



United Nations
Educational, Scientific and
Cultural Organization

Organisation
des Nations Unies
pour l'éducation
la science et la culture

Organización
de las Naciones Unidas
para la Educación
la Ciencia y la Cultura

Организация
Объединенных Наций по
вопросам образования
науки и культуры

• Intergovernmental
Oceanographic
Commission

• Commission
océanographique
intergouvernementale

• Comisión
Oceanográfica
Intergubernamental

• Межправительственная
океанографическая
комиссия

Looking beyond your microscope: contributing data and information to the global community

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IODÉ Programme Manager
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The IOC of UNESCO:

Building knowledge and capacity for sustainable ocean management

- * Established in 1960
- * Has **functional autonomy** within UNESCO
- * Only intergovernmental body **mandated to promote marine science in all ocean basins**
- * **Fosters marine sustainable development** through: science, services, observations, data exchange and capacity development



IOC Medium Term Strategy

2014 - 2021

4 High Level Objectives

- * **Healthy ocean ecosystems**
- * Early warning for ocean hazards
- * **Resiliency to climate change and variability**
- * Enhanced knowledge of emerging issues



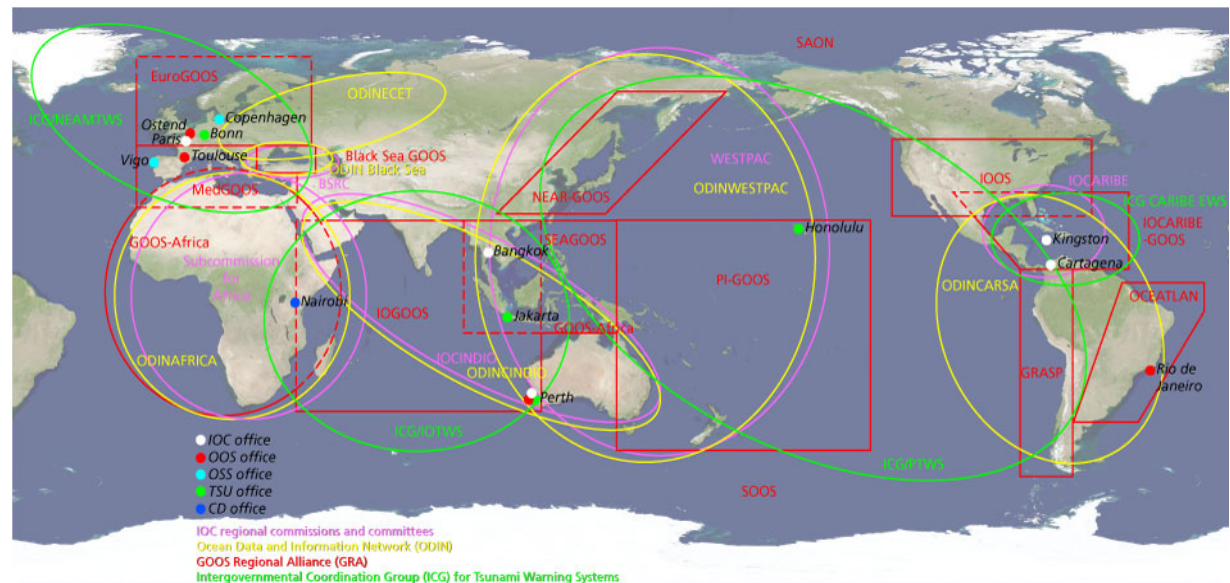
IOC = Communities of Practice

GLOBAL

You can join these communities!

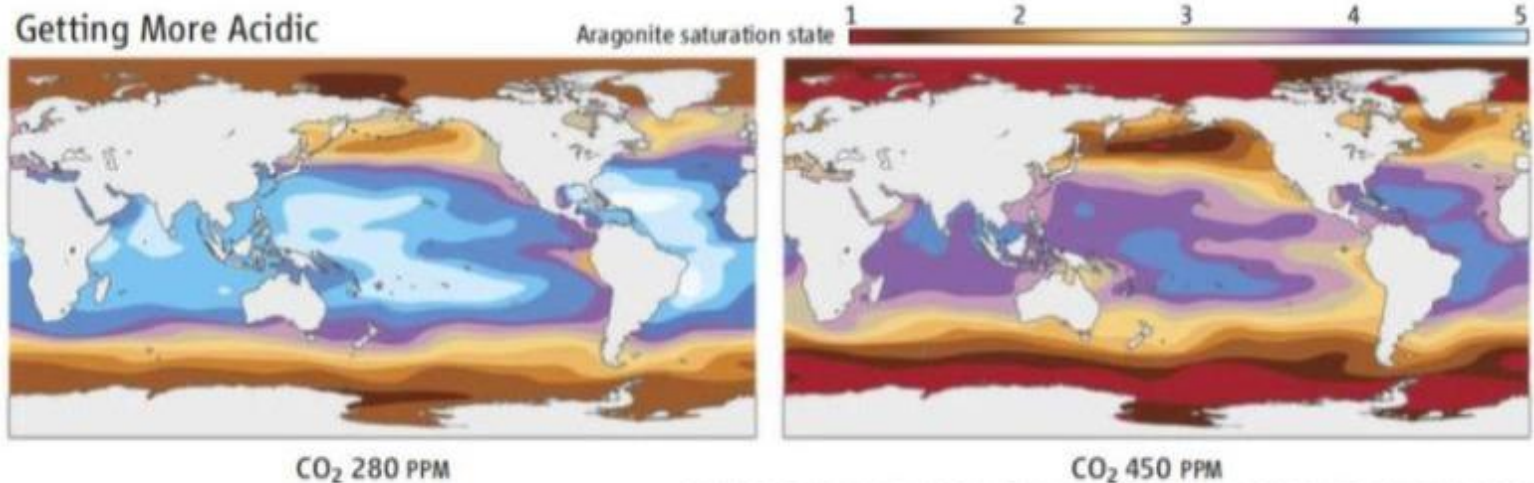
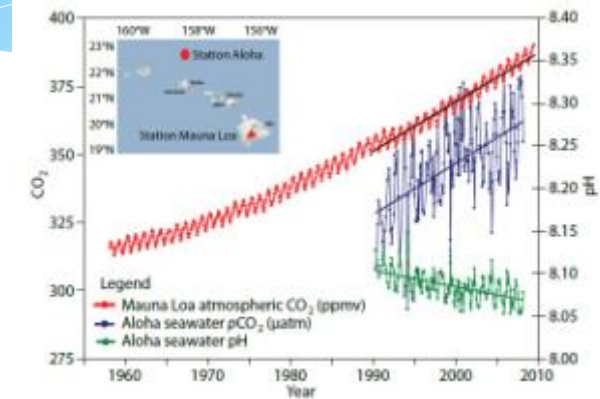
Ocean observation: GOOS
Data management: IODE
Tsunami warning and mitigation
Harmful algae
Coastal zone management
Ocean carbon

REGIONAL



Ocean Carbon, Acidification

- * International Ocean Carbon Coordination Project (IOCCP)
- * Third International Symposium on the Ocean in a High-CO₂ World
- * Rio+20 called for observations, research on OA



SOURCE: O. HOEGH-GULDBERG ET AL., SCIENCE 318, 5857 (14 DECEMBER 2007)

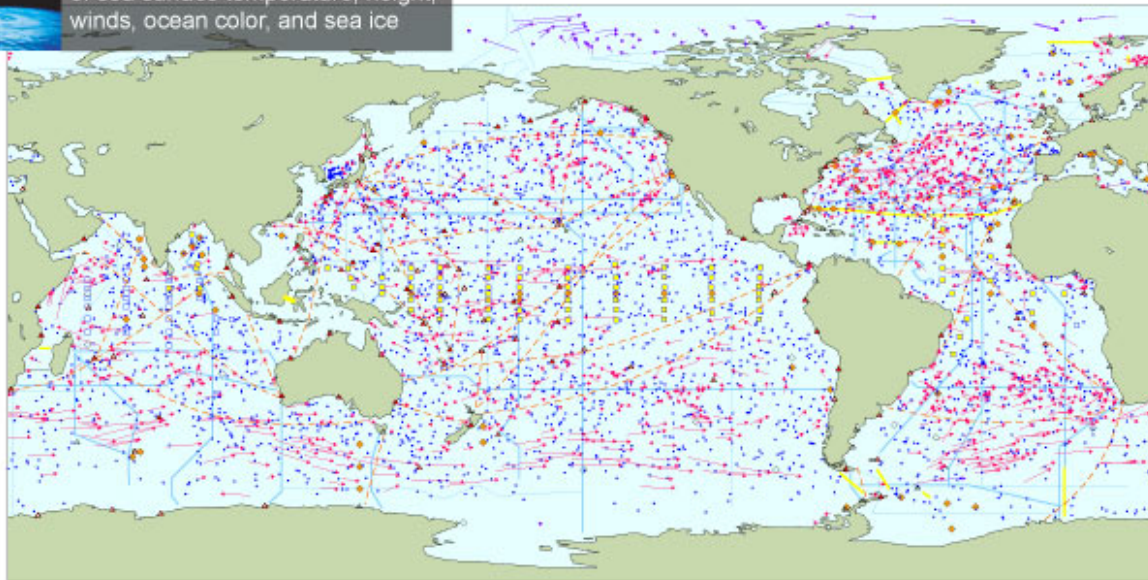
Global Ocean Observing System (GOOS)



continuous satellite measurements of sea surface temperature, height, winds, ocean color, and sea ice

Total *in situ* networks **61%**

April 2013



100% Surface measurements from volunteer ships (VOS)

250 ships in VOSclim pilot project



75% Global drifting surface buoy array

5° resolution array: 1250 floats
ice buoys



66% Tide gauge network (GCOS subset of GLOSS core network)

170 real-time reporting gauges



81% XBT sub-surface temperature section network

51 lines occupied



100% Argo profiling float network

3° resolution array: 3000 floats



62% Repeat hydrography and carbon inventory

Full ocean survey in 10 years

48% Transport monitoring

29 sites



34% Global time series network

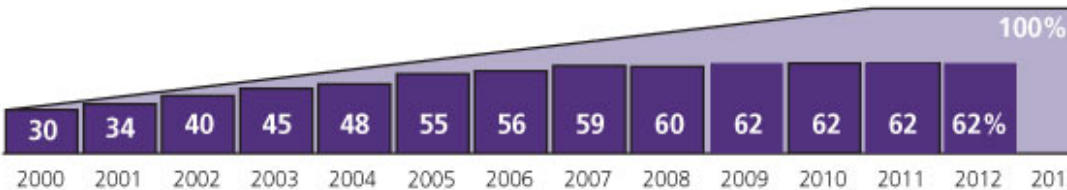
58 moorings planned



56% Global tropical moored buoy network

119 moorings planned

Representative milestones

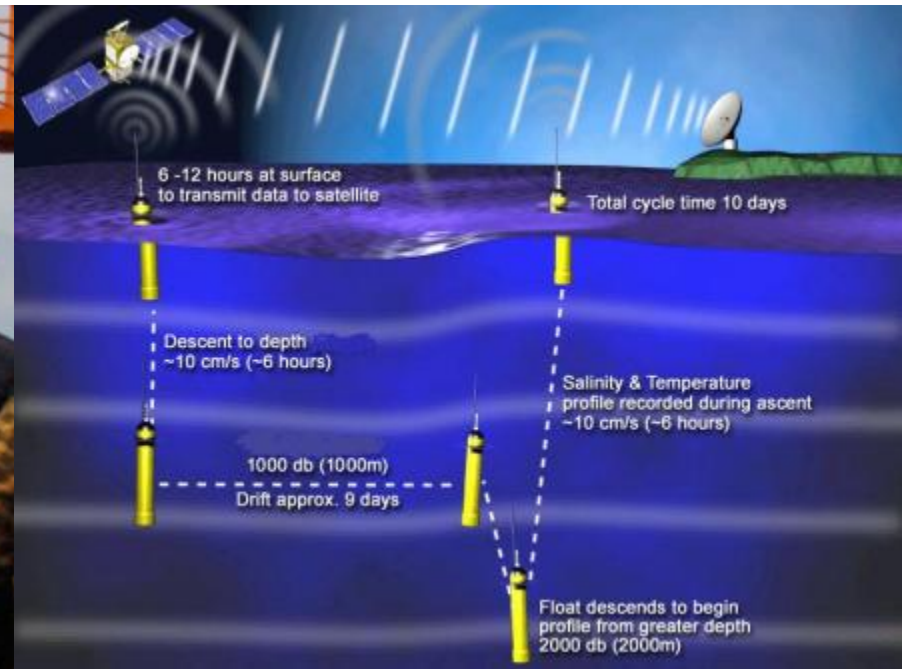


original goal for full implementation by 2010

System % sustained, of initial goals

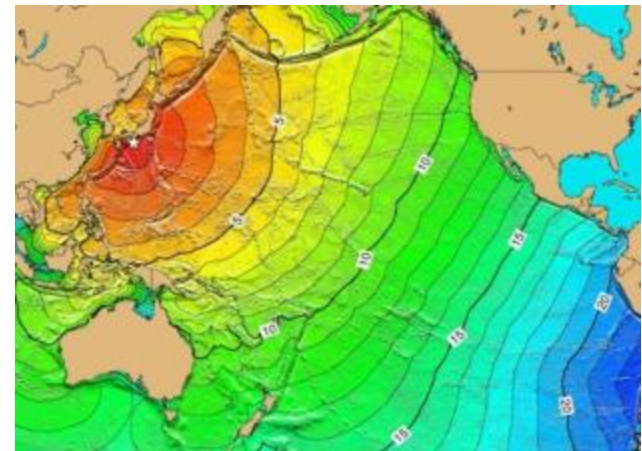
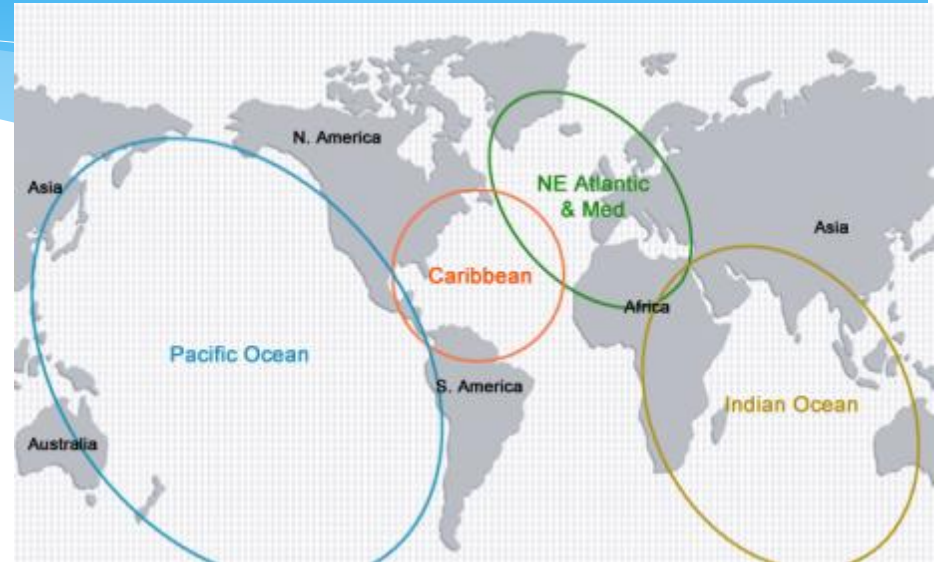


Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM)



Tsunami Warning Systems

- * Pacific since 1965
- * 2004 tsunami in Indian Ocean illustrated need for more
- * IOC mandated in 2005 to establish three more TWS
 - ICG IOTWS
 - ICG CARIBE EWS and
 - ICG NEAMTWS



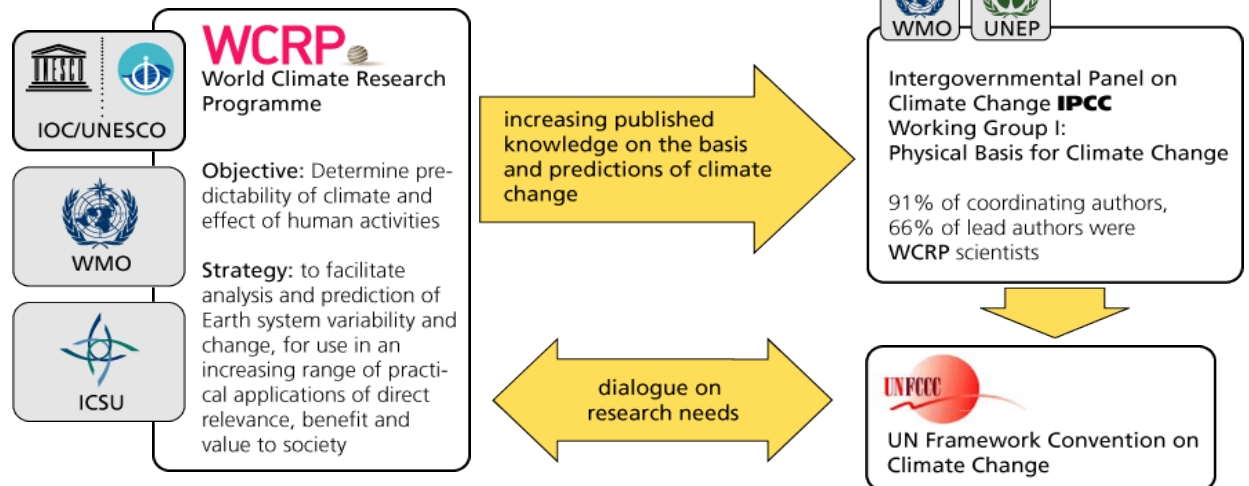
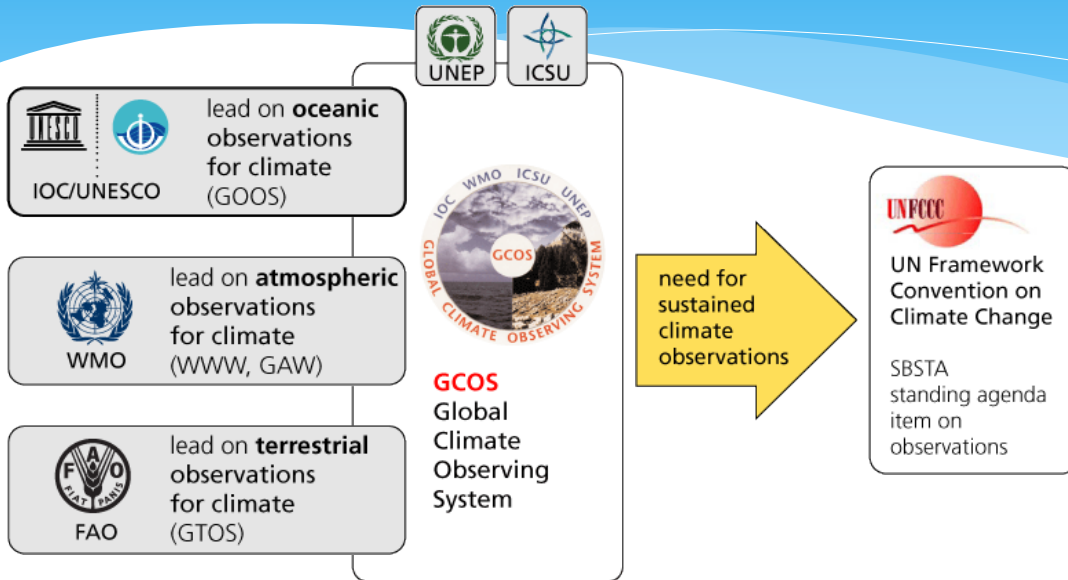
Harmful Algal Blooms

Vulnerability of humans and the ocean



- Enhanced capacity to manage HABs in developing Member States (i.e. training)
- A normative global research programme
- Manuals and guides for research and management
- Global data bases on HAB events and distribution

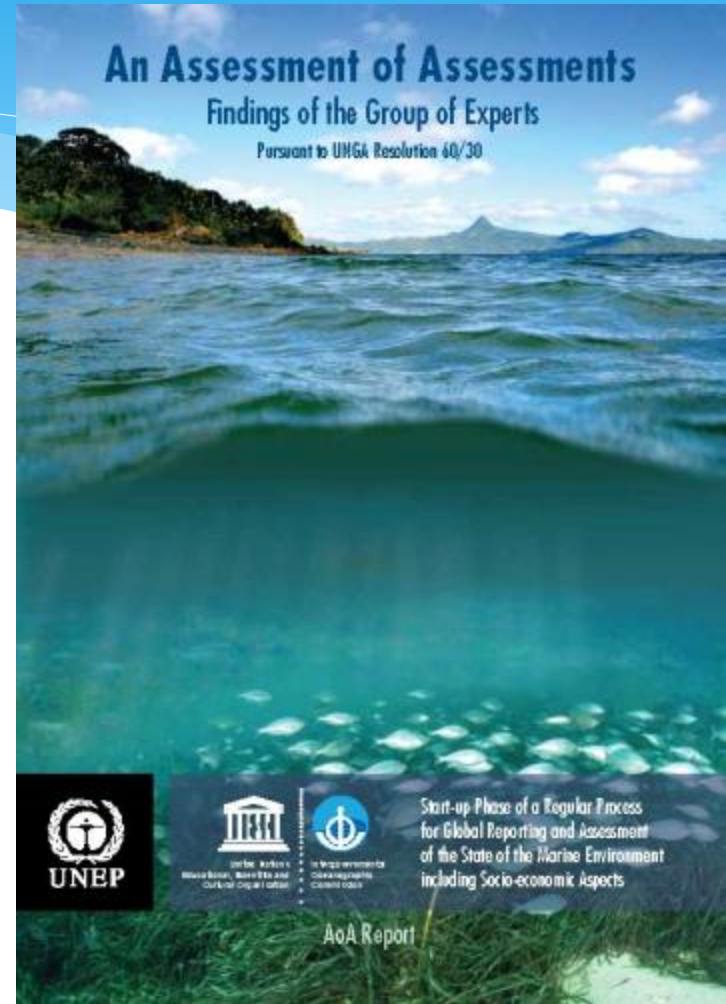
IOC and climate



World Ocean Assessment

Previously 'the UN Regular Process on Global Reporting and Assessment of the State of the Ocean including Social and Economic Aspects'

...mechanism to keep world's ocean and seas under continuing review by providing regular assessments at global and supra-regional levels (A/64/347)



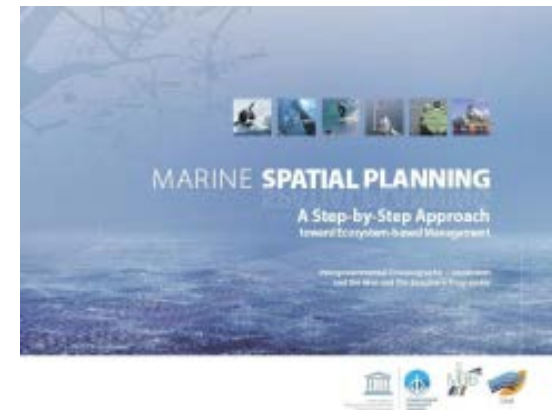
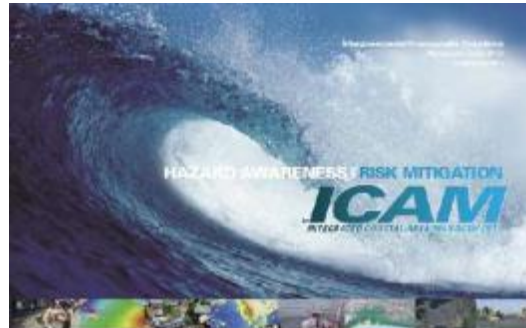
Published 31st August 2009

www.unga-regular-process.org



IOC is a leader in integrated management

- * Integrated coastal zone management
- * Marine Spatial Planning
- * Marine Atlases



❖ *IOC Handbook on Integrated Coastal and Ocean Management indicators*

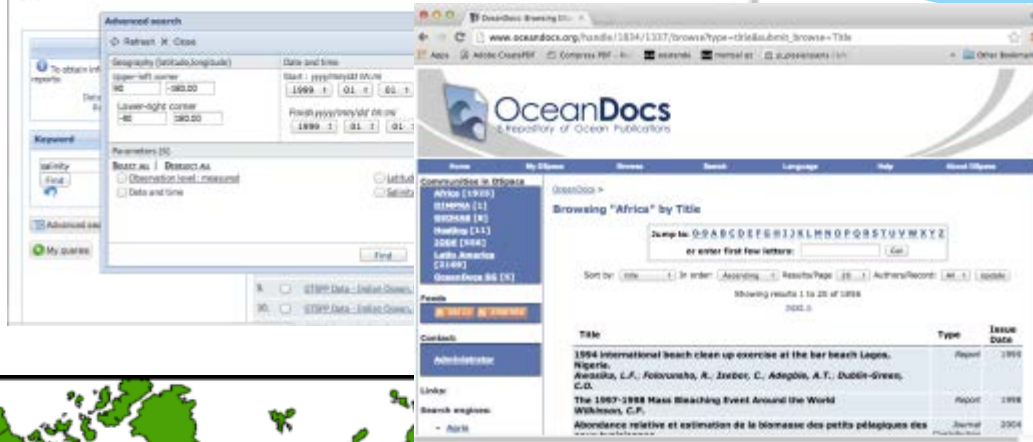
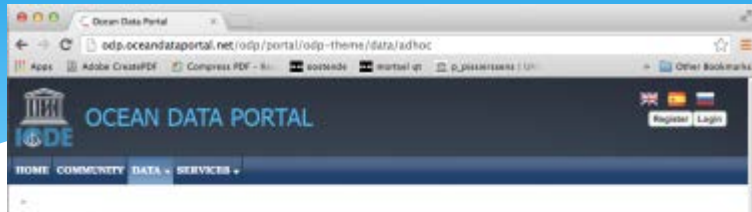
IODE

International
Oceanographic
Data and Information
Exchange



IOC

Services - Data Access



- * IODE data centre network
- * IODE data/information products

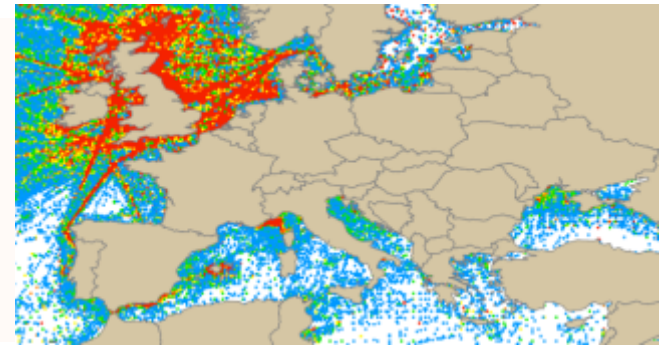
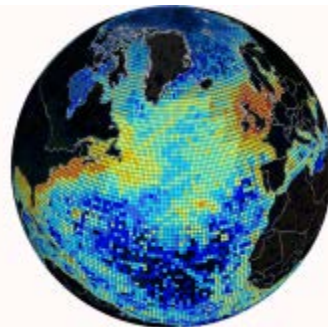
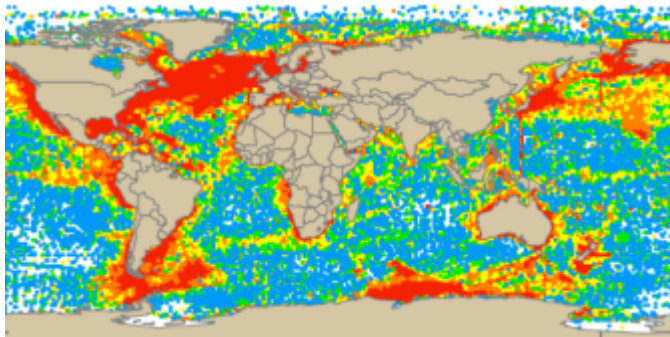


- * IOC Data Policy: open access
- * Data standards/exchange formats
- * Services to all IOC programmes
- * Initially physical, chemical data



Ocean Biogeographic Information System (OBIS) - ocean biodiversity

- * Legacy of the Census of Marine Life, now further developed under the IODE programme
- * Allows users to search, download and visualize marine species distributions through time, space and habitat, globally.



Global Network

>90 data centres
>80 countries



What is a data centre?

- The mission of a National Oceanographic Data Centre is to **provide access and stewardship** for the national resource of oceanographic data.
- This effort requires the **gathering, quality control, processing, summarization, dissemination, and preservation** of data generated by **national and international** agencies.



International role

- Participating in the development of **international standards and methods** for data management through the IODE and JCOMM;
- Participating in international oceanographic data and information **exchange** through the IODE and JCOMM, the Joint Commission for Oceanography and Marine Meteorology;
- Assisting with data management aspects of global or regional programmes or pilot projects through IODE and JCOMM ...;
- Operating as a **data assembly and quality control centre** for part of an international science experiment;
- Operating regional, specialized or World Data Centre (WDC) on behalf of the international science community.

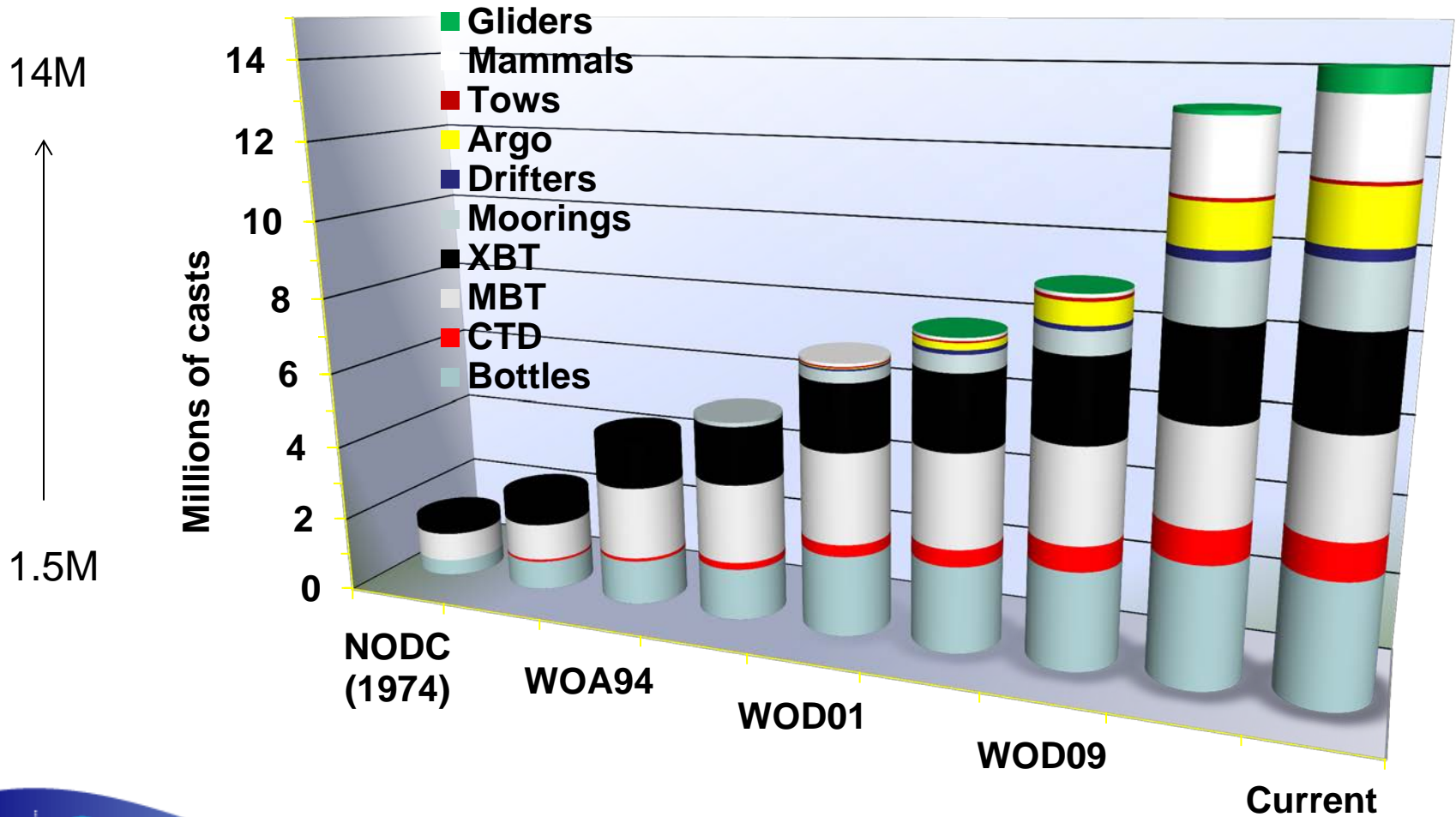


Data centres 1960-2013

- Centralized
- (usually) One country, One data centre



Growing data volumes...



More parameters...

- Temperature
- Salinity
- Oxygen
- Silicate
- Phosphate
- Nitrate
- Chlorophyll
- ...

- National/regional projects
- National/regional programmes
- National/regional institutions
- ...

New data management capacity...

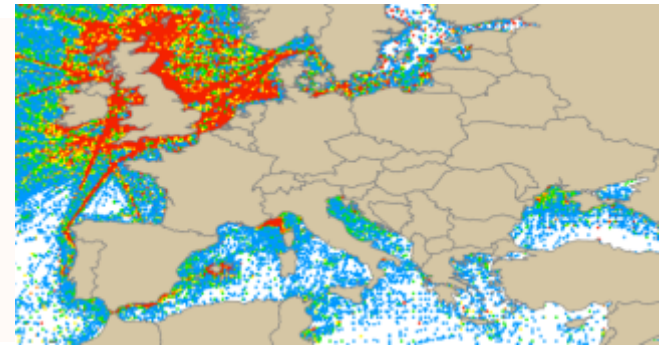
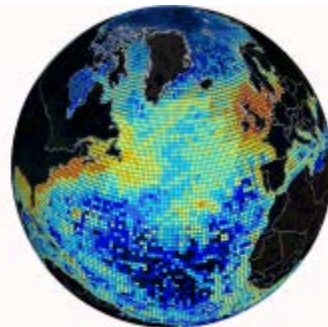
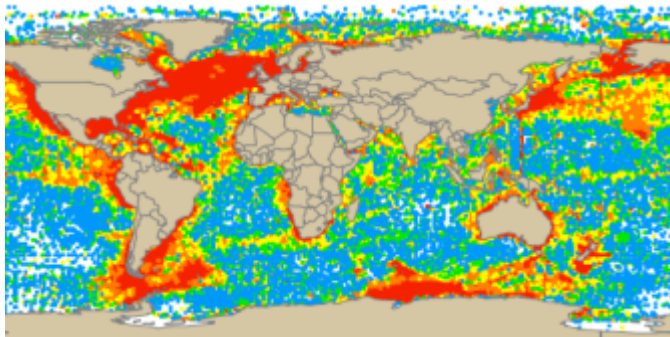


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Ocean Biogeographic Information System (OBIS) - ocean biodiversity

22 nodes connecting 500 institutions in 56 countries

- Legacy of the Census of Marine Life, now further developed under the IODE programme
- Allows users to search, download and visualize marine species distributions through time, space and habitat, globally.



Sampling stations in OBIS

New model: NODCs + ADUs

- **Associate Data Unit:** national projects, programmes, institutions or organizations (other than NODCs), or regional or international projects, programmes, institutions or organizations that carry out data management functions,
- **Increased role of scientists!**
- What data are available where?
- Make sure that legacy data are archived and preserved
- Make use of IODE agreed methodology



How to access data as a user?



World Data Center
for Oceanography
Silver Spring

- 1960-1990: magnetic tape from NODC or WDC
- >1990: ftp Centralized systems
- >2000: OBIS

- >2004: SeaDataNet [Europe]
- >2005: Global Earth Observation System of Systems (GEO/GEOSS) [Int]
- >2006: European Marine Observation and Data Network [Europe]
- >2006: Integrated Marine Observing System (IMOS) [Australia]
- >2008: World Data System (WDS) [International]
- >2009: IODE Ocean Data Portal [International]
- >2009: Integrated Ocean Observing System (IOOS) [USA]

Distributed systems

And what about you?

QUESTIONS:

1. Where do you store your data?
2. Do you keep back-ups of your data?
3. Have you received training in data management?
4. Do you create metadata for your data?
5. Do you share your data?
 - After how much time?
 - With whom?



Suggestion: Data Management Plan

- The goal of the data management plan is to ensure that data are properly collected, documented, made accessible, and preserved for future use.
- A data management plan should address the questions:
 - ***What data will be generated by the activity?***
 - ***What procedures will be used to manage the data?***



Suggestion: work with your data centre

- Discuss your data management plan
- Use the VLIZ Marine Data Archive
 - Individual scientists can protect their data files against loss by uploading them in the Marine Data Archive (MDA). In addition, research groups and project partners can also manage and archive data files collectively in a documented manner.
 - Each file in the archive is stored together with a description of the file's content.
 - Access to the user rights is regulated by an account-based registration procedure..
 - <http://mda.vliz.be/>



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Suggestion: Share your data

“Research data are viewed by many funding bodies as a public good which should be openly available to the academic community and often beyond”

(UK data archive)



IOC

Suggestion: Share your data

Sharing research data:

- encourages scientific enquiry and debate
- promotes innovation and potential new data uses
- leads to new collaborations between data users and data creators
- maximises transparency and accountability
- enables scrutiny of research findings
- encourages the improvement and validation of research methods
- reduces the cost of duplicating data collection
- increases the impact and visibility of research
- provides credit to the researcher as a research output in its own right
- provides great resources for education and training



EU: The INSPIRE Directive

(Infrastructure for Spatial Information in the European Community)

- Came into force on 15 May 2007 and will be implemented in various stages, with full implementation required by 2019.
- Aims to create a European Union (EU) spatial data infrastructure. **This will enable the sharing of environmental spatial information** among public sector organisations and better facilitate public access to spatial information across Europe.
- A **European Spatial Data Infrastructure** will assist in policy-making across boundaries. Therefore the spatial information considered under the directive is extensive and includes a great variety of topical and technical themes.



INSPIRE Principles

1. Data should be collected only once and kept where it can be maintained most effectively.
2. It should be possible to combine seamless spatial information from different sources across Europe and share it with many users and applications.
3. It should be possible for information collected at one level/scale to be shared with all levels/scales; detailed for thorough investigations, general for strategic purposes.
4. Geographic information needed for good governance at all levels should be readily and transparently available.
5. Easy to find what geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used.

Beyond Europe: IOC Data Policy

- *“The timely, free and unrestricted international exchange of oceanographic data is essential for the efficient acquisition, integration and use of ocean observations gathered by the countries of the world for a wide variety of purposes including the prediction of weather and climate, the operational forecasting of the marine environment, the preservation of life, the mitigation of human-induced changes in the marine and coastal environment, as well as for the advancement of scientific understanding that makes this possible.”*



IOC

IOC Data Policy 6 Clauses

- **Clause 1:** MS shall **provide timely, free and unrestricted (TFU) access** to all data, associated metadata and products generated under the auspices of IOC programmes.
- **Clause 2:** MS are encouraged to TFU access to relevant data and associated metadata from non-IOC programmes that are **essential for application to the preservation of life, beneficial public use and protection of the ocean environment, the forecasting of weather, the operational forecasting of the marine environment, the monitoring and modelling of climate and sustainable development in the marine environment.**
- **Clause 5:** MS shall, to the best practicable degree, **use data centres linked to IODE's NODC and WDC network as long-term repositories** for oceanographic data and associated metadata. IOC programmes will cooperate with data contributors to ensure that data can be accepted into the appropriate systems and can meet quality requirements.



Suggestion: Publish your Data

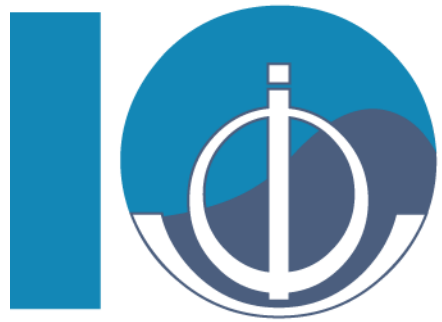
- Data citation/data publication: formally cite data that you use to write your paper
- Give more value to your data by giving them their own “identity” and making them “citable”
- Data related to traditional journal articles are assigned persistent identifiers referred to in the articles and stored in institutional document repositories
- <http://www.iode.org/mg64>



Conclusions

- *We all generate data and can play an active role in managing the data*
- *We need to learn more about data management*
- *We need to work with our data centres*
- *We must properly describe (document) our data*
- *We must make sure our data are preserved/archived*
- *We must share our data*
- *We must “publish” our data*





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Thank you

<http://www.iode.org>



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