Global Ocean Observing System for Coastal Oceanography

Tom Gross
GOOS Project Office, IOC / UNESCO
Human Activity has Global Impacts

Halpern et al., 2008, Science
GOOS Key Role

We cannot Manage what we do not Measure

- Human impacts are evaluated by monitoring change
- Ocean observations are key input for understanding, monitoring and projecting climate variability
- Policy decisions on climate mitigation and adaptation must be based on sound science
- Long term weather/climate forecasts require accurate data for initialization and verification
- Coastal Management and Planning require process prediction and evaluation
the Global Ocean Observing System

- **collaborative system** of observations
  - in situ and satellite
  - operational and sustained research observations
  - driven by requirements, linked to data management and product generation activities

- **platform for enabling collaboration**
  - identify requirements, promote best practices and standards, assess readiness, synergies, technical coordination

- promote **global participation** through capacity development
If GOOS were to disappear

- The impact would not happen overnight –
  - Ocean data will keep flowing from National systems
  - Tsunami warnings would not stop.

- Observation systems for science would degrade.
  - Data interruptions when technical coordination is missing
  - Gaps in key climate records when local support programmes are stopped.
  - Standards for data and sharing of best practices erode and diverge, making it more difficult to compare observations across a global ocean.
  - Opportunities for exchange and coordination across the observation community are missed, and possibly funding opportunities are missed.
If GOOS were to disappear

- Lack of communications will lead to duplication of effort, development of gaps in measurements, and a divergence in observational methods.

- The ocean observing system will not expand to address new questions of ocean ecosystem stressors function such as: climate change; ocean acidification; pollution; fishing; shoreline modification.

- Countries with new capacity to contribute to a global system will have less help and encouragement to share data in a common system.

- Future global science issues will not be addressed by global ocean observations.
How Does GOOS Deliver?

- Convenes Intergovernmental programmes
- Convenes International Science meetings
- Helps promote involvement of developing countries in international science
- Advocates for shared observation products
- Enables global system to be evaluated, and gaps identified and plugged
- Allows Nations to identify national priorities with international priorities
Framework and Regional GOOS

Issues (Scientific and societal drivers)

Requirement

What to Measure

Essential Ocean Variables

Data Assembly

Data/Info. Products

Observations Deployment and Maintenance

Issues Impact

Argo

SOOP

Satellite Constellation

VOS

OceanSITES

IMOS

Satellite

IOOS
New GOOS Structure

governance & intergovernmental commitments

IOC Assembly

co-sponsors: ICSU, WMO, UNEP

scientific guidance & advice

GOOS Steering Committee

PICO OOPC BIO? ECO?

implementation

GOOS Regional Alliances

GOOS Project Office

JCOMM

ROOS / RCOOS
GOOS as a global system

• What is global?
  – global requirements for UN agreements (climate, biodiversity, marine assessment, sustainable development),
  – coordinating global observing networks, data management, and products
  – Built from national contributions, aligning existing structures
GOOS as a global system

- Monitoring and promoting **readiness**, assessing **fitness-for-purpose**
  - uniform tracking of **regional priorities and implementation** to align with **global priorities**

- Promoting global participation
  - bringing message to highest level
  - promotion of **data sharing, best practices and standards**
  - supporting **GRAs** in developing country regions
GOOS for climate
in situ observing networks
GOOS for climate
global participation varies by network
Coastal GOOS: through regional implementation

1st GOOS Regional Forum, Athens, Greece, 2002
2nd GRA Forum, Nadi, Fiji, 2004
3rd GRA Forum, Cape Town, S. Africa, 2006
4th GRA Forum, Guayaquil, Ecuador, 2008
5th GRA Forum, Sopot, Poland, October 2011
Vision for the role of the GRAs

• National drivers for ocean observation will always be the primary driving force for GOOS
  – systems need to provide information and products for local use (can be quite simple) – real-time services and assessments
  – each nation/region has different issues/threats, different organization and arrangements, different capacity
  – Framework provides some system thinking that can be applied at the national and regional levels
GOOS Regional Alliances

➢ GRAs work with data providers & users in their respective regions to:
  • Specify observing system requirements for products & services
  • Set priorities for capacity building
  • Establish R&D test beds

➢ Based on user specifications, GRAs build Regional Coastal Ocean Observing Systems (RCOOSs) by:
  • Integrating existing data streams & data bases as needed,
  • Identifying sentinel sites for in situ observations,
  • Increasing spatial & temporal resolution of observations & models,
  • Measuring more variables as needed.
PICO Coastal Implementation Plan

- The PICO draft plan offers a way forward and recommends expanding GOOS to include ecological and biogeochemical elements in the context of an ecosystem-based approach.
- Identifies key indicators of pressures, states & impacts of changes in state for 7 priority *Phenomena of Interest*
- Specifies the building blocks for a System of Systems
  - *End-to-End observing systems for each set of pressures & states*
  - Updates the list of Essential Ocean Variables based on these specifications
- Describes the required infrastructure of the System of Systems
- Recommends procedures for building the System of Systems
Accelerating Delivery of Coastal GOOS

Empower the GOOS Regional Council to

- Coordinate phased implementation on a global scale
- Support national & international infrastructure for priority observations & predictions
- Establish data management & communications systems for
  - Interoperability among monitoring systems & data integration within regions
- Support capacity building to
  - Fill priority spatial & temporal gaps in the Global Coastal Network in developing countries & emerging economies
- Fund regional implementation of projects in priority super site regions to
  - Demonstrate the value added of end – to – end system of systems