



REPORT

EXECUTIVE SUMMARY

4th GEO Blue Planet Symposium was held from July 4 – 6, 2018 in Toulouse, France. The symposium was hosted by [Mercator Ocean](#), member of the GEO Blue Planet Initiative and entrusted by the European Commission to operate the European Union’s [Copernicus Marine Service](#). The symposium was the first GEO Blue Planet symposium organized in Europe and served as a forum for discussion of ocean and coastal information needs for sustainable development, Blue Growth and societal awareness. The symposium took place over three days and consisted of sessions with presentations and panel discussions and poster sessions. A total of 300 delegates attended the symposium from international organizations and networks, research scientists, government agencies, various industries, ocean science communicators and graduate students.

The main recommendations from the symposium include:

- GEO Blue Planet should play a coordinating role, creating linkages and identifying linkages between existing networks and organizations. Blue Planet should share best practices between regions (for sharing new services, user engagement, capacity building & ocean literacy etc.).
- Completing the “ocean observing seascape” project should be a priority.
- GEO Blue Planet should facilitate user discover of data and products.
- GEO Blue Planet should put together success stories for the utilization of ocean observations for decision making.
- GEO Blue Planet needs additional secretariat support and should put out a call for interest in hosting a secretariat node.



SYMPOSIUM OVERVIEW

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Day 1

Sessions on Day 1 introduced participants to GEO Blue Planet; provided an overview of the environmental and economic drivers and pressures on our oceans and coasts; and provided an overview of the status of the ocean and coastal observing system, the forecasting and its evolution and the development of information and services.

Session 0: Welcome and Introduction



Presentations

| Presentation Title | Presenter |
|--|--|
| 1st Welcome and Opening Comments | Jean-Claude Dardelet (Toulouse City) |
| 2nd Welcome and Opening Comments | Pierre Bahurel (Mercator Ocean) |
| An Introduction to the Copernicus Programme | Philippe Brunet (EC-DG GROW) |
| The Group on Earth Observations (GEO) | Douglas Cripe (GEO Secretariat) |
| The European Union's Role in GEO | Gilles Ollier (EC-DG RTD) |
| The GEO "Oceans and Society: Blue Planet" Initiative | Sophie Seeyave (GEO Blue Planet) |
| Opening address by Peter Thomson, UN Special Envoy for the Ocean | Peter Thomson (Permanent Representative/Ambassador at Permanent Mission of Fiji to the UN) |

Session 1: Understanding and Managing the Sustainable use of our Oceans and Coasts



Presentations

| Presentation Title | Presenter |
|---|--|
| Economic drivers and pressures on the ocean environment: innovation as a game changer | Claire Jolly (OECD) |
| United Nations Decade of Ocean Science for Sustainable Development | Emily Smail (NOAA/UMD) on behalf of Vladimir Ryabinin (IOC-UNESCO) |
| Ocean, climate change and the conference of parties | Valerie Masson Delmote (IPCC) |
| Key global ocean drivers, impacts, and solutions | Jean Pierre Gattuso (CNRS/SU/IDDRI) |
| International ocean governance for better management of the marine environment | Stefaan Depypere (EC DG MARE) |

Summary of Panel Discussion: How to ensure that policies effectively drive the development of sustainable management of our oceans and seas?

Pressure on resources is increasing

- Over 90% of global trade is marine
- There is an increasing need for rare earth metals
- The need for freshwater is driving desalination activity
- Only 11% of fisheries are not overfished
- In order to meet the 1.5 – 2°C target of the Paris Agreement, emissions would need to become negative

Actions needed to address pressure on resources

- The size of the Blue Economy vs. the impact of economic activities on the ocean needs to be understood and addressed
- Adaptive management strategies need to be developed and implemented
- Tensions between ocean advocacy NGOs that do not support continued resource use and those that are looking to develop sustainable ways to utilize ocean resources need to be addressed
- Fisheries subsidies need to be eliminated
- Ocean data collection and dissemination needs to be increased
- Monitoring of marine plastic needs to increase and the production and use of plastic needs to be decreased
- Carbon sequestration research and project implementation needs to be supported and expanded

Existing and upcoming initiatives to address these challenges

- An initiative in Europe, <http://www.openinnovation.eu>, offers to design or facilitate masterclasses or workshops for companies and also supports conference and event planning.
- The European Commission has, and is continuing to, make commitments to support ocean challenges
- OECD will be increasing efforts to support ecosystem service valuations

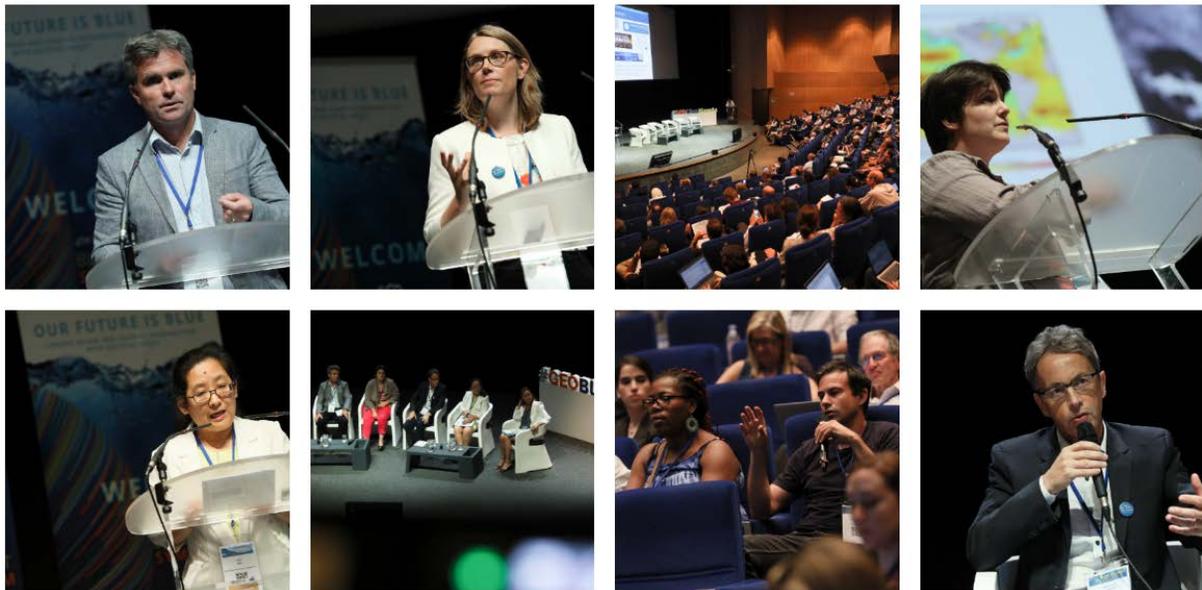


- The IPCC is producing a Special Report on the Ocean and Cryosphere in a Changing Climate
- The Ocean Solution Initiative is working to compile a list of solutions aimed at mitigating the impact of climate change and ocean acidification

Recommendations for GEO Blue Planet

- GEO Blue Planet should validate processes of getting information to policy makers
- GEO Blue Planet should support the integration of data (not metadata)
- GEO Blue Planet should outline who is doing what in this arena
- GEO Blue Planet should serve coordination and networking role
- GEO Blue Planet should connect with NGOs and charitable organizations that develop recommended legislation for policy makers based on scientific information

Session 2: Producing and Deriving Coastal and Ocean Information



Presentations

| Presentation Title | Presenter |
|--|---------------------------------------|
| The global ocean observing system and its evolution | Glenn Nolan (EuroGOOS) |
| Towards an European Ocean Observing System (EOOS) | Kate Larkin (European Marine Board) |
| The role of satellite observations and perspectives for the next decade | Valerie Masson Delmote (IPCC) |
| Key global ocean drivers, impacts, and solutions | Juliette Lambin (CNES) |
| Development of information services: example from the Copernicus Marine Environment Monitoring Service (CMEMS) | Pierre-Yves Le Traon (Mercator Ocean) |
| Ocean forecasting information and its social benefits in China | Liyang Wan (NMEFC) |

Summary of Panel Discussion: The role of coastal and ocean information for the sustainable management of our oceans and seas: status, gaps and perspectives

Evolving ocean observing activities

- EOOS is working to link components of the ocean observing system in Europe and promote partnerships
- The Copernicus Marine Service is working to provide the link between observations and services/users.
- While the organization landscape is complex, organizations are working to develop partnerships and collaborate due to limited man power and resources.
- Cost-sharing between entities is becoming increasingly important and should be expanded.

Data management and processing challenges

- Open sharing of data and services in some regions, such as China, is still a challenge.
- For integrating data from the private sector, EMODnet is developing a data ingestion project that will allow the private sector to submit data to the EMODnet ingestion portal, allowing for data and metadata from the private sector to be more readily available.
- With the increasing amount of data, users need to be able to process data online without having to directly download the data
- Standardization of data is a challenge – the Ocean Best Practices Initiative is working to provide best practices in support of data standardization

Data gaps

- Increased interactions with current and potential users is needed to identify requirements and data gaps.
- Many coastal/local observations are not linked with existing data infrastructures.
- Biological observations need to be increased and expanded.

User engagement

- Work needs to be done on the best way for stakeholders to use observations to understand the ocean
- The value of data needs to be communicated to users.
- Modeling and data assimilation needs to be advanced for applications such as modeling for Harmful Algal Blooms, fisheries, etc.
- Downscaling of predictions is a challenge but needs to be done for coastal zones to support long range forecasting for ecosystems and communities.

Recommendations for GEO Blue Planet

- GEO Blue Planet should support data collection and ingestion efforts.
- GEO Blue Planet should work to develop regionally focused activities for areas with data and information gaps.
- GEO Blue Planet should work to connect observations and data with users.
- GEO Blue Planet should advocate for observations and further develop the link with advocates and funders.
- GEO Blue Planet should establish its role on the downstream/user side of observations with GOOS focusing on upstream coordination of observations and GODAE OceanView/OceanPredict focusing on the coordination of the modelling/data assimilation component.
- GEO Blue Planet should communicate the need for specific information services and knowledge to GOOS.
- GEO Blue Planet should clarify and continue to develop synergistic relationships with other organizations.

Day 2

Sessions on Day 3 focused on connecting current and potential users to ocean and coastal information that is currently available to support sustainable economic growth in the fields of marine renewable energy, marine transportation, oil and gas, and aquaculture.

Session 3: Ocean and Coastal Information in Support of Blue Growth



Presentations

| Presentation Title | Presenter |
|---|--|
| From ocean observation to end-users of the Blue Economy: a virtuous value chain | Pierre Bahurel (Mercator Ocean) |
| Marine renewable energy: overview of industry and ocean information needs | Rémi Gruet (Ocean Energy Europe) |
| Ocean information for marine renewable energy: status and perspectives | Laurence Crosnier (Mercator Ocean) |
| Maritime transport: overview of industry and ocean information needs | Christine Valentin (WOC) |
| Ocean information for maritime transport: status and perspectives | Gilles Larnicol (CLS) |
| Offshore oil and gas: overview of industry and ocean information needs | Mark Calverley (IMarEST Operational Oceanography Special Interest Group) |
| Ocean information for offshore oil and gas: status and perspectives | Ed Steele and Caroline Acton (UK Met Office) |
| Aquaculture: Overview of Industry and Ocean Information Needs | Ralph Rayner (NOAA & London School of Economics) |
| Ocean Information for Aquaculture: Status and Perspectives | Andy Steven (CSIRO) |

Summary of Panel Discussions: Ocean and Coastal Information in Support of Blue Growth

General information needs for marine industries

- There is an increased need for more real time data and higher resolution data
- Climate change forecasts are important for reinsurance decisions and site selection
- More maritime spatial planning tools are needed
- Examples of best practices are important such as the 150 use cases available from the Copernicus Marine Service
- There needs to be a dialogue between the European Union and industry partners on activity in the Arctic

Information for Marine Renewable Energy

- Information about physical processes at the vertical and horizontal scales are important for the placement of turbines in terms of determining where to place the turbines and where turbines should be placed for the collection of water for cooling purposes

- The South African Weather Service is finalizing a Wave Energy Atlas for South Africa and are keen to work with wave energy companies that are interested in prospecting in Southern Africa
- For the wind industry, climate change is largely not taken into consideration for planning purposes as the lifetime of machines is typically 20-25 years
- Environmental impact assessments for marine renewable energy projects are crucial and there is a large difference between technologies in terms of impacts
- Higher resolution information on long term time scales for waves is needed and this need could potentially be met by intermediate users

Information for Marine Transport

- The transportation industry requires ocean information that supports safety and sustainability efforts (e.g. reducing fuel usage)
- Additional information is needed on extreme weather events, sea level rise, bathymetry and tidal modeling for ports
- More real time data is needed
- While there is an interest in ocean vessels collecting data along routes, there are challenges in terms of passing along collected information as well as funding for the data collection
- Intermediate data providers are important to the transportation industry as they work to produce value added products such as products that blend Met ocean data with the performance of vessels

Offshore Oil and Gas

- Information about water column mixing and advection is needed for oil spill response and impact analysis
- Additional information about ocean currents is needed
- In regards to decommissioning of offshore platforms, additional information about the biogeochemical impacts of removing structures needs to be collected
- More information about the water column is needed for shelf and deep sea based activities
- The oil and gas industry is becoming increasingly interested in releasing data they collect but infrastructure to upload and store this data is lacking
- Additional modeling efforts are desired for planning purposes
- The industry needs to have information about environmental conditions to identify the operational limit for site selection and to predict cost/loss ratios
- Forecasts with longer lead times are needed

Aquaculture

- Offshore aquaculture will need additional information about waves and other environmental conditions
- Artisanal aquaculture and large industrial aquaculture operations have different information needs
- Shellfish aquaculture operations need information about ocean acidification
- Information about shrimp farming in relation to mangrove cover is needed
- Feasibility assessments and constraint mapping is needed for aquaculture planning purposes

- Systems similar to [BarentsWatch](#) could support aquaculture industries in other regions
- Delivery of satellite-derived aquaculture products requires additional validation data
- Research on mixed trophic aquaculture for mitigating pollution, ocean acidification and other environmental stressors is needed to advance the industry

Recommendations for GEO Blue Planet

- GEO Blue Planet should work with maritime industries and regulatory agencies to increase awareness of the potential for Earth observations to be used in support of industries and for environmental reporting
- GEO Blue Planet should consider developing training and education workshops for industry stakeholders
- GEO Blue Planet should work with industry partners to identify information needs and requirements

Day 3

Sessions on day 3 focused on connecting current and potential users to ocean and coastal information that is currently available to support sustainable development in general; SDG monitoring and implementation; and examples of successful efforts to engage the public.

Session 4: Ocean and Coastal Information in Support of Sustainable Development



Presentations

| Presentation Title | Presenter |
|--|---|
| Informing the Blue Economy: Small Island States as Sentinels of the Oceans | Antoine Onezime (James Michel Foundation) |
| GEO Blue Planet's role in sustainable development | Paul DiGiacomo (NOAA) |
| Policy issues and information needs for sustainable fisheries | Anton Ellenbroek (FAO) |
| Developing operational products for ocean ecosystem and fishery management | Patrick Lehodey (CLS) |
| Assessing the State of Regional Seas: from Observations to Indicators. The OSPAR Perspective. | Jo Foden (OSPAR Commission) |
| The Copernicus Marine Service Ocean State Report and its role to inform sustainable development policies | Karina von Schuckmann (Mercator Ocean) |
| Ocean and coastal observations and information for management of marine biodiversity | Isabel Sousa Pinto (U.Porto) |

Summary of Panel Discussion: Ocean and Coastal Information in Support of Sustainable Development

Coordinated Approach for Ocean Observing

- Coordination across nations is crucial for building capacity for ocean observations as some countries have a large marine area with a small capacity and some countries have high amounts of funding available and have small marine areas
- More input from technology is needed for monitoring areas beyond national jurisdiction
- Networking organizations like GEO Blue Planet are needed for sustainable development efforts as many developing countries are not well linked with existing data, infrastructure and experts

Information Gaps and Challenges

- Information that is simplified for use in small island states and non-experts, such as fishers and the tourism industry
- There is a need for additional support to countries to aid understanding of what data is available and how it is accessed
- The Seychelles needs more information about the health of tuna stocks and their migration patterns as well as coral bleaching information and predictions on how environmental events such as bleaching will impact the environment and economy in the region
- For sustainable fisheries, additional information is need on ocean physics, primary production, oxygen values, pH, and fishing data on the spatial distribution of fishing efforts and catch

- For improved management of biodiversity, there is a need for long term monitoring, engagement with fishers and citizen science and technological innovation for data collection in areas beyond national jurisdiction
- eDNA analysis is a promising tool for real time monitoring of biodiversity
- Maintenance of existing observing systems is crucial to avoid creating new data and information gaps
- Understanding and monitoring of coastal zone processes requires time series data on biological measurements and geostationary ocean color measurements
- More merged and blended products that bring together satellite data with in situ data and other transdisciplinary information such as socioeconomic data

Efforts to address these information gaps

- FAO is working to use fishers as data collectors and to support training efforts that will help fishers understand the impacts of their behavior
- The Seychelles are developing the world's first Blue Pond to finance fisheries projects
- The IPCC data distribution center has been doing user surveys to determine gaps in data, information and capacity building

International, regional and voluntary policy frameworks

- Data providers need support in demonstrating and communicating the utility of Earth Observations in support of policy
- Countries that manage 1% of the global fisheries and get 90% of the funding; funding needs to be passed to developing countries
- Additional and improved port state measures agreements are needed to ensure that countries inspect vessels for safety and fisheries activity
- The policy sector is increasingly interested in moving towards integrated ecosystem assessments and ecosystem-based management; additional monitoring is needed to implement these efforts
- Selection of marine protected areas and other marine spatial planning policies need to be based on observation-based information
- Climate driven shifts in fisheries distribution is a challenge for the development and implementation of successful fisheries policies

The UN sustainable development goals

- The SDG goals and targets are inter-related and should not be analyzed in a silo
- There is concern that increasing the score of an SDG indicator does not necessarily indicate that a country is moving towards sustainability
- Information on SDG indicators is one portion of information needed for progress toward sustainable development, we also need to look at capacity building and other types of indicators for sustainable development

Recommendations for GEO Blue Planet

- GEO Blue Planet should work to support existing frameworks to help the ocean observation community understand the information needs for policy
- GEO Blue Planet should improve interactions with other communities including those for biodiversity
- GEO Blue Planet should support connections between existing data sets such as those that include animal tracking data, fishing data and acoustic data
- GEO Blue Planet should scale up resources and work on connecting regional organizations that have specific information needs with experts that can meet these information needs
- GEO Blue Planet should work to provide small island states with an avenue to share their interests and information needs at the global scale

Session 5: Societal Awareness of the value of Ocean and Coastal Information



Presentations

| Presentation Title | Presenter |
|---|---|
| Welcome address from the Oceanographic Institute, Albert II Prince of Monaco Foundation | His Serene Highness Albert II Prince of Monaco |
| Our Future is Blue, Our Future is Ocean Literate | Peter Tuddenham (College of Exploration) |
| Ocean literacy in Bangladesh | Mohammad Uddin (Univ. of Chittagong) |
| Lessons for engaging the public in conservation: Synthesis across coastal and marine citizen science projects | Heidi Ballard (UC Davis) |
| North Pacific Exxpedition 2018 | Emily Penn (Exxpedition) |
| Ocean and Climate Platform | Françoise Gaill (INEE/CNRS) |
| Engaging with the public in Europe | Jan Seys (VLIZ) |
| Wikinomics strategy for public engagement | Olivier Dufourneaud (Oceanographic Institute, Albert II Prince of Monaco) |

Summary of Panel Discussion: Societal Awareness of the value of Ocean and Coastal Information

Driving societal change

- The ocean science community needs to work to trigger emotion in the public and policy makers to drive behavioral changes that support conservation and sustainability
- Research in environmental education has shown that a feeling that personal actions will make a difference is an important driver for behavioral change
- Creating human connections and driving emotional response is key to producing societal change

Ocean literacy

- Working with citizen science is a way to improve ocean literacy and get communities involved
- Ocean literacy efforts need to be done at every level such as efforts by the Decade of Ocean Science and local community efforts
- Connections with other people and organizations is very important for driving ocean literacy and the GEO Blue Planet network is an important for developing these connections
- The space community has been successful in creating a sense of wonder that drives interest from the public; the ocean science community should work with psychologists to better understand how to drive interest
- The ocean should be presented as a connecting element of the planet

Recommendations for GEO Blue Planet

- GEO Blue Planet should look at generating stories about questions that were answered by data that can drive emotional connections
- GEO Blue Planet should work to create connections between ocean literacy efforts
- GEO Blue Planet should support the sharing of best practices for advocacy, capacity building and ocean literacy

Summary of Symposium Recommendations and Next Steps

In the closing session, priorities for GEO Blue Planet were discussed with the audience. The primary recommendations were identified as follows:

- GEO Blue Planet should play a coordinating role, creating linkages and identifying linkages between existing networks and organizations. Blue Planet should share best practices between regions (for sharing new services, user engagement, capacity building & ocean literacy etc.).
- GEO Blue Planet should establish its role on the downstream/user side of observations with GOOS focusing on upstream coordination of observations and GODAE OceanView/OceanPredict focusing on the coordination of the modelling/data assimilation component.
- Completing the “ocean observing seascape” project should be a priority.
- GEO Blue Planet should facilitate user discover of data and products.
- GEO Blue Planet should put together success stories for the utilization of ocean observations for decision making.
- GEO Blue Planet needs additional secretariat support and should put out a call for interest in hosting a Secretariat node.

An announcement was made that the next GEO Blue Planet Symposium would be held in 2020 and that an open call for a host for the Symposium will be distributed in early 2019.