

WCRP Data Advisory Council

Ocean Observation Panel for Climate and the Framework for Ocean Observing

Eric Lindstrom, OOPC Chair @ NASA HQ
4 March 2013, Darmstadt, Germany



OOPC: Our Foci and Agenda

1. ***State of the Ocean:*** Improve and expand ocean climate indices at OOPC web site.
2. ***Societal Relevance:*** Stories and implications for society from ocean observations and ocean climate indices
3. ***Brief Current Events:*** El Niño, PDO, weather/climate events
4. ***State of the Observing System:*** Up-to-date info for status of satellite and in-situ observing system including data management. Better integration.
5. ***Liaison and Review:*** Continue to interact with the ocean/climate community and with other programs to advocate for sustaining and enhancing the observing system; reviewing components of the system as necessary.

OOPC Activities in 2012

- Completed “Framework for Ocean Observing” and move on to implementation through the GOOS Steering Committee
- Completing report on Requirements for Deep Ocean Observing
- Initiate review of upper ocean thermal observing requirements
- Continue building outreach and societal relevance (web feature)
- Dealing with issues related to Secretariat support & UNESCO/IOC budget – secretariat moving to GCOS in Geneva

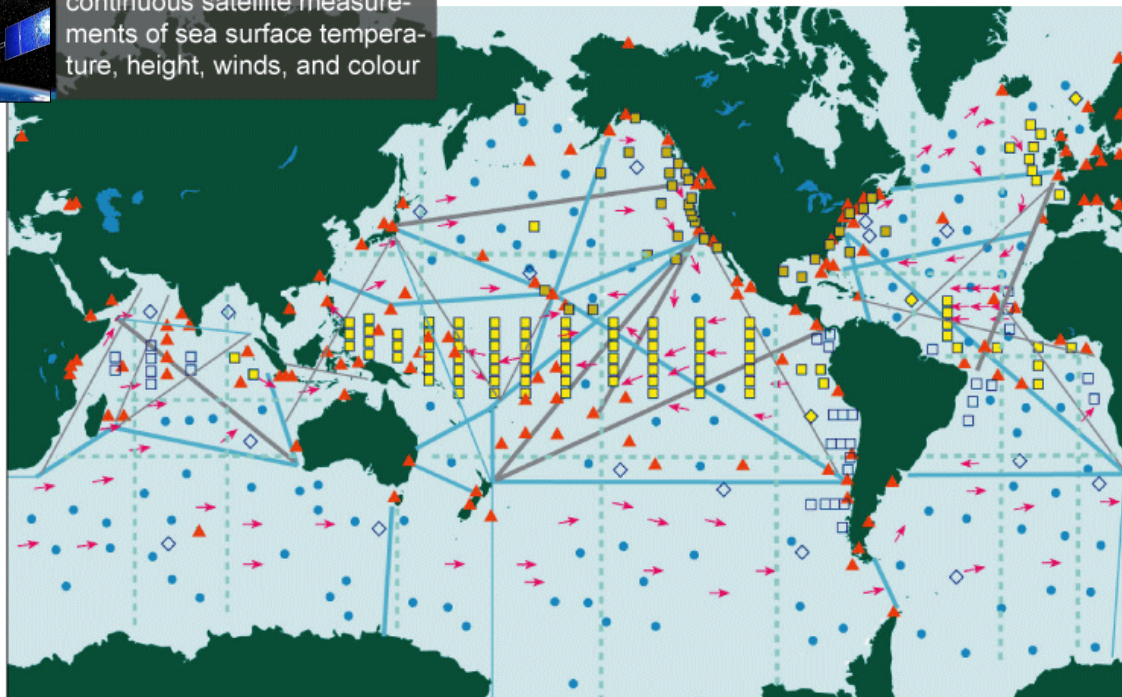
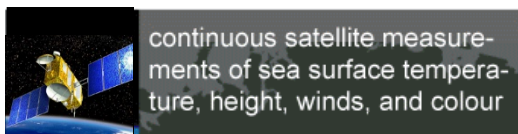
Initial Global Ocean Observing System for Climate

Status against the GCOS Implementation Plan and JCOMM targets

Total *in situ* networks

62%

September 2012



100% **Surface measurements** from volunteer ships (VOSclim)

200 ships in pilot project



100% **Global drifting surface buoy array**

5° resolution array: 1250 floats



59% **Tide gauge network** (GCOS subset of GLOSS core network)

170 real-time reporting gauges



80% **XBT sub-surface temperature section network**

51 lines occupied



100% **Profiling float network** (Argo)

3° resolution array: 3000 floats



62% **Repeat hydrography and carbon inventory**

Full ocean survey in 10 years

Reference time series **48%**

58 sites



34% **Global reference mooring network**

29 moorings planned



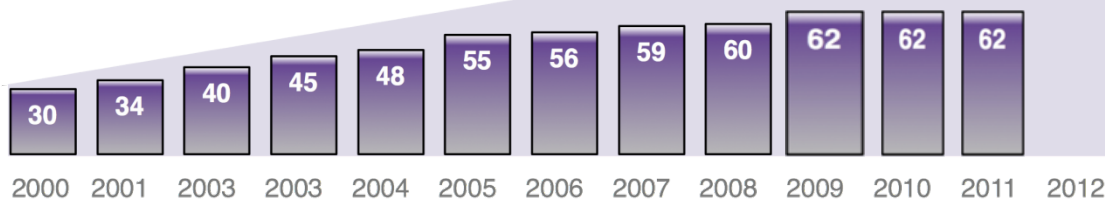
73% **Global tropical moored buoy network**

119 moorings planned



Original goal: Full implementation in 2010

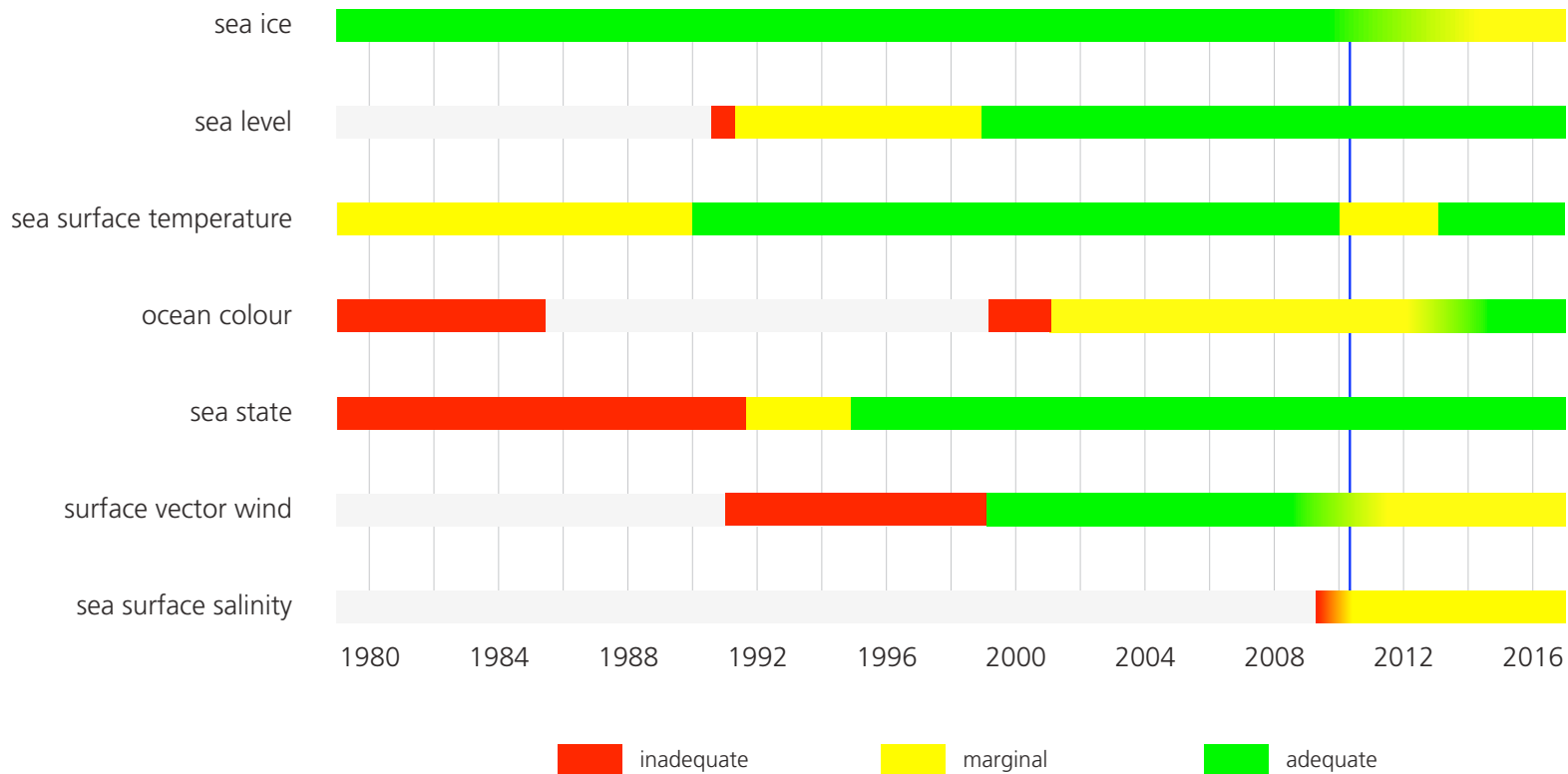
System % complete



Observing networks – Improving commitments for satellite observations

Adequacy of committed satellite missions status in 2011

Essential Climate Variable
from ocean satellites



OceanObs'09

Ocean information for society: **sustaining the benefits, realizing the potential**



Alberto Piola, Susan Wijffels, Ray Schmitt, and Anny Cazenave in Session 2A



Conference co-chairs Julie Hall, Ed Harrison, and Detlef Stammer

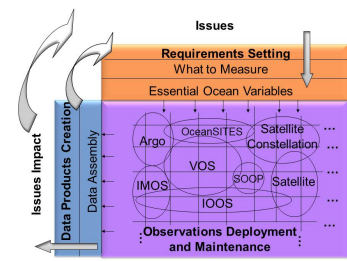


Patricio Bernal, Executive Secretary of the IOC, opens the conference

Why a Framework?

- OceanObs'09 identified tremendous opportunities, significant challenges
- Called for a **framework for planning and moving forward with an enhanced global sustained ocean observing system over the next decade**, integrating new physical, biogeochemical, biological observations while sustaining present observations
- **www.oceanobs09.net/FOO**

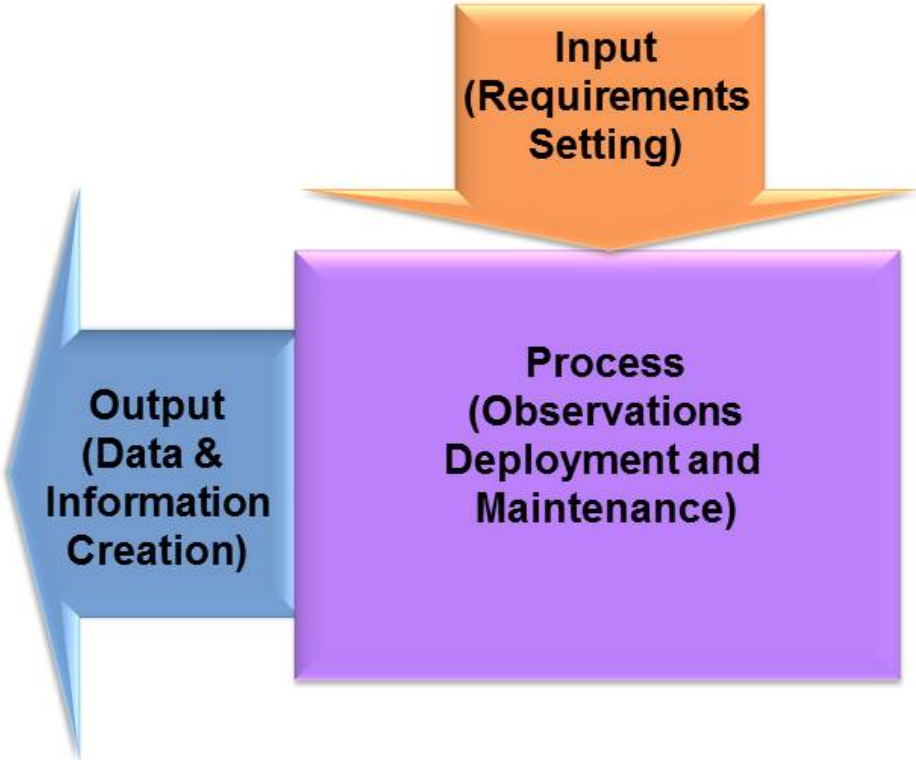
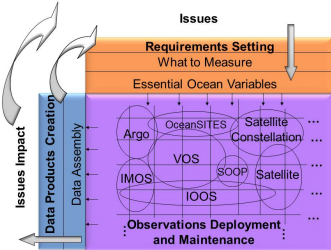
Framework for Ocean Observing High Level Objectives



- Take lessons learned from successes of existing observing efforts – **best practices**
- **Guide** observing community as a whole to sustain and expand the capabilities of the ocean observing system
- Deliver and observing system that is **fit-for-purpose**
- Promoting **collaborative alignment** of independent groups, communities and networks, **building on existing structures** as much as possible

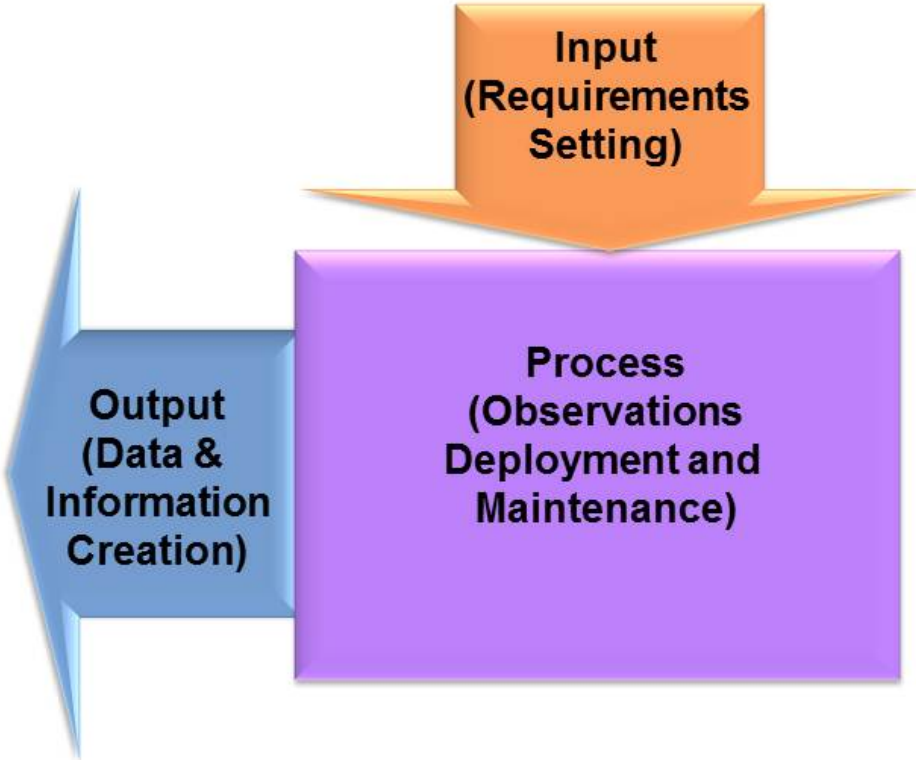
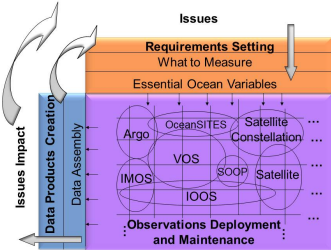
Framework for Ocean Observing

A Simple System

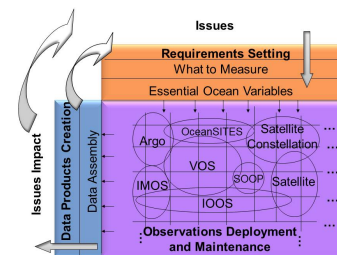
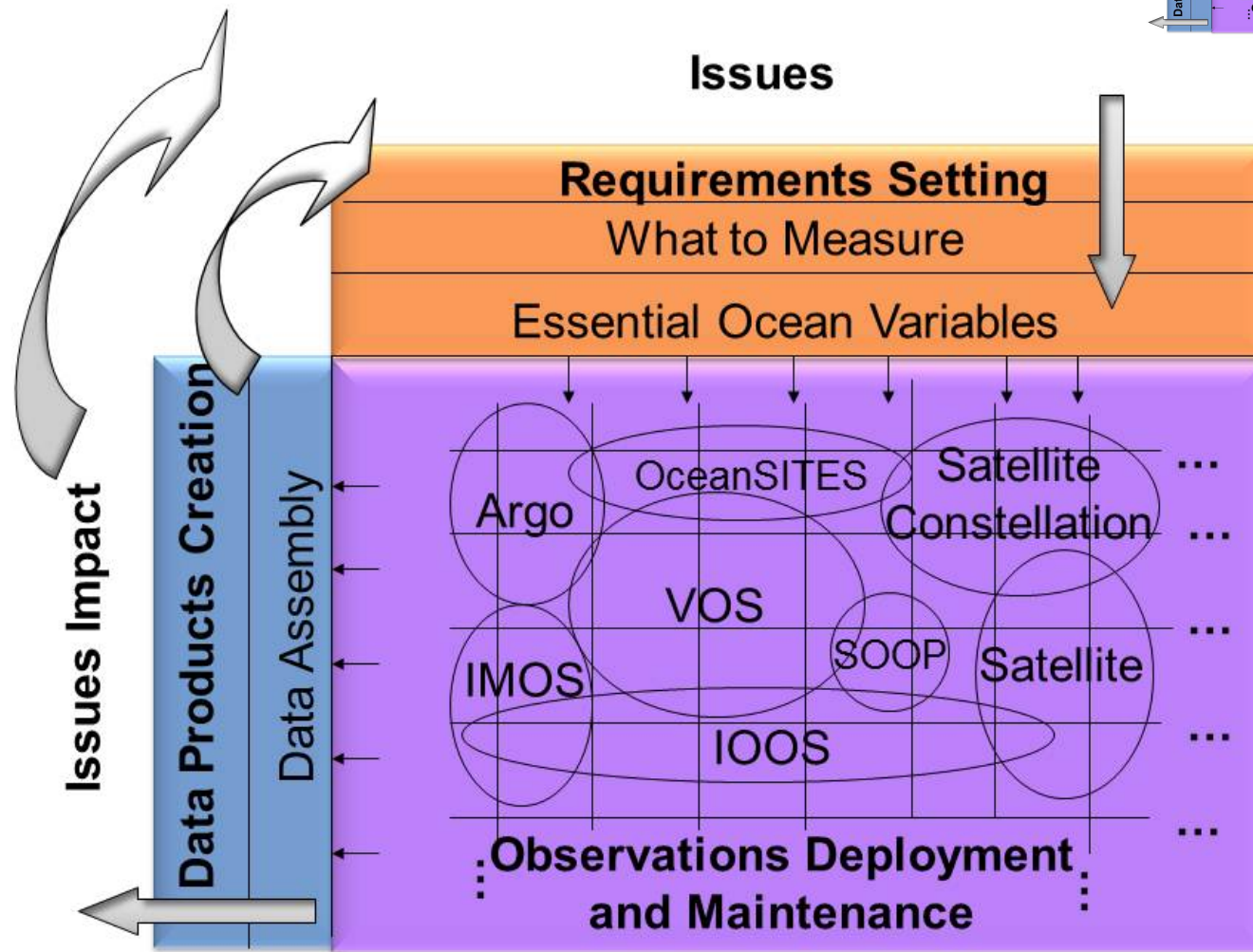


Framework for Ocean Observing

A Simple System

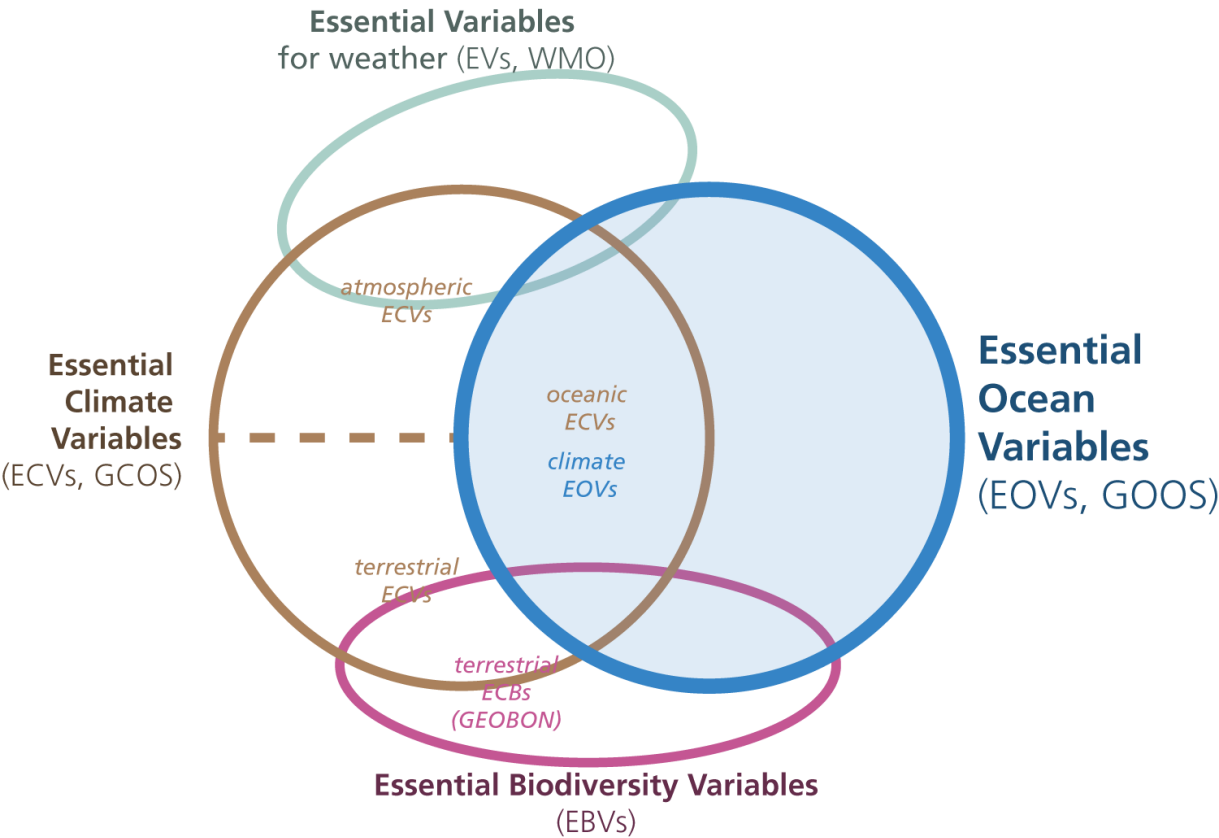
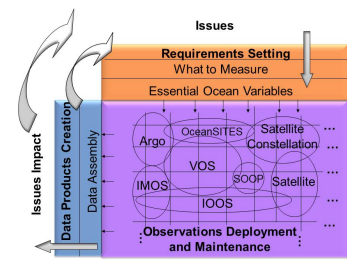


Structure of the Framework

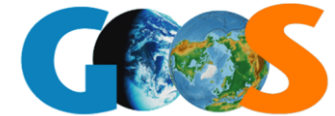


Driven by requirements, negotiated with feasibility

Essential Ocean Variables

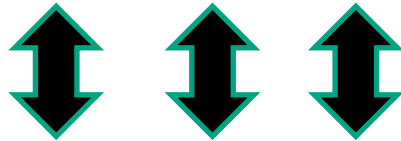


- **We cannot measure everything, nor do we need to**
- basis for including new elements of the system, for expressing requirements at a high level
- Driven by requirements, negotiated with feasibility
- Allows for innovation in the observing system over time



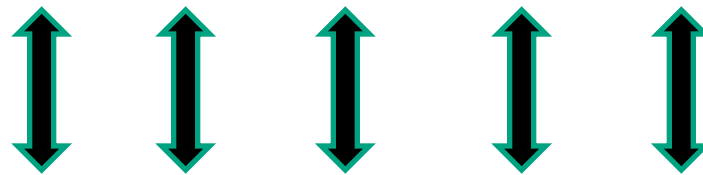
GOOS Steering Committee

(Peak Bodies, Sponsors, Observing Panel Chairs,
Observing System leaders)



Observing System Panels

(focused on EOVs e.g. Physics, Carbon/Biogeochemistry,
Biology/Ecosystems); Coordination for observing system elements



Technical Advisory Groups

(Observing technologies and networks,
Variable focus: data and products, synthesis, link to models)

Towards a Deep Ocean Observing Strategy

Eric Lindstrom

GOOS iSC, Paris, 20-22 June 2012



Deep Ocean Observing Strategy Workshop

- 30 March - 1 April 2011, Paris
- Objective: Develop a common statement of requirements and a first strategy for sustained global deep ocean observations for climate; considering all Essential Climate Variables, regions, and technologies to extract high priority and feasible actions for the next 5-10 years.
- Framework experiment in integration across disciplines: physics, carbon/biogeochemistry, biology/ecosystems

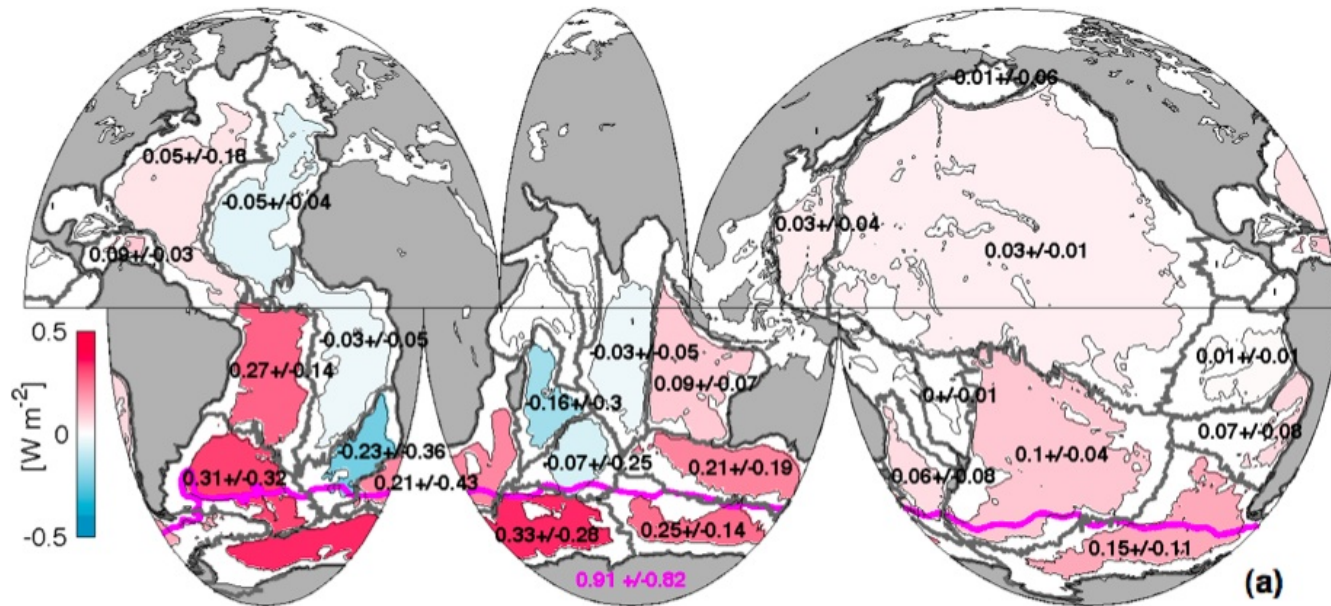
Relationship to Framework for Ocean Observing

- Framework structure being used to coordinate the writing team activities
- Readiness levels will be used to assess the fitness-for-purpose as related to the EOVs and associated observations and data products
- Oversight Panels, Expert Teams, and Implementation Communities structure will be used to organize conversation related to requirements, observations, and data products needs going forward

Rationale for deep ocean observations

Abyssal & Deep Heat Content Changes

(Purkey & Johnson, 2010)



Region	Global Heat Gain (W m^{-2})
Abyssal Ocean ($z > 4 \text{ km}$)	0.027 (± 0.009)
Southern Ocean ($1 > z > 4 \text{ km}$)	0.068 (± 0.062)
Total (Abyssal + Southern)	0.095 (± 0.062)

Deep ocean $\sim 1/7$ of upper ocean change 1990s-2000s:
source or limit to predictability?

Deep Ocean Observing Strategy

Executive committee responsible
for monitoring progress

- Eric Lindstrom (OOPC/FOO)
Bob Molinari (WCRP/CLIVAR)
Albert Fischer (OOPC)
Kathy Tedesco (IOCCP)
Bill Westermeyer (GCOS)
Myriam Sibuet (post-CoML)

Three writing teams:

Climate and Physical Observations
Gregory C. Johnson
Bernadette Sloyan

Carbon, Biogeochemistry Observations
Rik Wanninkhof
Toste Tanhua

Biodiversity and Ecosystem Observations
Myriam Sibuet
Antje Boetius
Lisa Levin

Report Outline

- Societal Issues that the observations will address
- Science questions that the observations will address
- Articulation of EOVs for each group
- Overview of current and required observing platforms, technologies and programs
- Data management strategy
- Strategies for integration through expert panels and implementation teams

What is the timeline for Deep Ocean Strategy?

- Year One: June 2011 to June 2012
 - Created small writing teams
 - Held several teleconferences
 - Materials placed on OOPC website
 - Drafted initial text for the plan
 - Initiated informal roll-out of the concept to high-level groups
- In next two years:
 - Establish a development program
 - Incorporated into GCOS, CLIVAR, IMBER, COML-follow on activities
- In five years:
 - Pilot program underway
- OceanObs 2019
 - Global sustained coverage in sight