Keith Alverson
Ocean Observations and Services
Intergovernmental Oceanographic Commission of UNESCO
Major Accomplishments 2005-2010: Global Ocean Climate Observations

- The ocean observing system for climate is 60% complete.
- Reporting to UNFCCC ensures high visibility and national engagement.
- Understanding of global climate change – particularly detection and attribution - has been substantially enhanced.
- Development of a Global Framework for Climate Services is being enabled.

EUROPE: is **directly** affected by regional impacts of global climate variability and change and **indirectly** affected through socio-economic impacts such as human migration, calls for adaptation funding, etc.
Major Accomplishments 2005-2010: Regional Observations for Societal Benefit

- Relevant regional components of the GOOS are increasingly available in real time, enabling coastal hazard warnings and mitigation (e.g., oil spills, storm surges, tsunami, cholera ...).
- Seasonal products derived from ocean observations are also starting to become possible (e.g., ENSO, Monsoon, drought, flooding and fire regime forecasts).
- Quotidian services are being delivered (e.g., Shipping and Port traffic optimization, offshore wind and drilling operations supported ...)

EUROPE: provides a stellar example of a strong and effective GOOS regional alliance (I-OOS in the US and IMOS in Australia are single-nation systems).
Milestones
Surface Drifters 2005
Argo Floats 2007
VOSClim 2007
Implementing Coastal and Regional GOOS

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 and 1st Regional Council, Sopot, Poland, 10/2011
Near real time ocean conditions (t, s, and currents) are now freely available on the web, and widely used. These products depend on data streams from the observing system (eg. www.mercator-ocean.fr)

Thanks:
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Katy Hill, IMOS Scientific Officer (Katy.Hill@imos.org.au)
The bottom line

- Core funding from the Australian Government
  - $102M over ~six years ($50M ‘NCRIS’ and $52M ‘EIF’)
- Co-investment by Partners
  - Operators, other Australian Govt. Programs, State Govt’s
  - ~$78M cash and in-kind (40+%) 
- Ramp up to 2009-10, then levelling out at ~$35M pa
IMOS Facilities (there are 11)

1. Argo Floats
   - autonomous profiling floats

2. Ships of Opportunity
   - repeat underway observing on volunteer ships
   - physical, chemical and biological observations

3. Deepwater Moorings
   - existing: Southern Ocean Time Series (47°S)
   - planned: Antarctic Coast (Adelie), Indonesian Through Flow, East Australian Current (26°S)

4. Ocean Gliders
   - coastal and open ocean
5. Autonomous Underwater Vehicle
   – benthic surveys

6. National Moorings Network
   – National Reference Stations (nine)
   – shelf moorings and arrays

7. Coastal Radar Network
   – phased array and direction finding

8. Tagging Marine Creatures
   – Acoustic curtains and satellite tags

9. Sensor Networks
   – southern Great Barrier Reef

10. Satellite Remote Sensing
    – SST, altimetry (planned), and ocean colour
11. electronic Marine Information Infrastructure (eMII)

- Facility responsible for creating and developing the information infrastructure
  - to make all data discoverable and accessible
- ~10% of core funding invested in this activity
- Opportunity to use this infrastructure to create a larger Australian Ocean Data Network (AODN)
  - providing access to IMOS and non-IMOS data
    - ‘publicly-funded data, publicly available’
Six IMOS Nodes

- **Bluewater and Climate** Node
  - open ocean focus
- Five Regional Nodes
  - continental shelf and coastal focus
  - **Western Australia**
  - **Queensland**
  - **New South Wales**
  - **Southern Australia**
  - **Tasmania (planned)**
IMOS – Bluewater Observations
IMOS – Shelf Observations
IMOS contributes to regional systems such as the Indian Ocean Observing System (IndOOS)
Sustaining the GOOS

The Marine Economic Sector comprises approximately 5% of Global GDP (2.7 Trillion Dollars).

At present, investment in the observing system underpinning this economic sector is approximately $1 billion/year, of which about $500,000/year is for global coordination.

The estimated required investment for adequately sustaining the system, as designed, is $2 billion/year of which $2 million/year is for global coordination.

The glass is about ½ full...

GOOS Summary for Policy Makers, “Cost and Benefits of coordinated ocean observations” 10-12, 2009
Regional Seas Conventions

Can they play an analogous role for *regional GOOS* to the one that the UNFCCC has played in developing the global climate module of GOOS?
European Contributions to Global Coordination

Funds available for international coordination of the Global Ocean Observing System through IOC/UNESCO in 2008 includes funds for GOOS, JCOMM, JCOMMOPS, IODE, ocean carbon includes staff and programme costs

GOOS Summary for Policy Makers, “Cost and Benefits of coordinated ocean observations”12, 2009
Governmental engagement and willingness to commit resources for both implementation and coordination remains weak.

Demonstrating clear societal benefits to catalyze ‘user pull’ requires better advocacy.

The observing system – especially the coastal module – needs redesigning to serve adaptation needs.
A multi-user, multi-purpose system delivering societal benefits beyond climate change.


The Economist, May 21, 2009
Advocacy and Outreach depends on high profile public interest stories

- 2004 Indian Ocean Tsunami
- Storm Surges (Katrina 2005 in New Orleans, Nargis 2008 in Myanmar…)
- Global Climate (Sealevel, ENSO, etc)
- Toxic Algal Blooms
- Pacific Garbage Gyres
- Ocean Acidification
- Fisheries Collapses – (Tunafish 2010)
- Opening of the Arctic to development

not to mention …
Bridge the research-operational divide

“A comprehensive ocean observing system simply cannot exist without the full engagement of the oceanographic research community”

- improve deployment opportunities for autonomous platforms (eg. Argo, drifters)
- facilitate data availability, archiving
- Ensure high quality ‘research’ data contributes to the sustained data flow of GOOS

Alverson, IOC Annual Report, 38-39, 2005
Major Challenges 2010-2015:
Global Ocean Climate Module

Europe and its Member States have built strong national and regional infrastructures and services. But, just as oceans and climate change know no political boundaries, Europe must also play an leading role at the international level by actively supporting global efforts.

- European Member States, and the European Commission, should support increase their support for the global ocean climate observing system.
- The European Commission has strongly supported satellite observations (eg through GMES). Because the oceans are opaque satellite data can only scratch the surface of the ocean. Engagement by the commission in sustaining the in-situ oceanographic observing system for climate is a top priority.
Major Challenges 2010-2015: 
European Regional Observing System

GOOS’ contribution, through its global climate module, to detection and attribution of anthropogenic impacts on global climate has been a substantial assistance to governments. A major challenge for the future comes with recognizing that adaptation to climate change occurs on a regional level and requires regional observing systems. There is an urgent imperative to ensure that GOOS can provide relevant, timely and useful data that will be required to underpin the development of the global framework for climate services that is being developed in the context of adaptation and mitigation.

• Europe lead by example. Show a regional alliance can work.
• Europe must provide leadership to the global council of regional alliances, thereby facilitating sharing of best practices, adoption of common standards, etc…