GROUP ON EARTH OBSERVATIONS

Coastal Zone Community of Practice CZCP

The GEOSS Coastal Zone Community of Practice

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GEOSS Workshop XXXVIII
Evolution of Oceans Observing Systems - Building an Infrastructure for Science

Seattle, Washington, USA
19 September 2010

NOAA Satellites and Information
National Environmental Satellite, Data, and Information Service

GEO Coastal Zone Community of Practice (CZCP)

- Global, regional and local trends in natural processes and human demands on coastal ecosystems jeopardize the ability of these ecosystems to support commerce, living resources, recreation and habitation.

- In this context, improved, integrated and sustained coastal observing capabilities are required to better support user information needs.

- GEOSS provides a valuable frame-work/mechanism to help implement these capabilities, and under the auspices of GEO, a *Coastal Zone Community of Practice (CZCP)* was initiated in 2006 by the IGOS Coastal Theme.

Figure 1.1. The Coastal Zone: Where inputs from land, sea, air and people converge

Heavily developed coast of Cancun, Mexico mostly for international tour-ism. Image credit: © Wolcott Henry 2001.

Image source: www.marinephotobank.org.

The IGOS Coastal Theme

• In an effort to bring together data providers (i.e., CEOS agencies) and data users in support of coastal research and applications across the land-sea interface, the *IGOS Coastal Theme* was established in June 2003 by the IGOS Partners.

• A Coastal Theme Team was assembled, whose members represented the coastal components of GOOS and GTOS, the IGBP LOICZ & IMBER Programmes, and CEOS member agencies (ESA, NASA, NOAA, CSA, DLR, ISRO, JAXA), among others.

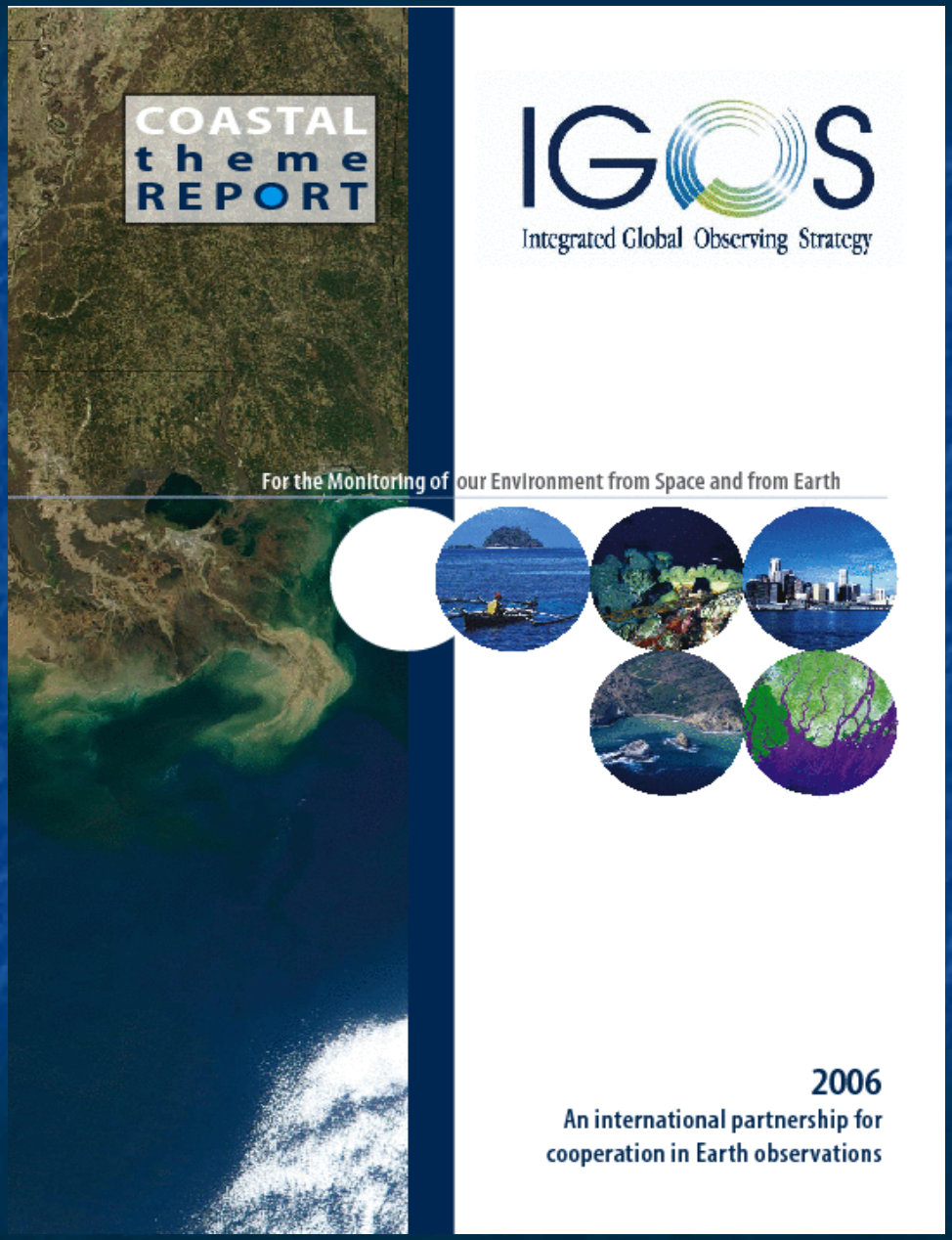
• Focusing on the cross-boundary, user-driven issues of:

Coastal Hazards,
Coastal Development and Urbanization,
Coastal Hydrological and Biogeochemical Cycles, and,
Ecosystem Health and Productivity,

this team identified, synthesized and distilled a suite of priority (primarily space-based) coastal observing requirements.

• These requirements, along with an assessment of existing capabilities, gaps, challenges & priorities were identified in the *IGOS Coastal Theme Report*

IGOS-P Coastal Theme Report



- Published January 2006, IOC
- http://www.ioc-goos.org/ content/ view/14/28/
- Also see related article:
  Christian et al., *Opportunities and Challenges of Establishing Coastal Observing Systems*, Estuaries and Coasts, 29(5):871-875. 2006

IGOS Coastal Theme Overview

Goal of Coastal Theme:

Develop a strategy for integrated global observations that will provide improved understanding of Earth system variability and change in the coastal zone, with a particular emphasis on the **land-sea interface**.

Objectives of Coastal Theme:

- ***Specify*** coastal user information needs and observation requirements
- ***Evaluate*** existing/planned capabilities and identify gaps & continuity needs
- ***Establish*** a framework to integrate observations across the land-sea-air interface in support of coastal research and improved coastal management
- ***Stimulate & facilitate*** coordination & collaboration among diverse groups/organizations

IGOS Coastal Theme intersection with GEO SBAs

IGOS COASTAL THEME	GEOSS
USER ISSUES	Societal Benefit Areas
Coastal hazards	Disasters; Climate; Health; Water; Energy; Agriculture
Coastal development & urbanization	Human Health; Agriculture; Energy; Climate; Water
Ecosystem health & productivity	Ecosystems; Biodiversity; Water
Hydrological & biogeochemical cycles	Water; Weather; Climate; Ecosystems

Coastal Observing Requirements & Gaps

	PARAMETER	HOR. RES	HR MIN	OBS. CYCLE	OC MIN	AVAIL	AVAIL MIN	ACCURACY	ACC. MIN
GEOPHYSICAL OBSERVATIONS	Sea surface temperature	100 m	1 km	3 h	6 h	1 h	3 h	0.2°C	0.5°C
	Wind speed and direction	300 m	5 km	1 h	6 h	1 h	3 h	1 m/s 10°	2 m/s 20°
	Sea surface height	1 km	15 km	1 d	10 d	1 h	3 h	4 cm	6 cm
	Surface wave height & direction	1 km	10 km	3 h	1 d	1 h	3 h	0.2 m 5°	0.2 m 10°
	Salinity	1 km	25 km	1 d	7 d	1 h	3 h	0.1 psu	0.3 psu
	Currents	300 m	5 km	1 h	24 h	1 h	3 h	3 cm/s	10 cm/s
	Streamflow/river discharge	10 m	100 m	1 h	3 d	1 h	3 h	10%	30%
	Precipitation	1 km	15 km	1 h	8 h	1 h	3 h	0.5 mm/h	2 mm/h
	Ice cover	50 m	100 m	6 h	24 h	1 h	3 h	100 m	200 m
BIOLOGICAL/BIOGEOCHEMICAL OBSERVATIONS	Phytoplankton pigments (e.g., chl-a)	100 m	500 m	1 h	2 h	1 h	3 h	20%	30%
	Total suspended matter	100 m	500 m	1 h	2 h	1 h	3 h	30%	40%
	Coloured dissolved organic matter	100 m	500 m	1 h	2 h	1 h	3 h	30%	40%
	Optical properties (includes PAR)	100 m	500 m	1 h	2 h	1 h	3 h	10%	20%
	Chlorophyll fluorescence	100 m	500 m	1 h	2 h	1 h	3 h	30%	40%
	Aerosol properties (includes AOT)	100 m	500 m	1 h	2 h	1 h	3 h	10%	20%
	Nutrients	10 km	100 km	1 d	1 mo	1 d	7 d	10%	30%
	O_2 and pCO_2	10 km	100 km	1 d	1 mo	1 d	7 d	10%	30%
	Slicks/films (sea surface roughness)	25 m	50 m	3 h	2 d	1 h	3 h	50 m	100 m
MAPPING (PHYSICAL/GEOL.)	Bathymetry	30 m	50 m	2 d	24 d	4 h	1 d	0.1 m (depth)	1 m (depth)
	Land Topography	30 m	50 m	3 mo	1 yr	--	--	5 cm (height)	10 cm (height)
	Shoreline position	1 m	5 m	15 d	3 mo	1 d	7 d	1 m	5 m
	Habitat maps (e.g., mangroves)	5 m	20 m	15 d	3 mo	1 d	7 d	--	--
	Reef maps	1 m	5 m	15 d	3 mo	1 d	7 d	2 m	10 m
	Land cover/use	15 m	1 km	1 yr	10 yr	--	--	--	--
	Night-time lights	1 km	5 km	1 yr	5 yr	--	--	--	--

IGOS Coastal Theme Report, 2006

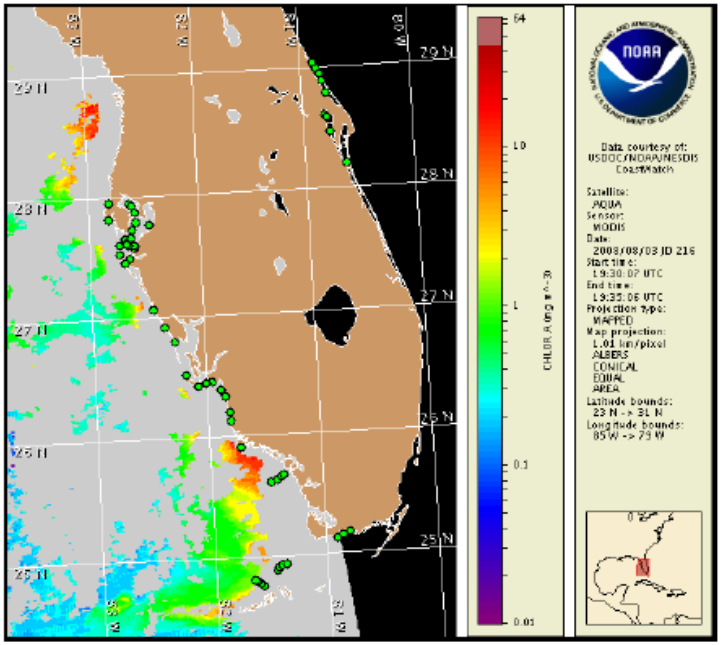
Common needs & gaps vis-à-vis existing and planned capabilities:

- Existing global observing assets/foci generally provide *inadequate* spatial, temporal and spectral resolution.
- Continuity required of many existing capabilities for context and assessment of climate variability and change.
- Some observations needed for coastal users not presently made from space; as such, often sparse/spotty data/info.

Harmful Algal Blooms – Operational Monitoring and Forecasting

Gulf of Mexico Harmful Algal Bloom Bulletin

Region: South Florida
4 August 2008
NOAA Ocean Service
NOAA Satellites and Information Service
Last bulletin: July 28, 2008



Satellite chlorophyll image with possible HAB areas shown by red polygon(s). Cell concentration sampling data from July 25 to 31 shown as red (high), orange (medium), yellow (low b), brown (low a), blue(very low b), purple (very low a), pink (present), and green (not present). For a list of cell count data providers and a key to the cell concentration categories, please see the HABFS bulletin guide:
http://www.csc.noaa.gov/crs/habf/habfs_bulletin_guide.pdf

Please note the following restrictions on all SeaWiFS imagery derived from CoastWatch.

1. Data are restricted to civil marine applications only; i.e. federal, state, and local government use/distribution is permitted.
2. Image products may be published in newspapers. Any other publishing arrangements must receive GeoEye approval via the CoastWatch Program.

Conditions Report

There is currently no indication of a harmful algal bloom at the coast in southwest Florida. No impacts are expected alongshore southwest Florida today through Sunday, August 10.

Analysis

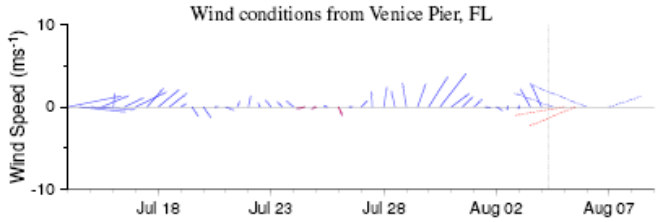
There is currently no indication of a harmful algal bloom at the coast in southwest Florida. No *Karenia brevis* was found in samples collected last week between Pinellas

[redacted]

harmful algae. Dead fish have been reported in the upper Tampa Bay, but are not due to *K. brevis* (FWRI, 08/01). Upwelling conditions are possible through Wednesday, August 6, however bloom formation alongshore is unlikely. No impacts are expected along the coast through Sunday, August 10.

Please note that SeaWiFS imagery is temporarily unavailable for display on this bulletin due to technical difficulties; MODIS imagery is shown on pages 1 and 2 of this bulletin.

"Fenstermacher, Fisher



Wind speed and direction are averaged over 12 hours from buoy measurements. Length of line indicates speed; angle indicates direction. Red indicates that the wind direction favors upwelling near the coast. Values to the left of the dotted vertical line are measured values; values to the right are forecasts.

Wind Analysis

SW Florida: Southeast to easterly winds today through Wednesday, with onshore winds in the afternoon (5-10 kns; 3-5 m/s). Southwesterlies Thursday and Friday (5-10 kns; 3-5 m/s)

To see previous bulletins and forecasts for other Harmful Algal Bloom Bulletin regions, visit the NOAA CoastWatch bulletin archive: http://coastwatch.noaa.gov/hab/bulletins_ns.htm

Note:

International Ocean Colour Coordinating Group (IOCCG) Working Group:

"Ocean Colour from a Geostationary Orbit"

to coordinate and provide in the future the desired higher repeat ocean color observations in support of user needs & research

NOAA - http://tidesandcurrents.noaa.gov/hab/bulletins.html

Coastal Observing Challenges and Priorities

OBSERVATION	KNOWLEDGE CHALLENGES[1]	RESOLUTION/COVERAGE CHALLENGES[1]	CONTINUITY CHALLENGES[1]
CROSS-CUTTING	· Satellite Cal/Val · Standardize & QA/QC *in situ* observations · Adaptive sampling · Power/telemetry/biofouling issues	· Require improved temporal & spatial resolution from satellite sensors (also see knowledge) · Expand coverage of *in situ* measurements	· Need to facilitate transition from research to operational satellites · Need to maintain and replace *in situ* assets
GEOPHYSICAL	· Improve SSH & wind measurements from space · Measuring coastal surface currents and river discharge from space · Measuring salinity remotely · Assimilate HF radar data and derive user products · Develop SAR algorithms & assess other SAR products · Measuring sea ice thickness remotely	· Extracting higher resolution information from satellite wind sensors · Add additional Doppler weather radar & HF radar sites · Densify stream & tide gauge networks	· Maintain existing stream & tide gauge networks · Maintain microwave RS capabilities for ice · Facilitate shore-based HF radar transition: research to operational mode · Make GHRSST-PP operational (see page 32)
BIOLOGICAL & BIOGEOCHEMICAL	· Use radar and/or lidar to obtain vegetation structure, regrowth, biomass · Improve bio-optical algorithms & atmospheric corrections · Merged chlorophyll & other VSR products · VSR/SAR data relationships with ecology · Functional type discrimination · Improve aerosol characterization	· Geostationary, hyperspectral, visible spectral radiance observations (VSR; i.e., ocean colour) · Expand coverage of nutrient measurements · Rapid & accurate pollutant assays	· Maintain high-quality global multi-spectral VSR observations for context and climate data records
MAPPING	· Require high spatial res. hyperspectral imagery for corals and vegetation assessments · Require InSAR for coastal subsidence/erosion · Need a common habitat classification system · Spatially explicit socio-economic variables	· Improve availability and use of high-resolution optical and lidar data for physical mapping · Access to highest resolution (spatial and vertical) DEMs	· Maintain DMSP-OLS (or related capabilities) for human population assessments · Maintain high-res. multispectral optical imagers for habitat maps

PROVIDE	Geostationary, hyperspectral visible spectral radiance (i.e., ocean colour) data for coastal waters
	Higher resolution/improved coverage for ocean vector winds & sea surface height
	High spatial and spectral resolution capacity to assess changes in coral reef & other terrestrial and aquatic habitats (e.g., estuaries)
	Ocean surface current observations and river discharge in coastal regions
	InSAR measurements for coastal subsidence and erosion
IMPROVE	Calibration/validation of measurements in coastal regions
	Data management infrastructure (near-real-time delivery; climate data records)
SUPPORT	Development of an integrated COastal Data Assimilation System
	Adaptive, coordinated remote and *in situ* sampling

IGOS Coastal Theme Report, 2006

GEO Coastal Zone Community of Practice (CZCP)

The GEO Coastal Zone Community of Practice (CZCP) objectives are to:

• Engage coastal users (e.g., managers and decision makers) and data providers to collaborate in the specification of requirements for *in situ &* remote coastal observations and derived Information products (variables to monitor, time-space resolution, accuracy, rate, forms and delivery methods in which data and derived products are needed);

• Evaluate current and projected observational capabilities against these requirements, identifying gaps, redundancies and activities that need to be strengthened;

• Promote the development of workshops and “proof of concept” pilot projects that both address these gaps and enable data integration for the provision of new or improved decision support tools;

• Promote development or strengthening of networks of institutions globally, regionally, and across Communities of Practice (CPs) that contribute to and benefit from GEOSS;

• Advise the GEO User Interface Committee, other CPs and GEO on matters relating to coastal zone observations and related societal benefits, and identify priority needs as well as areas for linkage, collaboration and support.

GEO Coastal Zone Community of Practice (CZCP)

CZCP membership/interests:

- CZCP has broad, open membership with many GEO member nations represented as well as various coastal interests and applications (e.g., sea level rise & inundation; water quality; habitat, resource and integrated coastal area management). All are welcome and encouraged to participate!

- *CZCP Leadership:*

- Co-Chairs: Paul DiGiacomo and Hans-Peter Plag

- *CZCP Workshop Series:*

- Chaired by Michael Bruno plus regional Co-Chairs for individual workshops

GEO Coastal Zone Community of Practice (CZCP)

Present coordination, developmental & support activities of the CZCP include:

* Organizing a series of Regional Workshops under the title: "GEOSS Support for Decision-Making in the Coastal Zone: Managing and Mitigating the Impacts of Human Activities and Natural Hazards in the Coastal Zone";

* Developing a community web page with access to relevant information, data & products – highlighting and addressing gaps and facilitating/enabling data integration for the provision of new or improved decision support tools;

* Liaison to other relevant GEO Tasks, Participating Organizations (e.g., GOOS, GTOS), Committees & activities;

* Support and stimulation of Pilot Projects and technical activities (e.g., Remote Sensing of Water Quality in Nearshore Coastal & Inland Waters);

* General user outreach and engagement activities – meetings, workshops, conferences et al.

Coastal Zone Community of Practice website: http://czcp.org/

GEO Coastal Zone Community of Practice - Mozilla Firefox

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http://czcp.org/

igos coastal theme report

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GEO GROUP ON EARTH OBSERVATIONS

Coastal Zone Community of Practice CZCP

Our mission:
Empowering integrated coastal zone management through Earth observations
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Citation

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Coastal zones are areas of particular ecological, social, and economic value where many conflicting interests need to be resolved in order to ensure a sustainable development of this highly complex environment. Humanity has always shown a special interest in the coastal zone and a large fraction of the human population traditionally settles in or close to the coastal zone. Recent increases in coastal urban population and changes in land-use practices have led to rapid and large changes in sediment supplies and increases in nutrient, pollutant and pathogen loadings to coastal waters. Climate-induced changes in sea level are likely to increase the risk of inundation in many parts of the coastal zone. The on-going and anticipated changes pose serious risks to human health and the capacity of ecosystems to support products and services critical to the survival and well being of human populations, in developed and developing nations alike.

The *Coastal Zone Community of Practice* (CZCP) supports the *Group on Earth Observations* (GEO) in its goal to provide observations required for informed decisions concerning the coastal zone. High and immediate priorities for GEOSS are improved forecasts of sea-level rise and associated increases in coastal inundation that may be exacerbated by increases in the frequency of extreme weather.

The IGOS-P Coastal Zone Theme Report: The Theme Report provides the basis for the work of the GEO Coastal Zone Community of Practice.

Latest News:

[15 October 2009] **CZCP will meet on November 20, 2009:** The CZCP is scheduled to meet on November 20, 2009 in Washington, D.C. The CZCP meeting will take place in the Canadian Embassy after the GEOSS in the Americas meeting at the same location. For more information, visit the CZCP Meetings Page and/or contact the CZCP Co-chairs.

Done

CZCP Regional Workshops

1) Mediterranean: "Observing System Requirements for Managing and Mitigating the Impacts of Human Activities and Coastal Inundation in the Mediterranean Region", June 9-13, 2008, Athens, Greece; Report available at: http://www.czcp.org

2) Africa: "Decision-Making Support For Coastal Zone Management, Water Resources & Climate Change In Africa"; 15-18 February 2010, Cotonou, Benin (www.czcp.org)

3) Americas: Building on GEOSS in the Americas activities, the CZCP is planning a CZCP Americas Regional Workshop for next year, targeted for March 2011 in Puerto Rico. Workshop theme: Earth Observation Support for Sustainable Tourism in Small Island States

4) Arctic, Asia and North Africa CZCP User Workshops have also been discussed/in early stages of planning.

CZCP Workplan Meeting, June 9, 2010, Washington, DC

Thirteen participants

Key conclusions for the Workshop Series:

* continuation of series of regional workshops
* better pre- and post-surveys
* survey showed low post-workshop impacts
* better preparation; something to offer for post-workshop actions
* participation: focus on provider world or decision makers?
* necessary: better linkage to end users/decision makers
* next workshop theme: Earth Observation Support for Sustainable Tourism in Small Island States

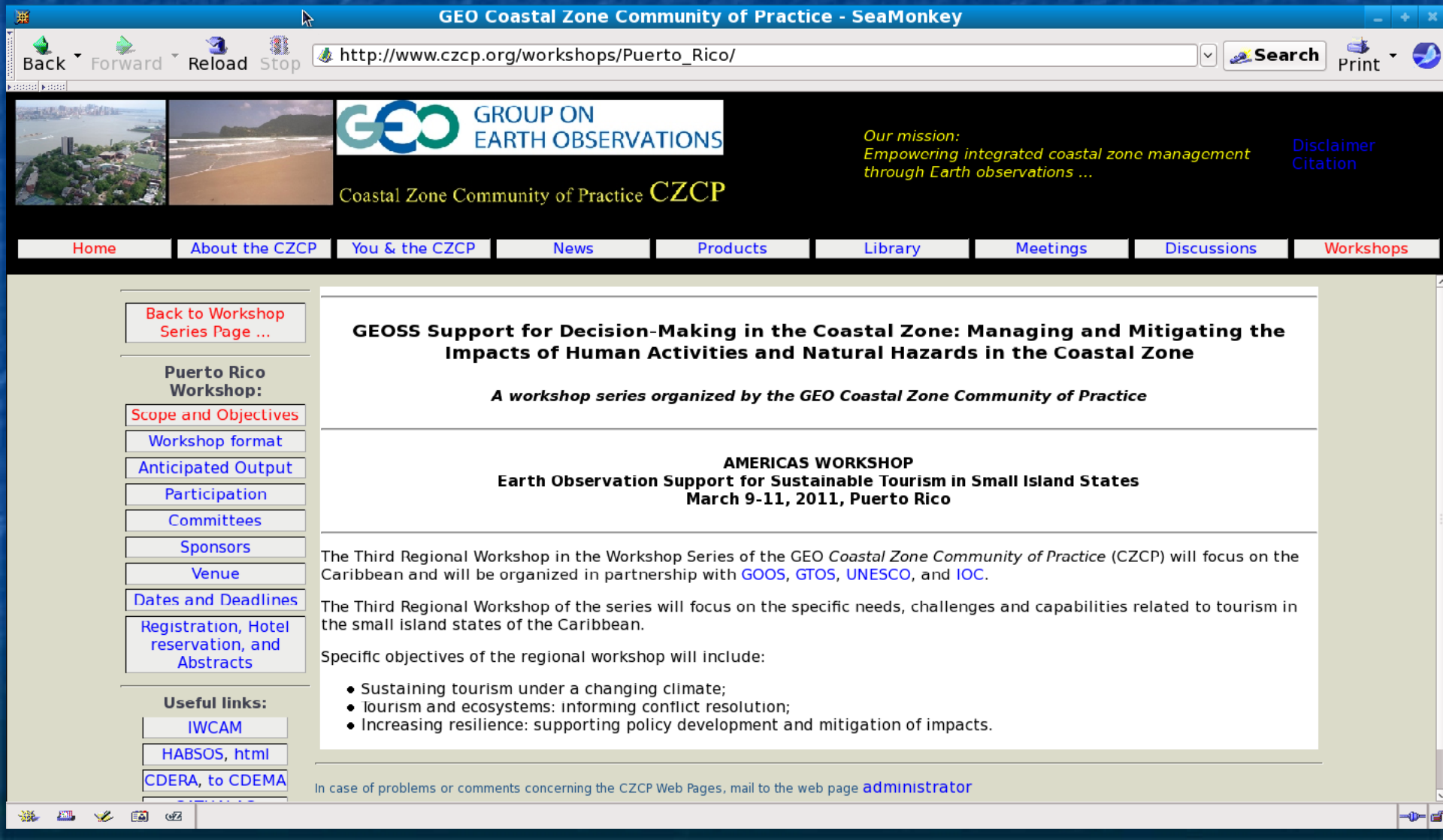
Key conclusions concerning membership and activities:

* attract more members through benefits for members
* CZCP needs more than the workshop series to be sustained
* candidate activity: assessment of the state of coastal zones
* approaches: "stories" for each country; thematic approach; living web site; snapshot in printed form

Immediate Plans: Puerto Rico Workshop

Venue: Caribe Hilton (tbc)

Participants: Providers, tourist organizations, governmental agencies, ecosystem experts, economists, NGOs



Future CZCP Plans and Activities

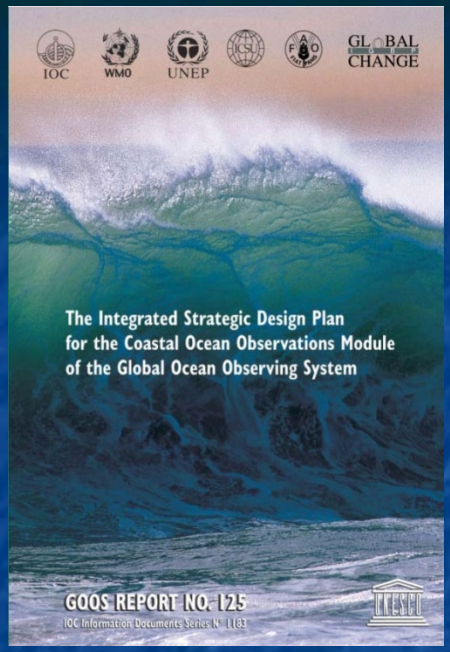
- Build on the legacy of the IGOS-P Coastal Theme
- Continue to implement the recommendations of the Theme Report
- Update the Theme Report as necessary/appropriate
- Continue the series of CZCP Regional Workshops
- Work with GOOS and GTOS, and contribute to implementation and build out of the global and regional coastal observing networks
- Improved coordination & linkage with Coral Reef user communities
- Facilitate development of pilot projects and other collaborative linkages (e.g., remote sensing of coastal and inland water quality)
- Improve user linkages and coordination, communication & outreach efforts
- Further develop and populate the CZCP Web Page
- Facilitate data access/sharing; transitions from research to operations
- Address funding and implementation issues and concerns

GOOS is comprised of:

An open ocean module

Advised by the Ocean Observations Panel for Climate (OOPC) [with JCOMM/WCRP/GCOS]

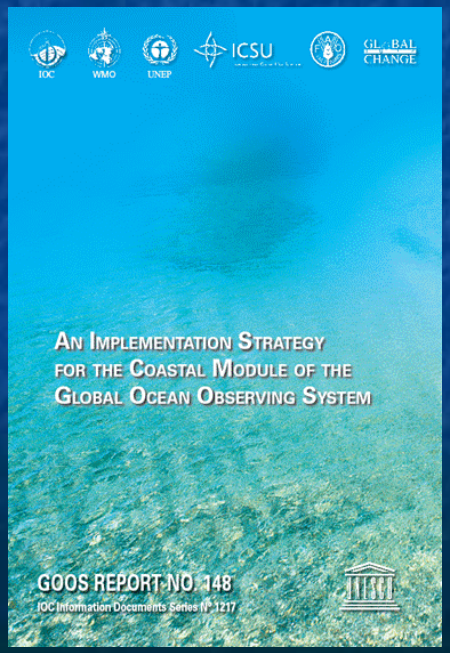
Implemented by member states usually cooperating through the Joint WMO-IOC Commission for Oceanography & Marine Meteorology (JCOMM)



A coastal module

Advised by the *Panel on Integrated Coastal Observations (PICO)*

Implemented by member states usually cooperating through **GOOS regional alliances**.



Some Opportunities & Challenges for an Oceans Observing Community of Practice

- IGOS Ocean Theme provides heritage; needs to be revisited: *"Back to the Future"*
- There are many ocean observing and related activities out there (a virtual "alphabet soup"); these could benefit from improved coordination (including coastal and open ocean; physical & biological sciences, as well as socio-economics)
- That said, need to identify a niche for this CoP that provides added-value and not redundancy
- Workshops and Reports are the "easy" part; the primary challenge is in effective, ongoing follow-up and implementation
- CoPs typically move forward on a "best-effort" basis; resources (time & money) are extremely limited – a new paradigm out there?