

EU China Blue Year Event

forecasting, data, monitoring, planning, indicators

中欧蓝色海洋

预报、数据、监测、规划与指标研讨会

1-2 June, 2017, Brussels

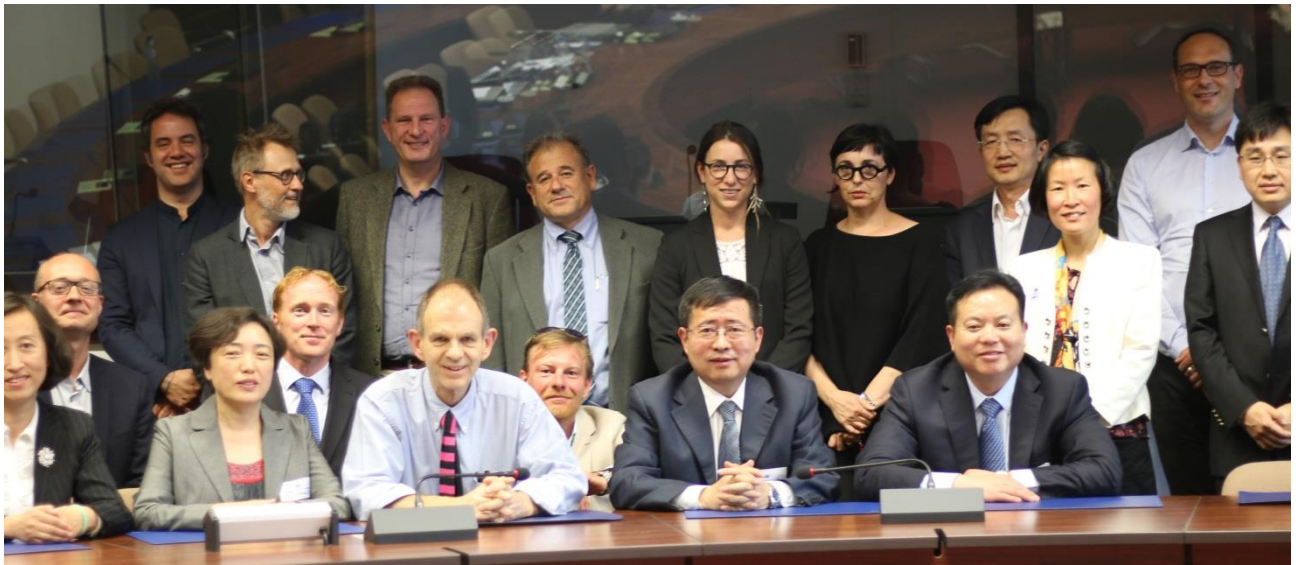


Table of Contents

Opening and Welcome.....	1
Commissioner Vella	1
Administrator Wang.....	1
EU systems for delivering marine data and forecasts	1
Copernicus	1
EMODnet.....	2
Data Collection Framework for Fisheries	2
Chinese Approach	2
Operational ocean observation and forecasting services in China	2
Development and Application of the Regional Ocean Forecasting System in China	3
Status and Trends of Marine Big Data in China	3
Spatial Planning	4
Pressures of semi-enclosed seas	5
Marine debris monitoring, modelling and collaboration.....	5
Operational monitoring, forecasting and blue growth	5
Environment assessment protection and ecosystem-based management	6
Existing cooperation:.....	6
Wishes for future cooperation:	7
Blue Economy Session	7
Panel Discussion.....	9
Ricardo Serrão Santos	9
Wang Hui	9
Haitze Siemers	10
Günter Hörmandinger.....	10
Final Remarks	11
Jun She, Danish Meteorological Institute	11
Juying Wang, National Marine Environmental Forecasting Center (NMEFC), State Oceanic Administration (SOA).....	11
Giovanni Coppini, Euro-Mediterranean Centre on Climate Change Foundation.....	11
Ricardo Serrão Santos, MEP	11
Chinese Delegate.....	12
Lodewijk Abspoel, Netherlands' Ministry of Infrastructure and the Environment	12

George Triantafyllou, Hellenic Centre for Marine Research	12
Juying Wang, National Marine Environmental Monitoring Center (NMEMC), State Oceanic Administration (SOA).....	12
Dou Yueming, North China Sea Branch(NCSB), State Oceanic Administration(SOA).....	12
Participants.....	13

OPENING AND WELCOME

Commissioner Vella

Investors are aware of the potential in the blue economy but it is an unfamiliar territory. They need more information on the resources and on the risks. For that they need data. Previously, many organizations in the EU held these data but it was hard to find them and hard to put them together to build up a coherent picture. In 2008, we began to gather all European institutions in a partnership. They have now produced a seabed map of Europe that is already reducing investment costs. But it is not only about collecting data. We must understand how to forecast the impact of changing climate and human activities. And, as the Blue Economy grows there is more demand for marine space and we need to plan who can use this space and under what conditions. Like China, we are developing spatial planning to know how each activity will affect others.

We should study each other's programmes. Our combined investments in monitoring and data make up a good proportion of the global total. If EU and China manage to find common ground others will follow.

Administrator Wang

The Chinese government attaches great importance to data, monitoring and forecasting. After four decades of great effort our capacity has greatly improved and our complete network now includes three reporting levels. Our forecasting capability is a key tool for assessing, preventing and managing disasters. This has benefited from strong cooperation with the International Maritime Organisation, France, Italy, and Belgium. We believe that joint-projects with the EU could be beneficial.

Other areas for collaboration include data, simulation, ocean biology and climate change. We have a particular interest in polar areas. Our 2017 to 2019 Arctic monitoring and reporting project could be a platform for cooperation.

EU SYSTEMS FOR DELIVERING MARINE DATA AND FORECASTS

Copernicus

Copernicus is the EU's flagship programme providing operational and sustainable European information services based on satellite Earth Observation and in situ data to support the monitoring, conservation and sustainable use of our environment and protecting citizen and goods. Six information services provide information to public bodies, citizen, science or business. Data and information products related to atmosphere, climate, land and marine services are available on a free and open policy worldwide. The Copernicus Marine Environment Monitoring Service provides regular and systematic reference information on the physical and biogeochemical state, variability and dynamics of the ocean and marine ecosystems for the global ocean and the European regional seas. The real-time observations, long time series and forecasts produced by the service support all marine applications: maritime safety, environmental and coastal monitoring, marine resources, climate and weather seasonal forecasting.

Recently new services on waves were delivered including near-real time wave forecasts and hindcast at global scale and for all European regional seas, associated real-time observations of wave parameters and waves products extracted from altimetry. Wave information from synthetic aperture radar is planned for December 2017. The ocean state report produced annually provides parameters and trend analysis for measuring the impact of climate change in the ocean. In support to sustainable development goals, the Copernicus marine service will produce end 2018 the ocean acidification (pH) indicator on a global coverage. Increasing attention is given to the ease with which the data and services can be taken up by added-value service providers.

EMODnet

It is complemented by the European Marine Observation and Data Network EMODnet which again is based on the principles of open data. It is divided into seven thematic groups: geology; bathymetry, physical habitats, physics, chemistry, biology and human activity. Each of these groups is a partnership of organisations that have the necessary skills and access to data to standardise the presentation of data and create data products. For instance the partners of the thematic group for geology are bodies responsible for geological surveys in EU coastal states as well as a number of neighbouring states. The aim is to be able to search for, visualise and retrieve all the measurements concerning a specific parameter within a certain time and space window with one single command wherever the data are stored. A digital map of the seabed topography, geology and habitats is already available. Work is underway to increase the resolution and number of parameters available.

The question of duplicates came up in the discussion. EMODnet collects data from national institutions and from regional groupings. Indeed a study in the Baltic did find that some data are present from only one source and some from both. Work is underway to solve this problem through better tagging of data.

Data Collection Framework for Fisheries

The third leg of the EU's effort is the Data Collection Framework for Fisheries. Operational since 2002, it provides the basic data needed for supporting the Common Fisheries Policy - for instance to set quotas. Data on the length, weight, sex and age of commercially-important fish are collected on board fishing vessels, at ports and through targeted scientific surveys. Data are also collected on the socio-economics of the industry as well as aquaculture and processing. Increasing attention is given to parameters such as by-catch, that indicate the environmental impact of fishing. All of this requires a coordinated effort to decide what should be collected and to disseminate the data. This is mostly organised separately for each of Europe's sea basins.

CHINESE APPROACH

Operational ocean observation and forecasting services in China

Professor Wang Hui, from National Marine Environmental Forecasting Center (NMEFC) in Beijing, gave a comprehensive overview of marine observing system and marine environment forecasting system and disaster warning service in China. As one part of the NEAR-GOOS (the North-East Asian Regional Global Ocean Observing System), the China Real Time Data Base (RTDB) is

operated by NMEFC, and the data is available since Sept. 2013. From three parts, real-time observation, real-time transmission and real-time monitoring, the marine environment observation system of SOA was introduced. All the data are derived from the ocean stations, buoys, radars, ship observations, satellite, coastal observing stations, et al. The marine forecasting services in China include the ocean wave, storm surge, sea ice, temperature, current, search and rescue, ENSO prediction, polar exploration and so on. In order to do better services for the public, the Chinese Global operational Oceanography Forecasting System (CGOFS v1.0) is established. As for the future cooperation aspects between China and EU, Dr. Hui Wang puts forward some advice that we should jointly develop the marine observation network and global/coastal ocean forecasting systems, and provide services for the countries along the 21st century One Belt One Road.

Development and Application of the Regional Ocean Forecasting System in China

Dr. Liu Guimei, from National Marine Environmental Forecasting Center (NMEFC) in Beijing, introduced the development and application of the regional and ocean forecasting system in China. The operational hydrological forecasting systems, including Northwest Pacific Model (NwPM), East China Sea Model (ECSM), South China Sea Model (SCSM) and Bohai Sea Model (BHS), are regional models at the CGOFS, which are based on the Regional Ocean Model System (ROMS). As an important part of the forecasting system, the data assimilation method is used in the ocean operational systems. In these systems, an oceanographic three-dimensional variational data assimilation scheme is adapted to the ROMS model in order to assimilate temperature and salinity (T/S) measurements from Argo profiles into the Hydrological forecasting system. The EnOI scheme is also applied to ROMS with the ability to assimilate TSLA (along-track Sea Level Anomaly), which has been used in the NwPM as an operational data assimilation system. Furthermore, the release of Operational Ocean Forecasting System have been applied well to oil spill forecasting, search and rescue, ecological, such as chlorophyll-a, nutrients in the north Pacific, CO₂ flux in the northwest Pacific Ocean, oil explosion in coastal areas, searching for MH370, and so on.

Status and Trends of Marine Big Data in China

Dr. Xiang Wenxi, from National Marine Data and Information Service (NMDIS) in Tianjin, comprehensively introduced the status and trends of marine big data research and development in China, from policy support at all levels, construction of marine big data system, application and service of marine big data, to visions for future development. Marine big data is developing fast in China and has finished the top-level design of marine information system and marine cloud platform. The ocean environmental integrated database and marine cloud computing platform is under construction, and research and development on unified data standards and technical specifications are also being carried out. Currently marine big data are widely applied in the R&D of data and information products, such as marine observation data products, global and regional marine environment statistical analysis products, ocean section statistical analysis products, and ocean reanalysis products. Big data are also used in promoting marine economic development, spatial planning, search and rescue, sea area and islands management, etc. Through a number of international and regional projects/programs, marine big data and data products of China are now providing service regionally and globally. Regarding the future possible cooperation in the field of big data between China and EU, Dr. Xiang Wenxi proposed the China-EU Marine Big

Data Center Initiative which aims at promoting marine data sharing and exchange, as well as technical research cooperation between the two sides.

SPATIAL PLANNING

Co-chairs Lodewijk Abspoel, Senior policy officer EU integrated maritime policy, Maritime Spatial Planning and North Sea, LU Wenhai, NMDIS

Both the EU and China are developing Maritime Spatial Planning (MSP) and are seeking cooperation on best practices. Bohai Bay in China and the Baltic Sea in Europe have similar geomorphological features: both being shallow enclosed seas. Bohai Bay has an average depth of less than 60 meters. Various rivers flow into the Bohai Sea, amongst others the Yellow River. The exchange of information and thoughts therefore focussed mainly on these regions. The theoretical framework on MSP worldwide is still under development and needs to take up evidence from practical implementation to strengthen it. The MSP Directive sets a deadline for MSP implementation in EU countries by April 2021 at the latest although in the north-western countries Maritime Spatial Plans have been in effect since 2009.

The Baltic with 9 different countries, each with a different background in culture, language and management/governance system and each with an own planning authority in their part of the Baltic (not all sea borders have been established) - couple of the challenges concern the design of the process and in particular the position and role of stakeholders. Two examples tabled are fishermen fishing in waters of other countries and the role of green NGO's like WWF in the process. Another challenge for planners is creating a holistic approach if stakeholders come to the table with a/their single interest.

Based on around 30 years development of MSP system in China, a more developed MSP system which is called marine major function-oriented zone planning system has been established in China, covering 11 provinces and stretches over 18.000 km of shore line and over 7.000 islands. 4 types of areas (Development-optimized area, Development-prioritized area, Development-restricted area, Development-prohibited area) defined by central government, the restricted development subdivided in 2 sorts: fisheries and ecosystem restoration. The high level zoning (planning) is informed from local and scientific sources.

The exchange of thoughts and information between the delegations on stakeholder engagement, top-down/bottom up approaches to MSP, setting up monitoring and evaluation practices on MSP, environmental assessments underpinning maritime spatial plans and aspects of governance in a wider scope have been greatly appreciated by the EU delegation. The suggestions made by the Chinese delegation for fields of further international cooperation (improving the theory of MSP, stakeholder involvement, monitoring and evaluation, and cross-border/high seas and Arctic MSP) will be relayed to the EU Member States Expert Group on MSP and the scientific community. The EU delegation suggested further cooperation on exchange of information on data and information management systems like EMODnet, comparing other sea basins (parts) in the EU with Chinese waters, and learning about MSP by means of serious gaming (e.g. university of Dalian).

Both delegations agree that there are lots of good reasons to work on the various aspects involved in MSP, also by looking into major international drivers for a sustainable blue economy including climate change agreements, sustainable development goals, the maritime silk road and the growth of offshore renewable energy.

PRESSURES OF SEMI-ENCLOSED SEAS

Session co-chairs: Jun She (DMI) and Liu Guimei (NMEFC)

Semi-enclosed seas such as Bohai Sea, Baltic Sea and Mediterranean Sea face significant pressures from human activities and climate change, and degradation in environment and fisheries. Speakers from China and EU introduced their challenges, approaches and state-of-the-art in monitoring, modelling, assessing, predicting and managing the semi-enclosed seas and ecosystems. Focused areas are operational monitoring, forecasting and application for blue economy, environment assessment, protection and ecosystem-based management, marine debris monitoring, modelling and collaboration.

Marine debris monitoring, modelling and collaboration

A comprehensive overview of China's monitoring activities on macro- and micro-debris was given by Professor Wang Juying from NMEMC in Dalian. China started macro-debris monitoring 10 years ago and micro-plastics last year, covering entire China's coastal seas. For macro-debris monitoring, debris in beaches, surface waters and sea floor are analyzed and classified. For micro-debris monitoring, micro-plastic concentration is measured in surface waters, beaches, and shellfishes. The results in China coast are inter-compared with other coastal areas in the world based on existing researches.

George from HCMR introduced an integrated European approach in handling marine macro- and micro-plastics, including monitoring, modelling, impact assessment, cleaning technology and business model for circular economy. A team of player ranging from governmental agencies, research institutes, universities and private companies from Mediterranean and Baltic Sea has been work together on key technologies in such an integrated approach.

Since the results of the monitoring and assessment of marine plastics are closely related to the monitoring methodology, the inter-comparison of monitoring methods and assessment standards for marine plastics between China and EU could be of great interests. RIVM (Netherlands) and NMEMC signed MoU in 2016, and Toulon Center of Infremer (France) and NMEMC are going to sign MoU on marine micro-plastics, especially on the monitoring methodology and ecosystem impact of micro-plastics.

Operational monitoring, forecasting and blue growth

Operational monitoring and forecasting systems in Bohai Sea, Baltic Sea and Mediterranean Sea were introduced. Monitoring and forecasting systems as well as environment protection in Bohai Sea were introduced by Dou Yueming and Li Rui from NCSB which is responsible for monitoring, forecasting and management of Bohai Sea. Currently there are more than 2000 monitoring stations in Bohai Sea. NCSB forecasting system covers ocean, wave, ice, drift of oil spill and green

macro-algae. There are great interests to improve the monitoring and forecast on ice, green macro-algae and Bohai-Yellow Sea water exchange.

Baltic Sea operational monitoring and forecasting system, including both CMEMS and BOOS systems and national systems, are introduced by Jun She (DMI, BOOS Chair). The state-of-the-art focuses on the integrated use of online and offline data in forecasting, optimization of observational networks, multi-model ensemble prediction, coupled atmosphere-ocean-wave-ice-ecosystem modelling both in synoptic and climate scales. DMI and NCSB signed MoU in 2007 on operational oceanography cooperation, especially for Yellow-Bohai Sea and Baltic Sea. In EU project YEOS (Yellow Sea Observing, forecasting and information system), the European weather-ocean-ice-wave forecasting system is applied in Yellow-Bohai Sea, and provided joint operational service for Olympic Sailing Competition in Qingdao 2008.

Mediterranean monitoring and forecasting system, as well as its blue-growth applications, were presented by Giovanni Copini from CMCC. Italy-China MoU on operational forecasting cooperation was signed in 2009 by NMEFC and 4 Italy partners (INGV, CMCC, OGS etc). Since then, bilateral meetings have been regularly organized.

There exists a good basis for cooperation on operational oceanography for semi-enclosed seas. Wishes for further cooperation in the area have been expressed by all relevant partners.

Environment assessment protection and ecosystem-based management

Progresses and challenges for ecosystem-based approach in the Baltic Sea were introduced by Jun She (DMI) and J. Rasmus Nielsen (DTU-Aqua). An end2end monitoring and modelling approach has been developed in Denmark in past 10 years for more adaptive, operational ecosystem-based management by integrating strengths from operational oceanography (including climate change adaptation), environmental monitoring and assessment and fishery modelling and management.

Since May 2017, the strictest measures have been applied by SOA in protecting Bohai Sea by limiting human activities and their impacts. An ecosystem approach for recovering Bohai ecosystem health is clearly called. As the management unit for Bohai Sea, NCSB will need to develop a series of measures for assessing impacts of applied environmental protection measures. Key technologies and knowledge gaps in Bohai marine ecosystem dynamics and response to human and climate pressures will also have to be developed. For the semi-enclosed sea management, Bohai has the advantage in its simplification and efficiency when implementing environment protection measures, as it is done in a single country and mainly managed by NSCB.

Cooperation in Baltic-Bohai Sea ecosystem-based management will benefit both sides, and be highly supported by DMI, NCSB and DTU-Aqua.

Existing cooperation:

- DMI-NCSB cooperation on operational oceanography (MoU, 2007-)
- EU project YEOS (Yellow Sea Observation, forecasting and information system): DMI, NCSB, FIO, CKJORC, HZG etc. 2007-2009
- NMEMC-HZG cooperation on marine pollutants
- NMEMC-NL cooperation on micro-plastics (MoU, 2016-)

- NMEMC-France cooperation on marine debris
- CN-Italy cooperation on operational forecasting (2009-): regular bilateral meetings
- NMEFC-Mercator Ocean/France cooperation in marine service provision in SCS (MoU, 2014-)
- NMEFC-FMI cooperation on marine forecasting (MoU, 2017)

Wishes for future cooperation:

In China, Bohai Sea has been chosen in 2017 as the first one which shall apply the strictest environment protection measures, an ecosystem-based management approach has been proposed. On the other hand, Baltic Sea countries have worked under HELCOM since 1990s, trying to recover the degraded marine environment and ecosystem based on an ecosystem-based approach. Considering high similarities and synergy in interests and challenges for Bohai Sea and Baltic Sea, a strong wish for Baltic-Bohai Sea cooperation is expressed by the partners from both sides. In the future, NCSB would like to hold a “China-EU Joint Workshop on Management and Research of Semi-Enclosed Seas” in Qingdao, China. Officials and researchers from both sides are all welcomed to share experiences and exchange ideas in terms of ecosystems, blue economics, monitoring, observing and forecasting of semi-enclosed seas, etc.

The proposed Baltic-Bohai Sea cooperation may serve as a demonstration of semi-enclosed cooperation and therefore may cover wide range of topics i) operational monitoring, modelling and forecasting and blue growth applications; ii) environment assessment and ecosystem-based management (including high trophic levels, seasonal hypoxia) and iii) marine debris monitoring, modelling and cleaning technology. and iv) marine disaster and emergency response management.

The participation of Baltic-Bohai Sea cooperation is not limited to institutes from Bohai Sea and Baltic Sea region. General issues on EU-China cooperation on semi-enclosed seas can also be included. Existing cooperation on semi-enclosed seas shall be further coordinated and strengthened.

BLUE ECONOMY SESSION

There were three papers presented and discussed in the Blue Economy session. The first by Iain Shepherd, European Commission (DG Marine Affairs) presented an overview of marine related activity at the EU level, the second by Lu Wenhai of the National Marine Data and Information Service (NMDIS) within the State Oceanic Administration (SOA) of China presented an overview of the Chinese marine economy monitoring and evaluation programme and the third by Dr. Stephen Hynes of the National University of Ireland, Galway discussed approaches and challenges in going beyond measuring marine industry activity to measuring marine natural capital.

In his presentation, Iain Shepherd outlined the composition of the blue economy for the EU as a whole. In doing so he used statistics provided by EU Member States to the EU's statistical office, Eurostat, through structural business statistics, the Labour Force Survey and tourism surveys. He also presented figures from the Data Collection Framework for fisheries and the European Wind Energy Association. He spoke of the process DG MARE has begun to estimate the size, nature and dynamics of the blue economy in EU Member States that allows for comparison across

different activities, different countries and different sea basins in order to inform policies aiming at promoting blue growth and jobs.

Iain also presented findings in relation to the supply chain associated with the shipbuilding industry in the EU and posed the question "Can ocean provide more than 2% of global food?" He outlined the growth that has been seen globally in aquaculture and compared it with the zero growth observed in Europe in recent years. He also presented findings in relation to renewable energy, sea bed mining, shipping and fishing activity across the EU, outlining in each case the growth in the sector, barriers to same, and any marine environmental concerns.

In his presentation, Lu Wenhai outlined the monitoring and evaluation system that goes into generating marine activity statistics in China. The classification system for marine activities in China include 12 major marine industries, 10 marine scientific research education, management and service industry categories and 6 marine - related industries (one step down the supply chain). He presented the many agencies involved in the data collection process; in what is referred to as the National Marine Statistics Information Network. These include over 29 national ministries or departments, marine management departments in coastal areas and direct contact with marine related enterprises. The regular reports produced using the data including statistical bulletins and the annual marine statistical year book that provides comprehensive and systematic statistical data for the ocean economy were also discussed.

According to the latest *2016 China Marine Economic Statistic Bulletin*, the national Gross Marine Product amounts to \$1,061.5 billion dollars, 6.8% up from the previous year (at comparable price), accounting for 9.5% of GDP. Lu also reviewed the China Marine Development Index which is a quantitative evaluation of the overall development of the marine economy over a specified period. Interesting, Lu also presented the "blue 100" Marine Economic Stocks Price Index in use in China. This index picks up 100 stocks in both the Shanghai and Shenzhen stock markets that are part of the marine economy, and is used to examine the development of the Marine economy from the perspective of the stock market.

Finally Lu outlined 4 areas where his institution would like to see further collaboration between China and the EU. Firstly, in relation to the incorporation of non-market values into Ocean economy accounts. Secondly, continue joint efforts in studying Blue Economy in terms of concept, classification and methodology (they have previously worked with SEMRU I NUI Galway in this regard). Thirdly, to promote studies and cooperation in the establishment of international standards for blue economy classification and fourthly, expand the Silk Belt and Road Initiatives to include data exchange and sharing with countries along the Belt and Road.

In the final paper in the session Stephen Hynes from the Socio-Economic Marine Research Unit (SEMRU) at NUI Galway moved the discussion beyond marine industry activity to the consideration of marine natural capital in national income accounts and marine ecosystem service accounts. Stephen discussed the need to align measures of natural capital stocks and flows with the measurement approaches prescribed for national accounts (System of National Accounts; SNA), the need to go beyond GDP for environmental economic accounts (System for Environmental Economic Accounts; SEEA) and the need to understanding of how ecosystem services, once quantified, can be incorporated in an accounting framework such as the SNA or the SEEA (the SEEA Experimental Ecosystem Accounting; SEEA EEA).

Stephen also reviewed the many valuation techniques that are being used to monetarise ecosystem service benefit values and which are becoming more central in applying an Ecosystem Approach to management at strategic policy level. The data and methodological challenges in incorporating natural capital into account frameworks were discussed and the presentation concluded with an example of marine ecosystem service benefit valuation for a number of key services from Irish waters based on the UN Common International Classification of Ecosystem Services (CICES) framework. Stephen argued that factoring marine ecosystem service values into ocean economy account frameworks may help to ensure a more sustainable “blue economy”. Delegates from both China and the EU agreed that while research has been progressed in both in relation to the development of marine industry accounts both the EU and China are really only beginning to attempt the difficult process of building marine ecosystem service values and natural capital values into national accounts. This should mean that closer collaboration between the EU and China on this work could result in more robust methodologies, in a shorter time frame, that allow for comparisons related to the sustainable growth of the blue economy across both regions.

PANEL DISCUSSION

Ricardo Serrão Santos

Professor Santos previous to his parliamentary duties taught at the Autonomous University of the Azores and was involved in the establishment of the "Centre for Science between Portugal and China" and "Sino-Por Cooperation" on marine science. He is also a member of the Fisheries Committee in the EU Parliament. He made the following points:

- China has a huge interest in oceans and it is increasing. Their Deep Submergence Vehicle has the greatest depth range of any manned research vehicle in the world)
- Although the Paris Agreement barely mentions oceans, their importance is universally recognised. The new U.S administration's stance on climate change provides an opportunity for the EU and China to cooperate on the problem of climate change and beyond; not only about adaptation to the climate change, but more importantly, mitigation of climate change. The EU Parliament is keen on cooperation with China on these matters.
- Observations are clearly a practical way to cooperate.

Wang Hui

Professor Wang Hui, director of the Chinese National Marine Environmental Forecasting Centre made the following points:

- We have common ideas and common objectives. Area of potential cooperation between EU-CN could be based on pilot areas such as marine monitoring, eco management, eco monitoring risk, disaster prevention, joint research on regional development and spatial planning etc.
- Understanding climate change requires us to study change patterns and regional forecasting. We are already cooperating with Italy on forecasting and measurement and are ready to expand and extend cooperation with other countries/agencies.

- We can strengthen cooperation on the maritime silk road – working together with local communities on developing services, protecting the safety of crews and reducing risk to the blue economy through the Andaman Sea, the Bay of Bengal and beyond
- The Ocean Administration has recently published a report outlining objectives and work plans for the future. This will become available in English.

Haitze Siemers

Mr. Siemers who is in charge of Maritime Innovation, Marine Knowledge and Investment at the European Commission's Directorate General for Maritime Affairs and Fisheries said:

- The EU and China have an enormous interest in ensuring that our seas and oceans remain healthy for long term and their impact on climate change is properly understood.
- Issues like environmental impact assessments and determining good environmental status depend heavily on data which is difficult to obtain and harmonize. We must have enough data on oceans to study the global climate change regarding their mitigation capacity, adaptation processes and impact of global climate change on humans.
- Big Data and the Science Cloud offer a huge potential for data sharing and greater transparency. We need to develop common standards at a global level. We have made progress at an EU level but we can do more. We must look at data collecting from the users' perspectives as well: making it available as a product for businesses; businesses are interested as it helps them retain resources and follow corporate social responsibility standards.
- The blue economy is not standing still. Renewable energy output will grow. Deep sea, digital and clean technologies will certainly have an impact on transport and offshore activities. Depending on commodity markets, deep-sea mining may expand. In that case we need to ensure that its impact on ecosystems is minimised. These new activities will grow as other industries such as coal, cement steel and paper decline¹.
- The EU and UNESCO's International Ocean Commission are studying how to promote international guidance on maritime spatial planning, China's participation would be useful for all.

Günter Hörmandinger

Mr. Hörmandinger, an official with the European Commission's Directorate General for the Environment explained that whilst the Directorate General for Maritime Affairs and Fisheries, was responsible for fisheries, investment and data collection, his own Directorate General was responsible for environmental policies. Global climate change is looked after by yet another Directorate General.

He said that

- China is one country. 28 belong to the EU. Its legislative process provides mechanisms for them to work together. The Marine Strategy Framework Directive; obliges EU countries to take measures to clean up their seas. Although how this is done is left to the discretion of individual countries, EU laws on urban waste water treatment, agriculture and air quality

¹ <https://www.whitehouse.gov/the-press-office/2017/06/01/statement-president-trump-paris-climate-accord>

contribute. Countries are also obliged to develop marine spatial plans and this too contributes towards ensuring that human activity is sustainable.

- There is a strong push in the EU to work towards a circular economy, involving recycling. Work is underway to develop standards for plastic products.
- Evidence-based policy requires us to know what happens if no action is taken and what the impact is of certain options. The Danish government already has such a model for its own territory. The Commission is building a database of pressures and measures under the Blue 2 initiative to feed a scenario generation tool, and then build a social economic assessment model for European waters.

FINAL REMARKS

Jun She, Danish Meteorological Institute

One Belt One Road is one of the major Chinese movements for the future. It is recommended that Europe should make some investments through EU-CN cooperation, otherwise we may lose the opportunity in future. Marine cooperation could be a good investment, if China and the EU join resources on developing joint ocean modelling, monitoring, the marine Cloud, e-Navigation etc.. I also see great potential for cooperation on the impact of regional climate change in future coastal development. European experiences on very high-resolution adaptation measures against climate change could help research on coastal protect in Chinese mega-cities. Cooperation could cover all Chinese and European coastal areas.

Juying Wang, National Marine Environmental Forecasting Center (NMEFC), State Oceanic Administration (SOA)

China accounts for one fourth of plastic production, in the world. As a result, the Chinese government attaches a lot of importance to ensuring that it does not damage the oceans. Last year my colleagues and I visited research centres in France and Netherlands and signed a cooperation agreement with the RIVM (Netherlands) to monitor and evaluate micro plastic in the sea. I hope we can extend our cooperation in research regarding plastic in sea with other European countries as the EU has expressed a wish for more research on methods to tackle this problem.

Giovanni Coppini, Euro-Mediterranean Centre on Climate Change Foundation

The great advantage of this workshop is that Europe is connecting existing cooperations together which is a step forward. We must be concrete in the next few years (for instance through promoting exchange of research). We need to speed up.

Ricardo Serrão Santos, MEP

At least 30 to 35% of fishing stock is over exploited. Fish provides protein for one fifth of the world population and. Europe imports 60% of the consumed fish. Although Europe implements strict rules on its fishing vessels operating in high seas, illegal, unregulated and unreported fishing remains a concern. China is the most important country in terms of world fisheries. Together the EU and China could make a significant contribution through cooperation on fish farming and implementing rules to fight illegal fishing on the world stage.

Chinese Delegate

In China it is the Ministry of Agriculture and the State Administration of Fishery and our national authorities responsible for fishing industry. We do attach a lot of importance to protecting our fishing stocks and have designated fishing free zones. We don't have any colleagues from Ministry of Agriculture with us but it is clear that fishing resources are a very important part of the world economy; both in coastal regions and high seas. We want to study the change of fishing resources due to climate change in order to make our fishing sustainable.

Lodewijk Abspoel, Netherlands' Ministry of Infrastructure and the Environment

I am part of the EU Council working group working on potential topics of collaboration between the EU and China. I will recommend that the working group map systematically the topics where European countries have strong interest whether in private industry, government, scientists, civil society etc. I'm also part of EU Working Group on Marine Knowledge. Maritime spatial planning, is a particularly useful platform for collaboration. We try to remain neutral and open to any evidence and opinion without making any judgement in order to bring together information and to help make a coherent plan.

George Triantafyllou, Hellenic Centre for Marine Research

It's about only about predicting the climate but also the potential impact on marine environment. With reduction of fishing vessels, Europe has found a substitute, aquaculture. Regarding macro and micro plastic, I suggest new practical methods and innovative technologies; it is not simple as new technologies must go through economic feasibility and policy recommendation. For this, we would need the society's support so we need social awareness, acceptance and responsibility. We have measurements, time to work on solutions. I'd be happy to work with people from China who have same ideas and like to collaborate.

Juying Wang, National Marine Environmental Monitoring Center (NMEMC), State Oceanic Administration (SOA)

We would really benefit from working with our colleagues from the EU. Over 5 trillion pieces of small pieces have gone into the seas. And once in the sea it takes forever for them to dissolve. Some estimates suggests that consumers are concerned about micro plastics when consuming shellfish. We need to work with the food industry to set standards. Is this a problem now or could it be in the future? If shellfish contain more than a certain limit of micro plastic we probably should warn consumers or initiate cleaning programs. This is one area of possible of joint research to ensure the safety of ecosystem as well as our consumers.

Dou Yueming, North China Sea Branch(NCSB), State Oceanic Administration(SOA)

Before coming over, we thought our interest would be mainly on joint research in the Baltic Sea because of similarity to Bohai Sea in China. But now I realize that we have many areas for future cooperation (ex. climate change, disaster control and prevention, etc.). In the next stage we could have some substantive cooperation and share good practices and perhaps both sides could contribute to the protection of global marine system..

PATICIPANTS

ABSPOEL	Lodewijk	Maritime Spatial Planning and North Sea,
ANDERSON	Tomas	Swedish Agency for Marine and Water Management.
BORG	Greta	Executive Agency for Small and Medium-sized Enterprises
CALEWAERT	Jan-Bart	EMODnet secretariat
COPPINI	Giovanni	Euro-Mediterranean Centre on Climate Change, Foundation
DONATI	Cecilia	Mercator Ocean
DOU	Yueming	NCSB/SOA
GILMORE	Richard	European Commission, Directorate General for Internal Market, Industry, ..Entrepreneurship and SMEs
HOERMANDINGER	Guenter	European Commission, Directorate General for Environment
HYNES	Stephen	SEMRU (Socio-Economic Marine Research Unit)Whitaker Institute, National University of Ireland, Galway coppini
INOTAI	Andras	Member of Cabinet of Commissioner Vella
ISOARD	Stéphane	European Environment Agency
JACQ	Fabienne	European Commission, Directorate General for Internal Market, Industry, ..Entrepreneurship and SMEs
JUN	She	Danish Meteorological Service
KOSTOPOULOU	Venetia	European Commission, Directorate General for Maritime Affairs and Fisheries
LI	Rui	NCSB/SOA
LIU	Guimei	National Marine Environmental Forecasting Center (NMEFC), State Oceanic Administration(SOA)
LU	Wenhai	NMDIS
MCMEEL	Oonagh	EMODnet secretariat
NIELSEN	J, Rasmus	Technical University of Denmark
SCORY	Serge	Royal Belgian Institute of Natural Science
SERRÃO SANTOS	Ricardo	Member of European Parliament
SHEPHERD	Iain	European Commission, Directorate General for Maritime Affairs and Fisheries
SIEMERS	Haitze	European Commission, Directorate General for Maritime Affairs and Fisheries
TRANTAFYLLOU	George	Hellenic Centre for Marine Research

VANHEULE	Bernard	International Association of Oil & Gas Producers
VELLA	Karmenu	Member of European Commission
WANG	Hong	Head of State Oceanic Administration
WANG	Juying	National Marine Environmental Forecasting Center (NMEFC), State Oceanic Administration(SOA)