

Global Ocean Observing Systems Coordination by JCOMMOPS

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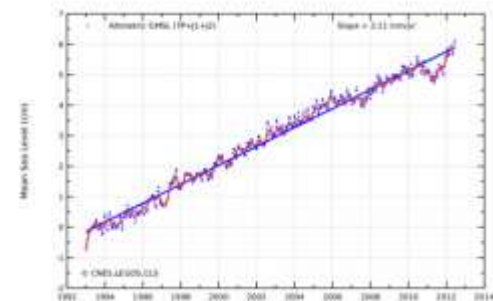
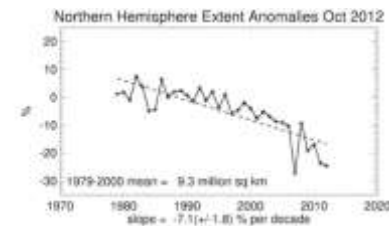
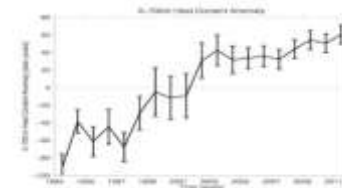
Why Ocean Observations?

- The ocean planet is in age of increasing human impact and vulnerability
- Welcome to the Anthropocene !
- « You can not manage what you do not measure ... » *www.ioc-goos.org*



Why Ocean Observations?

- CO₂ ...
- Heat content, sea ice, sea level
- Acidification, deoxygenation
- Resources over-exploitation
- Nutrients, sound, plastics, ...
- Climate extremes
- Natural/non natural hazards
- Ecosystems health



Why Ocean Observations?

- $\frac{3}{4}$ of human population lives in the coastal zone ...
- Predict the impact of global/local changes on coastal communities and nations
- Improve safety and efficiency of maritime operations
- Mitigate effects of hazards
- Guide international action and optimize government's policies
- Shape economic strategies
- Enable sustained use of ocean resources
- Reduce public health risks, protect ecosystems
- Prepare high quality and multi-disciplinary datasets for use by future generations
- **Healthy ocean = healthy blue economy**



Ocean Observations

- Before the 80s, most of ocean observations were made via research vessels (specific regional campaigns, expensive, seasonal bias, data sequestered)
- Advent of satellite measurements and in-situ moored/floating instruments led to enormous improvements in our understanding of the ocean
- Socioeconomic benefits of global ocean observations were formally recognized in 1990 (GOOS establishment) www.ioc-goos.org



- The joint IOC-WMO commission for oceanography and marine meteorology was then established in 1999 (JCOMM) www.jcomm.info



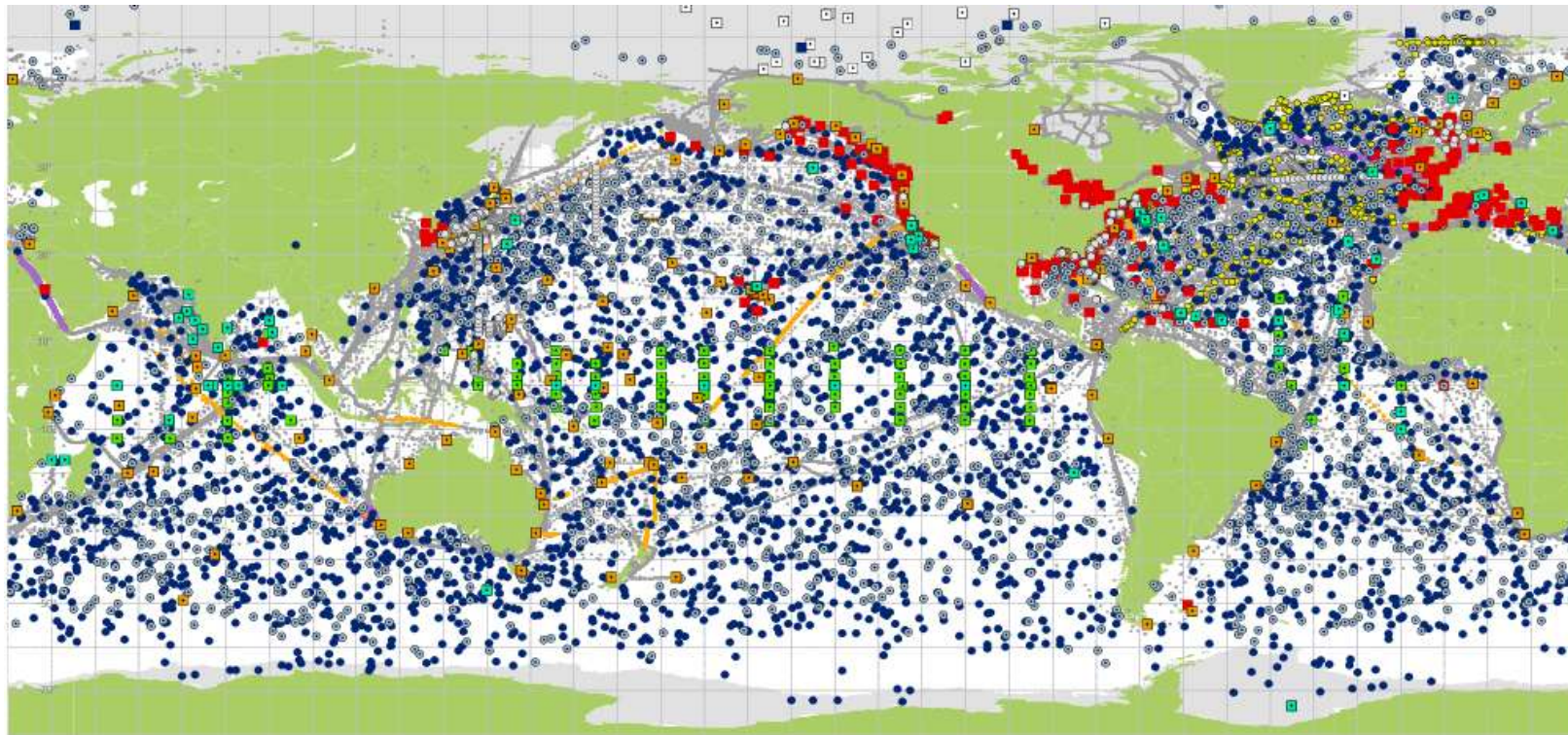
in-situ Ocean Observations

- Global observing programmes are funded and implemented nationally
- International and technical coordination is required between all actors
- JCOMM, GOOS JCOMMOPS:
 - coordination mechanism, developing standard procedures, best practices for fully integrated marine **observing, data management, and services** system



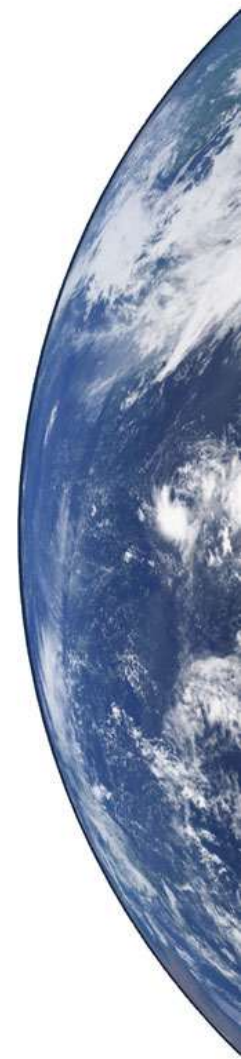
Partial vision of the GOOS

- Ships, platforms , sensors, ...



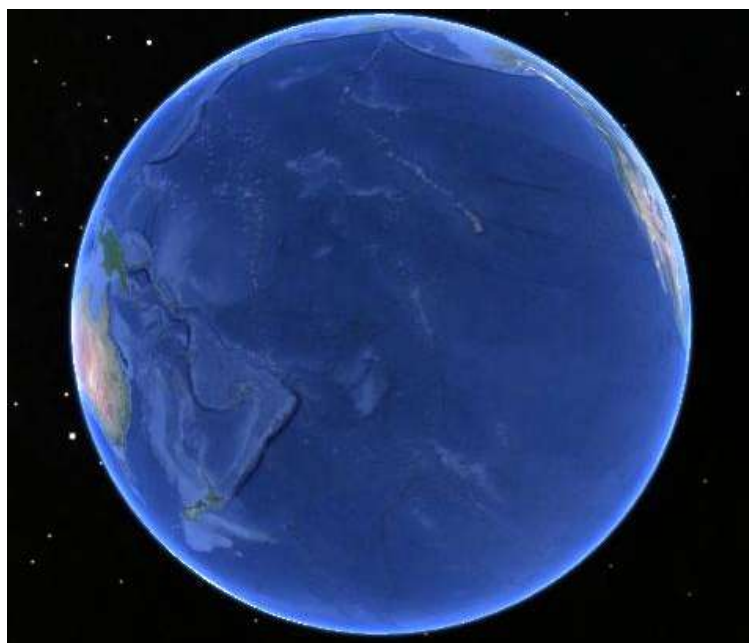
Issues

- System of systems is **not achieved** and **vulnerable**
- It is maintained at least at 50% by USA
- Europe shows some perspectives
- **Growing participation of Asia and China** in particular **will be crucial**
- South America and Africa contributions are modest
- In particular in a global economical context under pressure showing impacts on the GOOS (ship time)

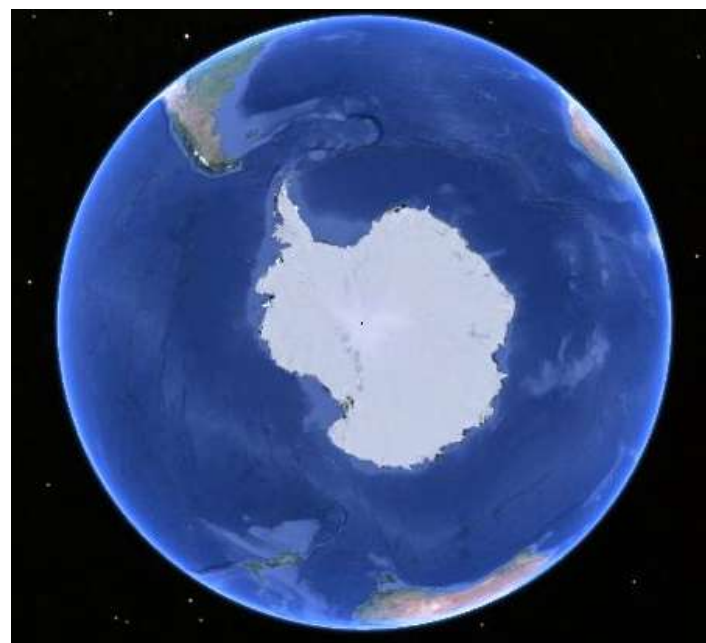


Issues

- A global system can't be implemented and sustained as an addition of « coastal or regional zones » implementation, driven by national interests



Pacific Ocean



Southern Ocean



Issues

- National fundings reached a maximum ?
 - System (Essential Climate Variables) is implemented at **60% since 2008**
 - No way to take off to truly global and multidisciplinary era
- In-situ platforms are far away from societal applications
- We need to do better and better with same or less
- Optimisation of observing systems is essential
- Sustain systems through mainly research funding is challenging ...
- Continuous cooperation between research and operational communities
- And international/technical coordination ...



JCOMMOPS

- 1st Coordinator 1985 (Data Buoy Cooperation Panel)
- 4+ persons operational centre based in France (Toulouse/Brest) since 2001
- Technical and human resources
 - Experts (technical coordinators)
 - Information System (DB, GIS, Web)
- Coordination, monitoring, assistance, services, operations
- Global Budget: ~1 M\$ / year
Member States and Brittany local authorities, Technopole Brest-Iroise, self
- 2015: (re)established as IOC/UNESCO Programme Office in Brest



Programmes

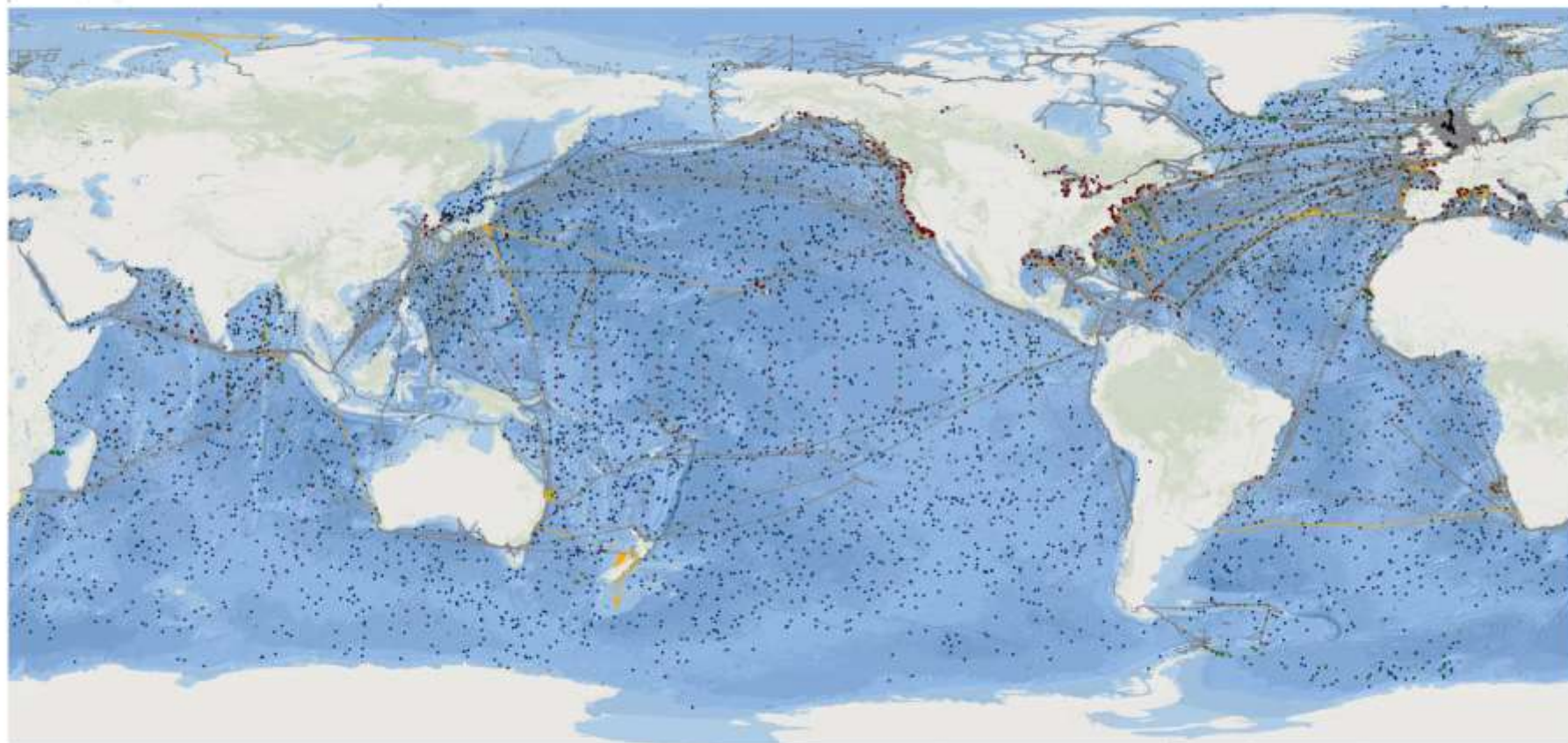
- Drifters, moorings (high seas/tropical), arctic buoys, tsunameters & co., all coordinated through the **DBCP**
- **Argo** profiling floats, & co.
- Deep ocean time-series reference stations using moorings, cables & co. (**OceanSITES**)
- XBTs and TSG (**SOOP**), atmospheric sounding from ships (**ASAP**), meteorological observations from ships (**VOS**), all coordinated through the **SOT**
- Sustained hydrographic sections (**GO-SHIP**)



THE JCOMM IN SITU OBSERVING PROGRAMME SUPPORT CENTRE (JCOMMOPS): MONITORING AND COORDINATING OCEAN DATA

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JCOMMOPS, the Joint WMO-IOC (World Meteorological Organization and Intergovernmental Oceanographic Commission) Technical Commission for Oceanography and Marine Meteorology (JCOMM) Observing Platform Support Centre, supports the implementation of a number of different types of in-situ observing systems including: 1) Drifting and moored buoys in the high seas and tropical moorings (DBCP), 2) XBTs (Expendable Bathythermographs), TSGs, atmospheric soundings from ships, meteorological observations from ships (SOT (JCOMM Ship Observations Team)), 3) Profiling floats (Argo), 4) Deep ocean time-series reference stations using Moorings, cables, gliders and other platforms (OceanSITES). These programs are illustrated in the global map showing the status during October, 2013.



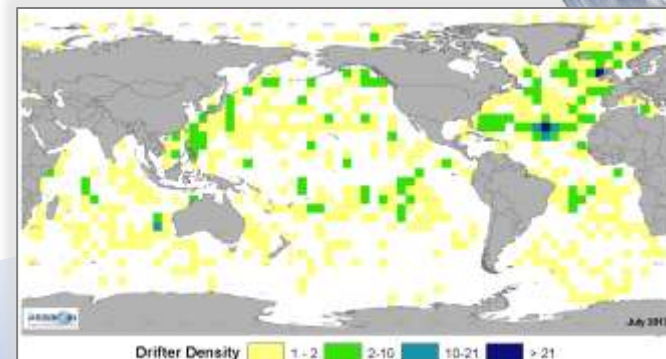
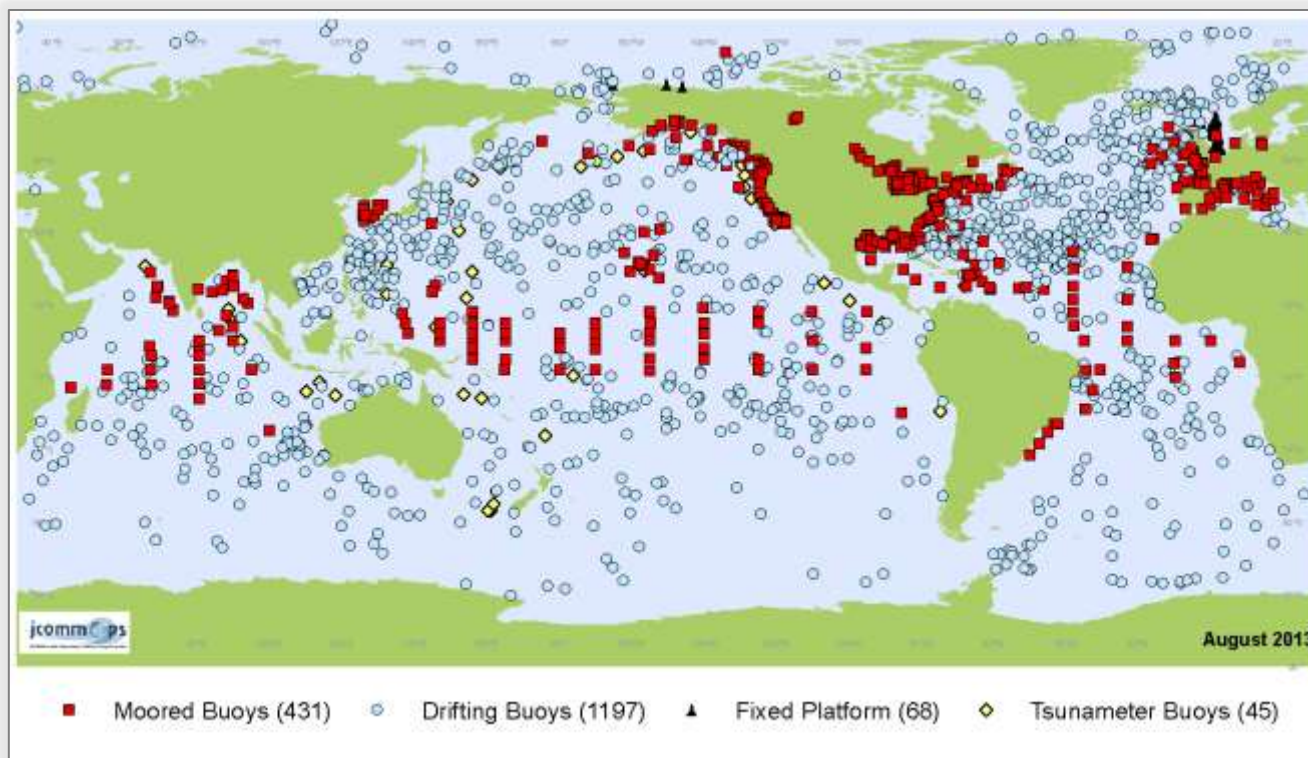
Global Ocean Observing System main in-situ components

- Moorings
- Drifters
- Tsunameter
- Floats
- Fixed Platform
- Reference stations
- Balloons
- XBTs
- Ships
- Ocean Base

October 2013



DBCP



DBCP

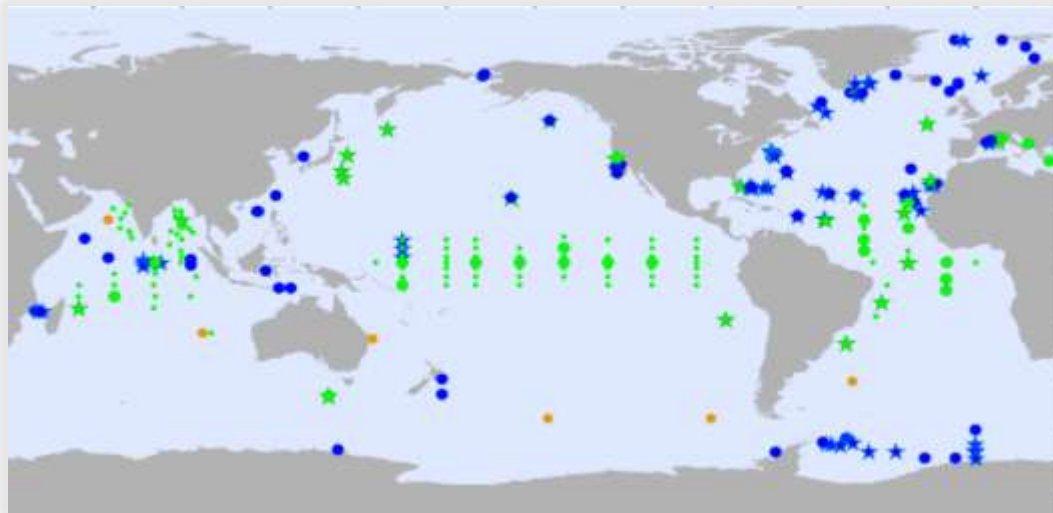
- an international program coordinating the **use of autonomous data buoys to observe atmospheric and oceanographic** conditions, over ocean areas where few other measurements are taken
- a network of **over 1200 drifting and 400 moored** buoys that measure air pressure, sea surface temperature, salinity, ocean current velocity, air temperature, humidity, wave characteristics and wind velocity across all oceans.
- aiming to increase the quantity, quality, global coverage and timeliness of atmospheric and oceanographic data.
- improving global forecasts of weather and ocean conditions



OceanSITES

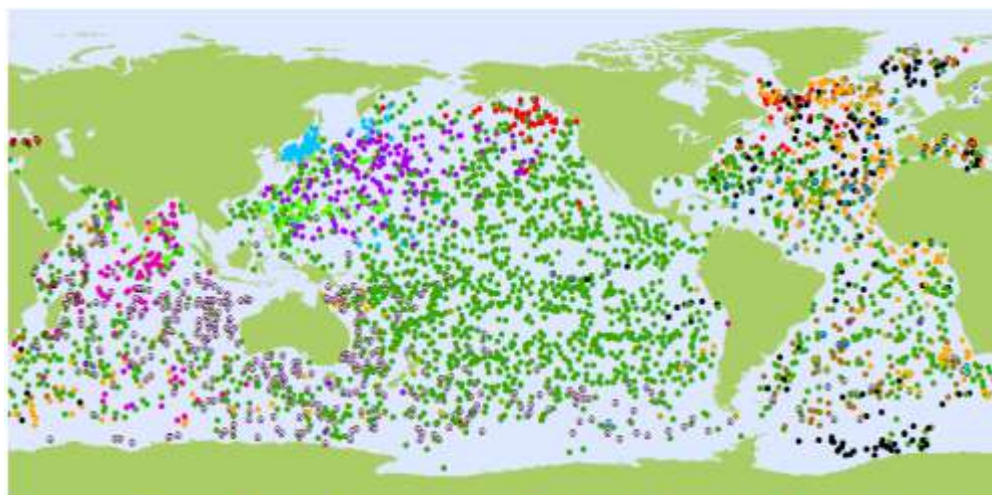
“Putting Eyes in the Deep Ocean”

- The OceanSITES project coordinates and facilitates a global open-ocean network of sustained **deep-ocean time series sites**
- Easy access to data in a unified format with agreed QC procedures
- Measuring a wide range of diverse variables in meteorology, climate, phys. oceanography, biogeochem., carbon, biology, etc.



Argo

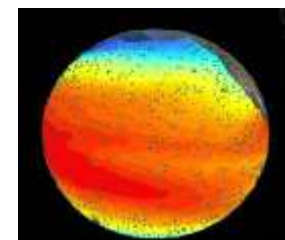
- A revolutionary achievement for subsurface observations
- An unprecedented cooperative effort in the history of oceanography
- A crucial mechanism to better understand the warming of the upper ocean
- An essential data for the new generation of numerical models, allowing seasonal forecasts



3606 Floats

ARGENTINA (4)	CANADA (88)	FRANCE (208)	IRELAND (15)	SOUTH KOREA (88)	NORWAY (2)	SRI LANKA (1)
AUSTRALIA (388)	CHINA (88)	GABON (1)	ITALY (18)	MAURITIUS (8)	POLAND (8)	TURKEY (2)
BRAZIL (2)	ECUADOR (2)	GERMANY (188)	JAPAN (208)	NETHERLANDS (20)	SOUTH AFRICA (2)	UNITED KINGDOM (132)
BULGARIA (3)	FINLAND (3)	INDIA (133)	KENYA (3)	NEW ZEALAND (12)	SPAIN (38)	UNITED STATES (1 973)

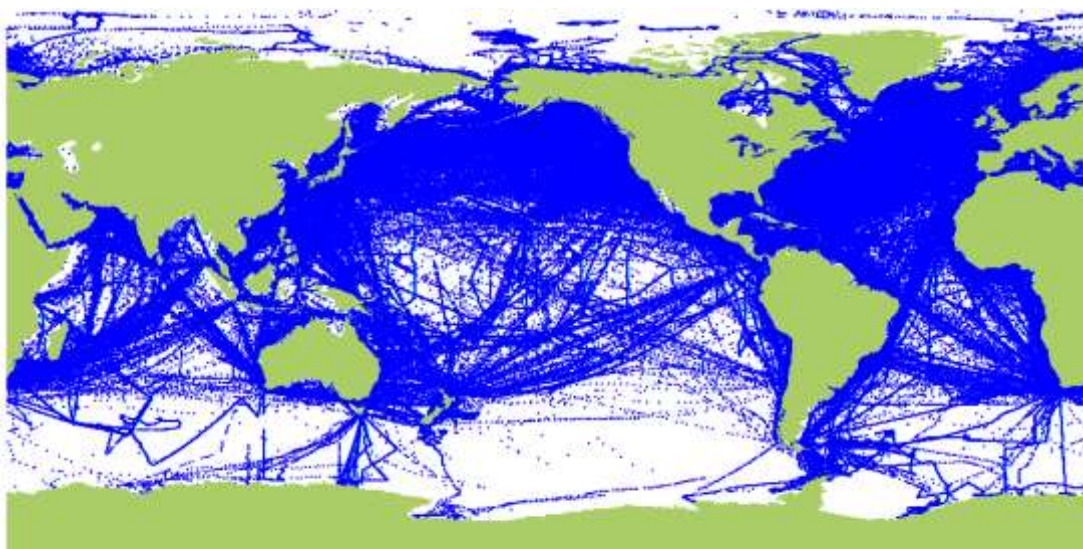
September 2013



Ship Observation Team

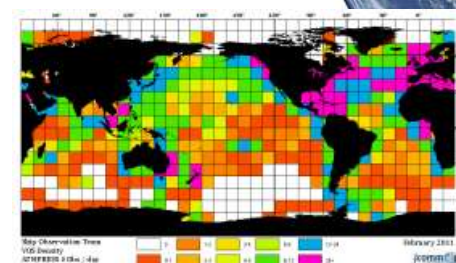
over 100 years of data collection ...

- The Voluntary Observing Ships (VOS) Scheme, which uses every month ~2000 mostly commercial ships to gather and distribute meteorological observations in near-real-time to shore, for immediate use by weather forecasting services.



Ship Observations Team
VOS (3686)
Reports (2357588)

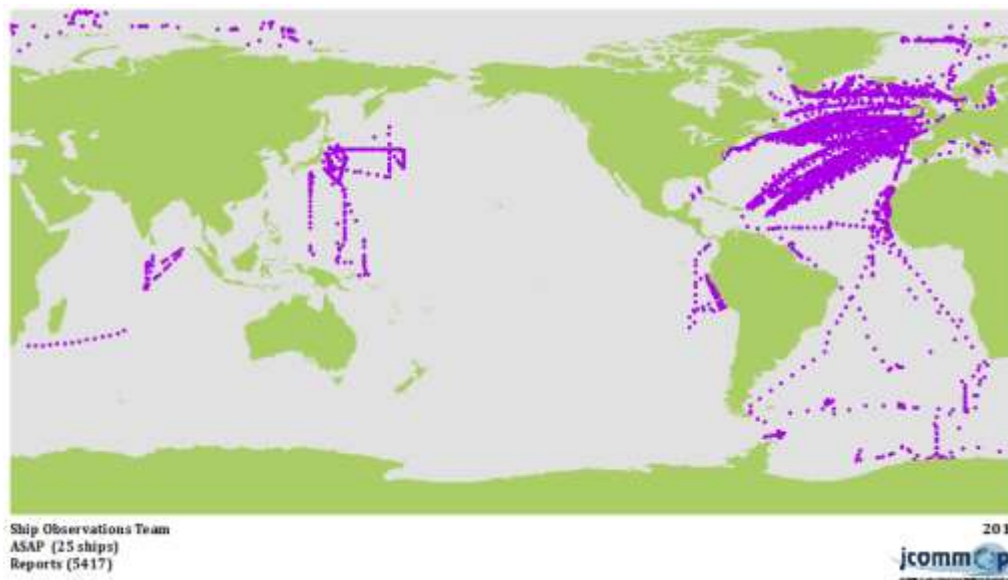
2012
jcommops



Ship Observation Team

over 100 years of data collection ...

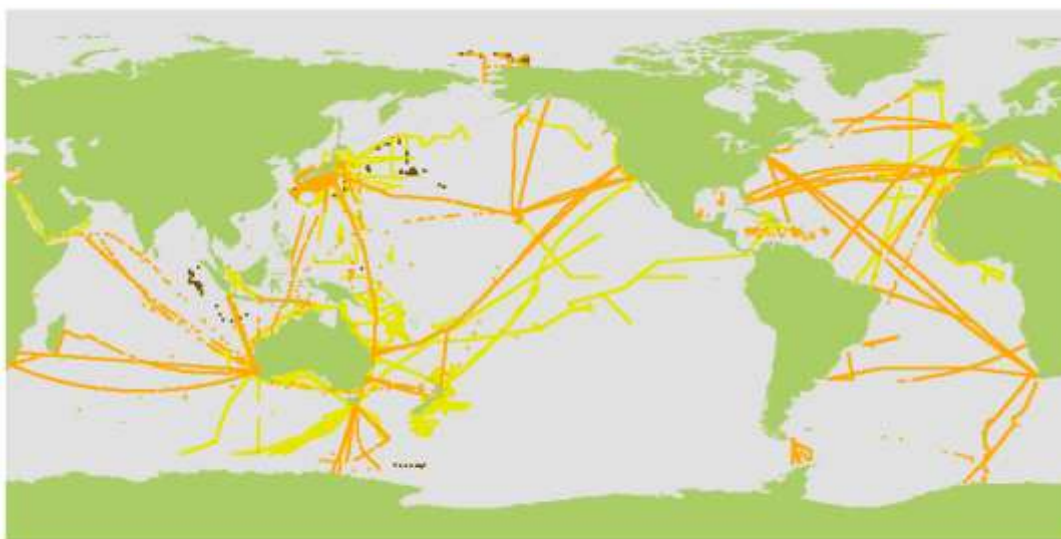
- The Automated Shipboard Aerological Programme (**ASAP**), operating mostly on ships participating in VOS, and using radiosondes tethered to gas-filled balloons to sample the atmosphere from the surface to a height of about 30km.



Ship Observation Team

over 100 years of data collection ...

- The Ship-of-Opportunity Programme (**SOOP**), collecting along repeat lines at regular intervals notably thermal data in the top 1000m of the oceans by expendable probes, known commonly as XBTs, mostly from VOS ships.



Ship Observations Team
SOOP (98 ships)

XBT (11588) • TSG (951600) • XCTD (290)

2012

jcommops
Joint Commission for Oceanographic Data Management

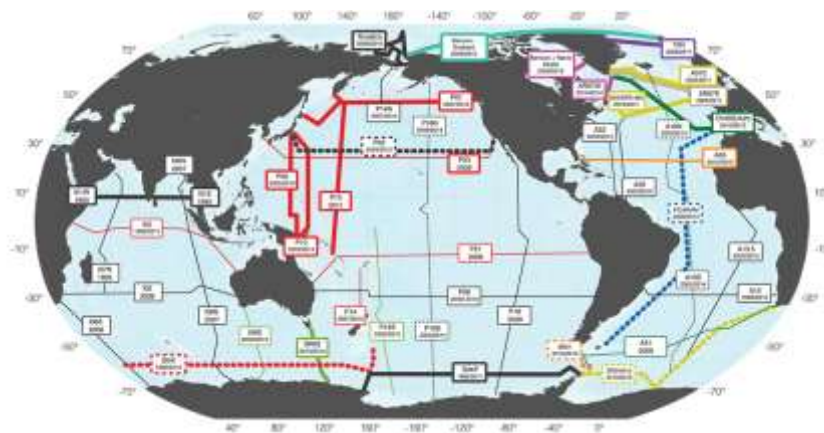


XBT automatic launcher - loaded and ready

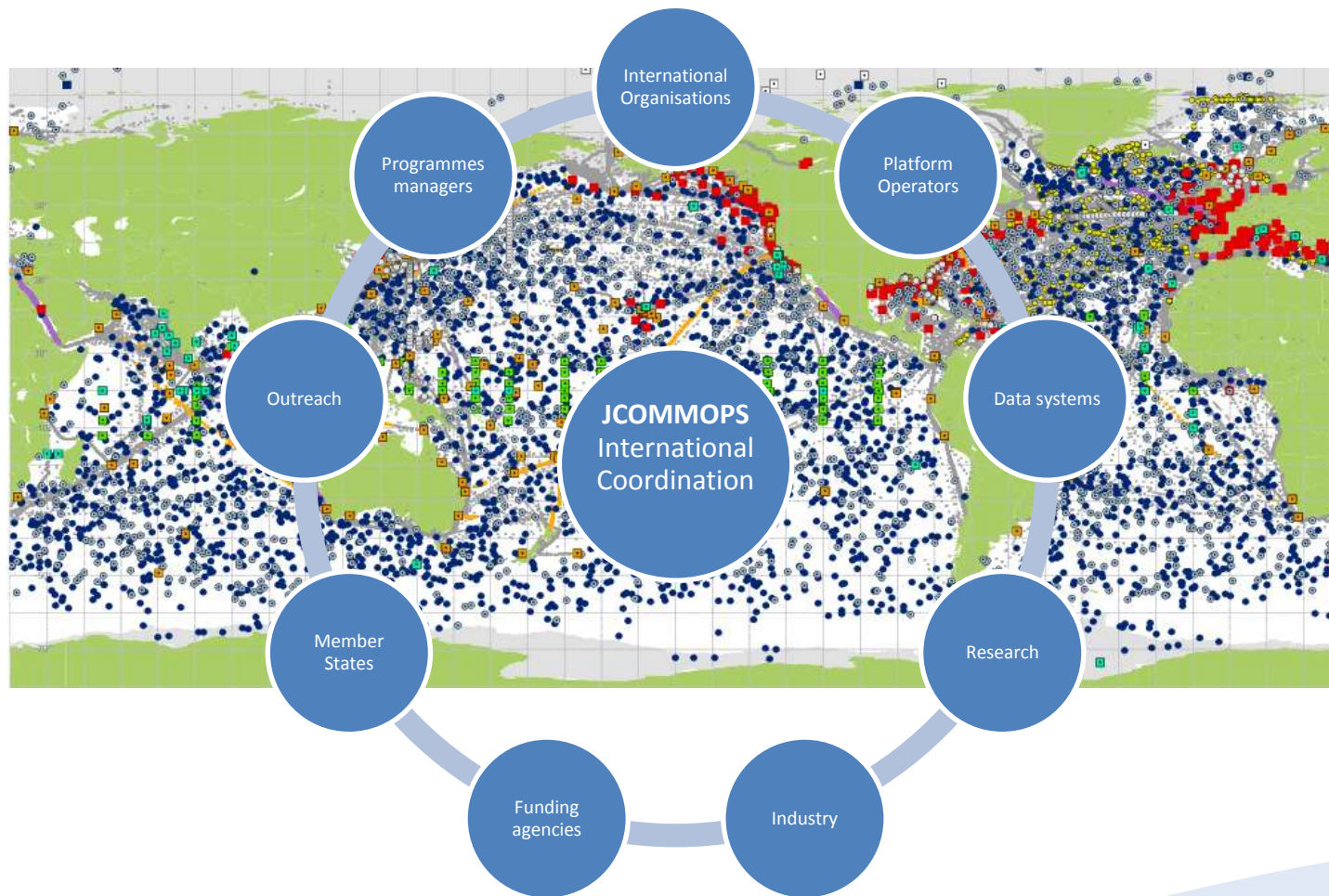


The Global Ocean Ship-based Hydrographic Investigations Program (GO-SHIP)

- GO-SHIP brings together scientists with interests in physical oceanography, the carbon cycle, marine biogeochemistry and ecosystems, and other users of hydrographic data.
- The aim is the development of a globally coordinated network of sustained hydrographic research sections.
- No other program gathers high-quality and multi-parameter data all through the water column on repeat lines.



Scope and audience

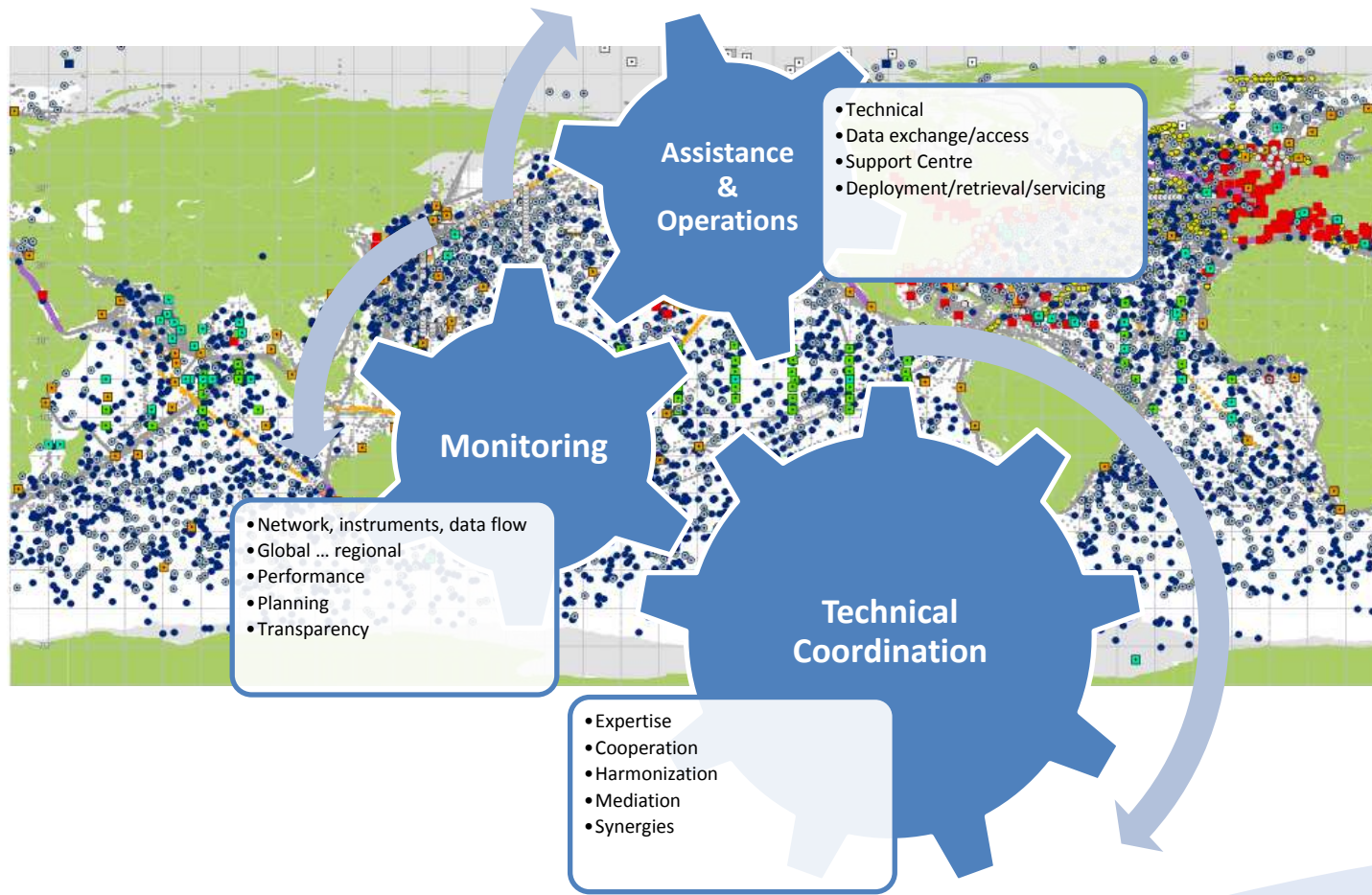


Mission

On behalf of GOOS and JCOMM, JCOMMOPS aims to:

- **monitor** and **evaluate** the performance of the networks (only **metadata**!)
- assist in the **planning, implementation** and **operations** of the observing systems
- act as a **clearing house** and **focal point** on all programme aspects
- **assist in data distribution** on the Internet and GTS
- provide **technical assistance** and **user support worldwide**
- encourage **cooperation** between communities and member states
- relay user **feedback on data quality** to platform operators
- develop **synergies** between observing systems (GOOS)

Activities



Some Key Achievements ...

- A recognized essential component of global observing systems
- Day to day assistance to all partners, including industry
- Innovative Information System and web based services
 - Full review (architecture, synch., operational, production and analysis tools, web interface)
- Rigorous metadata quality control and management, and real-time tracking of networks (**instrument registration/certification**)
- **Technical expertise** on codes, data systems, instrumentation, telecommunications systems

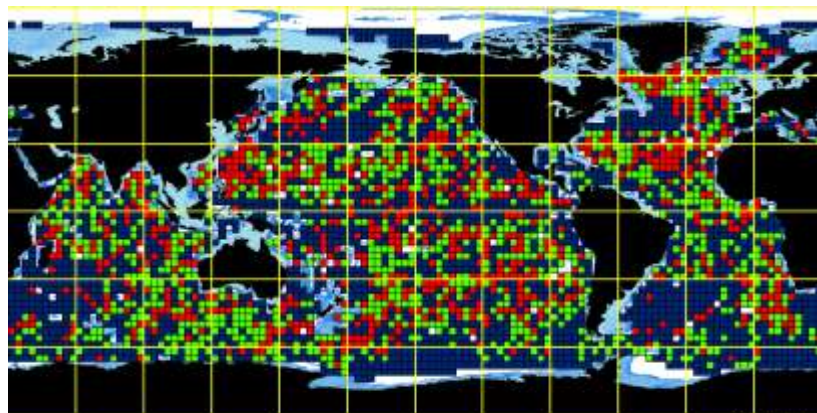


Some key achievements ...

- **Expertise on international and intergovernmental issues.** Operating a notification and warning system for Argo floats which might drift in Member States Exclusive Economic Zones, as per IOC/UNESCO Resolutions XX-6 and XLI-4
- Design of uniform and **authoritative status maps**, core metrics for network performance monitoring; regular publication of observing system status reports and bulletins
- Development of **international cooperation** (donor programmes)
- Development of cost effective **ship time capacity** (chartering, partnerships) and operational capacities to assist in filling networks gaps
- Assistance to educational and outreach activities

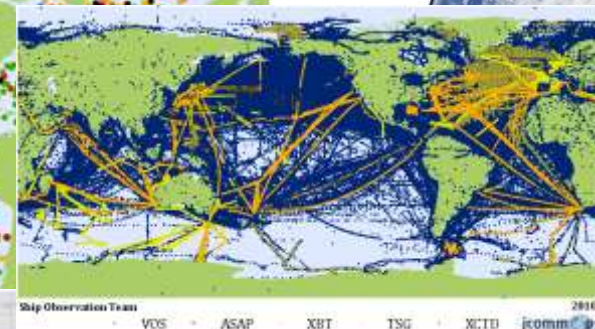
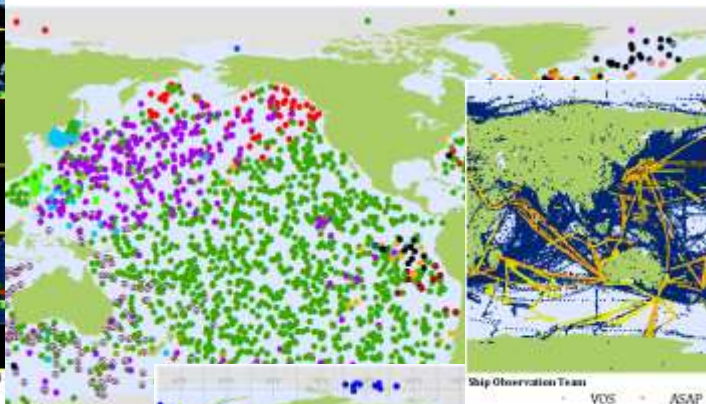
Innovation: Web / GIS / G-Earth

<http://argo.jcommops.org/maps.html>



Global Argo Density: Requirements

oversampled well sampled undersampled

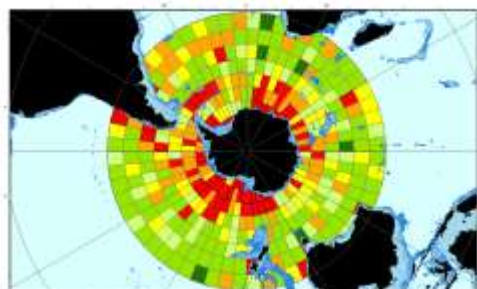


Ship Observation Team

VOS ASAP XBT TSG XCTD

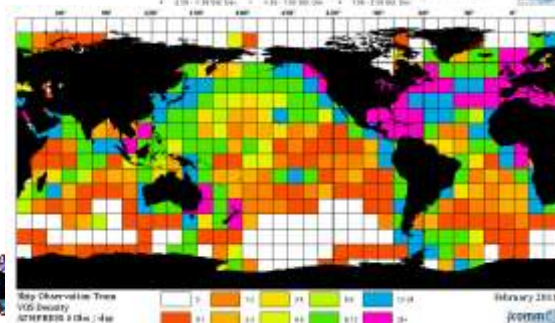


3261 Argo Floats



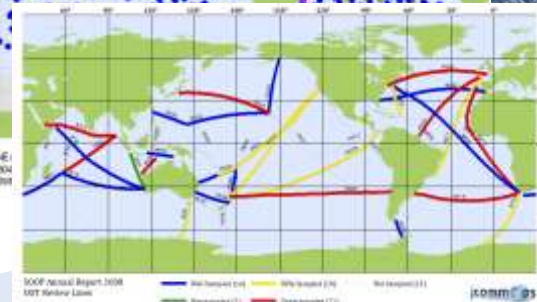
127 Arctic Floats (> 40%)

Target: 140



Ship Observation Team

VOS ASAP XBT TSG XCTD

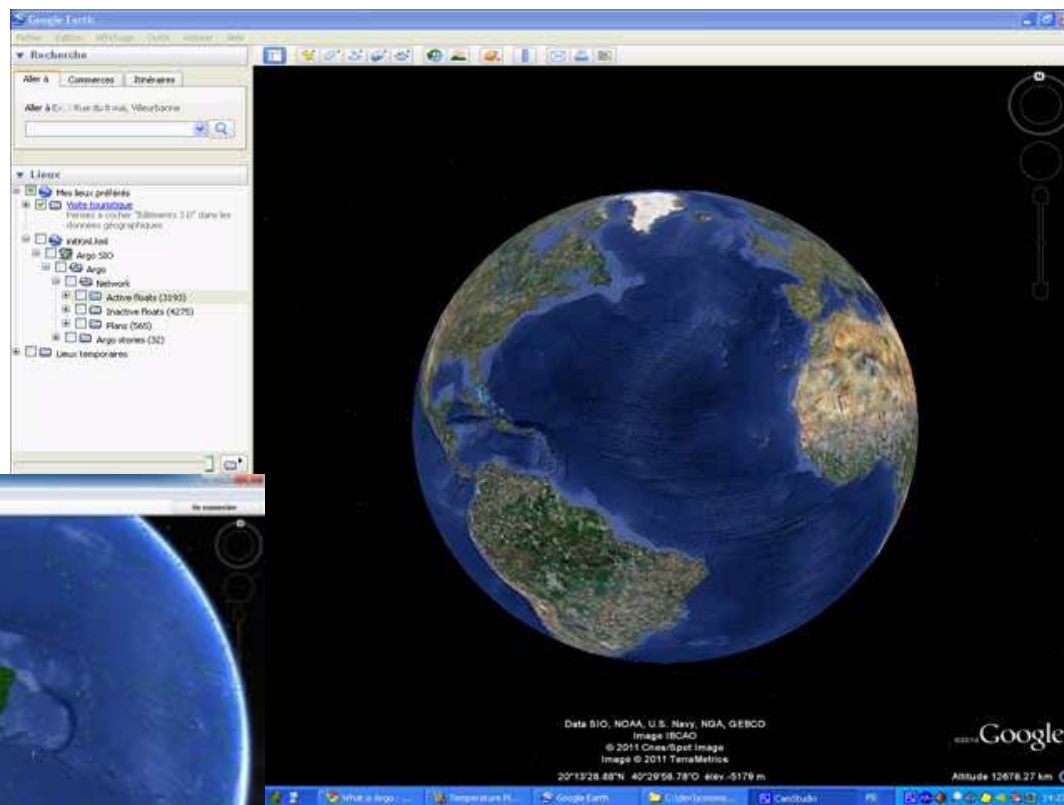
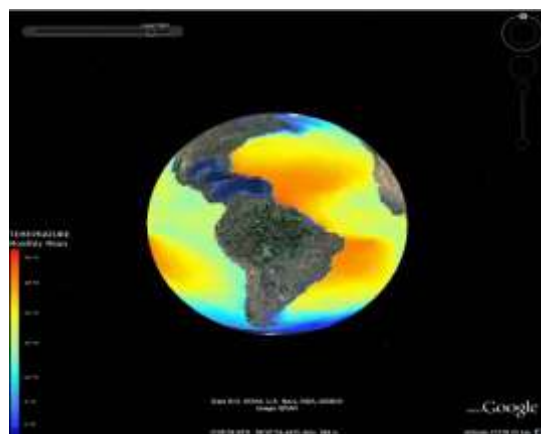


IOOP Annual Report 2008

IOOP Member States

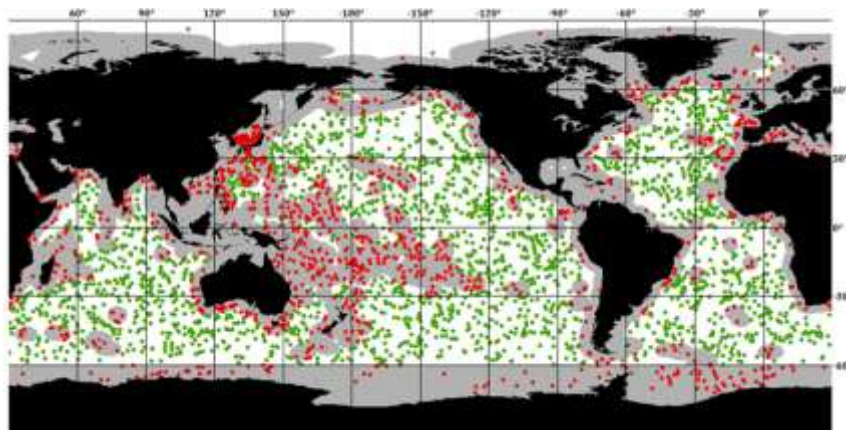
Innovation: Web / GIS / G-Earth

<http://argo.jcommops.org/argo.kml>



Intergovernmental issues

- Geopolitics of in-situ platforms ...
- Member States are informed in real time of floats which might drift into their Maritime Zones
- Reports generated to help implementers notify coastal states
- Caution for the future of the GOOS: Access to EEZ.
- Sensitive issue requesting **transparency** and true **cooperation**



Sailing Community

- Academic fleet decreasing
- Creativity necessary
- Operational efficiency
- Cost effectiveness
- Optimization
- Education/communication



Lady Amber



Voiles Sans Frontières



Race for Water



Barcelona World Race

- All racers will deploy a float: Argo day!
- New standard for sailing races?



barcelona world race

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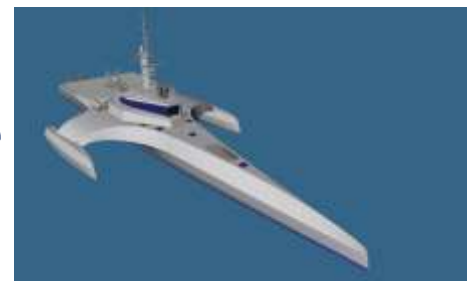
PREMIERE ANNÉE
2^{ème} CONFÉRENCE INTERNATIONALE
SUR LA RECHERCHE OCÉANIQUE

Barcelone (Espagne), 17-21 Novembre 2014



Global Solution

- Partnership with a professional
- Study realized
- Multiple solutions, everywhere
- JCOMMOPS coordinates
- Prolarge charters



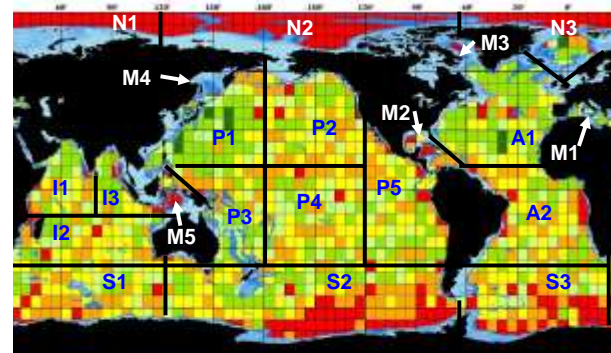
Ocean Eagle 43



Fishing vessel



ORGANISATION OF AREAS OF DEPLOYMENT



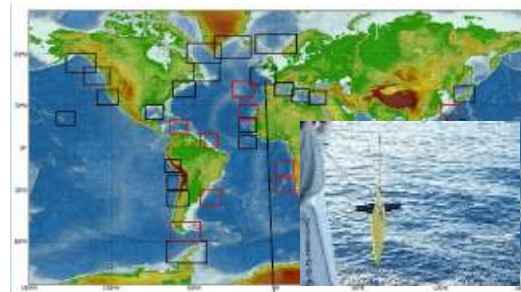
Perspectives

- Move to Brest and inauguration of a new office.
- New innovative (web) services: integrated, flexible, “standard”, adapted to users needs
- Partnerships (I.T.C. companies, ESRI, maritime operator)
- Industry/sponsors
- (United Nations) platforms
- Education (with UNESCO, “Ocean Literacy”, “Adopt a platform”)
- Scope expansion: **“Regional Coordinator”**



Coastal/Regional

- **GLOSS** tide gauges
- **Gliders**, coastal floats
- Polar systems
- Marine mammals/ sensors
- coastal and regional systems
- ?



- JCOMMOPS needs help to fund a dedicated coordinator



Conclusion

- In addition to dedicated Science, Steering and Data teams
- Obs. systems need coordination to become sustained
 - International (cooperation)
 - Science and implementation (target)
 - Data and metadata management (free)
 - Instrumentation (reliable)
 - Operations (cost effective)
 - Education and outreach (long term)
 - Dimension financially their value ...
- In-situ **obs. systems are cheap vs the outcomes for the blue economy** (today and tomorrow)
- They also generate direct employments ...



Conclusion

- JCOMMOPS helps to move from a **pilot** to a **sustained** phase
- With experience, impartiality and integrated services
- Optimizing existing means
- Delivering better services and information to the community on GOOS networks status

JCOMMOPS & MiTiN

- Anchor our activity in one regional maritime territory
- Develop further our activities with regard to:
 - Industry and blue economy sector
 - Education
 - in cooperation with local authorities
- More international cooperation can be fostered for our observing networks.

Action:

All MitiN partners to participate actively in the GOOS
JCOMMOPS can help



Thanks

The GOOS takes ocean pulse ...

... JCOMMOPS takes GOOS pulse

inputs GOOS, JCOMM

support@jcommops.org

<https://twitter.com/jcommops>

