

Transition of IGOS Coastal Theme into GEO

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Transition of IGOS Coastal Theme into GEO

- The IGOS-P Coastal Theme
- IGOS Coastal Theme intersection with GEO SBAs
- IGOS Coastal Theme Transition into GEO
- The Coastal Zone Community of Practice (CZCP)
- CZCP Future Plans

The IGOS Coastal Theme

IGOS Coastal Theme established in June 2003 by the IGOS Partners:

- **Motivation:** bringing together data providers and data users in support of coastal research and applications across the land-sea interface
- **Coastal Theme Team:** members represented coastal components of GOOS and GTOS, the IGBP LOICZ & IMBER Programmes, and CEOS member agencies (ESA, NASA, NOAA, CSA, DLR, ISRO, JAXA), among others.

The IGOS Coastal Theme

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**.

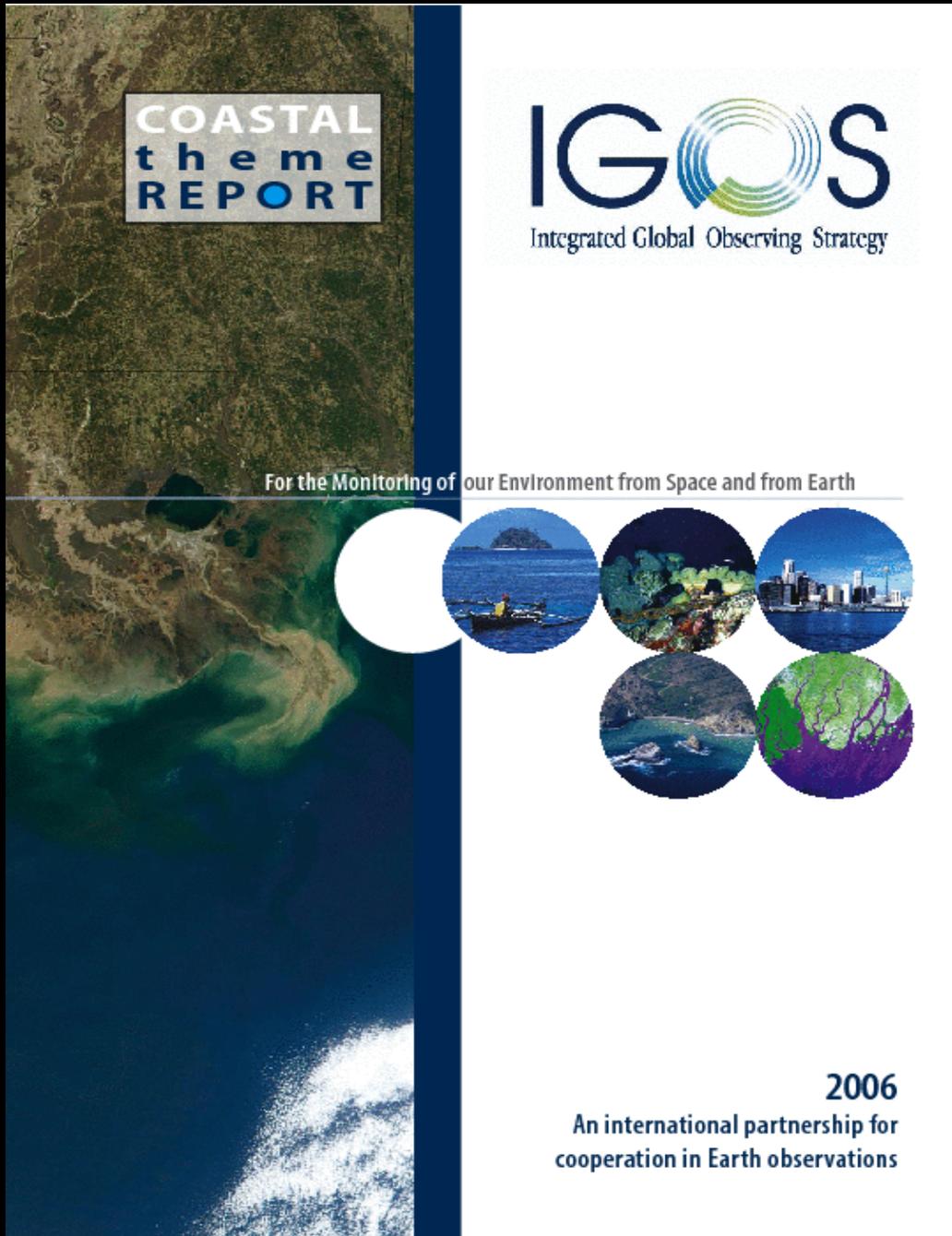
Achievements of Coastal Theme:

By 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,*

the Theme Team identified, synthesized and distilled a suite of priority coastal observing requirements.

The IGOS Coastal Theme



Theme Report published
January 2006, IOC

Also see related article:

Christian et al., 2006.

Opportunities and Challenges of
Establishing Coastal Observing
Systems, *Estuaries and Coasts*,
29(5), 871-875.

The IGOS Coastal Theme

	PARAMETER	HOR. RES	HR MIN	OBS. CYCLE	OC MIN	AVAIL	AVAIL MIN	ACCURACY	ACC. MIN
GEOGRAPHICAL 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%
	Slacks/films (sea surface roughness)	25 m	50 m	3 h	2 d	1 h	3 h	50 m	100 m
MAPPING (HYDRO. COOL. SOCO)	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	--	--	--	--

Coastal Observing Requirements

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

- Existing global observing assets generally provide *inadequate* spatial, temporal and spectral resolution.
- Continuity required of some existing capabilities for context and assessment of climate variability and change.
- Some observations needed for coastal users not presently made, especially synoptically and/or from space.

The IGOS Coastal Theme

Coastal Observing Challenges and Priorities

OBSERVATION	KNOWLEDGE CHALLENGES ¹	RESOLUTION/COVERAGE CHALLENGES ²	CONTINUITY CHALLENGES ³
CROSS-CUTTING	<ul style="list-style-type: none"> - Satellite Cal/Val - Standardize & QA/QC in situ observations - Adaptive sampling - Power/telemetry/biofouling issues 	<ul style="list-style-type: none"> - Require improved temporal & spatial resolution from satellite sensors (also see knowledge) - Expand coverage of in situ measurements 	<ul style="list-style-type: none"> - Need to facilitate transition from research to operational satellites - Need to maintain and replace in situ assets
GEOPHYSICAL	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Extracting higher resolution information from satellite wind sensors - Add additional Doppler weather radar & HF radar sites - Densify stream & tide gauge networks 	<ul style="list-style-type: none"> - Maintain existing stream & tide gauge networks - Maintain microwave RS capabilities for ice - Facilitate shore-based HF radar transition: research to operational mode - Make GHRSSST-PP operational (see page 32)
BIOLOGICAL & BIOGEOCHEMICAL	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Geostationary, hyperspectral, visible spectral radiance observations (VSR; i.e., ocean colour) - Expand coverage of nutrient measurements - Rapid & accurate pollutant assays 	<ul style="list-style-type: none"> - Maintain high-quality global multi-spectral VSR observations for context and climate data records
MAPPING	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Improve availability and use of high-resolution optical and lidar data for physical mapping - Access to highest resolution (spatial and vertical) DEMs 	<ul style="list-style-type: none"> - 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
IMPROVE	InSAR measurements for coastal subsidence and erosion
	Calibration/validation of measurements in coastal regions
SUPPORT	Data management infrastructure (near-real-time delivery; climate data records)
	Development of an integrated COastal Data Assimilation System
	Adaptive, coordinated remote and <i>in situ</i> sampling

The IGOS Coastal Theme

Coastal Integration Challenges & Strategies

INTEGRATION CHALLENGES	INTEGRATION STRATEGIES (see text for details)
Communication: <ul style="list-style-type: none"> • Biases in disciplines & applications 	<ul style="list-style-type: none"> • Interdisciplinary training programmes & workshops • Prioritizing interdisciplinary observation products
Data Access & Management <ul style="list-style-type: none"> • What data is available? • Data sharing across national boundaries • Separation of land & ocean data and models; separation of remote and <i>in situ</i> data 	<ul style="list-style-type: none"> • Coordinated cataloguing, archiving & distribution of current and historical coastal datasets & metadata; potentially leveraging the GTOS-TEMS database • Improve data management infrastructure to store, (re)process and disseminate expanding data streams, incl. (near) real-time & climate data records • Modeling & data assimilation => COastal Data Assimilation System (CODAS)
Unique Challenges <ul style="list-style-type: none"> • Mapping the coast • Scale dependent attributes • People at the coastal interface – linking natural with social sciences 	<ul style="list-style-type: none"> • Tidal monitoring, hydrodynamic models + Vertical datum transformation tool • Long term time series and data continuity • Humans & ecosystems => Coastal GIS => Integrated Coastal Decision Support System (ICoDSS)



IN SITU WITH REMOTELY SENSED DATA	<ul style="list-style-type: none"> • Expanded use of data assimilation techniques to accurately characterize the 4-dimensional variability of the coastal environment • Need to develop integrated CODAS (COastal Data Assimilation System)
LAND & SEA DATA	<ul style="list-style-type: none"> • Link and improve global land and ocean data assimilation efforts through an integrated high resolution CODAS using catchment-coastal basins as hydrologically linked geospatial units • Improve shoreline mapping = Tidal monitoring + Hydrodynamic models + Vertical Datum Transformation tool (VDatum)
SOCIAL & COASTAL ENVIRONMENTAL DATA	<ul style="list-style-type: none"> • Support GIS-based simulation modeling, e.g., Dynamic & Interactive Vulnerability Assessment (DIVA) tool • Leverage conceptual models, e.g., Driver-Pressure-State-Impact-Response (DPSIR) model • Develop an Integrated Coastal Decision Support System: ICoDSS • Initiate pilot projects to develop capabilities: e.g., impacts of urbanization or inundation on coastal ecosystems & populations.

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

IGOS Coastal Theme Transition into GEO

- Coastal Theme Transition Plan sent to IGOS-P and GEO Sec in August 2007.
- Coastal Theme activities and functions will ultimately be spread across a number of existing and proposed GEO and member organization bodies/structures:
 - > Coastal *user* engagement and support activities will reside in and be led by the **GEO Coastal Zone Community of Practice (CZCP)**;
 - > Technical guidance, support, and coordination of coastal observing requirements, capability assessments, and system development and implementation are beyond the purview of the CZCP. These will be pursued (initially) by the **GOOS Panel for Integrated Coastal Observations (PICO)**, Co-Chaired by P. DiGiacomo (USA) and J. Muelbert (Brazil);
 - > Per a primary recommendation of the Coastal Theme Report (2006), the ultimate desire is broaden PICO and establish a **Joint Panel for Integrated Coastal Observations (J-PICO)** for coordinated development of GEOSS in the coastal zone across the land-sea interface, bringing together the coastal elements of GOOS and GTOS, IGBP-LOICZ, et al. as appropriate.

IGOS Coastal Theme Transition into GEO

- **Coastal Theme linkage to GEO Committees:** Representatives in
 - > STC (T. Malone),
 - > UIC (P. DiGiacomo),
 - > other GEO Committee liaisons to be identified.
- **The Coastal Theme** intends to **remain at a nominal low level of existence** until it is replaced by J-PICO (or analog) which will represent a broader coastal constituency that includes both GOOS and GTOS expertise.
- **Requests to GEO Secretariat:**
 - > **formal recognition** of the PICO and the CZCP as the principal GEO advisory, coordinating and engagement bodies in support of coastal observations and user needs, leveraging existing capabilities and avoiding duplication of efforts. PICO and the CZCP will provide the primary support & guidance to GEO.
 - > **programmatic support** from the GEO Secretariat through a formally designate technical/scientific expert who will liaise with and support coastal observing activities.
- Resources are needed to support coordination activities, workshops, prototype efforts and pilot projects in support of integrated and coordinated coastal observation efforts.

GEO Coastal Zone Community of Practice (CZCP)

As indicated, coastal user engagement and support activities and efforts will reside in and be led by the **GEO Coastal Zone Community of Practice (CZCP)**, a body which focuses on user-driven information needs and related socio-economic considerations and drivers in the coastal zone.

Goals of CZCP include:

- 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*”;
- **Liaison** to other relevant GEO Tasks, Participating Organizations (e.g., GOOS, GTOS), and Committees;
- Stimulation of **Pilot Projects**;
- A **web page** with access to relevant data and products.

GEO Coastal Zone Community of Practice (CZCP)

Match between IGOS-P Coastal Theme and CZCP and progress:

- In terms of **membership**: many Theme Team members are in the CZCP;
- In terms of **goals**:
 - > CZCP is based on the Theme Report;
 - > CZCP will update the Theme Report;
 - > CZCP focused on decision support through Earth observations;
 - > CZCP strong in user linkage;
 - > CZCP addresses implementation.

GEO Coastal Zone Community of Practice (CZCP)

Membership:

- Broad, open membership with many active contributors
- Chairs/co-Chairs: Paul DiGiacomo and Hans-Peter Plag
- Workshop Series: Chaired by Michael Bruno plus co-chairs for individual workshops
- Many ad hoc task force leaders

Linkages in GEO:

- main linkage to UIC;
- Tasks:
 - > US-06-02
 - > CL-06-06
 - > WA-07-01

GEO Coastal Zone Community of Practice (CZCP)

CZCP Present Activities:

Workshop Series: *“GEOSS Support for Decision-Making in the Coastal Zone: Managing and Mitigating the Impacts of Human Activities and Natural Hazards in the Coastal Zone”*:

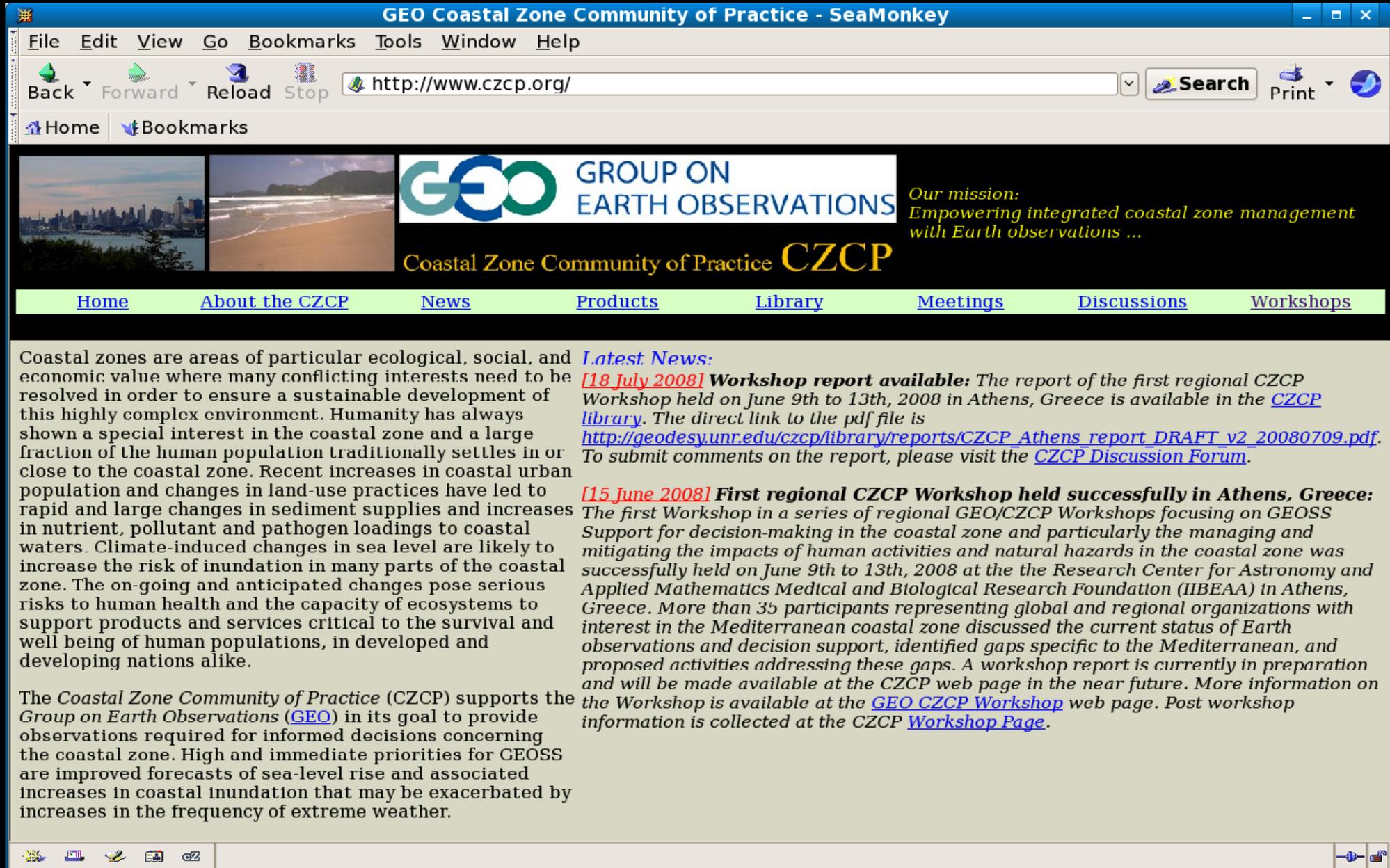
First regional Workshop: *“Observing System Requirements for Managing and Mitigating the Impacts of Human Activities and Coastal Inundation in the Mediterranean Region”*, June 9-13, 2008, Athens, Greece

Two regional workshops in preparation for 2009/2010:

- North Africa: focus on data availability and requirements from decision makers along the southern Mediterranean, helping to build user capacity in this region as a follow up to the Athens workshop;
- Africa: bring together coastal data providers and users across the African continent, working with GOOS, Large Marine Ecosystems et al.

GEO Coastal Zone Community of Practice (CZCP)

CZCP Present Activities: Web page at www.czcp.org



The screenshot shows a web browser window titled "GEO Coastal Zone Community of Practice - SeaMonkey". The address bar displays "http://www.czcp.org/". The website header features the GEO logo and the text "GROUP ON EARTH OBSERVATIONS" and "Coastal Zone Community of Practice CZCP". A mission statement reads: "Our mission: Empowering integrated coastal zone management with Earth observations ...". A navigation menu includes links for Home, About the CZCP, News, Products, Library, Meetings, Discussions, and Workshops. The main content area is divided into two columns. The left column contains a paragraph about coastal zones and their ecological, social, and economic value. The right column contains a "Latest News" section with two entries: a workshop report from July 2008 and a workshop held in Athens, Greece, in June 2008.

Home [About the CZCP](#) [News](#) [Products](#) [Library](#) [Meetings](#) [Discussions](#) [Workshops](#)

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.

Latest News:

[18 July 2008] Workshop report available: The report of the first regional CZCP Workshop held on June 9th to 13th, 2008 in Athens, Greece is available in the [CZCP library](#). The direct link to the pdf file is http://geodesy.unr.edu/czcp/library/reports/CZCP_Athens_report_DRAFT_v2_20080709.pdf. To submit comments on the report, please visit the [CZCP Discussion Forum](#).

[15 June 2008] First regional CZCP Workshop held successfully in Athens, Greece: The first Workshop in a series of regional GEO/CZCP Workshops focusing on GEOSS Support for decision-making in the coastal zone and particularly the managing and mitigating the impacts of human activities and natural hazards in the coastal zone was successfully held on June 9th to 13th, 2008 at the the Research Center for Astronomy and Applied Mathematics Medical and Biological Research Foundation (IIBEAA) in Athens, Greece. More than 35 participants representing global and regional organizations with interest in the Mediterranean coastal zone discussed the current status of Earth observations and decision support, identified gaps specific to the Mediterranean, and proposed activities addressing these gaps. A workshop report is currently in preparation and will be made available at the CZCP web page in the near future. More information on the Workshop is available at the [GEO CZCP Workshop](#) web page. Post workshop information is collected at the CZCP [Workshop Page](#).

CZCP Future Plans

- Build on the legacy of the IGOS-P Coastal Theme
- Implement the Recommendations of the Theme Report
- Update the Theme Report as necessary
- Continue the series of Regional Workshops
- Contribute to GEO Committees and Work Plan Tasks
- Facilitate development of pilot projects, working with GOOS and GTOS, and likewise help build out the global and regional coastal observing networks
- Improve user linkages;
- Develop the Web Page;
- Address funding issues