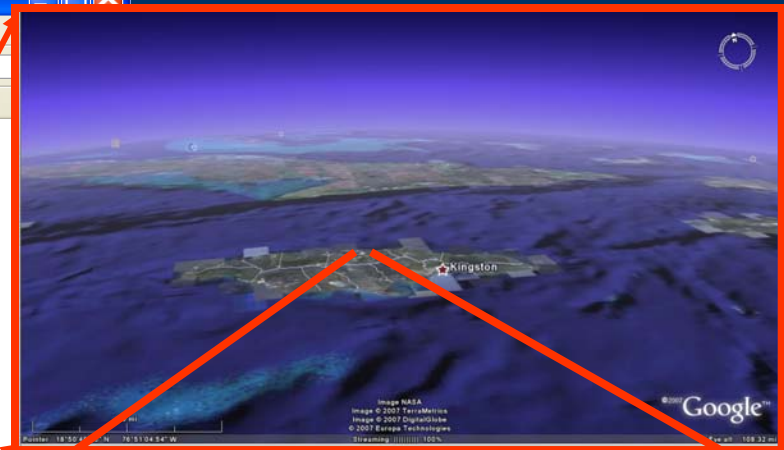
C. Jamaica, Discovery Bay coordinated by Quinn, Norman

D. Colombia, San Andres Isla coordinated by Abril, Alfredo

E. Curacao, Netherlands Antilles coordinated by Piontek, Steve

F. Trinidad coordinated by Gobin, Judith

G. Tobago coordinated by Gobin, Judith



# Mapping Census Activities

## *Coml.org - Census of Marine Life Portal*

Google Map  
For project  
locator / links

Census of Marine Life Portal - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.coml.org/

Google Search

Fransais • Deutsch • 日本語 • Español • English

**CENSUS OF MARINE LIFE**

The Census of Marine Life is a growing global network of researchers in more than 80 nations engaged in a ten-year initiative to assess and explain the diversity, distribution, and abundance of marine life in the oceans -- past, present, and future.

Welcome to the Census of Marine Life International Web Portal

Search • Census Partner Resources

**The Census**

- About the Census
- Census Secretariat
- Contact
- Meetings
- Monthly Updates
- Reports Archive
- Partners & Sponsors
- History of the Census
- Bibliography Database
- Participant Database

**Media Resources**

- Census in the News
- Press Releases
- Media Coverage
- Media Contact List
- Experts List
- Images & Videos

**Education**

- Investigating Marine Life
- Outreach Projects

**Project Descriptions**

- Abyssal Plains
- Antarctic Ocean
- Arctic Ocean
- Continental Margins
- Continental Shelves
- Coral Reefs
- Information System
- Microbes
- Mid-ocean Ridges
- Near Shore
- Oceans Future
- Oceans Past
- Regional Ecosystems
- Seamounts
- Top Predators
- Vents and Seeps
- Zooplankton

**Affiliated Activities**

- CoML-affiliated Cruises
- DNA Barcoding
- Galatee Film Project
- Great Barrier Reef Seabed
- Gulf of Mexico
- Technology Working Group

**Conversations**

- Dr. Malcolm Clark

**TOPP/CAML Expedition Reports from Antarctic Peninsula Region**

Follow along as an international team of researchers studies the foraging ecology of crabeater and southern elephant seals and the physical oceanography of the Antarctic Peninsula region. Researchers are deploying tags that will transmit information on the seals' locations and diving behaviors, as well as data on the temperature and salinity of the water as they dive.

[www.ccpo.edu.edu/Research/globec/costa\\_april07/index.htm](http://www.ccpo.edu.edu/Research/globec/costa_april07/index.htm)  
or [ontoppoftheworld.blogspot.com/](http://ontoppoftheworld.blogspot.com/).  
(Photo: The Seal Team)

**Locations of CoML Project Activities**  
(not all projects are currently represented)

Map Satellite Hybrid

Activities on the map Hide labels

- NaGISA
- GoMA
- MAR-ECO
- ChEss
- CeDAMar
- POST
- TOPP

**Quick Links: Project Sites**

- Census Secretariat
- ArcOD
- CAML
- CeDAMar
- CenSeam
- ChEss
- CMarZ
- COMARGE
- CRefs
- GoMA
- ICoMM
- MAR-ECO
- NaGISA
- POST
- TOPP
- FMAP
- HMAP
- OBIS

**Regional and National Committees**

- Australia
- Canada
- Caribbean
- China
- Europe
- Indian Ocean
- United States

**Working Groups**

- DNA
- SCOR

Launch in Google Earth (Get Google Earth) | View the map full size



# CoML Activities

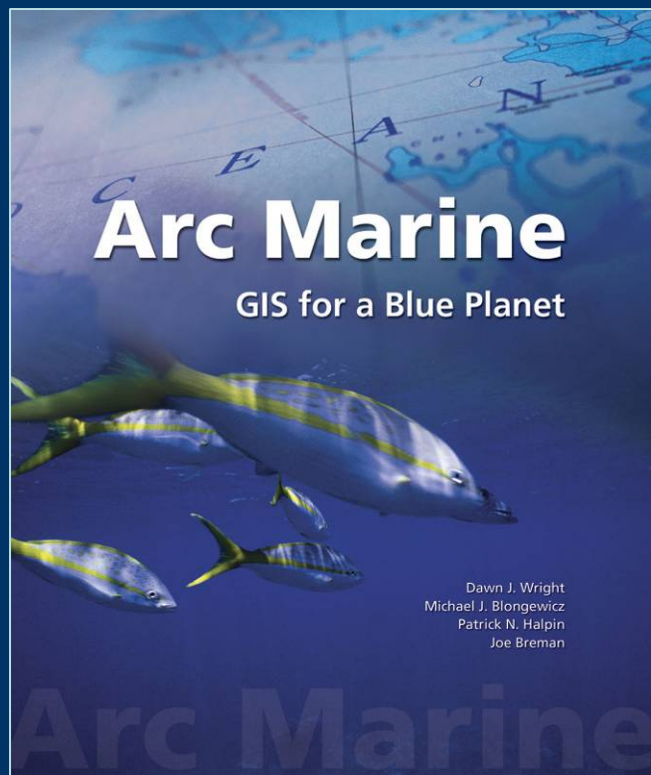
- How can we better represent all of the activities of the Census?
- How do we combine multiple types of activities in an easy to understand manner?
- Can we develop a dynamic chronology of the first 10 years of the Census?



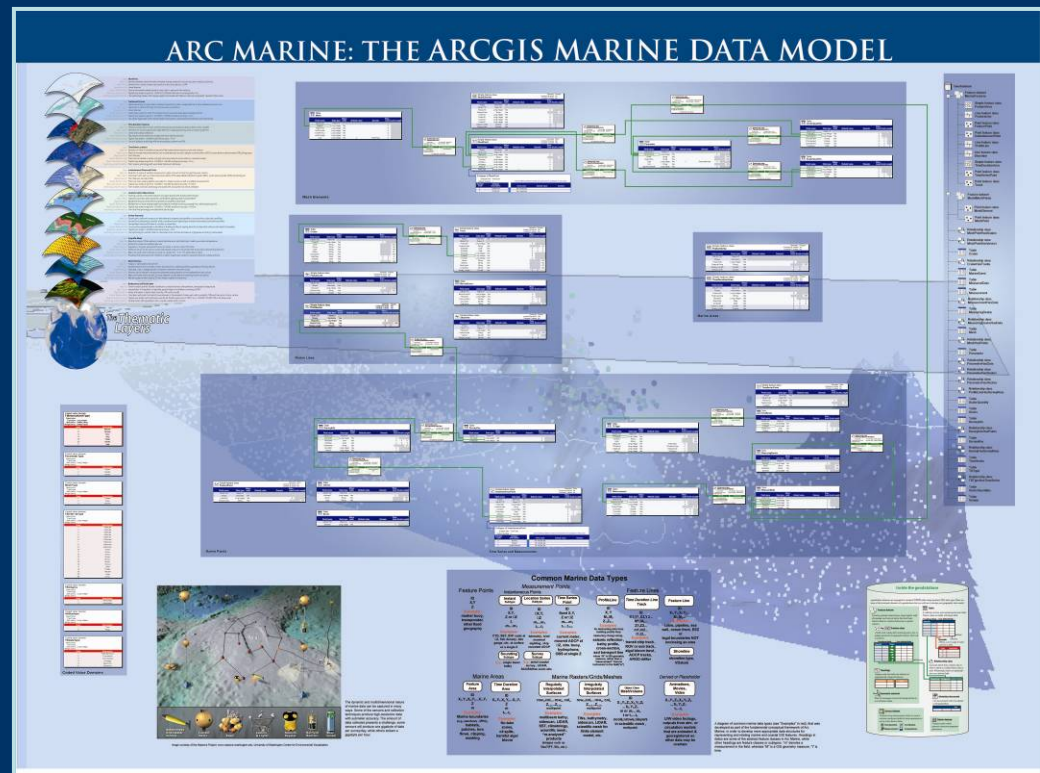


# Partner: ESRI

Environmental Science Research Institute (ESRI)  
ArcGIS Marine Data Model - relational database design



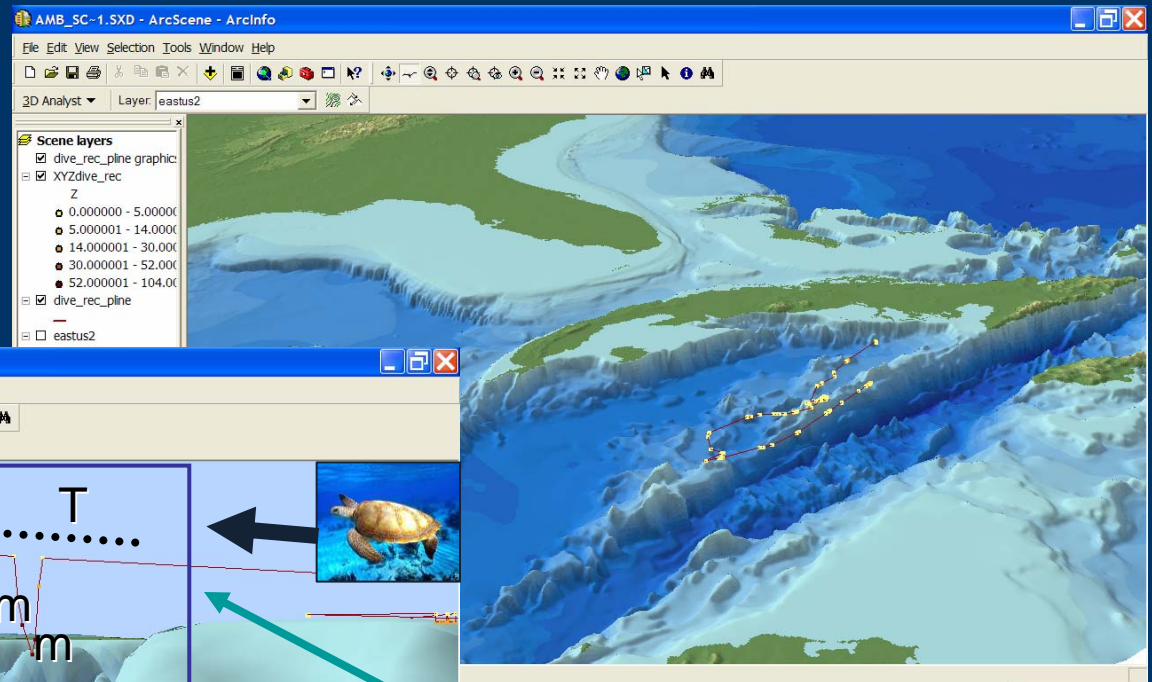
*Released June 2007*



# ESRI: GIS Visualization & Analysis

Environmental Science Research Institute (ESRI)

*3D + Time Telemetry  
Tracking  
- Location series with depth -*



Dive Profiles:  
~4D Data (X,Y,Z,T m...m)



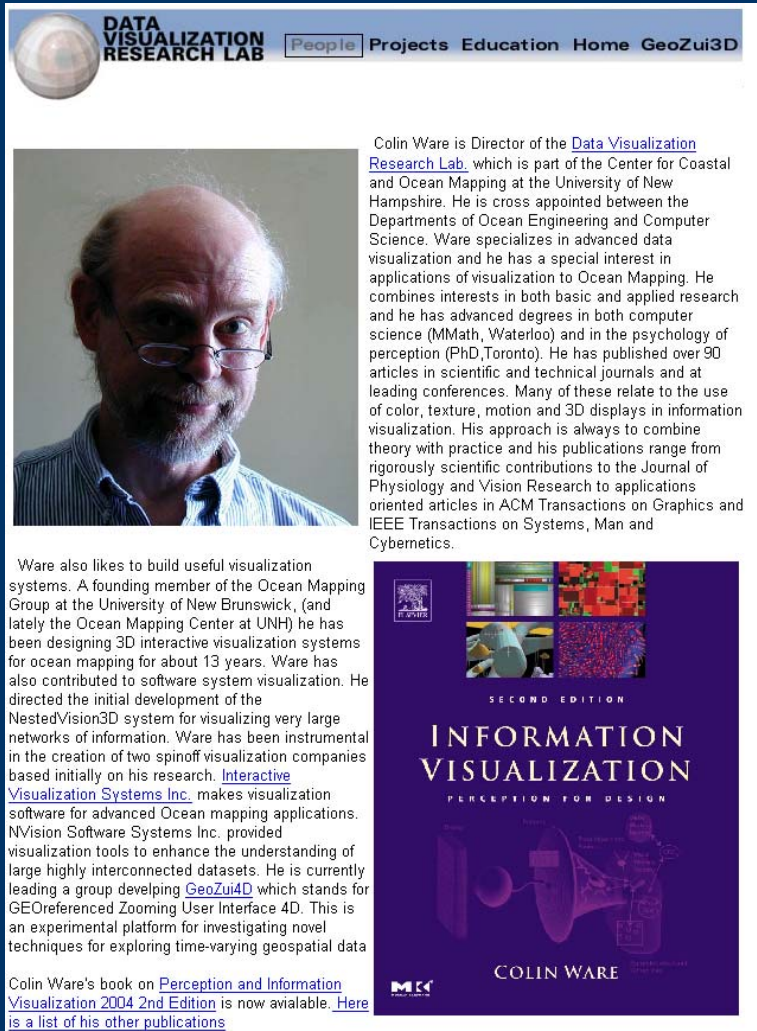


# Partners: Other Visualization Experts

*(example potential partner...)*

- Colin Ware (UNH)

GeoZUI



The screenshot shows the homepage of the Data Visualization Research Lab. At the top, there is a navigation bar with links: People, Projects, Education, Home, and GeoZui3D. Below the navigation bar is a large portrait of Colin Ware on the left. To the right of the portrait is a biographical text about him. Below the portrait and text is a paragraph about his work on building visualization systems. At the bottom right is a book cover for 'Information Visualization: Perception for Design' by Colin Ware, 2nd Edition.

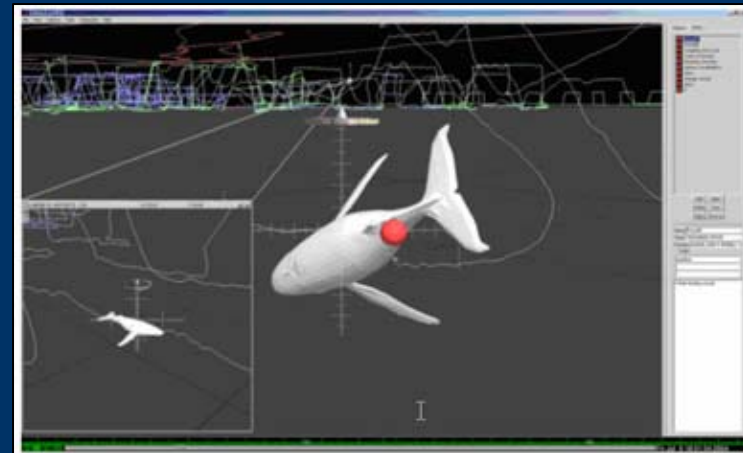
**DATA VISUALIZATION RESEARCH LAB** People Projects Education Home GeoZui3D

Colin Ware is Director of the [Data Visualization Research Lab](#), which is part of the Center for Coastal and Ocean Mapping at the University of New Brunswick. He is cross appointed between the Departments of Ocean Engineering and Computer Science. Ware specializes in advanced data visualization and he has a special interest in applications of visualization to Ocean Mapping. He combines interests in both basic and applied research and he has advanced degrees in both computer science (MMath, Waterloo) and in the psychology of perception (PhD, Toronto). He has published over 90 articles in scientific and technical journals and at leading conferences. Many of these relate to the use of color, texture, motion and 3D displays in information visualization. His approach is always to combine theory with practice and his publications range from rigorously scientific contributions to the Journal of Physiology and Vision Research to applications oriented articles in ACM Transactions on Graphics and IEEE Transactions on Systems, Man and Cybernetics.

Ware also likes to build useful visualization systems. A founding member of the Ocean Mapping Group at the University of New Brunswick, (and lately the Ocean Mapping Center at UNH) he has been designing 3D interactive visualization systems for ocean mapping for about 13 years. Ware has also contributed to software system visualization. He directed the initial development of the NestedVision3D system for visualizing very large networks of information. Ware has been instrumental in the creation of two spinoff visualization companies based initially on his research. [Interactive Visualization Systems Inc.](#) makes visualization software for advanced Ocean mapping applications. NVision Software Systems Inc. provided visualization tools to enhance the understanding of large highly interconnected datasets. He is currently leading a group developing [GeoZui4D](#) which stands for GEOreferenced Zooming User Interface 4D. This is an experimental platform for investigating novel techniques for exploring time-varying geospatial data

Colin Ware's book on [Perception and Information Visualization 2004 2nd Edition](#) is now available. [Here is a list of his other publications](#)

**INFORMATION VISUALIZATION**  
PERCEPTION FOR DESIGN  
SECOND EDITION  
COLIN WARE  
MCK



TrackPlot





# Partners: Other Visualization Experts


*(example potential partner...)*

- Clint Blight (SMRU, ST. Andrews University)

Staff Information

**Staff Profile**


**Mr Clint Blight**

school of **Biology** 

**Mr Clint Blight**  
Software Developer

**Tel:** 01334 463221  
**Fax:** 01334 463443  
**email:** [cjb22@st-andrews.ac.uk](mailto:cjb22@st-andrews.ac.uk)  
**Room:** 1.13 (Gatty)

Gatty Marine Research  
Institute  
University of St Andrews  
St Andrews  
Fife  
KY16 8LB  
UK

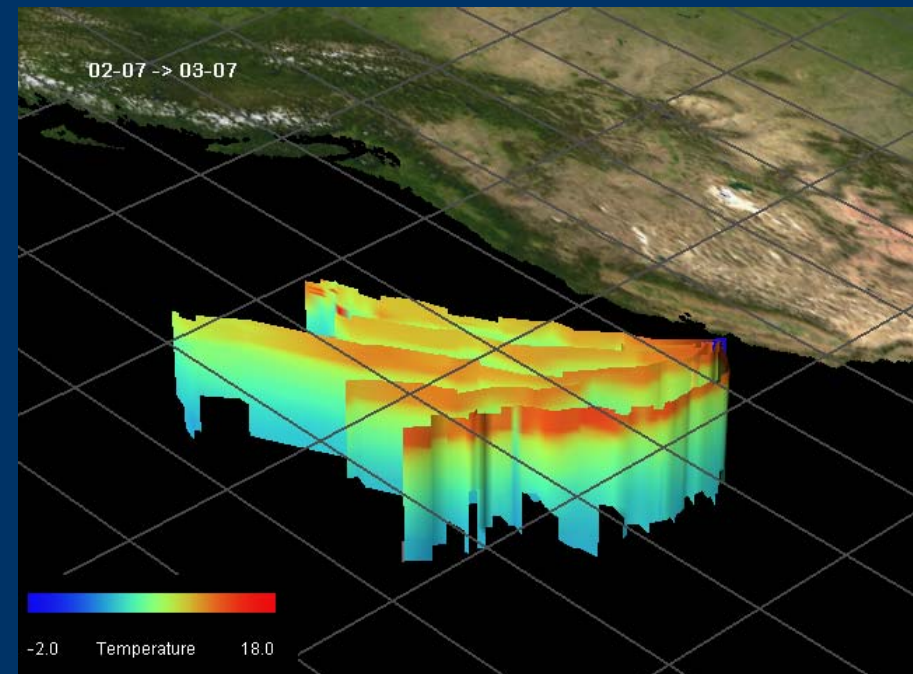


Other pages relating to **Mr Blight**:

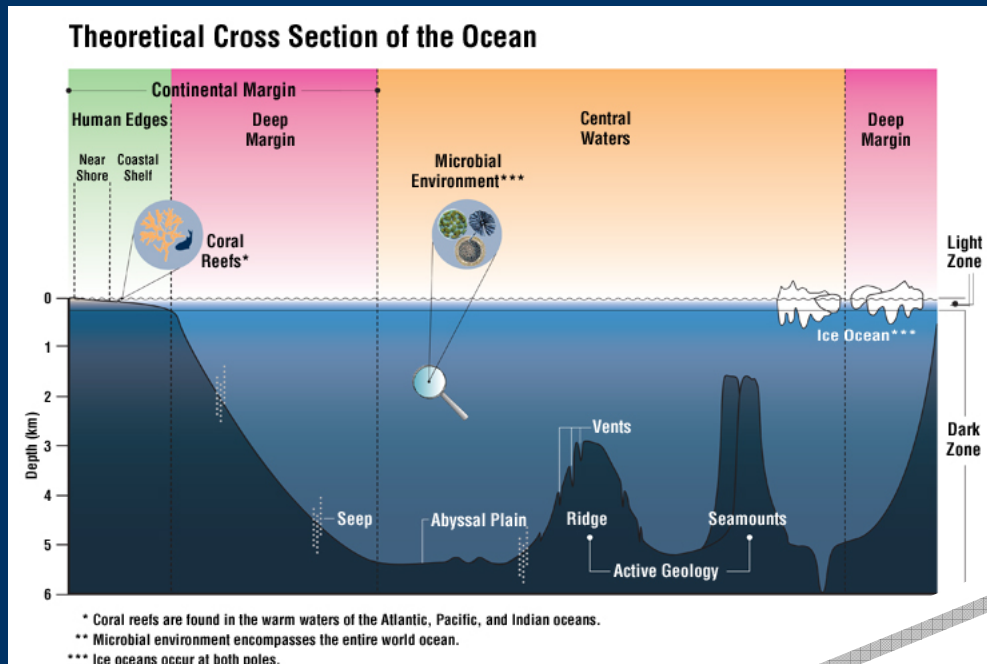
Member of: Gatty Marine Institute  
Sea Mammal Research Unit  
School of Biology  
SMRU Instrumentation

**General Information**

My main role within the Sea Mammal Research Unit has been to develop a new version of the Unit's "MAMVIZ" software package. This new incarnation, "MamVisAD", is now used by researchers to help visualise telemetry data about animal movements and the oceanic environment in which they live.

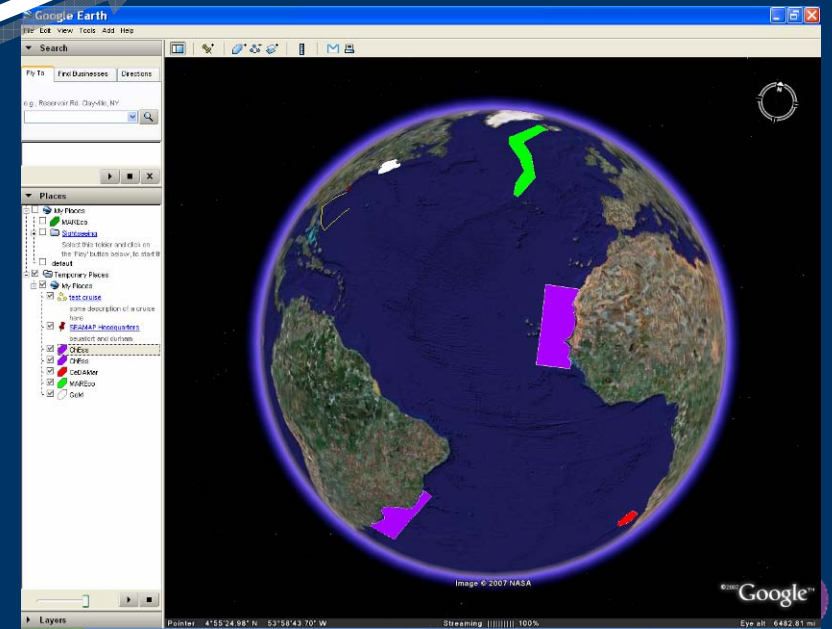


# Exploratory: Realms to Globe



Profile View

Planimetric View



# Census Map & Viz Website



*<http://comlmapviz.org> OR <http://comlmaps.org>*



# A Common Technical Guide

A common guide to development of visual and mapped products will provide timely technical documentation, software usage suggestions / help, standards, protocols as well as specific templates for mapping and visualization development.

The [comlmaps.org](http://comlmaps.org) site will serve content on:

- specific mapping standards and protocols,
- collective internet mapping and web-services,
- shared tools and scripts,
- consistent base-map data,
- guides to cartographic standards (digital / print), and
- common templates, color palettes, graphic libraries.



# Technical workshops

1. **Fall 2008 Census mapping and visualization workshop** will also be announced to take place at Duke University. This workshop will feature external experts and internal Census specialists for training, inspiring and discussing techniques with invited representatives across the Census projects.
2. **Spring 2009 Follow-up interaction will be conducted in Long Beach, CA** to coincide with the “Joint Assembly” to ensure visual consistency of the 2010 final reports. This workshop will train on use of provided templates and common visual elements, especially those cartographic in nature.



# Direct Project Interaction

- **Surveys** to assess needs and skills
- **Site visits** to work directly with Census research teams
- **Online communication** with email, internet chat and desktop sharing
- **Technical development management** with bug tracking, roadmaps, code versioning and on-line documentation





# Goals for This Week

- **Announce** Mapping & Visualization program
- **Refine** the scope of “mapping and scientific visualization support services” across CoML projects
- **Distribute** survey of needs and skills
- **Identify** more specific needs of CoML and projects



# Questions / Comments



*<http://comlmapviz.org> OR <http://comlmaps.org>*

