A Strategy for JCOMM

2013-2016

A Strategy for JCOMM

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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 and capacity building programmes.

As expressed in the strategic planning documents of WMO and UNESCO/IOC, urgent social and economic drivers need targeted improvements in weather, climate, water, oceanic and related environmental information and services. At the same time, while the future state of the oceans remains uncertain, there is a need to ensure that society and policymakers are better informed of the impact of oceans on humankind and vice versa. JCOMM has developed a vision, objectives and work programme which respond directly to these considerations.

JCOMM coordinates, and develops and recommends standards and procedures for a fully integrated marine observing, data management and services system that uses state-of-the-art technologies and capabilities; is responsive to the evolving needs of all users of marine data and products; and includes an outreach programme to enhance the national capacity of all maritime countries. The long-term objectives for JCOMM are: (i) to enhance the provision of marine meteorological and oceanographic services; (ii) To coordinate the development, enhancement and delivery of climate services as a contribution to the Global Framework for Climate Services; (iii) to coordinate the enhancement and long-term maintenance of an integrated global marine meteorological and oceanographic observing and data management system, within the context of GOOS and WIGOS/WIS and as a contribution to the GEOSS; and (iv) to manage the evolution of an effective and efficient programme, embracing all maritime Members/Member States.

Fundamental to the Strategic Planning Documents of WMO and UNESCO/IOC are agreed Strategic Priorities, with associated sets of Expected Results and Actions, respectively. The work of JCOMM over the period 2013 to 2016 will contribute to WMO and UNESCO/IOC Strategic Priorities in several overlapping but complementary ways.

During the period 2013-2016, the Commission will leverage on its core competencies to address specific priority areas: GFCS implementation, disaster risk reduction, WIGOS implementation and capacity development. These correspond closely with the organizational priorities specified by WMO and IOC in their respective strategic plans.

The Commission will also 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, the developing countries with particular emphasis on the Least Developed Countries

(LDC) and Small Island Developing States (SIDS). Additionally, the Commission will support cooperation among WMO, IOC and other UN 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, on matters related to marine meteorology and oceanography.

JCOMM's work will be accomplished through a Management Committee and three programme areas (Observations, Data Management, and Services and Forecasting Systems), and their subsidiary expert and task teams. The JCOMM strategy includes an increased emphasis on communications, both internal within JCOMM and external with marine users, partners and stakeholders. JCOMM Capacity Development requirements will not be addressed by any single Programme Area but by each Programme Area individually, focussed on its own implementation needs and concerns.

Receiving feedback from marine users is fundamental to the successful implementation of the JCOMM work programme. Some mechanisms to evaluate programme performance and satisfaction of marine users and stakeholders already exist, and strengthened mechanisms will be essential to help provide regular feedback and guide the evolution of JCOMM.

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. The implementation of the Commission's work programme will be a long-term, complex process, necessitating a phased, iterative and cost-effective approach over the period.

1. What is JCOMM

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 remained the primary objective of marine forecast and warning programmes, requirements for data and services steadily expanded in volume and breadth during the preceding 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 modeling and prediction, became increasingly important. Moreover, many of these applications required observational data sets and prognostic products for both the oceans and the overlying atmosphere.

Responding to these interdisciplinary requirements necessitated the development of ever-closer working relationships between oceanographers and marine meteorologists. This was reflected at the global level by 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 two agencies' operational activities in the oceans culminated when the Thirteenth WMO Congress (May 1999) and the 20th IOC Assembly (July 1999) formally agreed that a new WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology (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.

2. The JCOMM Vision

Within the context of the overall vision and strategic thrusts of its parent bodies, the WMO and the IOC, as detailed respectively in the WMO Strategic Plan and the IOC Medium Term Strategy, JCOMM coordinates, and develops and recommends standards and procedures for, a fully integrated marine observing, data management and services system that uses state-of-the-art technologies and capabilities; is responsive to the evolving needs of all users of marine data and products; and includes an outreach programme to enhance the national capacity of all maritime countries. JCOMM aims to maximize the benefits for its Members/Member States in the projects, programmes and activities that it undertakes in their interest and that of the global community in general.

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3. Strategic Considerations and the Long-Term Objectives of JCOMM

As noted in the strategic planning documents of WMO and IOC, urgent social and economic drivers need targeted improvements in weather, climate, water, oceanic 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 population growth in environmentally vulnerable regions, such as continental coastlines and lowlands, and, in recent years, an apparent increase in the intensities and frequencies of extreme events. At the same time, while the future state of the oceans remains uncertain, we need to ensure that society and policymakers are better informed of the impact of oceans on humankind and vice versa.

In response to these considerations, the long-term objectives of JCOMM are:

(i) To enhance the provision of marine meteorological and oceanographic services in support of the safety of life and property at sea and in coastal areas; contribute to risk management for ocean-based economic, commercial and industrial activities; contribute to the prevention and control of marine pollution, sustainable development of the marine environment, coastal area management and recreational activities, and in support of the safety of coastal habitation and activities; and 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;

(ii) To coordinate the development, enhancement and delivery of climate services related to the marine atmosphere and coastal and deep oceans, based on the core competencies within the Commission in marine meteorology and oceanography, as a contribution by JCOMM to the Global Framework for Climate Services;

(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 and including data communication facilities, as part of the Global Ocean Observing System (GOOS) and the World Weather Watch (WWW), and in support of the Global Framework for Climate Services (GFCS), the World Climate Research Programme (WCRP), the Global Climate Observing System (GCOS), and other major WMO and IOC Programmes. This system is contributing to the WMO Information System (WIS) and the IODE Ocean Data Portal, and will be complying with the requirements of the WMO Integrated Global Observing System (WIGOS);

(iv) To manage the evolution of an effective and efficient programme through the selective incorporation of advances in meteorological and oceanographic science and technology; and to work to ensure that all countries have the capacity to benefit from and contribute to these advances, and to contribute to the work of JCOMM in general.

(v) To promote and facilitate the equitable participation of all WMO Members and IOC Member States in all activities of, and benefit from all products and services provided by, JCOMM.

4. The JCOMM Structure

JCOMM must develop and sustain a work programme and an internal structure which allows it to implement its mandate and contribute to the Strategic Priorities of WMO and IOC in the most efficient and cost effective way. As formally constituted, JCOMM is an intergovernmental body of experts, and is the major advisory body to the two parent Organizations (consisting of their Members/Member States, Governing Bodies and other subsidiary bodies and programmes) 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 them. However, it is also important to understand that JCOMM is a technical body and not a commitments mechanism. The JCOMM Terms of Reference are given in Annex I.

JCOMM has a current membership of approximately 250 experts, with most national delegations comprising roughly equal numbers of oceanographers and marine meteorologists. It is co-chaired by a meteorologist and an oceanographer, 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 (Observations, Data Management and Services and Forecast Systems), together with a number of cross-cutting activities, for which individual members of the Management Committee carry specific responsibilities for oversight and coordination. Each Programme Area is, in turn, managed by a Coordinator, with support from a small coordination group and with specific activities being 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. The JCOMM structure is shown diagrammatically in Annex 2.

5. Implementation Priorities

The WMO Strategic Plan 2012-2015 identifies five strategic priority areas within the five strategic thrusts which will make a significant contribution to the achievement of the expected results: GFCS, aviation meteorological services, capacity building for developing and least developed countries, implementation of WIS and WIGOS, and disaster risk reduction. Likewise, the IOC Medium Term Strategy 2008-2014 defines the High Level Objectives as: prevention and reduction of the impacts of natural hazards, 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 2013-2016 are: GFCS

implementation, disaster risk reduction, WIGOS implementation and capacity development. These priorities will guide and be addressed through the work plans of the Programme Areas and cross-cutting activities, and will address the specific expected results of WMO and IOC as detailed in Annex 2.

The Services and Forecast Systems Program Area (SFSPA) core competencies include providing maritime safety information for navigation and marine accidents and emergency response, providing warning and forecast services to mitigate risks for coastal communities from natural weather and oceanographic hazards such as storm surge, and providing operational oceanographic forecast services. The SFSPA will leverage on its core competencies in developing a work plan that will directly support the JCOMM strategic priorities as articulated above.

Priority SFSPA implementation tasks include the following:

- Enhancing Arctic Ocean maritime services to support commercial and recreational activities in navigation, natural resource exploration and tourism, in response to anticipated seasonal ice free Arctic Ocean;

- Supporting mitigation of coastal hazard risks through improved coastal forecasting services for inundation from waves and storm surges, and building storm surge forecasting capacity in developing countries;

- Partnering with relevant WMO bodies such as WGNE to coordinate and improve ocean model component of operational seasonal coupled climate forecast systems including enhancing application of ocean observations through data assimilation and better articulate requirements for ocean observing systems;

- Enhancing the coordination for marine accidents emergency response capability. In particular, to address the gap in responding to accidental radioactive hazard material discharge into the ocean, such as the event following the earthquake and tsunami at the Fukushima Nuclear Power Plant, through coordinated effort to develop oceanic dispersion modelling and tracking capability.

- A priority in Capacity Development for the SFSPA is to benefit from a pilot project that is developing and implementing a quality management approach to the delivery of marine weather, tsunami warning and ocean services. Combined with this project is the leverage to be gained from the WMO Quality Management Framework activities and associated resources that are focused on NMHSs of developing Members/Member States.

The Observations Programme Area (OPA) and its Coordination Group (OCG) works to maintain, coordinate and integrate a comprehensive in situ ocean observing system. Strategic priorities for OCG during 2013-2016 include:

- Improve the synergies and integrated action amongst the observing networks to address requirements for climate monitoring, research and services; non-climate

requirements articulated through the WMO Rolling Review of Requirements; and marine hazard-related services.

- Strengthen the technical coordination of an integrated observing system through the JCOMM in situ Programme Support Centre (JCOMMOPS).
- Enhance system-wide monitoring by JCOMMOPS and the Observing System Monitoring Center (OSMC).
- Improve data system issues (including documentation of best practices) for each in situ observing network for the real-time and delayed-mode data streams to advance consistent, climate-quality and seamless data delivery.
- Support innovative pilot projects to improve cost-effectiveness of the observing system.
- Support capacity building activities to increase participate in, and benefit from, the global ocean observing system.

The Data Management Programme Area (DMPA) priorities for the period 2013-2016 are targeted to the improvement of the data flow from the observing systems to the operational applications and the end users, ensuring the best use of data and contributing to the harmonization of the diverse data systems in support of the JCOMM strategic plan:

- updating existing standards/best practices and developing new ones (for data collection, methods of observations, quality control, metadata discovery, data exchange and archive) in the marine community through the IODE-JCOMM Standards Process in support of the Global Framework for Climate Services (GFCS) and the WMO Integrated Observing System (WIGOS) implementation;
- contribution to the WMO Information System (WIS) and the WIGOS implementation, as well as to the development of the IODE Ocean Data Portal (ODP) and by making ODP interoperable with the WIS as well as with other national and regional systems, such as US IOOS, SeaDataNet, Australian Oceans Portal, etc
- development of a new Marine Climate Data System to better address the requirements of the GCOS and the development of the GFCS
- improvement of the instrument/platform metadata management, thus ensuring the high quality of the exchanged marine data in support of climate services
- development of integrated *in situ* and satellite products to improve operational forecasting services
- dedicated training activities and collaborative work on WMO and IODE training tools to support the DMPA work implementation

JCOMM Capacity Development activities are implemented through the Programme Areas, and thus focussed on developing the capabilities of Members/Member States to

participate in and benefit from the other priority activities under the overall JCOMM programme. In this, the JCOMM CB strategy seeks to coordinate with and make use of facilities and tools of the wider WMO/IOC Capacity Development, and to report on and publicise the results of this work through the Management Committee.

6. Communications and Outreach

Effectiveness in communicating the availability of data and services to, 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. In 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 sensitize the marine community to the vital role that JCOMM now plays in operational oceanography and marine meteorology, and to provide easy access to updated information on its programmes, meetings and reports, a JCOMM web site and internet portal has been activated at:

www.jcomm.info

JCOMMOPS, an operationally oriented center, has also been established to provide direct technical and integrative coordination and support to in situ observational system components. The JCOMMOPS web site address is:

http://www.jcommops.org/

7. Performance Evaluation

An integral part of any programme has to be the performance evaluation of its components. For an organization or body such as JCOMM, with its many programme activities and links with many organizations, such evaluation has to occur at many levels. In addition, JCOMM has to be able to evaluate and take account of user response to and satisfaction with its data, products and services. This can be done primarily through the maintenance of close relations with Organizations representing major user groups, such as IMO, ICS, the oil and gas producer groups, etc. The primary reporting and evaluation mechanisms for JCOMM are:

- reviewing and evaluating the Commission's overall strategy and work plans of subsidiary bodies through the Management Committee;
- reporting to and evaluation by the parent bodies at sessions of Congress, the Assembly and the Executive Councils;
- reporting to and evaluation by Members/Member States of the overall JCOMM programme and structure at formal Commission sessions.

In addition, and as noted also in Section 8 below, 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, inter alia, other

programmes and subsidiary bodies of WMO and IOC, research programmes and the 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.

8. 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.

As one of the Technical Commissions of WMO, JCOMM must ensure complementarity with and synergy from the activities of other WMO Technical Commissions, as well as those of other WMO Programmes such as the World Weather Watch, Space and Disaster Risk Reduction Programmes. Likewise, there will be a number of overlapping elements between JCOMM and other programmes and Committees of IOC, for example the International Ocean Carbon Coordination Project (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 TEMA Programme. JCOMM must also strive to contribute to and benefit from the contributions of WMO and IOC to external programmes that are relevant to JCOMM, such as the Global Earth Observing System of Systems (GEOSS), the International Polar Decade (IPD), and others.

9. Evolution of JCOMM

JCOMM, in both conceptual and management terms, is an ambitious and complex endeavour. At the same time, it holds the prospect of 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, to supply the basis for 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 must consider an evolution to meet all the current and future needs of global operational oceanography and meteorology. Such evolution will take many forms, including incorporation of new (or evolving existing) Expert/Task Teams to address priority challenges, establishment of pilot projects, partnerships with other organizations within and outside the UN system, establishment of specialized centres and regional groupings to deliver the services, facilitating intergovernmental agreements to allow access to data, products, information and services, and capacity

building and capacity enhancements, etc.

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

- Determination of all requirements and scientific, technical, organizational and procedural specifications associated with establishing the element within JCOMM;
- Evaluation of the feasibility of proceeding, and the appropriate pathway/model to migrate the concept through the trial, pilot and long-term maintenance stages;
- Identification of capacity/training needs and formulation of appropriate skill development or enhancement activities;
- Accommodation by JCOMM of the new element, either within an existing programme, team or activity or through changes to them which may be required;
- 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.

JCOMM will need to be involved to a lesser or greater degree in all phases.

JCOMM is, by definition, a body dealing with concerns covering the global ocean, and relevant to all Member States of IOC and WMO maritime Members. On the other hand, the WMO Regional Associations and IOC Sub-Commissions are concerned primarily with issues relating to their specific regions or national groupings. Nevertheless, in many cases JCOMM implementation (e.g., in elements of the observing system) is best coordinated at the regional level, while many of the benefits of JCOMM, such as specific regional products and services, are delivered at the 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 both two-way and mutually beneficial.

JCOMM offers benefits to Members/Member States of the Commission, or potential Members, that need to be well-stated and understandable, with descriptions of tangible benefits as far as possible. Examples include the timely delivery to national agencies (and sometimes directly to middle or end users) of integrated streams of high quality ocean data and metadata, to support the provision of operational oceanographic products and services; a range of operational oceanographic products prepared and made freely available by designated specialized centres; and direct and indirect support for developing countries to enhance their capacity to benefit from available operational ocean data and products. Non-Members/Member States of JCOMM, and indeed the global community in general, also will be recipients of the benefits, and if a country is unable to participate, benefits nevertheless accrue and therefore JCOMM is still fulfilling its mission. The challenge is to entrain those countries by demonstrating how they can influence JCOMM evolution and the services/deliverables on which it focuses. While in operational meteorology, the potential contributions to and benefits for all countries from a global system such as the World Weather Watch are evident (e.g., through accurate and timely meteorological warnings and forecasts, not possible without the WWW), and directly

related to national concerns and responsibilities, such is not necessarily the case for operational oceanography and marine meteorology and the work of JCOMM. Here, smaller and poorer countries may feel unable to contribute to global ocean systems, and at the same time be unaware of the benefits which might accrue to them from such systems. In this case, by using a more regionally based approach to interacting with Members/Member States, via the WMO Regional Associations, IOC Sub-Commissions and GOOS Regional Alliances, JCOMM will have a better chance of "personalizing" the relationship with non-Member countries and communicating the potential individual benefits.

Most of the themes covered in this JCOMM Strategy Document, including in particular issues relating to specific implementation targets and performance evaluation, are elaborated in detail in the JCOMM Operating Plan. This Plan comprises, in large part, Operating Plans for the component JCOMM Programme Areas.

Annex 1

TERMS OF REFERENCE FOR THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

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 capacity 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, the developing countries with particular emphasis on the Least Developed Countries and Small Island Developing States. Additionally, the Commission will support cooperation among WMO, IOC and other Untied 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, on matters related to marine meteorology and oceanography.

Within its terms of responsibility as defined above, and consistent 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, and shall 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 the Expected Results

Fundamental to the Strategic Planning Documents of WMO and IOC are agreed sets of Expected Results or Actions. The work of JCOMM will contribute to the Expected Results and Actions of WMO and IOC in the following ways:

For WMO Expected Result 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 their use in decision-making by all relevant societal sectors.

For IOC Expected Result 11 (Action 4c) - Enhance development and implementation of decision support tools that improve integrated ocean and coastal management

The Commission will assist, coordinate and, where appropriate, regulate 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 processes are based; and (2) development of feedback systems to measure and subsequently enhance the overall effectiveness of these services.

For WMO Expected Result 2: Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate, water and related environmental elements.

For IOC Expected Result 1 (Action 1a) - Promote integrated and sustained monitoring and warning systems for coastal and oceanic natural hazards, in close coordination with other relevant intergovernmental organizations where appropriate, using enhanced coastal and ocean networks, including education and training activities.

For IOC Expected Result 2 (Action 1b) - Educate communities at risk with respect to natural hazards impact prevention, preparedness and mitigation measures

The Commission will support and, where appropriate coordinate and regulate, efforts to reduce risks of marine hazards, including storms, waves, surges and other hazardous events in the marine environment, 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.

For WMO Expected Result 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

For IOC Expected Result 3 (Action 2a) - Increase the understanding of the ocean's role in climate variability and climate change

For IOC Expected Result 4 (Action 2b) - Contribute to the better prediction of climate through ocean observations and process studies, at regional and global scales

For IOC Expected Result 5 (Action 2c) - Increase the understanding of the impacts of climate change and variability on marine ecosystems and their living resources

The Commission will support and, where appropriate, coordinate and regulate 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.

For WMO Expected Result 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.

The Commission will support and where appropriate coordinate and regulate 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.

As a follow up to the modernization of the Marine Climatological Summaries Scheme (MCSS), and based on the Vision for a new Marine Climate Data System (MCDS) as endorsed at JCOMM-IV, the Commission will strive to address the WMO and IOC applications requirements for marine meteorological and appropriate oceanographic climatological data, and particularly address those of the Global Framework for Climate Services. These developments will require using state of the art techniques for developing a 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 known quality, and extend to products that satisfy the marine data requirements for long-term climate monitoring and climate services.

For WMO Expected Result 5: Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and related environment science and technology development.

For IOC Expected Result 7 (Action 3b) - Further develop the research and monitoring required for the prevention of marine environment degradation, and the maintenance of biodiversity and the sustainable use of marine habitats

For IOC Expected Result 10 (Action 4b) - Facilitate science related to ocean and coastal resource management

The Commission will promote and facilitate the international exchange of experience, implementation of verification projects, transfer of technology and research uptake, and support relevant education and training related to new research and technologies to meet the needs of relevant national agencies and of other organizations that play a role in the provision of marine meteorological and oceanographic services.

For WMO Expected Result 6: Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates

For IOC Expected Result 9 (Action 4a) - Enhance regional cooperation and involvement of the Member States through capacity building and transfer of technology

For IOC Expected Result 8 (Action 3c) - Identify and develop the capacity building necessary for maintenance of healthy oceans ecosystems focusing on the regional needs

The Commission will give 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 (SIDCs), through enhanced and more effective cooperation with the regional entities of WMO and UNESCO/IOC (WMO Regional Associations, UNESCO/IOC Sub-Commissions and GOOS Regional Alliances).

For WMO Expected Result 7: New and strengthened partnerships and cooperation activities to improve NMHSs' performance in delivering services and to increase the value of the contributions of WMO within the UN System, relevant international conventions and national strategic issues.

For IOC Expected Result 6 (Action 3a) - Actively contribute to the regular process for global reporting and assessment of the state of the marine environment

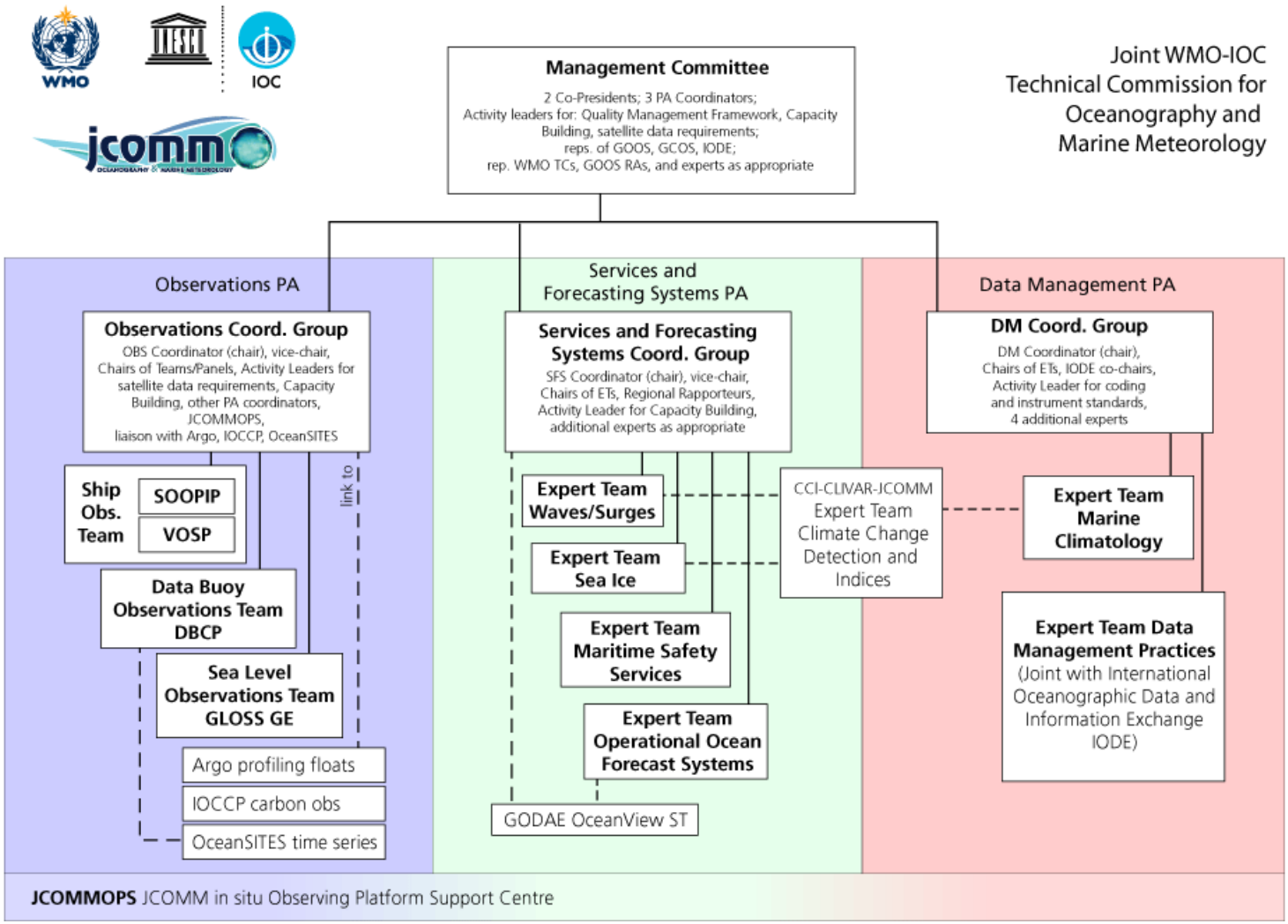
The Commission will support cooperation among WMO-IOC and other UN Agencies members of UN-Oceans, the International Hydrographic Organization, the International Council for Science and other governmental and non-governmental organizations on matters related to marine meteorology and oceanography.

For WMO Expected Result 8: An effective and efficient Organization.

The Commission will keep under review its organisational structures, activities and process, as well as the needs of Members/Member States so as to undertake its tasks efficiently and effectively.

Annex 3

JCOMM Structure



Annex 4

List of Acronyms

CMM Commission for Marine Meteorology (of WMO)
GCOS Global Climate Observing System (of WMO, IOC, ICSU and UNEP)
GEOSS Global Earth Observation System of Systems
GFCS Global Framework for Climate Services
GOOS Global Ocean Observing System (of IOC, WMO, UNEP and ICSU)
GRA GOOS Regional Alliance
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 *in situ* Observing Platform Support Centre
LDC Least Developed Country
NMHS National Meteorological and Hydrological Service
ODP Ocean Data Portal
OGP Oil and Gas Producers
PA Programme Area
RA WMO Regional Association
SIDC Small Island Developing Country
TEMA IOC Programme for Training, Education and Mutual Assistance in the Marine Sciences
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)