

A Strategy for JCOMM
(version 1)

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Executive Summary

The WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) was established in 1999 to coordinate worldwide marine meteorological and oceanographic services and their supporting observational, data management and capacity building programmes.

JCOMM's vision to benefit the global community is long-term, far-reaching and innovative: 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 strategy for making this vision a reality will be through creative synergies amongst governments, the international community, donors and the private sector, and increased national support in terms of experts, in-kind resources and funding.

JCOMM's work is accomplished through a Management Committee and three programme areas (Observations, Data Management and Services), their subsidiary expert and task teams, and two crosscutting activities for capacity building and satellite data requirements. The Management Committee and the Programme Area Coordination Groups function at a strategic level, while at the same time ensuring the implementation of the work plan through the subsidiary expert teams, pilot projects, and collaboration with other programmes. JCOMM strategy also calls for regular review of its programmes and performance and adjustment of its work plan to reflect changes in requirements, emphasis, priorities and resources of JCOMM.

JCOMM strategy includes an increased emphasis on communications, both internal within JCOMM and external with clients, partners and stakeholders. JCOMM will devote continuing efforts to the dissemination of information on its various programmes, activities and initiatives to the broader client community around the world.

Receiving feedback from potential clients is fundamental to the success of JCOMM and its members. Some mechanisms to evaluate programme performance and satisfaction of stakeholders already exist (e.g., marine meteorological services user surveys and observing system performance metrics); strengthened mechanisms will be essential to help provide regular feedback and guide the evolution of JCOMM.

JCOMM is an ambitious and complex endeavour. 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. The implementation of the Commission's programme will be a long-term, complex process, necessitating a phased, iterative and cost-effective approach over the decades to come.

1. Introduction

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 IOC/WMO Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) should be established, initially through the merger of CMM and IGOS. 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

JCOMM's vision to benefit the global community is long-term, far-reaching and innovative: 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.

3. The Long-Term Objectives of JCOMM

The long-term objectives of JCOMM are:

- (i) To enhance the provision of marine meteorological and oceanographic services in support of the safety of navigation and safe operations at sea; 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 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 World Climate Programme (WCP), the World Climate Research Programme (WCRP), the Global Climate Observing System (GCOS), and other major WMO and IOC Programmes;
- (iii) To coordinate and regulate the maintenance and expansion of a comprehensive database of marine meteorological, oceanographic and sea ice data, in support of marine services, operational meteorology and oceanography and the WCP;
- (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.

4. JCOMM Structure

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), together with two cross-cutting activities (capacity building and satellite data requirements). 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 Terms of Reference for the Management Committee and the Programme Areas are given in Annex 1, and the structure is shown diagrammatically in Annex 2.

The Commission itself and its subsidiary bodies will normally meet at regular intervals as dictated by the requirements of the work programme, recommended by JCOMM in session and the Management Committee, and approved by the Governing Bodies of WMO and IOC. Such meetings will normally be financed through the regular budgets of WMO and IOC, supplemented where possible and necessary by extra-budgetary funds and various “self-financing” mechanisms.

4.1 The JCOMM Secretariat

The Secretariat responsibilities of JCOMM are jointly undertaken by its parent bodies. This falls under the Marine Meteorology and Oceanography Programme at WMO and under the GOOS Project Office and the IODE and TEMA Secretariats at IOC. The composition of the Secretariat and the division of responsibilities is specified in some detail in a formal Memorandum of Understanding between WMO and IOC.

4.2 The Management Committee

The Management Committee presently consists of the 2 co-presidents, the coordinators of the 3 Program Areas, representatives of the 2 major cross-cutting activities and 4 additional experts, as well as the chairs (or their representatives) of the GOOS Scientific Steering Committee (GSSC), the GCOS Steering Committee and the IOC Committee for IODE. Other experts are invited to the Management Committee meetings as needed. The primary role of the Management Committee is both tactical and strategic: it is charged with overseeing the implementation of the JCOMM work programme agreed by the Commission in session, as well as 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 liaison with and reporting to the IOC and WMO Governing Bodies, as well as with external bodies and programmes; and it deals with a number of additional cross-cutting issues such as communication and outreach.

4.3 The Observations Programme Area (OPA)

OPA is primarily responsible for coordinating and facilitating the development and maintenance of *in situ* and ground-based remote sensing observation networks (moored and drifting buoys, all ship-based systems, HF radars, tide gauge networks, and others as appropriate), as well as their related telecommunication facilities, and their coordination with space-based observational networks, on the basis of requirements and designs prepared by the WWW, GOOS, GCOS and major research programmes of WMO and IOC. It monitors the efficiency of the overall observing system and, as necessary, recommends and coordinates changes designed to improve it. It also coordinates the setting and maintenance of instrument and network standards and intercalibration. It has inherited lead responsibility for a number of important and well-established observational programmes, which are managed by bodies that now report through JCOMM. The operational *in situ* observing system is only some 50% implemented, and significant new resources would be required to achieve full implementation, and not simply a re-allocation of existing resources, as has occurred in the past.

The current sub-teams under this programme area are:

- The Ship Observations Team (SOT), coordinating the Voluntary Observing Ship (VOS) programme, the Automated Shipboard Aerological Programme (ASAP) and the Ship-of-opportunity Programme (SOOP). VOS ships volunteer to take surface meteorological and surface oceanographic observations while ASAP vessels acquire upper air observations over data-sparse ocean areas by means of automated radiosonde systems. Similarly, the SOOP involves volunteer merchant and scientific ships that acquire oceanographic measurements using one or more scientific instruments such as Expendable Bathythermographs (XBTs) and thermo-salinographs.
- The Data Buoy Co-operation Panel (DBCP), addressing the requirements for real-time and archived data from drifting and moored data buoys on the high seas, coordinates buoy deployments in the world's oceans and provides a forum for the exchange of information on buoy technology, communications systems and applications of buoy data. The DBCP undertakes a large part of its implementation work through regional or programmatic Action Groups, including the Tropical Moored Buoy Implementation Panel, TIP, and the Global Drifter Programme, GDP.
- The Global Sea Level Observing System (GLOSS), which oversees the operation of a worldwide network of tide gauge stations in support of both operational activities and studies of sea level variations and global climate.

As new global observational programmes become operational, JCOMM will liaise with their managers, with a view to their future association with the overall global programme, either within the context of one of the existing teams, or through the establishment of new expert/task teams, as appropriate. Potential candidates may include Argo, the International Ocean Carbon Coordination Project, and the Coastal Ocean Observing System.

The JCOMM IN-SITU Observing Platform Support Centre (JCOMMOPS) was formally established by JCOMM-I to assist internationally those in charge of the national components of the DBCP, SOOP and Argo. JCOMMOPS helps these programmes through planning, implementation and operations and by providing technical assistance. It encourages platform operators to share and distribute data in real-time. The JCOMMOPS Terms of Reference were modified by JCOMM-II to enable it to also provide support to all the other components of the JCOMM *in situ* ocean observing system.

The assignment to JCOMM of overall responsibility for coordinating and facilitating the implementation and maintenance, on an operational basis, of the preceding observational elements clearly brings a new level of integration to these ongoing programmes and paves the way for continued integration of other appropriate elements as required. Consequently, it significantly advances the long-term goal of a fully integrated ocean observing system - one that provides easy access to detailed observations of the temporal and spatial structure of the oceans and overlying atmosphere and thus supporting responsible management of the marine environment, its resources and the ecosystem.

4.4 The Services Programme Area (SPA)

The SPA is concerned with coordinating and facilitating the development of operational marine meteorological and oceanographic products globally and the provision of related

public good services. Consequently, it facilitates and supports the delivery of agreed upon products and services of national marine meteorological and oceanographic agencies. These currently include warnings of gales, storms, severe tropical weather systems such as typhoons, hurricanes and tropical cyclones and other hazardous phenomena at sea, information on sea ice conditions and other products disseminated through the Global Maritime Distress and Safety System (GMDSS) in response to requirements established under the International Convention for the Safety of Life at Sea (SOLAS). The continuing provision of safety-related weather and oceanographic services is an absolutely fundamental priority of JCOMM and of its Services Programme Area. Currently JCOMM supports the delivery of these products and services through the following Expert Teams:

- The Expert Team on Maritime Safety Services (ET MSS), which coordinates, monitors and reviews arrangements for GMDSS and related services provided in support of safety at sea.
- The Expert Team on Wind Waves and Storm Surges (ET WS), which advises on scientific and operational aspects of wind-wave and storm surge forecasting, and coordinates with other JCOMM groups, scientific and technical bodies to ensure that the latest advances are incorporated into operational practice.
- The Expert Team on Sea Ice (ET SI), which coordinates the delivery of sea ice products and services to facilitate maritime operations in high latitudes, advises on scientific and operational aspects of sea ice and oversees the operations of the Global Digital Sea Ice Data Bank.
- The Expert Team on Marine Accident Emergency Response (ET MAES), which promotes development of pollution response support capabilities on a world wide basis and advises on techniques and systems available to agencies charged with combating marine pollution emergencies. It also facilitates coordination and cooperation in the provision of meteorological and oceanographic information and support to maritime search and rescue operations.

JCOMM has also established a number of ad hoc task teams, jointly with the Global Ocean Data Assimilation Experiment (GODAE) and in association with intermediate and end users, to identify, standardize and implement operationally, new ocean products and public good services.

JCOMM does not conduct research or develop models, but coordinates and facilitates the operational implementation and dissemination of proven models, products and services. Part of this dissemination process is the implementation and maintenance of a JCOMM Products Web Portal. The process also covers Quality Assurance issues and user interactions related to products and services.

4.5 The Data Management Programme Area (DMPA)

DMPA addresses the quality assurance, archiving and provision of access to marine meteorological and oceanographic data and related metadata. Most marine meteorological and oceanographic data are currently held in IOC, WMO and ICSU data centres, or at various institutions with differing data storage and management systems operating on a variety of computer platforms. However, there is an increasing requirement for timely and easy access

to highly integrated marine data that include meteorological, oceanographic and physical and non-physical data. The ultimate aim of JCOMM is to meet the needs of all users by coordinating and regulating the development and implementation of a fully integrated data management system able to deliver high-quality data spanning the complete spectrum of marine meteorological and oceanographic observations. At the same time, JCOMM has inherited responsibility for several established data management programs. These include:

- The Expert Team on Marine Climatology is tasked with ensuring the continued coordination and regulation of the management of marine climatological data and the provision of advice on the applications of these data. This is done in part through the Marine Climatological Summaries Scheme (MCSS) that facilitates the international exchange, quality control and archiving of marine climatological data and the publication of marine climatological summaries.
- The Expert Team on Data Management Practices has been charged with the forward-looking role of developing, promoting and implementing best practices in ocean data management. This ET, through a merger with the Group of Experts on the Technical Aspects of Data Exchange (GE/TADE) of the IOC Committee for the International Oceanographic Data and Information Exchange (IODE), is now coordinated jointly by DMPA and IODE.
- The Global Temperature-Salinity Profile Programme (GTSP), the Global Sea Level Observing System (GLOSS), and the data buoy programme, with both real-time data and delayed-mode data being acquired, quality controlled and stored in designated data centres. These tasks are currently coordinated by the Ship Observations Team (SOT), the GLOSS Group of Experts and the Data Buoy Cooperation Panel (DBCP) under the OPA, in coordination with the DMPA.

Establishment of a fully integrated data management system will require increasing coordination of data sources, development and implementation of international standards and protocols for database management and processing software, and the utilization of a modern, highly compatible, infrastructure of computer hardware and advanced communication technologies. It will result in the creation of a distributed JCOMM data system. This will encompass the IODE, WMO and other centers interacting with each other and performing their functions in strict accordance with agreed rules and protocols, and will be closely coordinated with wider DM activities within the parent Organizations, such as the WMO Information System, and the IOC Data Management Strategy. The orchestration of this ambitious process of integration across a distributed, worldwide, system clearly presents a major challenge for JCOMM's Data Management Programme Area.

The JCOMM strategy for meeting these challenges is to establish or participate in pilot projects, and eventually bring the results under the JCOMM umbrella as appropriate, as well as to offer expertise to assist other groups in specifying and implementing their respective data management systems to ensure that these will fit readily into a coherent global system.

4.6 Cross-cutting Activities

4.6.1 Capacity Building

JCOMM will assist countries to enhance their capacities in marine data collection, data management and provision of marine meteorological and oceanographic services. Building

capacity is a high priority activity directed at ensuring that maritime nations can not only contribute meaningfully to JCOMM's various programmes but also gain optimum benefits from the global system. The Capacity Building activity, in direct consultation and cooperation with the three Programme Areas, has the mandate to coordinate the delivery of training, facilitate the transfer of technology, assist in providing equipment and work closely with the capacity building programmes of donor countries and other UN Agencies. In structural terms, the JCOMM Capacity Building activity is supported by and delivered through three Capacity Building Rapporteurs, attached to each of the three Programme Areas, and reporting to the Management Committee through a single designated representative.

The JCOMM capacity building strategy is a straightforward one - to first determine national and regional needs and then address identified deficiencies in knowledge, skills, observing and telecommunications systems, data management and services. The implementation of this strategy will, however, necessitate carefully targeted initiatives, the pursuit of mutual cooperation and the aggressive development of partnerships with national governments, donors and international organizations. To achieve these objectives, JCOMM Capacity Building is supported by a Task Team on Resources, reporting to the Management Committee and charged, *inter alia*, with the identification of potential sources of funding for JCOMM CB, as well as with assisting in the preparation of CB project proposals for submission to these bodies.

Capacity Building within IOC is coordinated through the Training, Education and Mutual Assistance (TEMA) programme. Similarly, within WMO, capacity building generally is coordinated and implemented through the Education and Training and Technical Cooperation Programmes. JCOMM will continue to work closely with these broader CB programmes, and adapt as required to their evolving mandates.

4.6.2 Satellite Data Requirements

Remote sensing, and in particular satellite space-based data, are playing an important and increasing role in the realization of the goals and work programme of JCOMM. To respond to this, JCOMM has designated for each of the Programme Area Coordination Groups, an expert on satellite data, with two such experts in the Observations Programme Area, bringing a meteorological and oceanographic perspective respectively. These four experts form a cross-cutting and integrative Team on Satellite Data Requirements, with the chair of the team being designated to represent it on and advise the Management Committee appropriately. The chair is also responsible for organizing satellite/remote sensing data requirements within the Commission, through coordination of the work and inputs of the other experts, as well as through liaison with other external bodies.

Specifically, the satellite data requirements activity in JCOMM, working through the Team on Satellite Data Requirements, is responsible for collecting and integrating the space-based remote sensing requirements that are essential for JCOMM services and products. It advises JCOMM subsidiary bodies on satellite/remote-sensing matters, within each PA, such as the distribution and dissemination of satellite data and relevant data products. It also maintains JCOMM satellite remote sensing data requirements based on regular contact with CGMS, the WMO Space Programme, the IOC Remote Sensing Plan, CEOS, the relevant IGOS Themes, the WMO high level policy meetings, the COOP and OOPC, and other appropriate groups.

5. 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:

<http://www.jcommweb.net/>

JCOMMOPS, an operationally oriented center, has also been established to provide direct technical support to observational system components such as Argo, SOOP, the VOS and ocean data buoys, as well as associated satellite data collection systems. The JCOMMOPS web site address is:

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

As more and more products become available and are required to be distributed, these will be disseminated through a distributed network of operational centers, accessed through a dedicated JCOMM Products Web Portal.

6. 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.

6.1 Review of Work Plans of Subsidiary Structure

This will be done in a top-down and bottom-up process.

The Management Committee will review the progress of JCOMM annually and will adjust its work plans in response to input from its advisory or associated groups such as the GSC, the GCOS Steering Committee and IODE, as well as from its parent bodies IOC and WMO.

The changes in the work plan of the Management Committee will be reflected in the work plans of each programme area coordination group, which are expected to meet at a frequency of about two years.

In turn, each of the expert teams and task teams will meet at appropriate intervals, but typically at least every two years, to review the progress of its activities and align its work plans.

Similarly, any new requirements identified by the expert and task teams will be reviewed and

approved as appropriate by the coordination groups and the Management Committee and will be integrated into the work plans of the relevant groups.

The Management Committee will adjust the meeting schedules of JCOMM subsidiary groups to be responsive to the requirements, subject to funding levels.

Within each of the Programme Areas, mechanisms will also be put in place for the implementation of quantitative Quality Assurance and performance metrics, to facilitate evaluation of the effectiveness and performance of the different systems against requirements.

6.2 Reporting to the Parent Bodies

JCOMM is a major subsidiary body of IOC and WMO and as such must report to the Executive Council and Congress/Assembly of each of these Organizations, which implies annual reporting. These reports should 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. The JCOMM Secretariat supports the implementation of the work plans and develops an appropriate budget for this purpose, to be included in the IOC and WMO budget process. As noted in Section 4, this budget should, *inter alia*, 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.

6.3 JCOMM in Session

WMO and IOC have approved a meeting frequency of 4 years for the formal JCOMM Sessions, alternately funded by the two Organizations. These Sessions provide a forum for JCOMM officers to present to the Members/Member States the status of JCOMM development, its successes and failures, challenges and work plan for the next inter-sessional period. It also provides an opportunity to adjust the JCOMM structure to meet the evolving requirements and to align the skill set in the JCOMM groups to such requirements.

6.4 External Review

The reviews mentioned above are either carried out internally by the JCOMM groups or by the Commission in Session based on the information presented to it by its officers and subsidiary bodies. The parent bodies must ensure that JCOMM is periodically reviewed by an external group of experts every 8 years and the findings reported to every alternate Session, to ensure that JCOMM is best aligned to the requirements identified by its parent bodies and its clients.

In addition, and as noted also in various places in Section 7 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.

7. 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.

7.1 Subsidiary Bodies of WMO and IOC

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 Natural Disaster Prevention and Mitigation Programmes. The Team on JCOMM Satellite Data Requirements will interact with WMO's Space Program to promote the marine applications of satellite observations and to influence the space agencies in decisions on technologies, on the type of satellites and deployment schedules, and on their data policies. A common challenge for all WMO activities is the development and implementation of an effective and efficient data and information system, the WMO Information System (WIS). JCOMM must contribute in this activity.

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 strive to ensure economies of scale and work closely with these programmes.

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 Year (IPY), and others.

7.2 Other Governmental and Non-governmental Global Organizations

JCOMM has much in common with other international and intergovernmental organizations such as the International Maritime Organization (IMO), the International Hydrographic Organization (IHO), the United Nations Environment Programme (UNEP), United Nations Food and Agriculture Organization (FAO), the International Council for the Exploration of the Sea (ICES), the North Pacific Marine Science Organization (PICES), the North Atlantic Fisheries Organization (NAFO), as well as non-governmental ones such as the Partnership for Observations of the Global Ocean (POGO). Through cross membership in working groups and implementation teams, and through co-sponsorship of activities, JCOMM will ensure that it provides support to and benefits from the work of these organizations.

7.3 Links to Science Programmes

JCOMM, because it is a technical implementation body, must rely on science programmes for scientific and technical directions. Such input will be necessary on many fronts: setting standards for instrumentation and data collection, data transmission, products, quality control

and others. Science programs also provide opportunities to develop pilot studies, instruments and infrastructure. Consequently, JCOMM must interact with global science programs right from their conceptual stage. In general, this can be achieved by direct cross-involvement of key representatives from these programmes in the relevant organs of JCOMM, or cross-membership of bodies, panels, teams, etc. where mutual interest is strong and potential benefit is high.

At the same time, and as is already the case for the WWW and atmospheric research, JCOMM facilitates the provision, through the operational ocean observing system and related infrastructure, of a basic structure to support ocean science and to which science programmes can add specific elements as required. Ultimately, such elements may, in turn, be absorbed into the operational structure, if this proves cost-effective.

JCOMM already has formal links to the GOOS scientific design bodies, OOPC and COOP, through their representation on the Management Committee, which in turn provide links to the ocean science community and programmes such as WCRP/CLIVAR/CLiC, GODAE, LOICZ and SOLAS. At the same time, JCOMM, through the Management Committee, needs to investigate ways in which interactions with these communities and programmes can be enhanced, to ensure that JCOMM can contribute to their implementation and also benefit from these programmes, as appropriate. An existing example of an effective interaction mechanism is the work of the DBCP (and JCOMMOPS), which supports both operational and research buoy deployments, and where the annual technical workshop provides a forum for the sharing of scientific and technical information on ocean data buoys and applications.

JCOMM already has an active involvement in global sea ice activities through the work of the Expert Team on Sea Ice, as well as an involvement in polar region observing through the DBCP. However, it also needs to enhance its involvement in and support for other areas of polar science and operations, including polar oceanography.

7.4 The Private Sector

JCOMM, through the former CMM, has inherited, and maintains, reasonably close interactions with some components of the private sector, notably:

- (i) Commercial shipping, through the International Chamber of Shipping (ICS), is both a service user (primarily maritime safety services) and also a data provider (the VOS);
- (ii) The offshore oil and gas industry, through the International Association of Oil and Gas Producers (OGP) is a major specialized service user (services normally provided through the private sector) and occasional data provider, or at least collaborator;
- (iii) Some equipment manufacturers and vendors, through direct involvement with component panels of the Observations Programme Area (DBCP, SOT);
- (iv) Providers of marine telecommunications systems, notably Inmarsat Ltd. and CLS/Service Argos.

Nevertheless, there remains considerable potential for benefits to both sides through enhancing the interactions between JCOMM and the private sector. Such involvement can take many forms, including the design, manufacture and sale of observing system equipment; the possible operation of observing systems and the supply of data; and the use of data and products, deriving from national agencies within the context of JCOMM programmes, to

prepare improved or secondary products for sale to end users. At the same time, it is likely that the private sector will wish to be actively involved in the planning, governance, and implementation of the overall system. Through such means, it is also likely that it will become a potentially powerful advocate for the full implementation of government funded, marine observing and data management systems.

JCOMM will therefore actively seek to enhance its involvement with the private sector, at the strategic level through the Management Committee, and at the working and implementation level through the Programme Area Coordination Groups and component expert teams and panels. An initial approach to this is through the establishment of a cross-cutting Panel, under the Management Committee, to include a number of private partners (representatives of major trade organizations or different private sector groups), to further explore and develop the international-to-private cooperation concept.

8. 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.

The first step in JCOMM implementation was, of course, to integrate and rationalize the relevant elements of CMM and IGOSS under the new Commission and thus create an organizational structure that resulted in efficiencies and economies of scale. This integrating process was further advanced at the first session of the Commission, through the introduction of measures, such as the formation of the Ship Observations Team (SOT) by merging the existing SOOP, VOS and ASAP Panels, all concerned in some way with the use of volunteer ships as marine observation platforms.

However, CMM and IGOSS, and thus the initial JCOMM, dealt with only standard physical variables. For JCOMM to be effective, it must consider an evolution to meet all the current and future needs of global operational oceanography and meteorology. Already, some of these needs have been identified, e.g., the design and implementation plans prepared by the Coastal Observations Panel (COOP) of GOOS. Such evolution will take many forms, including incorporation of new Expert/Task Teams, 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. Periodic review of JCOMM is an essential step in its development.

8.1 Incorporation of New Elements

As noted above, the current JCOMM structure is just the starting point. There are already many elements that are at varying stages of development and that will be required to be incorporated under JCOMM in coming years.

In general there are several phases involved in implementing new 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 operationalisation 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 to effectively transition an element into the operational state.

8.1.1 Pilot Projects

A definition of a pilot project in widespread use in GOOS is:

A pilot project is defined as an organized, planned set of activities, with focused objectives, designed to provide an evaluation of technology, methods or concepts, within a defined schedule and having an overall goal of advancing the development of the sustained, integrated ocean observing system.

Once a project has been identified as a potential JCOMM pilot project, a process will be established for the relevant Programme Area to liaise with the project leader to ensure that JCOMM will benefit from and contribute to that project.

8.1.2 Science and Technology Workshops and Conferences

Participating in the development of new technologies, modeling systems, methodologies and procedures relevant to JCOMM and in the performance evaluation of current ones is important. This will be achieved in part through series of specialized workshops in coordination with the meetings of the expert teams or by co-sponsoring workshops organized by other scientific and technical groups. Stand-alone workshops and conferences may also be organized to address specific topics.

8.2 Evolution of the Overall JCOMM Structure

In view of the operational nature of the activities facilitated, coordinated and supported by JCOMM, which implies an ongoing, long-term, support infrastructure, it is to be expected that much of the basic JCOMM sub-structure will also be relatively long-term in nature. Nevertheless, there will always be developments and changes in requirements, emphasis and priorities for JCOMM, within the context of continuing limited resources, and the Commission must therefore have in place, and be prepared to use, a mechanism to adapt to these developments and changes, and in particular to modify its sub-structure as necessary to respond to new priorities and the maturing of ongoing work. Formally, it is the Commission itself, in session, which decides on the format and membership of its sub-structure, on advice from the Management Committee. In practice, the co-presidents of the Commission, advised

by the Management Committee, will continuously review the operations of the sub-structure, to ensure that it meets the needs and priorities of JCOMM, and make both tactical and strategic decisions for any modifications as required.

8.3 Role of IOC and WMO Regional Bodies

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.

The WMO Regional Associations (RAs) all have established Regional Rapporteurs on Marine Meteorological and Oceanographic Services. These rapporteurs form a basic mechanism for interactions with the RAs, and they must therefore be more closely involved with the work of all Programme Areas. Similarly, the DBCP, within the Observations Programme Area, has established a number of regionally based Action Groups, which are proving very effective in entraining smaller countries into buoy programmes and in implementing such programmes through regionally coordinated deployments. Mechanisms such as these must also be found to enhance JCOMM interaction with the IOC Sub-Commissions.

With regard specifically to the implementation of GOOS, while JCOMM is responsible for coordinating such implementation for global elements, in particular relating to climate and similar issues, the GOOS Regional Alliances (GRAs) have a major role to play in implementation at the regional level, in particular with elements of the COOP design. It is thus important that interactions between JCOMM and the GRAs are enhanced and if possible formalized, to ensure maximum synergy and minimum overlap of effort. A first step in this process has been the establishment, under the Management Committee, of a crosscutting Panel dealing with JCOMM-GOOS-GRA coordination issues.

JCOMM also needs to enhance its participation in the IODE's regional networks for data management, viz., the Oceanographic Data and Information Network (ODIN) initiative. JCOMM's data management strategy will include strong collaboration among the meteorological service delivery within WMO Regional Associations, the modified specialized oceanographic centres providing marine data and products, the IODE centres (ODIN centres) and the World Data Centres of ICSU.

8.4 Assessing Performance and Success

The JCOMM Programme Areas have (or will have) mechanisms to evaluate performance, "compliance" and satisfaction with information or data from its stakeholder or client groups. Existing examples include the regular marine meteorological services user surveys within the SPA, and the observing system performance metrics already implemented by components of the OPA. Further, there must be enough expertise in the technical groups to give the PA Coordinators at least first order advice about whether targets are within reach or not. Other WMO Technical Commissions undertake extensive surveys to determine more quantitatively what Members' and client groups' requirements are and their perceptions on how well they

are being met. JCOMM must adopt a more structured and holistic approach to this type of process, under the auspices of the Management Committee, to provide regular feedback to the extent possible. The surveys should take into account the work plan and dimensions established by the stakeholders.

8.5 Involvement of and Benefits for all Members/Member States

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. Such an approach is reflected in the Strategy under section 8.2 above.

8.6 Implementation Plan

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

TERMS OF REFERENCE

Annex to Resolution XX-12 Terms of Reference for the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM)

The Technical Commission shall be responsible for matters relating to:

Further development of the observing networks

Under the guidance of the relevant scientific and operational programmes of IOC and WMO, development, maintenance, co-ordination and guidance of the operation of the global marine meteorological and oceanographic observing systems and supporting communications facilities of these organizations to meet the needs of the IOC and WMO Programmes and in particular of the Global Ocean Observing System (GOOS), the Global Climate Observing System (GCOS) and the World Weather Watch (WWW). Evaluation on a continuing basis of the efficiency of the overall observing system and suggesting and co-ordinating changes designed to improve it.

Implementation of data management systems

Development and implementation, in co-operation with the Commission for Basic Systems (CBS), the Committee for International Oceanographic Data and Information Exchange (IODE), the International Council of Scientific Unions (ICSU), and other appropriate data management bodies, end to end data management systems to meet the real-time operational needs of the present operational systems and the global observing systems; co-operation with these bodies in seeking commitments for operation of the necessary national compilation, quality control, and analysis centres to implement data flows necessary for users at time scales appropriate to their needs.

Delivery of products and services

Provision of guidance, assistance and encouragement for the national and international analysis centres, in co-operation with other appropriate bodies, to prepare and deliver the data products and services needed by the international science and operational programmes, Members of WMO, and Member States of IOC. Monitoring of the use of observations and derived products and suggesting changes to improve their quality. Co-ordination of the safety-related marine meteorological and associated oceanographic services as an integral part of the Global Maritime Distress and Safety System of the International Convention for the Safety of Life at Sea (SOLAS).

Provision of capacity building to Member States

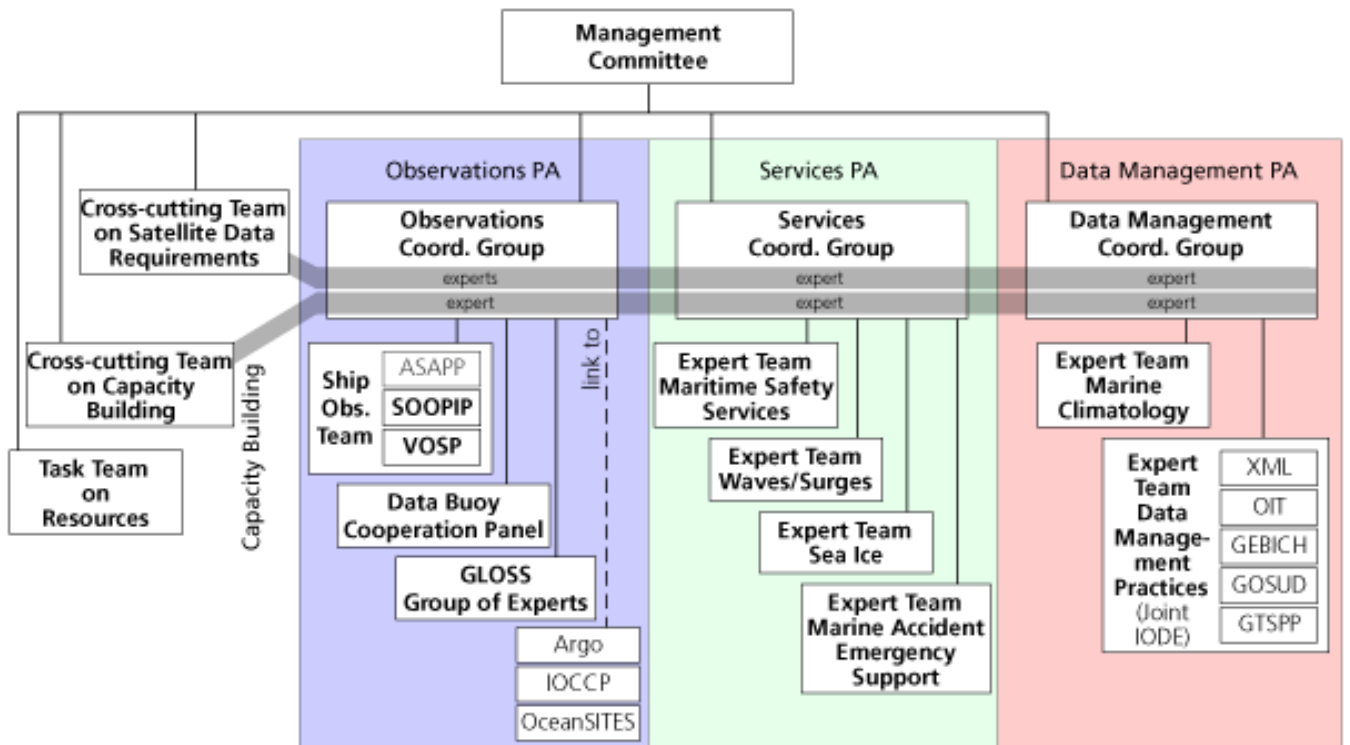
Review and analysis of the needs of Member States of IOC and Members of WMO for education and training, and for technology transfer and implementation support in the areas of responsibility of the technical commission. Provision of the necessary technical publications, guidance material, and expert lecturers/trainers and operation of workshops as required to meet the needs. Development of projects to enhance Member States capacity to participate in and benefit from marine meteorological and oceanographic programmes of WMO and IOC.

Assistance in the documentation and management of the data in international systems

Development of co-operative arrangements with the data management bodies of IOC, ICSU, and WMO, such as IODE, the Commission for Climatology (CCI), and the ICSU World Data Centres to provide for comprehensive data sets (comprising both real-time and delayed mode data) with a high level of quality control, long term documentation and archival of the data, as required to meet the needs of secondary users of the data for future long term studies.

These responsibilities exclude those aspects specifically handled by other WMO constituent bodies or equivalent bodies of IOC.

JCOMM STRUCTURE



LIST OF ACRONYMS

ASAP	Automated Shipboard Aerological Programme
CB	Capacity Building
CliC	Climate and Cryosphere
CLIVAR	Climate Variability and Predictability
CMM	Commission for Marine Meteorology (of WMO)
COOP	Coastal Ocean Observing Panel
DBCP	Data Buoy Co-operation Panel
DM	Data Management
DMPA	Data Management Programme Area
ET MAES	Expert Team on Marine Accident Emergency Response
ET MSS	Expert Team on Maritime Safety Services
ET SI	Expert Team on Sea Ice
ET WS	Expert Team on Wind Waves and Storm Surges
FAO	Food and Agriculture Organization of the United Nations
GCOS	Global Climate Observing System
GDP	Global Drifter Programme
GE	Group of Experts
GEO	Group on Earth Observations
GEOS	Global Earth Observation System of Systems
GLOSS	Global Sea-Level Observing System
GMDSS	Global Maritime Distress and Safety System
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GRA	GOOS Regional Alliance
GSC	GOOS Steering Committee
GSSC	GOOS Scientific Steering Committee
GTSP	Global Temperature Salinity Profile Programme
ICES	International Council for the Exploration of the Sea
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)
IODE	International Oceanographic Data and Information Exchange
IPY	International Polar Year

JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM <i>in situ</i> Observing Platform Support Centre
LOICZ	Land-Ocean Interaction in the Coastal Zone
MCSS	Marine Climatological Summaries Scheme
NAFO	North Atlantic Fisheries Organization
ODIN	Oceanographic Data and Information Network
OGP	Oil and Gas Producers
OOPC	Ocean Observations Panel for Climate
OPA	Observations Programme Area
PA	Programme Area
PICES	North Pacific Marine Science Organization
POGO	Partnership for Observations of the Global Ocean
RA	WMO Regional Association
SOLAS	International Convention for the Safety of Life at Sea
SOOP	Ship-Of-Opportunity Programme
SOT	Ship Observations Team
SPA	Services Programme Area
TADE	Technical Aspects of Data Exchange
TEMA	IOC Programme for Training, Education and Mutual Assistance in the Marine Sciences
TIP	Tropical Moored Buoy Implementation Panel
UNEP	United Nations Environment Programme
VOS	Voluntary Observing Ship
WCP	World Climate Programme
WCRP	World Climate Research Programme
WIS	WMO Information System
WMO	World Meteorological Organization
WWW	World Weather Watch
XBT	Expendable Bathythermograph