



JOINT WMO/IOC TECHNICAL COMMISSION FOR
OCEANOGRAPHY AND MARINE METEOROLOGY

A Strategy for JCOMM 2012 – 2017

June 2014

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CONTENTS

Executive Summary	5
1. Background.....	7
1.1 History	7
1.2 Driving Forces of JCOMM.....	9
1.3 JCOMM Stakeholders.....	9
1.4 Benefits of JCOMM.....	12
2. The JCOMM Vision	14
2.1 The Long-Term Objectives of JCOMM.....	14
2.2 Priorities for the Intersessional Implementation (2012-2017)	15
3. Strategic approach for JCOMM implementation	20
3.1 General Principles	20
3.2 An Integrated Approach for Cross-Cutting Issues	20
3.3 Communication and Outreach	21
3.4 External Interactions	22
3.5 Performance Evaluation	23
4. Framework for Implementation.....	24
4.1 General Governance	24
4.2 JCOMM Structure	25
4.2.1 The Co-Presidents	25
4.2.2 The Management Committee	25
4.2.3 Programme Areas	26
4.2.4 JCOMMOPS	28
4.2.5 The Joint WMO-IOC Secretariat for JCOMM.....	28
4.3 Intersessional Activities	29
5. To the Future: Evolution of JCOMM	30
Annex 1 Terms of Reference of JCOMM.....	34
Annex 2 Addressing Expected Results and High-Level Objectives	36
Annex 3 JCOMM Structure	40
Annex 4 List of Acronyms.....	42

PREFACE

The Strategy for JCOMM is to guide and motivate activities carried out by the Members of the World Meteorological Organization (WMO) and Member States of the Intergovernmental Oceanographic Commission (IOC) of UNESCO, as well as the Expert Team and Groups of the Commission, in support of the WMO and IOC Secretariats. It also indicates how JCOMM contributes to the objectives, functions and expected results of the WMO Members / IOC Member States.

This Strategy is continuously reviewed and revised under the purview of JCOMM Co-Presidents, with input from the leading experts of the Commission as well as the WMO and IOC Secretariat. A Strategy for the intersessional period 2012-2017 was prepared by the JCOMM Co-Presidents, Dr Nadia Pinardi and Dr Johan Stander, based on guidance of the former Co-Presidents and particularly Dr Peter Dexter. The support of the WMO and IOC secretariat, Dr Boram Lee and Dr Albert Fischer, is kindly acknowledged.

Executive Summary

The Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) was established by its parent organizations, the World Meteorological Organization and the Intergovernmental Oceanographic Commission (of UNESCO) in 1999, to coordinate worldwide marine meteorological and oceanographic services and their supporting observational, data management, forecasting, analysis and capacity building programmes.

JCOMM coordinates and recommends standards and procedures for a fully-integrated marine meteorology and ocean observing, data management, forecasting and analysis system which uses state-of-the-art technologies and capabilities. It is responsive to the evolving needs of all users of marine data and products, including an outreach programme to enhance the national capacity of all maritime countries. It aims to maximize the benefits for its Members/Member States in the projects, programmes and activities that it undertakes in their interest as well as those of the global community in general.

The long-term objectives for JCOMM are to:

- (i) enhance the provision of marine meteorological and oceanographic forecasting and analysis services;
- (ii) contribute to the development, enhancement and delivery of climate services related to the marine atmosphere and coastal and deep oceans;
- (iii) coordinate the enhancement and long-term maintenance of an integrated global marine meteorological and oceanographic observing and data management system;
- (iv) coordinate the evolution of the services through the selective incorporation of advances in meteorological and oceanographic science and technology;
- (v) promote and facilitate the equitable participation of all WMO Members and IOC Member States.

During the period 2012-2017, the Commission will leverage on its core competencies to address specific priority areas: disaster risk reduction, implementation of Global Framework for Climate Services (GFCS), implementation of WMO Integrated Global Observing System (WIGOS) and WMO Information System (WIS) implementation and Capacity Development. These areas correspond closely with the organizational priorities specified by WMO and IOC in their respective strategic plans.

JCOMM's work will be accomplished through a Management Committee and three programme areas (Observations, Data Management, and Services and Forecasting Systems), the JCOMM in situ Observations Programme Support Centre (JCOMMOPS) and the subsidiary expert and task teams.

JCOMM has an ambitious and complex work programme. It holds the prospect of considerable potential benefits to all Members/Member States in the long-term operation of a coordinated, integrated, global oceanographic and marine meteorological observing, data management, and forecasting and services system.

A Strategy for JCOMM

2012– 2017

1. Background

JCOMM, the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology, is an intergovernmental body of technical experts that provides a mechanism for international coordination of oceanographic and marine meteorological observing, data management and service systems, combining the expertise, technologies and capacity building capabilities of the meteorological and oceanographic communities.

1.1 History

Prior to 1999, marine meteorological and oceanographic observations, data management and service provision programmes were internationally coordinated by two separate bodies - the World Meteorological Organization (WMO), through its Commission for Marine Meteorology (CMM), and UNESCO's Intergovernmental Oceanographic Commission (IOC), jointly with WMO, through the Committee for the Integrated Global Ocean Services System (IGOSS). While enhancing safety at sea remains the primary objective of marine forecast and warning programmes, the need for data and services has steadily expanded in volume and breadth over the last few decades. Other applications such as coastal area management, sustainable management of commercial fishing activities, ship routing, offshore resource exploration and development, pollution monitoring, prevention and clean-up and, most recently, climate modelling and predictions, have become increasingly important. Many of these applications have also required observational data sets and prognostic products for both the oceans and the overlying atmosphere.

Responding to these interdisciplinary requirements has necessitated the development of ever-closer working relationships between oceanographers and marine meteorologists. This was reflected at the global level by the growing collaboration between the IOC and the WMO in organizing and coordinating ocean data acquisition, data management, the provision of related services, and associated capacity building needs. The increasingly close relationship between the operational activities of the two agencies in the oceans **culminated when the Thirteenth WMO Congress (May 1999) and the 20th IOC Assembly (July**

1999) formally agreed that a new JCOMM should be established, initially through the merger of CMM and IGOSS. This new body brought together the marine meteorological and oceanographic communities in a common global, intergovernmental forum, charged with overall responsibility for coordinating worldwide marine meteorological and oceanographic services and their supporting observational and data management programmes. The Terms of Reference for JCOMM are given in *Annex 1*.

1.2 Driving Forces of JCOMM

The driving forces are the strategic planning of its parent organizations, WMO and IOC of UNESCO. JCOMM is critical in the implementation of the Global Ocean Observing System (GOOS), the Global Climate Observing System (GCOS) and is a contributor to the Global Earth Observing System of Systems (GEOSS). In addition, the work of JCOMM will contribute substantially to the success of the WMO Integrated Global Observing System (WIGOS) and WMO Information System (WIS); the International Convention for the Safety of Life at Sea (SOLAS); and all the other international treaties and conventions that rely on accurate, near-term and long-term oceanic and marine meteorological integrated data and services.

The development and implementation of an integrated oceanic and marine meteorological system in support of meteo-marine and ocean forecasts, disaster impact reductions, climate change mitigation and adaptation has motivated JCOMM strategic planning over the years. The recent developments in many areas of marine meteorology and oceanography, such as operational oceanographic forecasting and analysis services through the first international Global Data Assimilation Experiment (GODAE), have provided JCOMM with leverage to achieve its goals.

1.3 JCOMM Stakeholders

JCOMM builds upon the network of stakeholders from the partner's organizations, WMO and IOC. JCOMM stakeholders are generally interested in integrated metocean information from global to local scales. Such information is the basis of a sustainable science-based management of the earth's environment, which will benefit society in general.

As expressed in the strategic planning documents of WMO and UNESCO/IOC, social and economic stakeholders need improvements in metocean weather, climate, ocean variability and marine environmental information and services, following scientific and technological advances. Society and policymakers need to be better informed on climate variability, change and impacts which largely depend on the interacting ocean, atmosphere and ecosystems, thus an integrated approach is required. It is a fundamental requirement to enhance support for decision making in order to reduce loss of life and properties due to meteomarine and oceanic natural hazards. JCOMM has developed a vision, objectives and

work programme which respond directly to these considerations by different stakeholder networks.

JCOMM stakeholders can be subdivided into upstream and downstream sectors, some of which are detailed in Table 1 below. Upstream stakeholder networks are partly contributors to the JCOMM activities, for example by providing observational data sets or services, while downstream sectors are mainly composed of product and service intermediaries or end-users.

Stakeholders are further subdivided into those that are international or national. Most of the JCOMM value network is composed of stakeholders that are both in the upstream and downstream sectors. They contribute to specifications for the development of products and services by providing inputs and then using the outputs, in a virtual end-to-end assessment cycle.

Category	Stakeholder name	Upstream	Downstream
International	WMO	X	X
	IOC	X	X
	GEO/GEOSS		X
	GCOS		X
	GOOS	X	X
	International Ocean Carbon Coordination Project (IOCCP)	X	X
	World Climate Research Programme (WCRP)	X	X
	International Maritime Organization (IMO)		X
	International Hydrographic Organization (IHO)		X
	International Chamber of Shipping (ICS)		X
	Oil and Gas Producers (OGP)	X	X
	GODAE /GODAE OceanView (GOV)	X	X
	International Council for Science (ICSU)	X	X
	Food and Agriculture Organization (FAO)		X
	Regional Fisheries Management Organizations (RFMOs)		X
	Regional Maritime Safety Agencies (e.g. EMSA)		X
Regional Marine Pollution Emergency Response Centers (e.g. REMPEC)		X	
National	Meteorological Services	X	X
	Oceanographic Centers	X	X
	Space Agencies	X	X
	Coast guards		X
	National Maritime Safety agencies		X
	Aviation sector		X
	Environmental Protection agencies		X
	Private Ocean Technology Companies	X	
	Private consulting for coastal engineering		X
	Ocean energy sector		X
	Ocean cabling for telecommunications	X	X
	Maritime transport	X	X

	Maritime transport service providers		X
	National Fishery Managers		X
	Mariculture sector		X
	Research Institutions	X	X
	Ocean Teacher Academy		X
	Navy	X	X
	National security		X

Table 1: JCOMM upstream and downstream stakeholders

1.4 Benefits of JCOMM

JCOMM contributes to both WMO and IOC objectives concerning meteo-marine and oceanographic observations, data management and services.

The goals of WMO are to produce more accurate, timely and reliable forecasts and warnings of weather, climate, water, and related environmental elements, to improve the delivery of environmental information and services to the public, governments and other users, and to provide scientific and technical expertise and advice in support of policy and decision-making together with the implementation of the agreed international development goals and multilateral agreements.

The goals of IOC are to help Member States to collectively achieve healthy ocean ecosystems and sustained ecosystem services, effective early warning systems and preparation for tsunamis and ocean-related hazards, increased resiliency to climate change and variability through scientifically-founded services, adaptation and mitigation strategies, and enhanced knowledge of emerging ocean science issues.

JCOMM, through achieving the goals of WMO and IOC, will yield a broad range of societal benefits, including:

- improving metocean information, forecasting and warnings;
- reducing loss of life and property from natural (and indirectly, human-induced) disasters;

- understanding environmental factors affecting human health and well-being;
- understanding, assessing, predicting, mitigating, and adapting to climate variability and change;
- improving the management and protection of terrestrial, coastal and marine ecosystems;

JCOMM offers benefits to WMO Members / IOC Member States, and the global community in general, which are tangible and of direct use. These include the coordination of activities for the timely delivery to national agencies (and sometimes directly to intermediate and/or end users) of integrated streams of high quality metocean and oceanographic information, the provision of a forum to discuss the standardization of operational oceanographic products and services, the coordination of Members and Member State organizations that produce a range of operational marine meteorological and oceanographic products, and direct/indirect support for developing countries to enhance their capacity to benefit from available operational met-ocean data and products.

Conversely, Member / Member States of WMO or IOC can influence the evolution and the services/deliverables of JCOMM by participating in related WMO and IOC activities; as well as by raising awareness of the importance of operational oceanography, marine meteorology, and the work of JCOMM.

2. The JCOMM Vision

Within the overall vision and strategic thrust of its parent bodies, WMO and IOC, as detailed in the WMO Strategic Plan and the IOC Medium Term Strategy respectively, JCOMM aims to provide international coordination for fully-integrated metocean observations, data management and services; thereby maximizing the benefits for WMO Members/ IOC Member States, and the global community in general.

The Terms of Reference of JCOMM as approved by the Commission at its 4th Session (May 2012, Yeosu, Republic of Korea), hereafter referred to as JCOMM-4, are reported in *Annex 1*.

2.1 The Long-Term Objectives of JCOMM

As noted in Section 1 and in the strategic planning documents of WMO and IOC, JCOMM stakeholders need targeted improvements in weather, climate, water, ocean and related environmental information and services. Risks associated with climate variability and extreme environmental events create social and economic stresses that require new meteorological, hydrological, oceanographic and climate services in order to ensure the safety and security of populations and the development of adaptive economic strategies. Responding to these risks is especially critical given the population growth in environmentally vulnerable regions, such as continental coastlines and lowlands, exposed to weather and ocean related extreme events.

The protection and sustainable development of marine and coastal environments require a continuous improvement in knowledge and an understanding of ocean ecosystems and the coupled dynamics between the ocean and the atmosphere. Finally, we need to ensure that society and policymakers are better informed of the impact of oceans on humankind and vice versa.

Consequently, the long-term objectives of JCOMM are:

- (i) **To enhance the provision of marine meteorological and oceanographic forecasting and analysis services** in support of the safety of life and property at sea and in coastal areas; advance science-based risk management of marine and maritime economic, commercial and industrial activities; contribute to the prevention and control of marine pollution, help to sustain healthy and productive

oceans, develop integrated coastal area management services for recreational activities and the safety of coastal settlements and activities;

- (ii) **To contribute to the development, enhancement and delivery of climate services related to the marine atmosphere, coastal and deep oceans**, based on the core competencies within the Commission in marine meteorology and oceanography, as a contribution of JCOMM to the GFCS; to coordinate and enhance the provision of the data, information, products and services required to support climate research and the detection and prediction of climate variability;
- (iii) **To coordinate the enhancement and long-term maintenance of an integrated global marine meteorological and oceanographic observing and data management system**, containing both in situ and remote sensing components. This includes cost-effective and efficient data communication facilities, as part of the GOOS and the World Weather Watch (WWW), and in support of the GFCS, WCRP, GCOS, and other major WMO and IOC Programmes. This data management system should contribute to the WIS and the IODE Ocean Data Portal (ODP), and be compliant with the requirements of WIGOS;
- (iv) **To manage the evolution of the services through the selective incorporation of advances in meteorological and oceanographic science and technology**. The incorporation will be facilitated by active participation in international development research groups, such as GODAE, GOOS, SOLAS and by engaging experts from these communities in the JCOMM expert teams;
- (v) **To promote and facilitate the equitable participation of all WMO Members and IOC Member States** in all the activities of JCOMM, and benefit from all products and services provided by JCOMM. This promotion work will consist of capacity development in the field of marine meteorology and oceanography information and services, ensuring that all countries benefit from these advances and contribute to the work of JCOMM in general.

2.2 Priorities for the Intersessional Implementation (2012-2017)

The WMO Strategic Plan 2012-2015 identifies five strategic priorities within the five strategic thrusts which will significantly contribute to the achievement of the expected results: GFCS, aviation meteorological services, capacity development, implementation of WIS and WIGOS,

and Disaster Risk Reduction (DRR).

Likewise, the IOC Medium Term Strategy 2008-2014 defines the High Level Objectives as: prevention and reduction of the impacts of natural hazards on the coasts, mitigation of the impacts and adaptation to climate change and variability, safeguarding the health of ocean ecosystems, management procedures and policies leading to the sustainability of coastal and ocean environment and resources.

In this context, JCOMM's strategic priorities for the period 2012-2017 are:

- Weather and ocean forecasting,
- Disaster Risk Reduction (DRR),
- GFCS implementation,
- WIGOS and WIS implementation and
- Capacity Development.

These priorities will be addressed through the work plans of the Programme Areas and cross-cutting activities, and will contribute to the specific results of WMO and IOC as detailed in *Annex 2*.

The strategic priorities for weather and ocean forecasting for the intersessional period are:

- Continued implementation of operational ocean forecasting services, through; 1) developing technical guidance for modelling and data assimilation; 2) improved data flow between real time observations, new observations and forecasting and analysis systems; 3) review of requirements and performance analysis of operational forecasting systems and services; 4) coordination of the development of coupled ocean-atmosphere forecasting systems and climate coupled models as needed;
- Enhancing communication between IOC oceanographic institutions and services and WMO NHMS in order to reciprocally improve meteo-marine and oceanographic forecasts, by updating requirements and facilitating the use of new products stemming from oceanographic forecasting and analysis services.

The Strategic Priorities of JCOMM for the intersessional period in the DRR and GFCS areas are:

- Supporting the mitigation of coastal hazard risks, through improved coastal forecasting services for flooding from waves, storm surges, and other hydro-meteo-oceanographic causes, improved forecasting services in terms of the good environmental status of coastal and open ocean waters;
- Continued support for Maritime Safety Information Services, through; 1) continuous review of technical regulations; 2) improving services in polar regions; and, 3) renewed assessment of user requirements and interface for extended maritime safety information;
- Enhancing international coordination for marine environmental emergency responses. In particular to address oil spill management and response, to improve the response to accidental radioactive and other hazardous material discharge into the ocean, through a coordinated effort for oceanic dispersion modelling.

In the WIGOS and WIS context, strategic Priorities during 2012-2017 include:

- Increasing the overall capability to monitor the oceans in real time, in particular: 1) assess and recommend improvements in the availability of ocean observations in real time, in coordination with and complementary to the satellite ocean observing system; 2) design and recommend the deployment of multidisciplinary observations for marine environmental forecasting;
- Continuous review and update of the implementation goal of a global ocean observing network through enhanced dialogue within WIGOS, with requirement setters (such as Ocean Observation Panel for Climate, OOPC, WMO Rolling Review of Requirements, RRR; and GFCS), other ocean observing communities and marine industry forums;
- Extending engagement of WMO Members and IOC Member States in global ocean observing efforts, while the relevant activities would further the national and regional priorities also within the GOOS Regional Alliances (GRA) and particularly for coastal states in Africa;

- Developing synergies and integrated actions between the satellite and in situ observing components of the global ocean integrated observing system. This will be done by exploiting complementarities and elucidating sustainability of both the ocean satellite and in situ components;
- Developing and designing a data management system that will consider both real time and delayed mode meteo-oceanographic and ocean observations and the flow of information between them. In particular, review and design the oceanographic components of the WIS considering all data flows, from observing systems to analyses/forecasts;
- Strengthening the technical coordination and monitoring of an integrated observation system through the JCOMM in situ Programme Support Centre (JCOMMOPS);
- Continuous review and update of standards, best practices and assessment of the management / use of metocean data by the marine meteorological and oceanographic community; through the IODE-JCOMM Standards Process, in support of the GFCS, GOOS, IODE and WIGOS implementation;
- Assisting in the future development of the IODE/ODP, its linkages with other ocean data systems (e.g. SeaDataNet, IMOS, OBIS , GEOSS), its interoperability with the WIS, and its capacity development to ensure full participation of WMO Members and IOC Member States;
- Developing a strategy and implementation plan to create a vision for a new Marine Climate Data System (MCDS);

In the context of Capacity Development (CD), strategic Priorities during 2012-2017 include:

- Determining national and regional needs, and then addressing identified deficiencies in knowledge, skills, observing and modelling systems, data management and services;
- Enhancing capabilities of WMO Members / IOC Member States for metocean service delivery, observations and data management, particularly those of the African nations; building on the implementation of a quality management approach, and leveraged by

the continuous improvement in regulatory and guidance material in WMO and IOC;

- Reinforcing and updating capacity development in collaboration with partners such as IODE Ocean Teacher Academy;

3. Strategic approach for JCOMM implementation

3.1 General Principles

The long-term objectives of JCOMM can be accomplished through:

- use of state-of-the-art technologies and capabilities;
- responding to the evolving needs of all users of marine data and products;
- Encouraging development and implementation of pilot/demonstration projects as a means to develop best practices, and to extend the participation of WMO Members and IOC Member States in JCOMM activities. In principle, these projects are defined as organized, planned sets of activities with focused objectives, designed to provide an evaluation of technologies, methods or concepts, within a defined schedule and with the overall goal of advancing JCOMM implementation;
- ensuring a greater working relationship with relevant programmes, groups and projects, such as other WMO technical commissions, WMO regional associations (RAs), IOC regional bodies and scientific groups;
- promoting and encouraging participation in the JCOMM framework of young scientists, considering gender balance, for sustainable and continued development.

3.2 An Integrated Approach for Cross-Cutting Issues

The assignment of JCOMM involves a number of cross-cutting issues requiring the incorporation and integration of different teams, groups and programmes with a common interest.

JCOMM requires an integrated approach to address these cross-cutting issues, such as; 1) quality management, particularly for marine meteorological and oceanographic service provision; 2) satellite data requirements, which are essential for JCOMM services and products; 3) integration and interoperability of marine observations and data process, within the WIGOS and WIS frameworks; 4) climate and seasonal forecasting, and related service delivery; and many others.

JCOMM thus maintains a regular dialogue with users, service providers and researchers of related areas; continues providing input to the policy-making process, primarily of WMO and IOC and of the related bodies; and provides a framework for interdisciplinary collaboration within JCOMM and with relevant programmes.

3.3 Communication and Outreach

The effectiveness in communicating the availability of data and services, and in receiving feedback from potential clients is as fundamental to the success of JCOMM and its members as the actual delivery of the products themselves. As a consequence, JCOMM will devote continuing efforts to the dissemination of information on its various programs, activities and initiatives to the broader client community around the world.

To disseminate JCOMM information to the marine and meteorological community, a JCOMM website and internet portal has been set up:

<http://www.jcomm.info>

and for JCOMMOPS:

<http://www.jcommops.org/>

At present, JCOMM communication focuses on “inreach”; communication of information regarding JCOMM among the planners, developers, and operators of the system, i.e., “the JCOMM family.” Inreach information should be of interest and assistance to: Management Committees; Secretariats; members/experts of JCOMM Groups, Teams, and Panels of experts; and other groups that are relevant to and interested in the work of JCOMM; and representatives of nations participating in the Commission itself.

As an immediate step, JCOMM needs to carry out a comprehensive analysis of outreach requirements; identification of primary audiences, of the information that each type of audience requires, and of available and effective tools for each type of audience (e.g., decision makers, private sector, government agencies, NGOs, and news media).

3.4 External Interactions

JCOMM is closely linked to many international bodies, intergovernmental, non-governmental and science organizations. It is through these close-working relationships that JCOMM can continue to gain maximum leverage for the entire range of activities it undertakes. In addition, the private sector is already, or has the potential to be, a major user of, advocate for and partner in the data products and services flowing from the work of JCOMM. The Commission must therefore strengthen and further develop its links with the private sector in marine observing systems, data management, products and services.

An immediate priority for the commission's external relations is to develop and maintain a close cooperation with partner organizations that represent, review and regulate the requirements of nations as users of metocean information / services. Interactions with these organizations should further assist the international regulatory framework through regulations and guidance of WMO, IOC and partner organizations in support of functions of WMO Members and IOC Member States. For example, JCOMM under its Management Committee, strategically strengthens close cooperation with relevant components of IMO, IHO and the International Atomic Energy Agency IAEA, in a continuous review of user requirements and relevant legislations for maritime safety and marine environmental emergency responses.

As one of the Technical Commissions of WMO, JCOMM must ensure complementarities with and synergy from the activities of other WMO technical commissions, as well as those of other WMO Programmes such as the WIGOS, Space Programme, DRR, WMO Technical Commission for Hydrology (CHy), and WMO Technical Commission for Agricultural Meteorology (CAgM). Likewise, there will be a number of overlapping elements between JCOMM and other programmes and Committees of IOC, for example the IOCCP on ocean carbon monitoring; oceanographic instrument and measurement standards with the IOC Ocean Science Programme; ocean data management with IODE; and capacity building with the IOC Training, Education and Mutual Assistance in the Marine Sciences (TEMA) Programme. JCOMM must also strive to contribute to and benefit from the contributions of WMO and IOC to relevant external programmes, such as the Global Earth Observing System of Systems (GEOSS), and the International Polar Decade (IPD).

3.5 Performance Evaluation

For an organization or body such as JCOMM, in which activities are undertaken at various levels in conjunction with various organizations and programmes, a performance evaluation is required at many levels in terms of:

- technical aspects, taking into account improved performance of operation and research by WMO Members / IOC Member States through JCOMM implementation;
- institutional aspects, considering improved mechanisms of WMO Members / IOC Member States in terms of user engagement for planning, provision and evaluation of products / services coordinated through JCOMM activities

Like other subsidiary bodies of WMO and IOC, the primary mechanism for JCOMM is to report to and be evaluated by WMO Members / IOC Member States, through the governing body sessions (WMO Congress, IOC Assembly and Executive Councils of both Organizations) on its activities and achievements. In addition, receiving feedback from marine users is fundamental to the successful implementation of JCOMM. Some mechanisms to evaluate programme performance and satisfaction of marine users and stakeholders already exist, but strengthened mechanisms will be essential to help provide regular feedback and guide the evolution of JCOMM.

In addition, JCOMM must develop and maintain close links to and feedback mechanisms with major external bodies representing the users of JCOMM data, information, products and services, including other programmes and subsidiary bodies of WMO and IOC, research programmes and representatives of different user communities. Such mechanisms and feedback, at regular and frequent intervals, are essential to ensure that JCOMM supports, and is responsive to, all such user requirements.

4 Framework for Implementation

JCOMM is a technical body of experts for WMO and IOC, but it is not a mechanism for contractors / procurers / stakeholders / clients. Through its regular sessions, JCOMM develops an internal structure that enables the commission to implement its mandates, which should be brought into effect during the intersessional period through the approval of WMO and IOC governing bodies.

The JCOMM structure (see *Annex 3*) was approved at JCOMM-4. In the following we describe the building blocks of its governance and implementation.

4.1 General Governance

As formally constituted, JCOMM is an intergovernmental body of experts, and is the major advisory body to its two parent organizations - WMO and IOC - on all technical aspects of operational marine meteorology and oceanography. In fulfilling this role, it is expected to prepare plans, proposals, regulations, guidance etc, within its field of competence, for consideration and approval by the Governing Bodies. Following such approval, there is an obligation on Members/Member States to apply and implement these plans and proposals. However, it is also important to understand that JCOMM is a technical body and not a commitment mechanism.

The Commission itself and its subsidiary bodies normally meet at regular intervals (currently set at four-year intervals) as dictated by the requirements of the work programme. The work programme is recommended by the co-presidents and other members of the Management Committee and by JCOMM in session, and approved by the Governing Bodies of WMO and IOC. Meetings of the Commission are normally financed through the regular budgets of WMO and IOC, supplemented where necessary and possible by extra-budgetary funds and various “self-financing” mechanisms.

JCOMM is co-chaired by a meteorologist and an oceanographer, reflecting JCOMM's integrated responsibilities for meteorological and oceanographic programmes. Between sessions of the Commission, the responsibility for the management of JCOMM is vested with the co-presidents with advice from the Management Committee and support from the JCOMM Secretariat.

JCOMM must report to the Executive Council, WMO Congress and IOC Assembly and Executive Councils of both Organizations. These reports include the progress made during the reporting period, the work plan for the following year and the current and expected challenges. It is just as important to showcase the successes as to inform on the obstacles for JCOMM implementation.

4.2 JCOMM Structure

4.2.1 The Co-Presidents

At its regular sessions, JCOMM elects two Co-Presidents – a meteorologist and an oceanographer – reflecting its integrated responsibilities for marine meteorological and oceanographic programmes. The Co-presidents share the responsibilities of leading the implementation of JCOMM during the intersessional period. This is achieved through guiding, directing, and approving actions including the creation and dissolution of expert groups and task teams, with the assistance of leading experts and the WMO-IOC Secretariats.

The Co-Presidents also carry out specific duties for the Governing Bodies of WMO (Co-President for Meteorology) and IOC (Co-President for Oceanography), as prescribed by the regulations of each organization. These include regular reports to the regular sessions of the Governing Bodies on the activities of the commission, and representation of JCOMM to relevant programmes/bodies.

4.2.2 The Management Committee

The Management Committee (MAN) currently consists of the two Co-Presidents, the Coordinators of the three Programme Areas, experts who carry specific responsibilities for overseeing and coordinating cross-cutting activities. The MAN maintains close dialogue with the leaders of the relevant programmes and activities of WMO, IOC and others, to identify, review and assess the requirements for and the implementation of the Commission.

The MAN advises the co-presidents. It is both tactical and strategic. It is charged with overseeing the operations of JCOMM, as well as the implementation of the JCOMM workplans agreed by the Commission in regular sessions, together with any adjustments to this programme and associated subsidiary body structure as the work progresses. It develops a conceptual and strategic approach to fulfilling the JCOMM mandate, and drafts

future plans and programmes for the Commission to consider. It organizes liaisons with and reports to the IOC and WMO Governing Bodies, as well as with external bodies and programmes, and deals with a number of additional cross-cutting issues such as communication and outreach.

4.2.3 Programme Areas

Under the overall direction of the MAN chaired by the co-presidents, the Commission is organized into three Programme Areas (PAs): Services and Forecasting Systems (SFSPA), Observations (OPA) and Data Management (DMPA), together with prioritized cross-cutting activities under the purview of MAN, such as capacity development, quality management approach, and satellite data requirements. Each PA is, in turn, managed by a Coordinator with support from a small coordination group and with specific activities undertaken by designated teams or panels of experts. The establishment of these three Programme Areas is intended to facilitate the delivery of JCOMM's mandated responsibilities by subdividing them into logical and coherent groupings. Each PA has a set of expert teams (ETs) and ad hoc task teams (TTs).

The SFSPA and associated systems focus on the application of these observations within operational systems that generate products (climatologies, analyses, hindcasts and forecasts) using advanced ocean model and synthesis systems. The OPA and associated teams focus on the sustained development and collection of meteorological and oceanic observations to support Member/Member State activities. The DMPA is concerned with developing and monitoring new standards for data product formats, distributed data management systems, communication protocols, data base formats, quality control and marine climatology (among others).

The continuing provision of safety-related weather and oceanographic services is a fundamental aspect of JCOMM and its SFSPA. The aim of SFSPA is to coordinate and facilitate the sustained provision of global and regional coverage data products and services to address the continued and expanding requirements of the ocean and coastal user community for marine meteorological and oceanographic services and information. The SFSPA was created to facilitate the development and application of these globally distributed services in partnership with the user communities, supporting the JCOMM observational, data management and capacity building areas. The SFSPA also covers Quality Assurance, Standards and User Interactions related to products and services.

OPA has inherited the lead responsibility for a number of important and well-established observational programmes, which are managed by bodies that now report through JCOMM. It is primarily responsible for coordinating and facilitating the development and maintenance of in situ and ground-based remote sensing observation networks (including moored and drifting buoys, all ship-based systems, tide gauge networks, and others as appropriate), as well as their related telecommunication facilities, and their coordination with space-based observational networks. The ocean chapter of the Global Climate Observing System Implementation Plan (GCOS-92) provides specific implementation targets for building and sustaining an initial global ocean system. The work of the OPA is to help implement this system in support of GCOS, GOOS, WWW and major research programmes of WMO and IOC. The OPA monitors the efficiency of the overall observing system and recommends and coordinates changes designed to improve it as necessary. It also coordinates the setting and maintenance of instrument and network standards and intercalibration.

The DMPA 'bridges the gap' between the SFSPA and the OPA and plays a central role in terms of providing interfaces to data (in situ observations, satellite observations), ocean model outputs (analyses, hindcasts and forecasts, including observation input to assimilation systems etc.), data providers and the user community. Data management standards and protocols for ocean model outputs are rapidly evolving. The DMPA has a key role in ensuring that interoperability and data management standards are adhered to at an international level (especially important when integrating the outputs of several national systems into critical applications and inter-comparison projects).

JCOMM activities also include user interactions, guidance and standards for quality assurance, and the issue of standards related to the definition and delivery of products and services. JCOMM considers a large range of applications, from variable ocean state forecasts to complex decision-making tools and systems requiring state-of-the-art inputs (e.g., currents, wind, sea ice, waves, storm surges etc) such as ship routing, engineering design, search and rescue or marine environmental accident management tools.

A number of cross-cutting activities are identified through regular sessions at JCOMM, and mainly with the oversight of the MAN, while the experts' input is coordinated and consolidated by the relevant Groups, Teams and Panels of JCOMM in collaboration with external groups/programmes. These include capacity development, satellite data requirements and quality management.

4.2.4 JCOMMOPS

Fundamental to the implementation strategy of JCOMM is the work of the JCOMM in situ Observations Programme Support Centre (JCOMMOPS¹) which are designed to enhance synergies between the observation Panels (DBCP, SOT, GLOSS) and associated observation programmes (Argo, OceanSITES, IOCCP, GO-SHIP...) from an implementation support and programme monitoring perspective.

JCOMMOPS acts as a focal point for implementation and operational aspects of the relevant JCOMM observing platforms. It provides support for programme planning, implementation, and operations including information on (i) observational data requirements, (ii) technology, instrumentation, and costs, (iii) operational status of observing networks (e.g. identification of data-sparse area), and (iv) deployment opportunities (by ship and air). It maintains information on relevant data requirements for observations in support of GOOS, WIGOS, GCOS, and the WWW as provided by the appropriate international scientific panels and JCOMM Expert Teams and Groups, and routinely provides information on the functional status of the observing systems. JCOMMOPS also encourages platform operators to share the data and distribute them in real-time, by providing national/regional centres with the necessary technical assistance.

The centre is currently located in Brest (France) and funded through voluntary contributions from Member States, through the marine observing programme, as well as panels such as the DBCP, Argo, SOT, OceanSITES, and GO-SHIP. Efforts will be made to rationalize the management of the JCOMMOPS budget (through various organizations), to seek contributions from the host country, and ensure sustainability.

4.2.5 The Joint WMO-IOC Secretariat for JCOMM

JCOMM's secretariat responsibilities are undertaken jointly by its parent bodies, WMO and IOC. This falls under the Marine Meteorology and Oceanography Programme at WMO, and under the Ocean Observations and Services section and IODE Project Office of IOC. The composition of the Secretariat and the division of responsibilities is detailed in a formal Memorandum of Understanding between WMO and IOC (2002).

¹ <http://www.jcommops.org>

The Joint WMO-IOC Secretariat for JCOMM supports the implementation of the work plans and develops a dedicated budget for inclusion in the IOC and WMO budget. This budget should, amongst other things, fund meetings of the Commission and its subsidiary bodies, as proposed by JCOMM and the Management Committee and approved by the Governing Bodies of WMO and IOC.

4.3 Intersessional Activities

JCOMM's regular sessions, which are generally convened every four years, provide a forum for JCOMM officers to present WMO Members and IOC Member States with an update of JCOMM's development, successes and failures, challenges and work plan for the next intersessional period. It also provides an opportunity to review the JCOMM structure and provide recommendations to the WMO and IOC Governing Bodies for the reconstitution of the commission, to meet the necessary requirements and to align the skill set in the JCOMM groups to meet such requirements.

Intersessional activities are overseen by the JCOMM Management Committee, and supported jointly by the WMO Secretariats (Marine Meteorology and Oceanography Programme) and IOC Secretariat (mainly Ocean Observations and Services). The JCOMM Operating Plan, as a dynamic document, provides an outline of the intersessional implementation and activities.

5. To the Future: Evolution of JCOMM

JCOMM is an ambitious and complex endeavor. At the same time, it has considerable potential benefits to all countries in the long-term operation of a coordinated, integrated, global oceanographic and marine meteorological observing, data management and services system. It is aimed at supporting the provision of value added data, products and services to virtually all sectors of society, both maritime and land-based. The full implementation of the Commission's programme, the achievement of its objectives, and its future evolution, is therefore a long-term, complex process, necessitating a phased-in, iterative approach.

For JCOMM to be effective, it needs to evolve to meet all the current and future needs of global operational oceanography and meteorology. Such an evolution will take many forms, including the incorporation of new (or evolving) Expert/Task Teams to address priority challenges, the establishment of pilot projects, partnerships with other organizations within and outside the UN system, the establishment of specialized centres and regional groupings to deliver the services, the facilitation of intergovernmental agreements to allow access to data, products, information and services, together with capacity building etc.

Fundamentally JCOMM should foster the integration of oceanographic and meteo-marine services and the exchange of knowledge and know-how in the relevant earth system sectors. Greater integration and collaboration among NHMS and oceanographic centers and institutions is at the very heart of the future JCOMM. A new scheme has been envisaged for JCOMM that highlights the move towards an end-to-end system where research, partnerships and users/stakeholders drive the creation of JCOMM's vision through quality management, capacity building and data management.

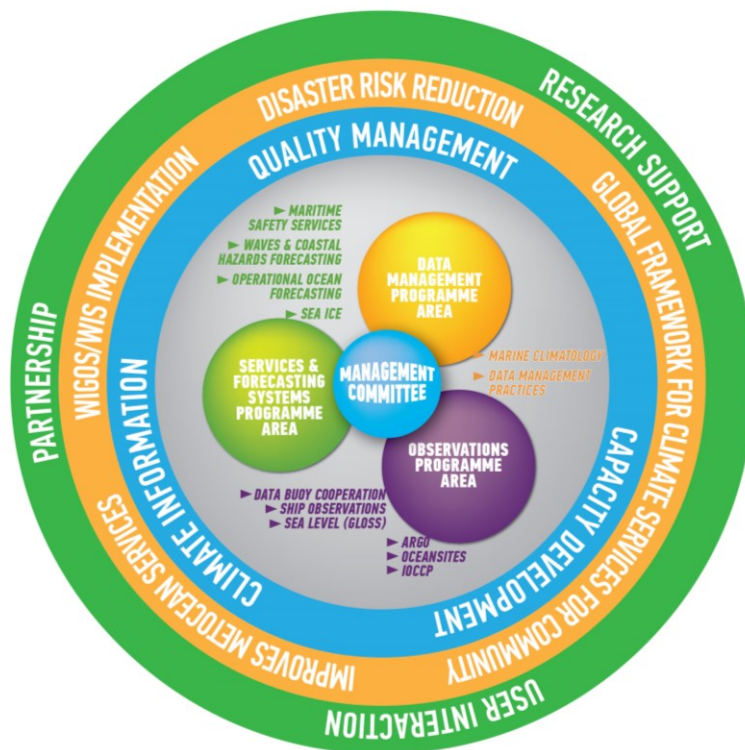


Fig. 1 The new design scheme for JCOMM

In general there are several phases involved in implementing new (or evolving) elements of JCOMM. These include:

- Animation of exchanges of Member States among oceanographic and meteo-marine service systems
- Identification of user requirements and scientific, technical, organizational and procedural specifications associated with the implementation of JCOMM objectives;
- Evaluation of the feasibility of the appropriate pathway/model to migrate the JCOMM concept from a pilot to long-term maintenance program;
- Integration by JCOMM of new elements, either within an existing programme, team or activity or through any necessary changes;
- Monitoring and review of the progress of pre- and post-operational stages, including both quantitative and qualitative measures of the performance and success of the added element, which should be obtained from both internal and external

stakeholders.

- Increased collaboration with IMO and IHO on matters of maritime safety and management of emergencies at sea, cooperating closely with international research groups such as GOOS and GODAE in the development of ocean products and services;
- Increased collaboration with IGBP IMBER, SOLAS and LOICZ core projects
- Identification of capacity/training needs and formulation of appropriate skill development or training, in view of extended participation of Members / Member States in JCOMM implementation, currently and in the near future;
- Ensuring the succession of JCOMM leadership, through the involvement of young scientists and operators in JCOMM activities in various levels / stages.

By definition, JCOMM covers the global ocean, and is relevant to all Member States of IOC and WMO maritime Members. On the other hand, the WMO Regional Associations and IOC GOOS Regional Alliances are primarily concerned with issues relating to their specific regions or national groupings. However, in many cases JCOMM implementation (e.g., in elements of the observing system) is best coordinated at a regional level. In addition many of the benefits of JCOMM, such as specific regional products and services, are delivered at a regional or even national level. It is therefore important for JCOMM to engage with these regional subsidiary bodies at various levels, to ensure that the interactions are not only two-way but mutually beneficial.

JCOMM offers benefits to Members/Member States of the Commission, or potential Members, which need to be well-stated and clearly understandable, with as far as possible descriptions of the tangible benefits. The challenge is to get these countries involved by demonstrating how they can influence the evolution of JCOMM and the services/deliverables on which it focuses. In addition, the challenge is to transition from a technology driven product and service system, where many components of the JCOMM programme areas activities lie at the moment, to a user-driven service maintaining the highest standards of technology and fitness-for-purpose operational services.

Annex 1 Terms of Reference of JCOMM

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

- (i) Coordinate, develop and recommend standards and procedures for the work of Members/Member States in the overall collection, exchange, access, understanding, application and delivery of marine meteorological and oceanographic data, information, forecasts and warnings upon which marine meteorological and oceanographic services and marine-related decision-making processes are based.
- (ii) Coordinate, develop and recommend standards and procedures for the work of Members/Member States in the overall collection, management, exchanges and archival of high-quality marine meteorological and oceanographic data, information and products, on which climate studies, predictions and services, as well as impact and adaptation strategies, are based.
- (iii) Promote and facilitate the international sharing of implementing experience, transfer of technology and research uptake, and support relevant education and training to meet the development needs of national agencies and of other organizations that play a role in the provision of marine meteorological and oceanographic services.

In this regard, the Commission will give special attention to education and training, and technology transfer initiatives on marine meteorological and oceanographic data, products and services that respond to the needs of, and build capacity in, developing countries. This will include particular emphasis on the Least Developed Countries and Small Island Developing States. In addition, the Commission will support cooperation on matters related to marine meteorology and oceanography among WMO, IOC and other United Nations agencies that are members of UN-Oceans, the International Hydrographic Organization (IHO), the International Council for Science (ICSU) and other governmental and non-governmental organizations, the private sector, as well as user organizations..

Within its terms of responsibility as defined above, and in line with the IOC Statutes, the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology shall have responsibilities common to all WMO Technical Commissions as defined in WMO General Regulation 179. It shall also structure its work to address societal outcomes as

envisaged by the planning documents of the parent organizations, by creating an operating plan focusing on the areas identified within its specific terms of reference and addressing appropriate (or applicable) strategic thrusts and expected results.

Annex 2 Addressing Expected Results and High-Level Objectives

Fundamental to the Strategic Planning Documents of WMO are agreed sets of Expected Results (ER) and for IOC High-level Objectives and Functions, as from the IOC Medium Term Strategy. The work of JCOMM will contribute to this in the following ways:

IOC Functions- High-Level Objectives	JCOMM action	WMO Expected Results
B: Observing system-data management 3: <i>climate resiliency</i>	The Commission supports and, where appropriate, coordinates and regulates the work of Members/Member States in the implementation and improvement of capabilities to exchange high quality marine meteorological and oceanographic data, information and products, on which climate studies, predictions and services, as well as impact and adaptation strategies, are based.	ER-3: Enhanced capabilities of NMHSs to produce better weather, climate, water and related environmental information, predictions and warnings to support, in particular, climate impact and adaptation strategies
B: Observing system-data management 3: <i>climate resiliency</i>	The Commission strives to address the requirements for marine meteorological, oceanographic and climatological data for WMO and IOC programmes, particularly those of the GFCS. In close coordination with IOC-IODE and other related bodies, JCOMM works to develop a new Marine Climate Data System (MCDS) - standardized international system for the improved management of a wide range of marine/ocean climate data, integrating their collection, rescue, quality control, formatting, archiving, exchange, and access. The relevant data and associated metadata originating in real-time, delayed-mode and from historical records, will be of reputable quality, and extend to products that satisfy the marine data requirements for long-term climate monitoring and climate services.	ER-4: Enhanced capabilities of Members to access, develop, implement and use integrated and inter-operable Earth- and space-based systems for weather, climate and hydrological observations, as well as related environmental and space weather observations, based on world standards set by WMO.
B: Observing system-data management 2: <i>early warning</i> and 3: <i>climate resiliency</i>	JCOMM also fosters closer collaboration with other UN Agencies of UN-Oceans, the International Council for Science (ICSU) and other governmental and non-governmental organizations on matters related to marine meteorology and oceanography.	ER-7: New and strengthened partnerships and cooperation to improve NMHSs' performance in delivering services and to increase the value of the contributions of WMO within the UN System, international conventions, and national

IOC Functions- High-Level Objectives	JCOMM action	WMO Expected Results
		strategic issues
<p>B: Observing system-data management</p> <p>2: <i>early warning and 3: climate resiliency</i></p>	<p>The Commission supports and where appropriate coordinates and regulates the collection, implementation, maintenance and application use of integrated in situ and space-based observing systems in oceanography and marine meteorology to assist Members/Member States in the provision of marine meteorological and oceanographic data, products and services. Providing an implementation framework for WIGOS and GOOS, JCOMM continuously reviews and updates the implementation goals for the global ocean observing network, as guidance for Members / Member States.</p>	<p>ER-4: Enhanced capabilities of Members to access, develop, implement and use integrated and inter-operable Earth- and space-based systems for weather, climate and hydrological observations, as well as related environmental and space weather observations, based on world standards set by WMO.</p>
<p>C: Early warning and services</p> <p>2: <i>Effective early warning and preparedness</i></p>	<p>JCOMM plays a key role in operational oceanography and marine meteorology. The Commission assists, coordinates and, where appropriate, regulates the work of Members/Member States in the (1) implementation and improvement of capabilities to access and exchange data, information, products, forecasts and warnings upon which marine meteorological and oceanographic services and marine-related decision-making are based; and (2) development of feedback systems to measure and subsequently enhance the overall effectiveness of these services.</p>	<p>ER-1: Enhanced capabilities of Members to deliver and improve access to high quality weather, climate, water and related environmental predictions, information and services informed by users' needs and to enable them to be used in decision-making by all relevant societal sectors</p>
<p>C: Early warning and services</p> <p>2: <i>Effective early warning and preparedness</i></p>	<p>The Commission supports and, where appropriate coordinates and regulates, efforts to reduce risks of marine hazards caused by storms, waves, surges and other hazardous events in the marine environment. This is done through supporting and coordinating the development and enhancement of techniques and procedures for modelling and forecasting marine-related hazards, and through assisting Members/Member States to access, understand and apply relevant data, information, products and services.</p>	<p>ER-2: Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate, water and related environmental elements</p>

IOC Functions- High-Level Objectives	JCOMM action	WMO Expected Results
<p>C: Early warning and services</p> <p>2: <i>Effective early warning and preparedness</i></p>	<p>Through national and regional demonstration projects, JCOMM promotes and demonstrates the integrated approach in supporting mitigation of coastal hazard risks, at national, regional and global scales, as a specific contribution to the Global Framework for Climate Services (GFCS) and disaster risk reduction programmes of WMO and IOC. Efforts are made to support Members / Member States to deliver integrated coastal forecasting services for inundation from waves, storm surges, and other hydro-meteo-oceanographic causes; and to enhance integrated operational forecasting and warning capacity.</p>	<p>ER-2: Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate, water and related environmental elements</p>
<p>C: Early warning and services</p> <p>2: <i>Effective early warning and preparedness</i></p>	<p>Priority activities of JCOMM aim to assist Members / Member States with the future development of marine meteorological and oceanographic services including multi-hazard warning and responses. This is done through a continuous Quality Management (QM) approach for metocean services, as well as the adaptation/development of technologies for national and regional environments.</p>	<p>ER-6: Enhanced capabilities of NMHSs, in particular in developing and least-developed countries, to fulfil their mandates</p>
<p>C: Early warning and services</p> <p>2: <i>Effective early warning and preparedness</i></p>	<p>The Commission maintains a proactive role in ensuring a coherent, science-based approach to implement environmental conventions, including the International Convention for the Safety of Life at Sea (SOLAS). Thus continuous efforts are made to enhance cooperation among WMO-IOC and other UN Agencies members such as the International Maritime Organization (IMO) and International Hydrographic Organization (IHO).</p>	<p>ER-7: New and strengthened partnerships and cooperation to improve NMHSs' performance in delivering services and to increase the value of the contributions of WMO within the UN System, international conventions, and national strategic issues</p>
<p>F: Capacity development</p> <p>2: <i>Effective early warning and preparedness</i></p>	<p>The Commission promotes and facilitates the international exchange of experience, implementation of verification projects, transfer of technology and research uptake, and supports education and training related to new research and technologies. The aim is to meet the needs of national agencies and other organizations that play a role in the provision of marine meteorological and oceanographic services.</p>	<p>ER-5: Enhanced capabilities of Members to contribute to and benefit from the global research on weather, climate, water and related environment science and technology development</p>

IOC Functions- High-Level Objectives	JCOMM action	WMO Expected Results
F: Capacity development <i>2: early warning and 3: climate resiliency</i>	JCOMM does not itself conduct research, develop models or products, or provide services. Instead, it coordinates and facilitates the application of knowledge acquired from research, stimulates new scientific initiatives by identifying operational needs for new technologies, and ensures the operational robustness of new systems that serve a variety of national, regional and international users.	ER-5: Enhanced capabilities of Members to contribute to and benefit from the global research capacity for weather, climate, water and related environment science and technology development
F: Capacity development <i>2: early warning and 3: climate resiliency</i>	The Commission gives priority to education and training activities that respond to the needs of and build capacity in the developing countries with particular emphasis on the Least Developed Countries (LDCs) and Small Island Developing Countries (SIDs). The implementation of JCOMM capacity development is designed to be enhanced through effective cooperation with the regional entities of WMO and UNESCO/IOC (WMO Regional Associations, UNESCO/IOC Sub-Commissions and GOOS Regional Alliances).	ER-6: Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates
F: Capacity development <i>2: early warning and 3: climate resiliency</i>	The Commission will review its organisational structures and activities, as well as the needs of Members/Member States so as to undertake its tasks efficiently and effectively.	ER-8: An effective and efficient organization

Annex 3 JCOMM Structure

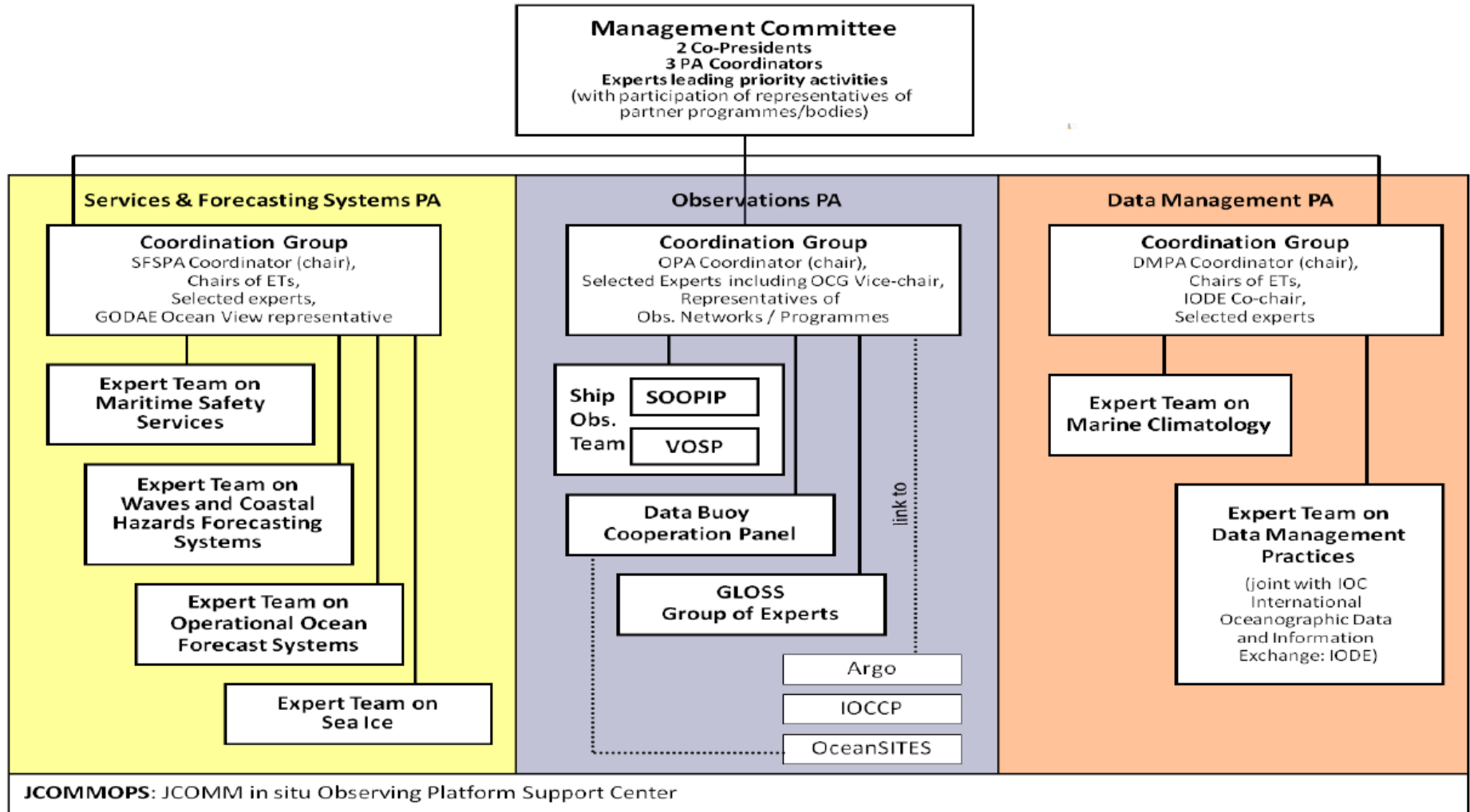
JCOMM shall develop and sustain a work programme and an internal structure that enables it to implement its mandate and contribute to the Strategic Priorities of WMO and IOC in the most efficient and cost effective way. As a formally constituted intergovernmental body of experts on all technical aspects of operational marine meteorology and oceanography, JCOMM is expected to prepare plans, proposals, regulations, guidance etc, within its field of competence, for consideration and approval by the Governing Bodies of WMO and IOC. Following such approval, there is an obligation on Members/Member States to apply and implement such plans, proposals etc. However, it is also important to understand that JCOMM is a technical body and not a commitments mechanism (see also *Annex 1*, JCOMM Terms of Reference).

JCOMM is co-chaired by a meteorologist and an oceanographer – co-presidents of JCOMM – reflecting its integrated responsibilities for meteorological and oceanographic programmes. Under the overall direction of a Management Committee chaired by the co-presidents, the Commission is organized into three Programme Areas (PAs) including Observations, Data Management and Services and Forecasting Systems. The structure of JCOMM is shown in *Annex 3*.

Individual members of the Management Committee carry specific responsibilities for overseeing and coordinating cross-cutting activities. Each PA is, in turn, managed by a Coordinator, with support from a small coordination group and with specific activities being undertaken by designated Teams, Groups or Panels of experts. The establishment of these three PAs is intended to facilitate the delivery of JCOMM's mandated responsibilities by subdividing them into logical and coherent groupings. A brief description on the general governance structure is provided in *Annex 4*.

The key players in the coordination and implementation of JCOMM are the members of JCOMM Teams, Groups and Panels of experts, comprising the experts selected from among the nominations by WMO Members and IOC Member States, as well as those invited experts from the identified priority areas.

(as decided at JCOMM-4, and approved by WMO EC-64 and IOC EC-45, 2012)



Annex 4 List of Acronyms

CAgM	Technical Commission for Agricultural Meteorology (WMO)
CD	Capacity Development
CHy	Technical Commission for Hydrology (WMO)
CMM	Commission for Marine Meteorology (of WMO, replaced with JCOMM)
DMPA	Data Management Programme Area (DMPA)
DRR	Disaster Risk Reduction
ET	Expert Team
FAO	Food and Agriculture Organization
GCOS	Global Climate Observing System (of WMO, IOC, ICSU and UNEP)
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GFCS	Global Framework for Climate Services
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System (of IOC, WMO, UNEP and ICSU)
GOV	GODAE OceanView
GRA	GOOS Regional Alliance
IAEA	International Atomic Energy Agency
ICS	International Chamber of Shipping
ICSU	International Council for Science
IGOSS	Integrated Global Ocean Services System (of WMO and IOC)
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCCP	International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange (of IOC)
IPD	International Polar Decade
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM <i>in situ</i> Observing Programme Support Centre

LDC	Least Developed Country
MAN	Management Committee (JCOMM)
MCDS	Marine Climate Data System (WMO)
NMHS	National Meteorological and Hydrological Service
ODP	Ocean Data Portal
OGP	Oil and Gas Producers
OOPC	Ocean Observation Panel for Climate (GOOS-GCOS)
OPA	Observations Programme Area (JCOMM)
PA	Programme Area (JCOMM)
RA	Regional Association (WMO)
RFMO	Regional Fisheries Management Organization (of FAO)
RRR	Rolling Review of Requirements
SFSPA	Services and Forecasting Systems Programme Area (JCOMM)
SIDC	Small Island Developing Country
SOLAS	International Convention for the Safety of Life at Sea
TEMA	IOC Programme for Training, Education and Mutual Assistance in the Marine Sciences
TT	Task Team
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCP	World Climate Programme (of WMO)
WCRP	World Climate Research Programme (of WMO, ICSU and IOC)
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization
WWW	World Weather Watch (of WMO)