Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology

Abridged Final Report of the Fifth Session

Geneva

25–29 October 2017

WEATHER CLIMATE WATER

WORLD METEOROLOGICAL ORGANIZATION

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanography Commission

WMO-No. 1208
WMO-IOC/JCOMM-5/3

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By agreement between IOC-UNESCO and WMO, reports of sessions of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) are largely consistent with the WMO style for other constituent bodies. The documents for JCOMM-5 were translated and the report was prepared by the WMO Department of Language, Conference and Publishing Services.

WMO-No. 1208

WMO-IOC/JCOMM-5/3

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ISBN 978-92-63-11208-8

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. The co-president of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), Mr Johan Stander, opened the fifth session of JCOMM on Wednesday 25 October 2017 at 9.30 a.m. in the headquarters of WMO in Geneva. He thanked the Government of Indonesia for the original offer to host the session in Bali and regretted that the session had to be relocated to Geneva due to the high risk of eruption of the Agung volcano, expressing his appreciation to all those involved for their collaboration in overcoming the inconvenience. He recalled the important agenda in marine meteorology and oceanography discharged by JCOMM and the many tasks lying ahead for the Commission.

The Secretary-General of WMO, Mr Petteri Taalas, emphasized the uniqueness of JCOMM as a mechanism to coordinate oceanographic and marine meteorological observations, data management, forecasting and services systems, and highlighted that the reform of WMO constituent bodies represents an opportunity for WMO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO to identify ways to strengthen their collaboration to foster marine weather and oceans services and the global ocean agenda. The Executive Secretary of IOC, Mr Vladimir Ryabinin, highlighted that the motivation for the creation of JCOMM and the collaboration between oceanographers and meteorologists remains valid today to generate longer-term weather forecasts, information and warning services. He expressed his confidence that IOC of UNESCO and WMO, as the parent Organizations of JCOMM, will ensure that the interests of their Member States and Members are fully represented in the life of, and any changes to, the Commission.

The Acting Director-General of the Meteorological, Climatological and Geophysical Agency (BMKG) of Indonesia, Mr Widada Sulistya, emphasized that with climate change hydrometeorological hazards are expected to increase in scale and intensity. Noting that ocean-related problems that demand climate mitigation and adaptation have not been sufficiently addressed within the Paris Agreement, he called for additional ocean and atmospheric observations. The former co-president of JCOMM, Mr Peter Dexter, gave a lecture on the history of international and intergovernmental coordination of marine meteorological and oceanographic observations and services through JCOMM, underlining how new developments in technology and requirements for operational ocean services based on numerical ocean modelling and forecasting are now calling on JCOMM for a potential additional contribution.

2. The agenda is provided in Appendix 1.

3. The session adopted 9 resolutions (given in Appendix 2), 40 decisions (given in Appendix 3) and 15 recommendations (given in Appendix 4).

4. The Commission elected a co-president (meteorology), Mr Johan Stander (South Africa) and a co-president (oceanography), Ms Nadia Pinardi (Italy) to hold office until the end of the next session of the Commission. Details regarding eligibility and procedures for election are given in Regulations 11, 27, 57–65, 80–90 and 183 of the WMO General Regulations and Resolution 37 (Cg-XI). Further guidance regarding the co-presidency is given in the general summaries of the final reports of the Thirteenth World Meteorological Congress, paragraph 3.4.4.5, and of the Twentieth IOC Assembly, paragraph 262.

5. Out of a total of 106 participants, 39 were women, that is 37%. The list of participants is given in Appendix 5.

6. In recognition of the dedicated work of experts who have contributed to JCOMM activities over many years, 32 certificates of appreciation were awarded. The list of recipients is given in Appendix 6.

7. The Commission decided that its sixth session would be held in 2021 or 2022. Indonesia has offered to be host.

8. The fifth session of JCOMM closed at 3.24 p.m. on 28 October 2017.

APPENDIX 1. AGENDA

1. Organization of the session

1.1 Opening of the session

1.2 Consideration of the report on credentials

1.3 Adoption of the agenda

1.4 Establishment of committees

1.5 Other organizational matters

2. Report by the co-presidents and review of JCOMM-4

2.1 Co-presidents' report

2.2 Review of previous resolutions and recommendations of the Commission

2.3 Internal and external review of JCOMM

3. Review of decisions of the governing bodies of WMO and IOC related to the Commission and relationships with other programmes and bodies

3.1 WMO

3.2 IOC

3.3 Relationships to other bodies

4. Scientific and operational context and requirements of JCOMM

4.1 Climate research and services

4.2 Disaster risk reduction, early warning and operational services

4.3 Sustainable Development Goals

5. Marine meteorological and oceanographic services and forecasting systems

5.1 Services Forecasting System Programme Area vision, corresponding governance model and workplan in the next intersessional (including implementation of metocean services, future priorities and emerging activities for the Services Forecasting System Programme Area)

5.2 Support for disaster risk reduction particularly in coastal zones

6. Data management, exchange and information systems

6.1 JCOMM Data Management Strategy, Implementation Plan and workplan in the next intersessional

6.2 Data management practices, standard setting and documentation

6.3 Marine climatology and Marine Climate Data System

7. Integrated observing systems

7.1 Observations Coordination Group vision, corresponding governance model and workplan in the next intersessional

7.2 Implementation of the metocean observing system

7.3 Observing best practices and standards

8. Cross-cutting activities

8.1 Capacity development and technology transfer

8.2 Integrating marine meteorological and oceanographic services within the WMO and IOC Information Systems

8.3 Satellites

8.4 Weather, climate and fisheries

9. Review of technical regulations of interest to the Commission, including Guides and other technical publications

9.1 WMO *Manual on Marine Meteorological Services* (WMO-No. 558)

9.2 WMO *Guide to Marine Meteorological Services* (WMO-No. 471)

9.3 Guide to Operational Ocean Forecasting Systems

9.4 Other WMO and IOC regulatory and guidance material

10. Marine Technical Conference

10.1 Recommendations from the Marine Technical Conference

11. Gender and JCOMM

11.1 JCOMM activities and gender

11.2 Recommendations from the Women's Marine Leadership Workshop

12. JCOMM programme and planning

12.1 Updated JCOMM strategy and vision

12.2 Establishment of groups and expert teams

12.3 Workplan and resources

12.4 Date and place of the sixth session

13. Election of officers

14. Certificates of appreciation

15. Any other business and closure of the session

APPENDIX 2. RESOLUTIONS ADOPTED BY THE SESSION

Resolution 1 (JCOMM-5)

REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) Regulation 191 of the World Meteorological Organization General Regulations,

(2) The actions taken on the resolutions and recommendations adopted by the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) prior to its fifth session,

Considering that actions identified through previous resolutions and recommendations had mostly taken place and been completed, or had become ongoing activities of the teams and groups of JCOMM,

Decides:

(1) To keep in force the following recommendations:

Commission for Marine Meteorology (CMM)-XI	1 and 12
CMM-XII	4 and 6
JCOMM-I	2, 5 and 12
JCOMM-II	3, 5, 12 and 13
JCOMM-III	1, 2, 4, 5, 6 and 15
JCOMM-4	1,2, 3, 4 and 5;

(2) Not to keep in force other resolutions and recommendations adopted before the fifth session of JCOMM in 2017 unless otherwise stated.

Resolution 2 (JCOMM-5)

CONTINUATION OF JOINT WMO–IOC COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY AND COMMISSION FOR AGRICULTURAL METEOROLOGY JOINT TASK TEAM ON WEATHER, CLIMATE AND FISHERIES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) *Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology Fourth Session Executive Summary of the Abridged Final Report with Resolutions and Recommendations* (WMO-No. 1093), general summary, 5.4.7 – Developing climate

services for the fisheries community, which endorses the formation of the Joint WMO–IOC Commission for Oceanography and Marine Meteorology (JCOMM) and Commission for Agricultural Meteorology (CAgM) Task Team on Weather, Climate and Fisheries,

(2) WMO Resolution 4 (CAgM-16) – Working structure of the Commission for Agricultural Meteorology, which included this joint Task Team (Annex 4) in the CAgM structure,

Acknowledging the important collaboration and coordination of the Task Team with support from both JCOMM and CAgM experts,

Noting that the work of this Task Team focuses on improving weather and climate services for IOC and WMO Member States and Members and contributes to the implementation of the Global Framework for Climate Services,

Noting also the establishment of the Global Ocean Observing System (GOOS) Biology and Ecosystems Panel during the intersessional period following JCOMM-4, which focuses on providing a clearer understanding of ocean ecosystems through a sustained and targeted global observation system,

Considering the development of, and positive response to, the WMO proposal to the Food and Agriculture Organization of the United Nations (FAO) and the Regional Fisheries Management Organizations (RFMOs), requesting their support for improving marine meteorological observations through installation of relevant equipment on fishing vessels, and requesting RFMOs to inform fishing vessels about the value of monitoring buoys, and to develop communication strategies and efforts to reduce damage to the buoys,

Noting with satisfaction the progress of this Task Team since the fourth session of JCOMM and the sixteenth session of CAgM, including the publication of the special issue of *Climate Change* 119(1) – Climate and Oceanic Fisheries (2013) and the significant interactions with FAO and RFMOs,

Recognizing that the Task Team is new and that more work needs to be done in liaising with the RFMOs on implementing the above proposals and other issues, including data buoy vandalism,

Encourages the publication of a new special edition of *Climate Change* relative to coastal regions;

Decides that this joint Task Team will continue its work, based on the terms of reference cited in the annex to the present resolution, under the JCOMM Services and Forecasting Systems Programme Area;

Decides to liaise with CAgM on any modifications of the terms for reference of this joint Task Team based on the outcomes of the seventeenth session of CAgM in 2018;

Recommends that this joint Task Team, through WMO and IOC, coordinate with GOOS Biology and Ecosystems Panel on any complimentary aspects of their work to ensure clear communication and avoid any potential duplication;

Decides, in coordination with CAgM, to report the results of this Task Team to their respective management groups.

Annex to Resolution 2 (JCOMM-5)

JOINT WMO–IOC COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY AND COMMISSION FOR AGRICULTURAL METEOROLOGY JOINT TASK TEAM ON WEATHER, CLIMATE AND FISHERIES TERMS OF REFERENCE

The Team is tasked to:

1. Review the current data collection by JCOMM and others, to assess how these data meet the current needs of the ecosystem-approach to management in fisheries; as appropriate, work with other JCOMM expert teams to develop climate services for fisheries based on the available marine climate data;

2. Encourage oceanic and coastal fisheries management organizations to inform their members about the advantages of making, reporting and protecting relevant marine meteorological and ocean observations that are used by the various WMO and IOC observation and information systems;

3. Contribute to the understanding of the impacts of climate change on fisheries and marine aquaculture;

4. Identify risk assessment or management evaluation tools that incorporate climate variability in order to improve the ecosystem-approach to management of fisheries;

5. Identify how weather and climate tools can inform integrated coastal zone management relevant to coastal fisheries and marine aquaculture;

6. Explore the possibility of developing inputs of climate impacts on fisheries for the WMO Annual Statement on the Status of the Global Climate;

7. Promote the strengthening of climate services for fisheries under the GFCS agriculture/food security priority area by developing pilot projects with other international organizations;

8. Submit reports, including recommendations on follow-up actions, in accordance with timetables agreed by the Management Committees of CAgM and JCOMM.

Resolution 3 (JCOMM-5)

GENDER EQUALITY AND EMPOWERMENT OF WOMEN

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) WMO Resolution 59 (Cg-17) – Gender equality and empowerment of women, and the annex to Resolution 59 (Cg-17) – WMO Gender Equality Policy,

(2) WMO Decision 77 (EC-68) – WMO Gender Action Plan,

(3) The United Nations Educational, Scientific and Cultural Organization (UNESCO) Priority Gender Equality Action Plan, 2014–2021,

Acknowledging the outcomes of the Conference on the Gender Dimensions of Weather and Climate Services (Geneva, 5–7 November 2014), (*Conference Report – Conference on the Gender Dimensions of Weather and Climate Services* (WMO-No.1148)),

Noting with satisfaction that JCOMM is among the two technical commissions to have organized a women's leadership workshop prior to its session, in implementation of the WMO Gender Action Plan and the priority actions identified for 2016–2019,

Noting also the need expressed by participants of the above workshop for increased investment in female marine meteorologists and oceanographers through the creation of professional networks, capacity-building, increased female involvement in governance and management, and increased female participation in international scientific cooperation,

Observing that women are underrepresented in JCOMM working structures and that increased female participation is required to meet the 30% target set by the World Meteorological Congress at its seventeenth session within the context of the WMO Gender Equality Policy,

Recognizing the impacts of weather, water and climate on gender roles, especially in the event of disasters, and their implications for the provision of marine services,

Recommends that Members and Member States use the outcomes of the Conference on the Gender Dimensions of Weather and Climate Services as guidance and seek to identify as well as address the distinct needs of women and men in the provision of marine services, including their potentially different levels of access to information and capacity to act;

Invites JCOMM members to nominate more women as members of the JCOMM Management Committee, coordination groups and expert teams;

Requests the JCOMM Management Committee, in collaboration with the WMO Gender Focal Point and the women who participated in the Women's Marine Leadership Workshop:

(1) To devise strategies to increase the involvement of women in the work of JCOMM;

(2) To undertake steps to implement the WMO and UNESCO action plans on gender.

Resolution 4 (JCOMM-5)

THE JOINT WMO–IOC COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY 10-YEAR VISION

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) The discussions at the Seventeenth World Meteorological Congress on the need to foster marine meteorological services to address the evolving requirements of user communities at sea and in coastal zones,

(2) The IOC high-level objectives, in particular effective early warning systems and preparedness for tsunamis and other ocean-related hazards, and increased resilience to climate change and variability, and enhanced safety, efficiency and effectiveness of all ocean-based activities through scientifically founded services, and adaptation and mitigation strategies,

(3) WMO current priorities, in particular disaster risk reduction, implementation of the WMO Integrated Global Observing System and the development of climate services, as well as the development of a new WMO Strategic Plan to be approved by the World Meteorological Congress in 2019 with overarching priorities to reduce losses of life and property, build resilience to climate risk and enhance economic value from services,

Having considered the revised Joint WMO–IOC Commission for Oceanography and Marine Meteorology (JCOMM) Strategy 2012–2017 (A Strategy for JCOMM 2012–2017, JCOMM document MAN-11/BM.5.1),

Noting that Members and Member States need to address the needs of the metocean community and the advances of the research community in the implementation of observing networks and data management systems, and in the delivery of services,

Decides to authorize the JCOMM Management Committee and co-presidents to approve the JCOMM 10-year Vision after a one month review period to allow Members and Member States to provide input;

Requests the Management Committee:

(1) To contribute to a revision of the JCOMM terms of reference (see Annex 2 to WMO Resolution 14 (Cg-XIII) and IOC Assembly Resolution XX-12 – Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology) for consideration by the upcoming WMO Executive Council in 2018 and by the Eighteenth World Meteorological Congress and IOC Assembly in 2019;

(2) To write a strategy and implementation plan in line with the JCOMM 10-year Vision;

Requests Members and Member States to provide financial and human resources to accomplish JCOMM work plans;

Requests the IOC and WMO Secretariats to support the above work of the JCOMM Management Committee.

Resolution 5 (JCOMM-5)

MANAGEMENT COMMITTEE OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) Resolution 2 (JCOMM-4) - Management Committee of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology,

(2) WMO Resolution 2 (EC-64) – Report of the fourth session of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology, and IOC Decision EC-XLV/Dec. 3.2 (II) – Ocean observations and services,

(3) That the Seventeenth World Meteorological Congress decided to keep in force Resolution 24 (Cg-XVI) – Marine Meteorology and Oceanography Programme,

(4) The report of the co-presidents of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) at its fifth session,

Considering:

(1) The requirement of JCOMM to promote, coordinate and integrate marine meteorological and oceanographic programmes and activities,

(2) The contributions of JCOMM to the World Weather Watch (WWW), World Climate Programme (WCP), World Climate Research Programme (WCRP), Global Ocean Observing System (GOOS), Global Climate Observing System (GCOS), International Oceanographic Data and Information Exchange (IODE), Disaster Risk Reduction Programme (DRR), Global Framework for Climate Services (GFCS) and other major WMO and IOC Programmes,

(3) The need to coordinate the work of JCOMM with other appropriate international organizations and their subsidiary bodies, as well as with relevant non-governmental organizations and the private sector,

(4) The need for the work of JCOMM to be aligned with and contribute directly to the WMO Strategic Plan and the IOC Medium-term Strategy, and their expected results,

(5) The need for continued overall coordination of the work programme of JCOMM and for advice on matters referred to it by the governing bodies of WMO and IOC,

Decides:

(1) To re-establish a Management Committee with the following terms of reference:

(a) Review and prioritize the short- and long-term planning of the work programme of JCOMM and advise on its implementation;

(b) Take all necessary actions to ensure that the JCOMM strategy, work programme and operating plan are aligned with and contribute directly to the WMO Strategic Plan and the IOC Medium-term Strategy and their expected results, as well as with the respective operating plans;

(c) Assess the resources required for the implementation of the work programme, as well as approaches to identifying and mobilizing these resources;

(d) Coordinate and integrate the work of JCOMM, as implemented through the various subsidiary groups and expert teams;

(e) Coordinate and provide oversight for the capacity development and quality management activities undertaken within the three JCOMM programme areas, as appropriate;

(f) Ensure that the JCOMM requirements for satellite and other remotely sensed ocean data are properly documented and communicated to the appropriate mechanisms of WMO and IOC, and to the satellite system operators, as required;

(g) Provide guidance to the Satcom coordinator on satellite data telecommunication issues relevant to JCOMM programme areas;

(h) Coordinate and integrate the work of JCOMM, as appropriate, with that of the other WMO technical commissions, IOC major subsidiary bodies and other Programmes of WMO and IOC, and in particular initiate, coordinate and provide oversight for joint projects and activities with these bodies and programmes;

(i) Review the internal structure and working methods of JCOMM, including its relationship to other bodies, both internal and external to WMO and IOC, and develop proposals for modifications as required;

(j) Assess the implementation of activities and projects referred to JCOMM for action by WWW, WCP, GOOS, GCOS, IODE, DRR and other programmes;

(k) Ensure a close working relationship with the International Hydrographic Organization and the International Maritime Organization with respect to maritime safety and navigation warnings, and especially in relation to implementing new services, such as the Polar Code and marine competencies, and investigations for cost recovery methods;

(l) Investigate new ocean observation, data and service technologies that may result in savings for Members or Member States;

(m) Ensure the JCOMM WMO and IOC focal points maintain a close working relationship with each other, and with WMO and IOC, with the ultimate aim of enhancing communication of issues and solutions;

(2) That the co-presidents shall have the responsibility to jointly undertake the duties required of presidents of technical commissions of WMO and technical committees of IOC as defined in their respective regulations; these would include or be extended to include the following:

(a) In joint consultation, to guide and coordinate the activities of JCOMM and its groups intersessionally;

(b) In joint consultation, and with the assistance of the IOC and WMO Secretariats, to direct and approve intersessional actions including the creation and dissolution of expert groups, pending approval by the JCOMM in session;

(c) To carry out specific duties as prescribed by decisions of the governing bodies of WMO and IOC, as well as by the regulations of each organization;

(d) To report to the governing bodies of WMO and IOC at their regular sessions on the activities of JCOMM, as required;

(e) To ensure that the activities, recommendations and resolutions of JCOMM are consistent with the provisions of the WMO Convention, the IOC Statutes, the decisions of WMO and IOC governing bodies, and the regulations of both organizations;

(f) To liaise with presidents of WMO regional associations and chairpersons of GOOS regional alliances to ensure that regional requirements are taken into consideration when developing the work programme for JCOMM;

(3) That the Management Committee will be composed of:

(a) The two co-presidents of JCOMM: Ms Nadia Pinardi (Italy; IOC) and Mr Johan Stander (South Africa; WMO);

(b) The programme area coordinators: Mr Sergey Belov (Russian Federation), Mr Thomas Cuff (United States of America) and Mr Davide Legler (United States);

(c) Two capacity development coordinators: Ms Stella Aura (Kenya) and Mr Wei Zhao (China);

(4) That additional experts may be invited by the co-presidents, in consultation with the Secretary-General of WMO and the Executive Secretary of IOC, in the identified priority areas within the intersessional workplan of JCOMM;

(5) That senior representatives of GFCS, GOOS, GCOS, IODE and the IOC Working Group on Tsunamis and Other Hazards Related to Sea-level Warning and Mitigation Systems will also be invited to participate in Management Committee sessions to ensure full coordination of programmes and activities;

(6) That representatives of WMO technical commissions such as the Commission for Basic Systems, WMO regional associations, GOOS regional alliances and other bodies may be invited, as appropriate.

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Note: This resolution replaces Resolution 2 (JCOMM-4), which is no longer in force.

Resolution 6 (JCOMM-5)

OBSERVATIONS PROGRAMME AREA

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) Resolution 3 (JCOMM-4) – Observations Programme Area,

(2) IOC Resolution EC-XXXIII.9 – Global Sea-level Observing System,

(3) The *Fourteenth World Meteorological Congress Abridged Final Report with Resolutions* (WMO-No. 960), 3.4.4.13, concerning the Argo project,

(4) IOC Assembly Resolution XX-6 – The Argo project,

(5) IOC Assembly Resolution XXVI-8 – Strengthening and streamlining the Global Ocean Observing System,

(6) The report of the Chairperson of the Observations Coordination Group (OCG) to the Joint WMO–IOC Commission for Oceanography and Marine Meteorology (JCOMM) at its fifth session,

Considering:

(1) The need to maintain, improve, coordinate and integrate a comprehensive, in situ ocean observing system in response to stated requirements for marine data to support the World Weather Watch, World Climate Programme, World Climate Research Programme, Global Framework for Climate Services, Global Ocean Observing System (GOOS), Global Climate Observing System (GCOS) and marine services,

(2) The need to monitor new developments in marine observing technology and advise on their incorporation into operational observing networks, as appropriate,

(3) The need to coordinate the development and implementation of standardized, high-quality marine observing practices and instrumentation,

(4) The need to review continuously and provide advice on new marine telecommunications systems and procedures,

(5) The need to provide guidance to Members and Member States on technical aspects of marine observing systems,

(6) The need to identify and coordinate the provision of resources and logistic facilities for the deployment and servicing of marine observing platforms and instrumentation,

(7) The need to continuously monitor the performance and quality of marine observing systems and to assist in the implementation of remedial actions as necessary,

(8) The need to coordinate with appropriate bodies of the Commission for Basic Systems, the Commission for Instruments and Methods of Observation, GOOS and GCOS on marine instrumentation, observations networks and requirements for marine data,

Decides:

(1) To re-establish a JCOMM Observations Programme Area, with the following components:

(a) An OCG;

(b) The Data Buoy Cooperation Panel (DBCP);

(c) The Global Sea-level Observing System Group of Experts (GLOSS Group of Experts);

(d) A Ship Observations Team (SOT), whose work will be to continue to develop coordination and synergies among the existing ship-based panels, that is, the Ship-of-Opportunity Programme Implementation Panel (SOOP-IP) and the Voluntary Observing Ship (VOS) Panel;

(2) To maintain a close liaison and coordination with the Argo Steering Team, OceanSITES Project, International Ocean Carbon Coordination Project, Global Ocean Ship-based Hydrographic Investigations Programme, and ocean glider and high-frequency radar programmes;

(3) That the terms of reference for OCG, DBCP, the GLOSS Group of Experts and SOT shall be as given in the annex to the present resolution;

(4) That the general membership of OCG, DBCP, the GLOSS Group of Experts and SOT shall also be as given in the annex to the present resolution;

(5) To select, in accordance with WMO General Regulation 33 on establishing working groups and Rule 25 of the IOC Rules of Procedure:

(a) A Chairperson of OCG and Observations Programme Area coordinator: Mr David Legler (United States of America);

(b) A Chairperson of SOT: Mr Darin Figursky (United States);

(c) A Chairperson of SOOP-IP of SOT: Ms Rebecca Cowley (Australia);

(d) A Chairperson of the VOS Panel of SOT: Mr Henry Kleta (Germany);

(e) A coordinator on intercomparison activities: Mr Yongchao Pang (China);

Requests the Secretary-General of WMO and the Executive Secretary of IOC to invite relevant organizations and bodies to participate in the work of this programme area as appropriate.

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Note: This resolution replaces Resolution 3 (JCOMM-4), which is no longer in force.

Annex to Resolution 6 (JCOMM-5)

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE OBSERVATIONS COORDINATION GROUP AND TEAMS OF THE OBSERVATIONS PROGRAMME AREA

1. Observations Coordination Group

Terms of Reference

The Observations Coordination Group (OCG) shall:

(a) Keep under review, provide regular reports on, and advise on the effectiveness, coordination and operation of the Observations work programme, including implementation status, performance measured against requirements, delivery of raw data, marine telecommunications, measurement standards, logistics and resources;

(b) Provide advice to JCOMM and to Observations Teams on possible solutions for newly identified requirements, consulting, as appropriate, with relevant scientific groups, the Commission for Basic Systems (CBS), and the Commission for Instruments and Methods of Observation (CIMO);

(c) Coordinate with appropriate bodies to ensure JCOMM contribution towards the development of the WMO Integrated Global Observing System;

(d) Review in situ data requirements and recommend changes, as appropriate, taking into account the continuing development of satellite observations and their capabilities;

(e) Coordinate the development of standardized, high-quality observing practices and instrumentation and prepare recommendations for JCOMM;

(f) With concurrence of the co-presidents of JCOMM, establish and create expert teams, task teams, pilot projects, as appropriate, to undertake the work of the Observations Programme Area;

(g) Examine trade-offs and use of new and improved observation techniques/developments against: (i) relevant requirements for variables within the Global Climate Observing System (GCOS), Global Ocean Observing System (GOOS), the WMO CBS rolling review requirements and Global Observing System (GOS); and (ii) available resources;

(h) Provide general oversight to the JCOMM In Situ Observations Programme Support Centre – JCOMMOPS;

(i) Liaise with, and input to, CBS activities regarding the consolidated requirements database and operational satellites;

(j) Liaise with, and input to, CIMO activities regarding instruments and methods of observation;

(k) Liaise with, and input to, Global Ocean Observing System activities regarding development, implementation, and performance of JCOMM ocean-based observing;

(l) Encourage and coordinate capacity development requirements related to the Programme Area;

(m) Identify requirements on satellite data and information in the meteorological and ocean domains related to the Programme Area.

Membership

The Membership is selected to ensure an appropriate range of expertise, and to maintain appropriate geographical and gender representation.

The membership of the Observations Coordination Group, for the priority areas of metocean observations, will include:

(a) Observations Programme Area (OPA) coordinator (Observations Coordination Group Chairperson);

(b) Observations Coordination Group Vice-Chairpersons (Vice-Chairpersons for WIGOS/WIS, New Technologies, Standards and Best Practices, Data and Integration);

(c) Chairpersons of the Ship Observations Team (SOT), Data Buoy Cooperation Panel (DBCP), and Global Sea-level Observing System (GLOSS) Group of Experts;

(d) Representatives of the Argo Steering Team, International Ocean Carbon Coordination Project, OceanSITES, the Global Ocean Ship-based Hydrographic Investigations Programme, and from the OceanGliders and the HF Radar Program (jointly supported through GEO).

Additional experts may be invited as appropriate to lead the range of Observations Programme;

The OCG is authorized to develop the terms of reference for OCG Vice-Chairpersons.

Additional experts may be invited as appropriate to lead the range of Observation Programme Area activities, on a self-funded basis, and in general with no resource implications to JCOMM;

The Data Management Programme Area Coordinator as well as the Services and Forecasting Systems Programme Area coordinator will be invited to participate in Observations Coordination Group sessions, to ensure full coordination of cross-PA programmes and activities;

The JCOMM In Situ Observations Programme Support Centre (JCOMMOPS) will participate in the work and the meetings of the Coordination Group.

2. Ship Observations Team (SOT)

Terms of Reference

The Ship Observations Team shall:

(a) Respond to requirements for ship-based observational data (metadata) expressed by relevant international programmes and/or systems in support of marine services, and coordinate actions to implement and maintain the networks to satisfy these requirements;

(b) Provide continuing assessment of the extent to which those requirements are being met;

(c) Oversee and monitor the implementation of methodologies as determined by the scientific and operational communities for constantly controlling and improving the quality of data;

(d) Review marine telecommunication facilities and procedures for observational data collection, as well as technology and techniques for data processing and transmission, and propose actions as necessary for improvements and enhanced application;

(e) Coordinate Port Meteorological Officer (PMO) operations globally, propose actions to enhance PMO standards and operations, and organize PMO and observers training, and greater PMO collaboration;

(f) Review, maintain and update as necessary technical guidance material relating to ship observations and PMOs;

(g) Liaise and coordinate as necessary with JCOMM Programme Areas and expert teams, relevant Technical Commissions , executive bodies, working groups, and Global Climate Observing System (GCOS), Global Ocean Observing System (GOOS), as well as with other interested parties, such as the International Maritime Organization (IMO) and other relevant international organizations;

(h) Participate in the planning activities of the appropriate observing system experiments and major international research programmes as the specialist group on meteorological and oceanographic observations based on board ships;

(i) Seek new opportunities for deploying and/or recovering various kinds of measuring devices as recommended by the relevant panels and widely publicize those opportunities;

(j) Develop as necessary new pilot projects and/or operational activities and establish new specialized panels as required;

(k) Carry out outreach, capacity development and other activities as agreed by participating Members/Member States to implement and operate the SOT programme and to promote and expand it internationally, seek collection of third-party data from ships, and collaborate with the industry in the view to enhance the collection of data from ships;

(l) Develop improved real-time feedback to volunteer ships regarding the quantity and quality of the observations that they submit and that are inserted on the GTS;

(m) SOT may establish an Executive Board to execute SOT business during SOT intersessional period;

(n) Assist IHO in its mission to collect bathymetric data.

Terms of Reference of Component Panels to the SOT

Voluntary Observing Ship (VOS)

The Voluntary Observing Ship (VOS) Panel shall:

(a) Review, recommend and coordinate the implementation of new and improved specialized shipboard meteorological instrumentation, siting and observing practices, as well as of associated software;

(b) Support the development and maintenance of new pilot projects;

(c) Oversee the upgrade of ships to VOS Climate standard, and encourage other new ships to be recruited to VOS;

(d) Develop and implement activities to optimize ship inspections and recruitment, including promotional brochures and training videos;

(e) Prepare annually a report on the status of VOS operations, data availability and data quality.

Ship-of-Opportunity Implementation Panel (SOOPIP)

The Ship-of-Opportunity Implementation Panel (SOOPIP) coordinates the installation and deployment of instrumentation from Ships of Opportunity that travel in fixed transects, and in particular coordinates the implementation of regional and basin-wide instrumentation that measure physical, chemical and biological parameters, such as XBTs, TSGs, and CPR. Its terms of reference are to:

(a) Implement, maintain, and monitor specialized shipboard instrumentation and observing practices relevant to the SOOPIP;

(b) Coordinate the exchange of recommended practices, and technical and developmental information about oceanographic instrumentation relevant to the SOOPIP;

(c) Ensure the distribution of available programme resources to ships to meet the recommended sampling network in the most efficient way;

(d) Ensure the transmission of SOOP data to the GTS and relevant data centres is are carried out according to operational and scientific requirements;

(e) Provide guidance and assistance to the SOT Chairperson and SOT technical coordinator to produce, appropriate inventories, monitoring reports and analyses, performance indicators, implementation plans and information exchange facilities;

(f) Where relevant, serve as a platform for other observational programmes;

(g) Maintain close communications with the scientific community and periodically meet and discuss ongoing research performed with observations relevant to SOOPIP;

Membership of Ship Observations Team (SOT)

The SOT will be led by Chairperson and vice-Chairperson of the Ship Observations Team, selected by the Commission.

The SOT membership includes Chairpersons and Vice-Chairpersons of the SOOPIP and Voluntary Observing Ship Panel, selected by the Commission.

The remaining membership of the full team is open, comprising operators of VOS and SOOP, representatives of monitoring centres, data management centres and bodies, representatives of the International Mobile Satellite Organization (IMSO) and other communications satellite systems, representatives of manufacturers, representatives of science advisory bodies and users as appropriate.

The JCOMM In Situ Observing Platform Support Centre will participate in the work and the meetings of the Ship Observations Team.

3. Data Buoy Cooperation Panel

Terms of Reference

The data buoy observations team, otherwise known as the Data Buoy Cooperation Panel (DBCP) operates with its own governance, whereby their Terms of Reference is kept under review by the Panel. However, any changes proposed are to be considered by the Management Committee, with a view to their approval by the co-presidents on behalf of the Commission.

Membership

Membership is open to those involved in data buoy and related activities. JCOMMOPS will participate in the work and the meetings of the Panel.

4. Global Sea-level Observing System Group of Experts

Terms of Reference

The sea-level observations team, otherwise known as the Global Sea-level Observing System (GLOSS) Group of Experts, operates with its own governance, with an existing Terms of Reference determined by the IOC Executive Council.

Membership

The GLOSS Group of Experts and GLOSS Scientific Sub-Group is already existing, and determined by the IOC through the separate governance structure.

Resolution 7 (JCOMM-5)

DATA MANAGEMENT PROGRAMME AREA

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) Resolution 4 (JCOMM-4) – Data Management Programme Area,

(2) The report of the Chairperson of the Data Management Programme Area to the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) at its fifth session,

(3) The report of the twenty-fourth session of the Intergovernmental Oceanographic Commission (IOC) Committee on the International Oceanographic Data and Information Exchange (IODE),

Considering:

(1) The need to implement, maintain and make available to users a fully integrated ocean and atmosphere data system,

(2) The requirement for the timely delivery of integrated data and associated metadata,

(3) The need to develop and maintain monitoring, evaluation and follow-up procedures,

(4) The need for common practices including quality control, metadata, analysis, data flow and data exchange standards, formats and procedures,

(5) The need to identify and as appropriate, rescue, digitize and archive historical data,

(6) The need to collaborate and coordinate closely with other programmes and bodies, both within and outside WMO and IOC, namely the Commission for Basic Systems (CBS), Commission for Climatology (CCl) and IODE,

(7) The capabilities and experience of existing data management centres, systems and programmes, both within and outside WMO and IOC,

(8) The need to develop and/or strengthen national data management capacity, especially in developing countries,

(9) The successful ongoing collaboration between JCOMM and IODE,

(10) The importance of assuring proper migration to table-driven codes, and having JCOMM requirements taken into account and regularly submitted to CBS,

Agrees that, to the extent possible, the work of the Data Management Programme Area should be implemented through specific, clearly defined, time-limited projects;

Decides:

(1) To re-establish a Data Management Programme Area with the following components:

   (a) A Data Management Coordination Group (DMCG);

   (b) An Expert Team on Data Management Practices (ETDMP), co-sponsored by IODE;

   (c) An Expert Team on Marine Climatology (ETMC);

   (d) A new Inter-programme Expert Team on Integrated Marine Meteorological and Oceanographic Services within WMO and IOC Information Systems (IPET-MOIS) as outlined in Decision 36 (JCOMM-5) and in document JCOMM-5/INF 8.2;

(2) That the terms of reference of DMCG and the expert teams shall be as given in the annex to the present resolution;

(3) That the general membership of DMCG and the expert teams shall also be as given in the annex to the present resolution;

(4) To select, in accordance with WMO General Regulation 33 on establishing working groups and Rule 25 of the IOC Rules of Procedure, the following experts to serve as members of DMCG:

   (a) A Chairperson of DMCG and Data Management Programme Area coordinator: Mr Sergey Belov (Russian Federation);

   (b) After consultation with the co-chairpersons of IODE, a Chairperson of ETDMP: Ms Alessandra Giorgetti (Italy);

   (c) A Chairperson of ETMC: Mr Zhiqiang Gong (China);

   (d) A Chairperson of IPET-MOIS, Mr Rabia Merrouchi (Morocco) and a Vice-Chairperson, Mr Yulong Liu (China);

   (e) A coordinator on table-driven codes (nomination to be made by the JCOMM Management Committee);

(5) To select, in accordance with WMO General Regulation 33 on establishing working groups and Rule 25 of the IOC Rules of Procedure, experts to serve as members of ETMC, ensuring a vice-chair, and six core members (including the vice-chair); self-funded members may be appointed;

(6) To select, in accordance with WMO General Regulation 33 on establishing working groups and Rule 25 of the IOC Rules of Procedure and in consultation with IODE, eight experts (core members) to serve as members of ETDMP (four of whom will be selected by IODE and four by JCOMM); self-funded members can also be appointed;

Requests the Secretary-General of WMO and the Executive Secretary of IOC to invite CBS, CCl, IODE, directors of relevant centres of the World Data System and other relevant organizations and bodies to participate in the work of this programme area as appropriate.

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Note: This resolution replaces Resolution 4 (JCOMM-4), which is no longer in force.

Annex to Resolution 7 (JCOMM-5)

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE COORDINATION GROUP AND TEAMS OF THE DATA MANAGEMENT PROGRAMME AREA

1. Data Management Coordination Group

Terms of reference

The Data Management Coordination Group (DMCG) shall:

(a) Maintain a data management plan for JCOMM that identifies, assesses and specifies priorities and actions for the Data Management Programme Area addressing issues relevant to both real-time and delayed-mode marine meteorological data management;

(b) In concurrence with the co-presidents of JCOMM and the co-chairs of the International Oceanographic Data and Information Exchange (IODE), establish and create expert teams, task teams, and pilot projects, as appropriate, to undertake the work of the Data Management Programme Area;

(c) Ensure collaboration, appropriate coordination and liaison with IODE as well as with the Commission for Basic Systems (CBS) and other relevant bodies and activities external to WMO and IOC;

(d) Keep under review, assess and coordinate the adoption of appropriate new information technology;

(e) Establish and maintain cooperation with science programmes and assist with their data management activities, as appropriate;

(f) Provide advice and feedback to users of the Data Management Programme Area functions, through the appropriate JCOMM Programme Area, through IODE directly;

(g) Identify capacity development requirements related to the Programme Area and, as appropriate, coordinate activities to address these requirements;

(h) Identify satellite data and information related to the Programme Area.

Membership

The membership of DMCG is selected to ensure a range of expertise, and to maintain an appropriate geographical and gender representation,

The membership of the DMCG, for the priority areas of metocean data management, will include:

(a) Data Management Programme Area Coordinator (Chairperson of the DMCG);

(b) Chairpersons of the: Expert Team on Data Management Practices (ETDMP), Expert Team on Marine Climatology (ETMC), and the Inter-Programme Expert Team for Integrated Marine Meteorological and Oceanographic Services within WMO and IOC Information Systems (IPET-MOIS);

(c) IODE Co-Chairpersons;

(d) Up to four additional experts with experience in the priority areas of oceanography and marine meteorology data management in the DMCG workplan;

Additional experts may be invited as appropriate, with the concurrence of the co-presidents of the Commission, on a self-funded basis, and in general with no resource implications to JCOMM.

2. Expert Team on Data Management Practices (ETDMP)

Terms of reference

The JCOMM/IODE Expert Team on Data Management Practices, in close collaboration with JCOMM Programme Areas, Commission for Basic Systems subsidiary bodies, IODE Management Group and related experts, shall:

(a) Manage the process of adopting and documenting standards and best practices to be used in IODE-JCOMM data management through the Ocean Data Standards Process;

(b) Assist in the further integration of the IODE Ocean Data Portal, with other IODE projects (OBIS,GODAR/WDC, GTSPP, GOSUD),with IODE GDACS, NODCs, ADUs and with other ocean data systems(SeaDataNet, IMOS, EOOS, EMODnet), their interoperability with the WMO Information System (WIS), and their capacity development activities to ensure full participation of Members/Member States;

(c) Assist with the development, review and update the Marine Climate Data System (MCDS) strategy, implementation plan and performance indicators in the next two years for achieving the Vision for a new MCDS;

(d) In concurrence with the co-presidents of JCOMM, the Chairperson of the JCOMM DMCG and IODE Management Group, establish task teams and pilot projects, as necessary, to undertake the work of the Expert Team on Data Management Practices;

(e) Direct and coordinate the activities of the task teams and pilot projects referred to under (d);

(f) Provide advice to the IODE and DMCG and other groups of JCOMM, as required;

(g) Liaise and collaborate with other groups as needed, to ensure access to required expertise, appropriate coordination and to avoid duplication.

Membership

The Membership is selected to ensure a range of expertise and to maintain an appropriate geographical and gender representation, and includes:

(a) Up to five experts selected by JCOMM, including the chairperson, selected from Members/Member States with an appropriate geographical and gender representation;

(b) Up to four experts with relevant expertise based on the current workplans of the Task Teams and Projects established by the Expert Team on Data Management Practices, selected by IODE of IOC;

(c) One Co-Chairperson of the IOC Committee on IODE;

(d) The representative of IPET-MOIS;

Additional experts may be invited as appropriate, with the concurrence of the co-presidents of the Commission, on a self-funded basis, and in general with no resource implications to JCOMM.

Representatives of JCOMM Programme Areas, the IODE Committee, and other expert bodies may be invited as appropriate with the concurrence of the co-presidents of JCOMM and with no resource implications to the Commission.

Representative(s) of the Expert Team on Marine Climatology (ETMC) should be invited, in order to ensure close collaboration and cooperation across the DMPA.

3. Expert Team on Marine Climatology (ETMC)

Terms of reference

The Expert Team on Marine Climatology, in close collaboration with IOC-IODE, the Global Ocean Observing System, Global Climate Observing system, Commission for Climatology and Commission for Basic Systems subsidiary bodies and related experts, shall:

(a) Determine procedures and principles for the development and management of global and regional oceanographic and marine meteorological climatological datasets;

(b) Review and assess the climatological elements of the Commission, including the operation of the Marine Climate Data System (MCDS) and its centres, and the development of required oceanographic and marine meteorological products;

(c) Review the Global Ocean Observing System (GOOS) and Global Climate Observing System (GCOS) requirements for climatological datasets, taking account of the need for quality and integration;

(d) In close cooperation with IODE and other appropriate partners such as the ICSU World Data System, to develop, review and update the MCDS strategy, implementation plan and performance indicators in the next two years for achieving the Vision for a new MCDS;

(e) Develop procedures and standards for data assembly and the creation of climatological datasets, including the establishment of dedicated facilities and centres;

(f) Collaborate and liaise with other groups as needed to ensure access to expertise and ensure appropriate coordination;

(g) Keep under review and update, as necessary, relevant technical publications in the area of oceanographic and marine meteorological climatologies;

(h) Collaborate with IODE concerning historical Ocean Observations;

(i) Keep under review and provide guidance as appropriate on the operations of the Global Digital Sea Ice Data Bank (GDSIDB), in collaboration with ETSI.

Membership

The Membership is selected to ensure a range of expertise and to maintain an appropriate geographical and gender representation, and includes:

(a) Up to eight experts, including the chairperson, selected from Members/Member States, representative of the range of responsibilities of the Expert Team.;

(b) Additional representatives from MCDS centres, from the Services and Forecasting Systems Programme Area's Expert Teams on Disaster Risk Reduction (ETDRR) and on Sea Ice (ETSI), and from relevant projects and subsidiary bodies of IODE of IOC, as required, in consultation with the co-presidents of JCOMM;

Additional experts may be invited as appropriate, with the concurrence of the co-presidents of the Commission, on a self-funded basis, and in general with no resource implications to JCOMM.

Representatives of JCOMM Programme Areas and of other expert bodies may be invited, as appropriate, with the concurrence of the co-presidents and with no resource implications to the Commission.

4. Inter-programme Expert Team on Integrated Marine Meteorological and Oceanographic Services within WMO and IOC Information Systems (IPET-MOIS)

The mission of IPET-MOIS is to define a process for JCOMM to endorse centres providing Marine Meteorological and Oceanographic services and to guide those centres in their participation in (i) the WMO Information System (WIS) and (ii) the future IOC Ocean Data Information System (ODIS).

Terms of reference

IPET-MOIS shall:

(a) Identify marine meteorological and oceanographic centres that could be endorsed by JCOMM to contribute to ODIS and WIS,

(b) Develop technical specifications for centres providing marine and oceanographic services and define a process to be used by JCOMM to endorse such centres and to monitor their compliance with those specifications,

(c) Contribute to the development of the IOC of UNESCO Ocean Data and Information System (ODIS),

(d) Provide guidance on how to improve interoperability of marine meteorological and oceanographic data and information systems and enhance data exchange,

(e) Provide the necessary technical support, including the provision of guidance documents, to the designated centres in order to prepare the submission, demonstration, assessment and endorsement process,

(f) On behalf of JCOMM be responsible for assessment of candidate centres, arrange and evaluate demonstrations; and monitor compliance of centres with relevant IOC and WMO technical specifications,

(g) Liaise closely with the Commission for Basic Systems (CBS) WMO Information System (WIS) expert teams and in particular the Expert Team on Centre Audit/ Certification (ET-CAC) during all phases of the WIS certification process ,

(h) Report to DMCG and liaise with the Services and Forecasting Systems (SCG) and Observations (OCG) Coordination Groups and relevant expert teams and Panels to make sure their requirements are being considered,

(i) Function as the JCOMM Focal point for the interface with WIS and future ODIS for the Management Committee.

Membership

The membership of the Inter-Programme Expert Team for Integrated Marine Meteorological and Oceanographic Services within WMO and IOC Information Systems (IPET-MOIS) is selected to ensure a range of expertise and to maintain an appropriate geographical and gender representation, and will include:

(a) Up to eight experts, including the chairperson, selected from Members/Member States, representative of the range of responsibilities of the Expert Team;

(b) Additional representatives from the responsible members of the Commission for Basic Systems (CBS) WMO Information System (WIS) Expert Teams on Centre Audit/ Certification (ET-CAC) and WIS Centres (ET-WISC), and from relevant projects and subsidiary bodies of IODE of IOC, as required, in consultation with the co-presidents of JCOMM;

Additional experts may be invited as appropriate, with the concurrence of the co-presidents of the Commission, in general with no resource implications to JCOMM.

5. Coordinator on table-driven codes

Terms of reference

The purpose of the TDC coordinator is to coordinate the development and evolution of the use of table-driven code forms (TDCs) within JCOMM, and to coordinate their implementation with WMO commission for Basic Systems(CBS) and its applicable expert teams, including on Codes Maintenance (IPET-CM) and on Metadata and Data Interoperability (IPET-MDI). Specifically, the coordinator will carry out the following tasks:

(a) Liaise with appropriate representatives of groups using the TDCs to ensure their present and future needs are met;

(b) Review and evolve existing templates or new forms, whether actively used or being proposed, to meet the objectives of:

  (i) Using the same form, as appropriate, considering intrinsic characteristics of original data forms and reporting procedures, for data and metadata when reporting the same variable in different templates;

  (ii) Ensuring metadata necessary to real-time interpretation of the observations are carried with the data;

  (iii) Inserting the facility to handle new variables as they become necessary in a manner consistent with objectives a and b;

(c) Assess any proposed or enacted changes in TDCs for their impact on the climate record in consultation with the Expert Team on Marine Climatology (ETMC);

(d) Coordinate with CBS and its expert teams on TDC issues (including preparing documentation for presentation to the IPET-CM so as to get approval of the new or modified TDCs);

(e) Report progress to the Chairperson of DMCG.

Resolution 8 (JCOMM-5)

SERVICES AND FORECASTING SYSTEMS PROGRAMME AREA

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) Resolution 5 (JCOMM-4) – Services and Forecasting Systems Programme Area,

(2) The report of the co-presidents of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) at its fifth session,

(3) The report of the Chairperson of the Services Programme Area to JCOMM at its fifth session, especially in relation to Decision 16 (JCOMM-5) and document JCOMM-5/INF 5.1,

Considering:

(1) The continuing and expanding requirements of marine users for marine meteorological and oceanographic services and information,

(2) The need to ensure that the services provided to users meet these requirements, including in terms of timeliness and quality,

(3) The need to keep under review and to respond to the requirements of Members and Member States for guidance in the implementation of their duties and obligations with regard to marine services, in particular those specified in the *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I – Global Aspects,

(4) The need to monitor closely the operations of the International Maritime Organization (IMO)–WMO Worldwide Met-Ocean Information and Warning Service (WWMIWS), products of which are distributed via elements of the Global Maritime Distress and Safety System, as well as the metocean support services for Marine Environmental Emergency Response, to develop modifications to the systems as necessary and to assist Members and Member States as required,

(5) That METAREA coordinators are responsible for coordinating the provision of WWMIWS for their METAREA and that METAREA coordinators work closely with NAVAREA coordinators who have similar responsibilities for providing the World-Wide Navigational Warning Service,

(6) The need to guide and coordinate developments in the preparation and dissemination of ocean products and services,

(7) The need to coordinate closely with other programmes of WMO and IOC (World Weather Watch, World Climate Programme, Global Ocean Observing System, Global Climate Observing System, Disaster Risk Reduction, Global Framework for Climate Services, Global Cryosphere Watch, and the like), as well as with other organizations such as IMO, the International Hydrographic Organization (IHO), International Mobile Satellite Organization (IMSO) and International Chamber of Shipping (ICS) in the provision of marine services and information,

(8) The rationale outlined in Decision 16 (JCOMM-5) and the background provided in document JCOMM/INF. 5.1,

Agrees that, to the extent possible, the work of the Services and Forecasting Systems Programme Area (SFSPA) should be implemented through specific, clearly defined, time-limited projects;

Decides:

(1) To implement a restructured JCOMM SFSPA as outlined in Decision 16 (JCOMM-5) with the following components:

(a) An SFSPA Coordination Group inclusive of vice-chairpersons for specific interests;

(b) A Committee for WWMIWS;

(c) An Expert Team on Disaster Risk Reduction (ETDRR);

(d) An Expert Team on Sea Ice (ETSI);

(e) An Expert Team on Operational Ocean Forecasting Systems (ETOOFS);

(f) An Expert Team on Marine Environmental Emergency Response (ETMEER);

(g) National Marine Services focal points;

(2) That the terms of reference of the SFSPA Coordination Group and the expert teams shall be as given in the annex to the present resolution;

(3) That the general membership of the SFSPA Coordination Group and the expert teams shall also be as given in the annex to the present resolution;

(4) To select, in accordance with WMO General Regulation 33 on establishing working groups and Rule 25 of the IOC Rules of Procedure:

(a) A Chairperson of the SFSPA Coordination Group (who will also be the SFSPA coordinator): Mr Thomas Cuff (United States of America); and a Vice-Chairperson of metocean services (regulatory material): Mr Nick Ashton (United Kingdom of Great Britain and Northern Ireland); three vice-chairperson positions remain open;

(b) A Chairperson of the Committee for WWMIWS: Mr Neal Moodie (Australia);

(c) A Chairperson of ETDRR: Mr Kevin Horsburgh (United Kingdom); and a Vice-Chairperson: Ms Nelly Florida Riama (Indonesia);

(d) A Chairperson of ETSI: Mr Vasily Smolyanitsky (Russian Federation);

(e) A Chairperson of ETOOFS: Mr Pierre Bahurel (France);

(f) A Chairperson of ETMEER: Mr Giovanni Coppini (Italy);

(g) A coordinator on satellite data requirements (nominations to be made by the JCOMM Management Committee);

(5) That the SFSPA Coordination Group is authorized to develop the terms of reference for SFSPA Vice-Chairpersons and any task teams proposed;

(6) To select, in accordance with WMO General Regulation 33 on establishing working groups and Rule 25 of the IOC Rules of Procedure, eight experts to serve as core members (inclusive of the chairperson and vice-chairperson(s)), for each of the following:

(a) The Committee for WWMIWS;

(b) ETDRR;

(c) ETMEER;

(d) ETOOFS;

(e) ETSI;

Additional self-funded members can be appointed for each component;

Decides to update the terms of reference for the METAREA coordinators who will be instrumental in delivering the services required under the Committee for WWMIWS;

Requests the Secretary-General of WMO and the Executive Secretary of IOC to invite IMO, IHO, ICS, International Federation of Shipmasters' Associations, IMSO, Food and Agriculture Organization of the United Nations and other relevant organizations and bodies to participate in the work within this Programme Area as appropriate.

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Note: This resolution replaces Resolution 5 (JCOMM-4), which is no longer in force.

Annex to Resolution 8 (JCOMM-5)

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE COORDINATION GROUP AND TEAMS OF THE SERVICES AND FORECASTING SYSTEMS PROGRAMME AREA

1. Services and Forecasting Systems Programme Area (SFSPA) Coordination Group

Terms of reference

The Services and Forecasting Systems Coordination Group, in close collaboration with Commission for Basic Systems, the International Maritime Organization (IMO), the International Hydrographic Organization (IHO), Global Ocean Observing System, Global Climate Observing System, Disaster Risk Reduction and other subsidiary bodies and related experts, shall:

(a) Keep under review and ensure the effectiveness, coordination and operation of the Services work programme, including performance with respect to timeliness, standards, quality and relevance to established user requirements;

(b) Through the assembly of requirements identified by specialist service groups, and other PAs of JCOMM, provide advice on Services and Forecasting Systems PA activities that need to be changed, implemented or discontinued;

(c) Develop and enhance interfaces to representative user groups to monitor the strength and weaknesses of existing Services and Forecasting Systems PA activities;

(d) With the concurrence of the co-presidents of JCOMM, establish and create expert teams, Task Teams, Demonstration Projects and appoint Rapporteurs, as appropriate, to undertake the work of the Services and Forecasting Systems PA;

(e) Ensure effective coordination and cooperation with groups and bodies in the area of service provision, including other PAs of the Commission, other WMO Commissions (e.g. Commission for Basic Systems, Commission for Hydrology) and agencies such as IMO and IHO;

(f) Assess and recommend capacity development tools/systems in accordance with identified requirements;

(g) Identify and maintain the requirements for in situ and satellite data and information for metocean products and services and monitor its implementation.

Membership

The membership of the Services and Forecasting Systems Coordination Group is selected to ensure a range of expertise, and to maintain an appropriate geographical and gender representation, for the priority areas of metocean services, and will include:

(a) Services and Forecasting Systems Programme Area coordinator (the SFSPA Chairperson);

(b) Vice-Chairpersons for: Metocean Services Regulatory Material, WMO Systems, IOC Ocean Systems, Quality Management and Competency;

(c) Chairperson of the Worldwide Met-Ocean Information and Warning Service (WWMIWS) Committee;

(d) Chairpersons of four expert teams under the Programme Area;

(e) Chairpersons of Task Teams (including Task Team for Marine Competency, and Task Team for Weather, Climate and Fisheries), as required and/or determined by JCOMM, for the Teams' lifetime;

(f) Chairpersons of the CIFDP Project Steering Group, for the Group's lifetime;

(g) Experts nominated and selected by JCOMM, on the priority areas of the metocean services identified by WMO and IOC;

Additional experts representing the range of priority activities of the Programme Area may be invited as members, as appropriate, on a self-funded basis.

Representatives of other JCOMM PAs and of other expert bodies may be invited as appropriate, with the concurrence of the co-presidents, and in general with no resource implications to JCOMM.

2. Committee for the Worldwide Met-Ocean Information and Warning Service (WWMIWS)

The Committee for the Worldwide Met-Ocean Information and Warnings Service (Committee for the WWMIWS) acts as the interface between the JCOMM SFSPA and the users of the services. In particular, it has responsibility for monitoring and reviewing the provision of meteorological Maritime Safety Information (MSI) within the GMDSS and also for other vessels not covered by the SOLAS Convention.

The Committee itself is a team within JCOMM which works very closely with the International Maritime Organization (IMO) and will feed directly into the IMO's Maritime Safety Committee, and Navigation, Communication and Search and Rescue Subcommittee. The WWMIWS Committee will work closely with the World-Wide Navigation Warning System (WWNWS) Subcommittee, coordinated by IHO (International Hydrographic Organization), for the provision of MSI for navigational warnings.

Terms of reference

The WWMIWS Committee, in close collaboration with international organizations and other entities representing users' interests, such as the IMO, IHO, ICS, IMSO, and other concerned organizations and bodies on maritime safety, including the GMDSS, shall:

(a) In support of the Maritime Safety:

  (i) Monitor and review the operations of marine broadcast systems, including for the GMDSS and others for vessels not covered by the SOLAS Convention;

  (ii) Monitor and review technical and service quality standards for meteorological and oceanographic maritime safety information, particularly for the GMDSS, including setting standards and requirements for GDPFS Centres supporting marine services (eg. parameters, verification, formats), and provide assistance and support to Members/Member States as required;

  (iii) Propose actions as appropriate to meet requirements for international coordination of meteorological and related communication services;

  (iv) Oversee technical advice and guidance material on Marine Meteorological Services, including keep under review the Manual on Marine Meteorological Services (WMO-No. 558), the Guide on Marine Meteorological Services (WMO-No. 471) and Weather Reporting - Information for Shipping (WMO-No. 9, Volume D);

  (v) Maintain oversight of the display of SafetyNet and Navtex MSI messages and WWWMIS website hosted by Météo-France; Plan and coordinate the redesign of WWWMIS website scheduled for 2018 and its regular updates;

(b) Monitor requirements, by ensuring feedback from the user communities is obtained through appropriate and organized channels and applied to improve the relevance, effectiveness and quality of services;

(c) Liaise with and gather input from technical commission expert teams on all aspects of sea ice, sea state, storm surge and ocean circulation relevant to the operation and improvement of maritime safety services;

(d) Ensure effective coordination and cooperation with concerned organizations, bodies and Members/Member States on maritime safety issues and marine accident emergency support needs;

(e) Assist Members/Member States in the implementation of WMO strategic initiatives to support service delivery, including Marine Forecaster Competency Framework, Quality Management, Capacity Development, education and awareness programs, and performance reporting;

(f) Develop, in accordance with existing standards (e.g. from IHO), graphical/numerical product specification for marine parameters, foremost wind, sea state, and currents for use in an ECDIS;

(g) Provide advice to the Services and Forecasting Systems Coordination Group and other JCOMM groups, as required, on issues related to maritime safety services;

(h) Continue to liaise closely with WMO National Marine Service Focal Points, the IHO WWNWS Subcommittee, and relevant organizations, such as IMO, IHO, ICS, IMSO, EMSA, IUMI etc., to coordinate and improve maritime safety services.

Membership

(a) The Membership will consist of all METAREA Coordinators (including chairperson and vice-chairperson), selected to ensure an appropriate range of expertise in the provision of services for maritime safety and efficiency;

(b) The close links with IMO and IHO being an integral part of the Committee's function, IMO and IHO will be invited to nominate a member to the Committee;

(c) Additional experts and other National Marine Services Focal Points may be invited as appropriate, representative of a range of activities related to the implementation of services for maritime safety and efficiency, as well as representatives of international organizations and other entities representing users' interests, such as the ICS, IMSO, and other user groups, on a self-funded basis, and in general with no resource implications to JCOMM.

3. Expert Team on Disaster Risk Reduction (ETDRR)

Terms of reference

(a) Act as a focal point for WMO, IOC and for JCOMM for technical advice concerning all coastal and marine hazards in support of the WMO Disaster Risk Reduction (DRR) Roadmap, and relevant IOC Programmes;

(b) Support the activities of the WMO DRR Focal Points for Regional Associations, Technical Commissions and Technical Programs (DRR FP RA-TC-TP), IOC TOWS-WG, and IOC Intergovernmental Coordination Groups for Tsunami (and other coastal hazards) and provide the JCOMM representation to that group;

(c) Promote and disseminate technical advice and guidance on wind wave, storm surge, and tsunami forecasting as part of coastal multi-hazard warning systems, in support of the Sendai Framework for DRR 2015-2030 and in support of United Nations Sustainable Development Goals (SDGs);

(d) Provide assistance, advice and - where appropriate - capacity development to Member States, and in particular developing countries and Small Island Developing States, on all issues of coastal and marine hazards and improved multi-hazard forecasting systems, including supporting efforts to develop effective regional multi-hazard early warning systems;

(e) Coordinate, steer and initiate actions both within IOC and WMO and also with other international drivers to provide a coherent approach to coastal and marine hazard DRR;

(f) Support other international bodies (e.g. Global Framework for Climate Services, Global Ocean Observing System) through the provision of advice and recommendations concerning the observation, interpretation and projection of coastal and marine hazards;

(g) Liaise and coordinate with the other expert teams of the Services and Forecasting Systems Programme Area (SFSPA), other task teams within WMO, and the WMO Disaster Risk Reduction Services Division on all aspects of coastal and marine hazards with relevance to DRR.

The Expert Team will support IOC and WMO requirements through its expert capability and also – where appropriate – through specific, measurable and achievable time-limited projects.

Membership

The membership will consist of a core membership of up to eight members, with a range of technical expertise and will maintain a global geographical and gender representation. There will be a chairperson, and ideally at least one member will have experience of social science issues in a DRR context. Additional experts may be invited as appropriate, on a self-funded basis, and in general with no resource implications to JCOMM.

4. Expert Team on Sea Ice (ETSI)

Terms of reference

(a) Coordinate and advise Members/Member States on products and services required by user communities in sea ice areas, to support navigation, coastal and offshore activities, monitoring of the sea ice cover;

(b) Provide advice to the WWMIWS Committee and ETMEER on all aspects of impacts of sea ice relevant to maritime safety, marine pollution response and search and rescue services;

(c) Maintain linkages with ETOOFS and ETDRR on the relevant sea ice modelling and forecasting techniques;

(d) Maintain linkages with projects and programmes related to the role of sea ice in the global climate system, including through the WCRP and the Global Cryosphere Watch;

(e) Develop technical advice and guidance material, software exchange, specialized training and other appropriate capacity-building activities with regard to sea ice observations, analysis and services, and provide assistance to Members/Member States as required;

(f) Keep under review and provide guidance as appropriate on the operations of the Global Digital Sea Ice Data Bank (GDSIDB), in collaboration with ETMC;

(g) Maintain and develop formats, nomenclatures and procedures for sea ice data and information exchange as well as relevant terminology, coding and mapping standards;

(h) Develop, in accordance with existing standards (e.g. from IHO), graphical/numerical product specification for floating ice (sea ice, glacier ice, lake and river ice) parameters in Electronic Navigation Chart Systems (ENCs);

(i) Maintain linkages with relevant international organizations and programmes, in particular BSIM, CLIC, EIS, IICWG, NAIS, ASPeCt, GCOS and IHO.

As a general principle, these terms of reference will be implemented through specific, defined, time-limited projects.

Membership

(a) Up to eight core Members, including the chairperson and vice-chairpersons, representative of a range of activities related to sea ice and the ice-covered regions within JCOMM, and to maintain an appropriate geographical and gender representation,

(b) Representatives of regional and international sea ice bodies in particular the Baltic Sea Ice Meeting, European Ice Service, International Ice Charting Working Group and North American Ice Service will also be invited to participate at their own expense,

(c) Additional experts may be invited as appropriate, representative of the range of activities related to sea ice.

5. Expert Team on Operational Ocean Forecasting Systems (ETOOFS)

Terms of reference

(a) Manage and maintain the guide, scope and requirement documents, adhering to relevant Quality Management Systems, for Members/Member States providing ocean forecasting services;

(b) Manage and maintain an overview of OOFS service portfolio from ocean physics to biogeochemistry, highlighting the values of ocean products and services from short-term to seasonal forecasting;

(c) Manage and promote the adoption of an international standard to support interoperability and the common formatting of ocean forecast products and services and the quality assessment of the products in cooperation with GODAE;

(d) Guide and initiate actions at an international level that will contribute to the improvement of operational ocean prediction system efficiency, fidelity and service quality;

(e) Promote and facilitate the support for, and development of, operational and forecasting systems and their adoption in the wider community;

(f) Provide advice on Operational Ocean Forecasting Systems related matters and prepare submissions on the requirements (for example, research, observational and data management) of Operational Ocean Forecasting Systems operated by Members/Member States to other international groups;

(g) Liaise with and gather input from the other Expert Teams in SFSPA, OPA and DMPA on all aspects relevant to the operational ocean forecasting.

As a general principle, these terms of reference will be implemented through specific, defined, time-limited projects.

Membership

Membership is selected to ensure an appropriate range of expertise and to maintain appropriate geographical and gender representation. Up to eight core members, including the chairperson, representative of a range of activities related to ocean forecasting systems.

Additional experts may be invited as appropriate, representative of the range of activities related to ocean forecasting systems, on a self-funded basis, and in general with no resource implications to JCOMM.

6. Expert Team on Marine Environmental Emergency Response (ETMEER)

Terms of reference

At the 4th session of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM-4, May 2012), Members / Member States agreed that JCOMM should establish a Global Data-processing and Forecast System (GDPFS) to support Members / Member States to respond to marine environmental emergencies. This should include supporting responsible centres to extend their technical capabilities, exchange diagnostic and forecast data, as well as provide enhanced coordination for services and information provision in a way that meets requirements as defined by the International Atomic Energy Agency (IAEA) and International Maritime Organization (IMO).

In supporting marine environmental emergency response, the ETMEER shall:

(a) Monitor implementation and operations of Global Data-processing Forecasting System (GDPFS) Specialized Centres for MEER; establish or maintain standards for information products, and review the Marine Pollution Support System for the High Seas (MPERSS) including its website;

(b) Develop technical advice and guidance material on MEER information services and data-processing and forecasting systems;

(c) Monitor requirements by ensuring feedback from the user communities is obtained through appropriate and organized channels and applied to improve the relevance, effectiveness and quality of services (consistent with MARPOL, and other international conventions);

(d) Liaise closely with and gather input from technical commission expert teams on all aspects of winds, sea ice, sea state, storm surge and ocean circulation relevant to the operation and improvement of maritime accident emergency support;

(e) Provide advice to the Services and Forecasting Systems Coordination Group and other JCOMM groups, as required, on issues related to marine environmental emergency response support;

(f) Continue to liaise closely with relevant groups and teams of organizations, such as IMO, IAEA, etc., to coordinate and improve marine environmental emergency response support; in particular, to also liaise with regional bodies and groups involved in marine environmental emergency response tasks in regions such as the Mediterranean, Caribbean, Polar areas, etc.

Membership

Membership is selected to ensure an appropriate range of expertise and to maintain appropriate geographical and gender representation. Up to eight core members, including the chairperson, representative of a range of activities related to marine environmental emergency response.

Additional experts may be invited as appropriate, representative of the range of activities related to marine environmental emergency response, on a self-funded basis, and in general with no resource implications to JCOMM.

7. National marine services focal points

A national marine services focal point will play an important role in the implementation of metocean information services within national waters, under the framework of the WMO/IMO Worldwide Met-Ocean Information and Warning Service (WWMIWS). The National Focal Points will gather user requirements, foster partnerships, and monitor service delivery at the

national level; share these user requirements with the WWMIWS Committee and WMO Marine Meteorology and Oceanography Program Office; and contribute to the maintenance of national service information in relevant international documentation. The National Marine Service Focal Point should have a direct role in the delivery of marine services within the responsible national organization of JCOMM Members/Member States.

Terms of reference

(a) Act as the central point of contact on matters relating to meteorological information and warnings within national waters;

(b) Promote and oversee the use of established international standards and practices in the production and promulgation of meteorological information and warnings;

(c) Contribute to the development of international standards and practices through participation in the JCOMM Worldwide Met-Ocean Information and Warning Service Committee activities;

(d) Provide insights and monitor changes in customer requirements for updates of the *Guide on Marine Meteorological Services* (WMO-No. 471) and encourage participation in the bi-annual WWMIWS Marine Meteorological Monitoring Survey;

(e) Coordinate the promulgation of meteorological bulletins onto the WMO Information System (WIS);

(f) Act as a coordination point for implementation of WMO strategic initiatives under the services delivery framework, including verification, quality management, Marine Forecaster Competency framework and resilience activities;

(g) Liaise with national bodies that have responsibility for maritime safety, marine communications, port authorities, and other relevant maritime responsibilities on effective use of marine services.

(h) Identify national marine service related issues, needs and gaps that should be considered in WMO Marine Services action plans.

(i) Be responsible for maintaining national details of marine weather services and marine communications relevant for international service documentation such as WMO-No. 9, Volume D - Information for Shipping, UKHO Admiralty List of Radio Signals, IMO GMDSS Master Plan.

Membership

Membership is open to each JCOMM Member/Member State to nominate their National Marine Services Focal Point.

8. METAREA coordinators

Terms of reference

The following description of the role and responsibilities of a METAREA coordinator is prescribed in the IMO Assembly Resolution A.1051(27) – IMO/WMO Worldwide Met-Oean Information and Warning Service – Guidance Document.

Regarding METAREA coordinator resources, the METAREA coordinator should have:

(a) The expertise and information sources of National Meteorological Services; and

(b) Effective communications, e.g. telephone, email, facsimile, internet, etc., with National Meteorological Services in the METAREA, with other METAREA coordinators, and with other data providers.

Regarding METAREA coordinator responsibilities, the METAREA coordinator has to:

(a) Act as the central point of contact on matters relating to meteorological information and warnings within the METAREA;

(b) Promote and oversee the use of established international standards and practices in the promulgation of meteorological information and warnings throughout the METAREA;

(c) Coordinate preliminary discussions between neighbouring Members, seeking to establish and operate Navtex services, prior to formal application;

(d) Coordinate the promulgation of meteorological bulletins onto WMO Information System(WIS) and ensure the correct display of SafetyNET and MSI messages to WWMIWS website hosted by Météo-France;

(e) Liaise with entities that have responsibility for maritime safety, marine communications, port authorities, and other relevant maritime responsibilities on the effective use of meteorological information and warning services;

(f) Act as a coordination point for implementation of WMO strategic initiatives under the services delivery framework, including verification, quality management, Marine Forecaster Competency framework and resilience activities;

(g) Be responsible for maintaining details of marine weather services and marine communications relevant for international service documentation such as WMO-No. 9, Volume D - *Information for Shipping, UKHO Admiralty List of Radio Signals, IMO GMDSS Master Plan*; and

(h) Contribute to the development of international standards and practices through attendance and participation in the WMO Worldwide Met-Ocean Information and Warning Service Committee meetings, and also attend and participate in relevant IMO, IHO and WMO meetings as appropriate and required.

The METAREA coordinator has to also ensure that within its METAREA, National Meteorological Services which act as Issuing Services have the capability to:

(a) Select meteorological information and warnings for broadcast in accordance with the guidance given in the WMO's Manual on Marine Meteorological Services (WMO-No. 558);

(b) Provide insights and monitor changes in customer requirements for updates to the WMO *Guide to Marine Meteorological Services* (WMO-No. 471); and

(c) Monitor the SafetyNET transmission of their bulletins, broadcast by the Issuing Service.

The METAREA coordinator has to further ensure that within its METAREA, National Meteorological Services which act as Preparation Services have the capability to:

(a) Endeavour to be informed of all meteorological events that could significantly affect the safety of navigation within their area of responsibility;

(b) Assess all meteorological information immediately upon receipt in the light of expert knowledge for relevance to navigation within their area of responsibility;

(c) Forward marine meteorological information that may require wider promulgation directly to adjacent METAREA coordinators and/or others as appropriate, using the quickest possible means;

(d) Ensure that information concerning all meteorological warning subject areas listed in WMO No. 558 that may require a METAREA warning within their own area of responsibility is forwarded immediately to the appropriate National Meteorological Services and METAREA coordinators affected by the meteorological event;

(e) Provide insights and monitor changes in customer requirements for updates to the WMO Guide on Marine Meteorological Services; and

(f) Maintain records of source data relating to meteorological information and warning messages within their area of responsibility.

9. Coordinator on satellite data requirements

Terms of reference

The coordinator on satellite data requirements shall:

Coordinate satellite data requirements activities within JCOMM and act as a JCOMM liaison with the CBS ET-SAT and IPET-SUP and with CEOS and CGMS;

Report to the Chairperson of the SFSPA Coordination Group.

Resolution 9 (JCOMM-5)

OTHER COORDINATORS OF THE COMMISSION

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting WMO Resolution 31 (Cg-17) – Report of the extraordinary session (2014) of the Commission for Basic Systems relevant to centres and networks of the WMO Information System, which established the International Forum of Users of Satellite Data Telecommunications Systems (Satcom forum),

Considering:

(1) That the Satcom forum is co-sponsored by the Commission for Basic Systems (CBS) and the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM),

(2) The need to coordinate Satcom issues within JCOMM and liaise with CBS on Satcom issues,

Decides to establish a coordinator on Satcom issues (nomination to be made by the JCOMM Management Committee). The terms of reference for this position are given in the annex to the present resolution.

Annex to Resolution 9 (JCOMM-5)

TERMS OF REFERENCE OF THE COORDINATOR ON SATCOM ISSUES

Coordinator on Satcom issues

Terms of reference

The purpose of the Satcom coordinator is to provide coordination within JCOMM on Satcom matters and provide liaison with the International forum of Users of Satellite Data Telecommunication Systems (Satcom Forum). Specifically, the coordinator will carry out the following tasks:

(a) Coordinate Satcom issues within JCOMM and particularly with the Observation Coordination Group and the Observations networks/panels. This essentially involves identifying and consolidating requirements and issues concerning the collection via satellite of marine meteorological and oceanographic data from remote observing platforms at sea;

(b) Liaise with Satcom Executive Committee representing JCOMM, provide the committee with JCOMM perspective on Satcom, including on Satcom issues, requirements and capabilities, and relay Satcom recommendations to JCOMM as appropriate;

(c) Consider in the JCOMM framework how the requirements for disaster risk reduction can be considered by Satcom;

(d) Report to the Management Committee.

APPENDIX 3. DECISIONS ADOPTED BY THE SESSION

Decision 1 (JCOMM-5)

ORGANIZATION OF THE SESSION

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Having considered the provisional agenda proposed by the co-presidents of JCOMM on the recommendation of the JCOMM Management Committee,

Approves the provisional agenda;

Approves the report of the representative of the Secretary-General on credentials in accordance with WMO General Regulations 21 to 24;

Adopts the establishment of committees for the duration of the session as:

(1) Coordination Committee:

Chairperson: co-presidents

Members: Chairperson of plenaries, Secretary-General's representative, Secretariat staff, representative of local organizing committee;

(2) Credentials Committee:

Chairperson: [Bernd Brügge, Germany]

Members: [Hassan Bouksim, Morocco]

(3) Nomination Committee:

Chairperson: [Neal Moodie, Australia]

Members: [Nelly Florida Riama, Indonesia]

Agrees to the programme of work of the session:

(1) Working hours of the meetings: 9.30 a.m. – 12.30 p.m. and 2.30 p.m. – 5.30 p.m.;

(2) Arrangement and allocation of agenda items for the session;

Decides to suspend General Regulation 110 for the whole duration of the session to permit rapid processing of documents in accordance with General Regulation 3;

Decides that in conformance with General Regulation 112 summarized minutes are not required for the session;

Adopts for the duration of the session the practice to correct by editorial action, and not by debate in session, documents whose contents are determined solely by administrative procedures.

Decision 2 (JCOMM-5)

INTERNAL AND EXTERNAL REVIEW OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling agenda item 12.2 at JCOMM-4 on JCOMM Programme and Planning, whereby the Commission noted that a full external review of JCOMM had not been undertaken within the previous intersessional period but, nevertheless, saw value in providing the opportunity for Member/Member States to provide feedback on its past performance and future. The Commission noted that analysis of information from its past performance would assist in the preparation for meetings of JCOMM governing bodies. The Commission requested the Management Committee and the Secretariats to establish a mechanism for undertaking this task. In doing so, the Commission also requested the Management Committee to review the JCOMM priorities for intersessional period to ensure effective use of the available resources,

Noting action 3.2.1 from JCOMM MAN-12 to carry out a JCOMM Self Evaluation and Review,

Noting also that a JCOMM Performance Assessment: Stakeholder Survey was carried out for a period of five weeks from April-May 2016, and a report was prepared and reviewed by JCOMM experts,

Noting further that the aim of the JCOMM Performance Assessment: Stakeholder Survey is to use the results for inclusion in the revision of the JCOMM strategy,

Having examined the JCOMM Performance Assessment: Stakeholder Survey (JCOMM-5/INF. 2.3),

Expresses satisfaction with the assessment;

Decides that the survey results and recommendations should be included in the revision of the JCOMM strategy and capacity development activities.

Decision 3 (JCOMM-5)

PARTICIPATION OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY IN THE DEVELOPMENT OF THE WORLD METEOROLOGICAL ORGANIZATION STRATEGIC PLAN 2020–2023

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling the decision of the Seventeenth World Meteorological Congress (Cg-17) that the Global Societal Needs identified by the Organization based on post-2015 sustainable development goals, and which form the solid basis for the Strategic Plan for the period 2016–2019, represent relevant issues and directions that could still influence the focus of the Organization beyond the period 2016–2019, and should form the basis for the WMO Strategic Plan for the period 2020–2023,

Recalling also Resolution 71 (Cg-17) – Preparation of the Strategic and Operating Plans 2020–2023, requesting the Executive Council to organize a planning process, and Decision 82 (EC-68) – Preparation of WMO Strategic and Operating Plans 2020-2023,

Noting that the WMO Executive Council at its sixty-ninth session adopted Decision 65 in regard to the Preparation of WMO Strategic Plan 2020-2023, including the request to regional associations and technical commissions to continue to contribute to the preparation of the Strategic Plan to ensure that the needs of Members, as well as science and technology development, are taken into consideration,

Noting further that:

(1) An Ad Hoc Working Group for Marine Services was established by the Secretary-General following the discussions at Cg-17 to strengthen marine services,

(2) Decision 49 (EC-68) provided further direction to the Working Group,

(3) The results of the assessment are being considered in the context of WMO strategic planning to ensure the strengthening of WMO ability to provide support to marine and coastal safety services, and in the work of the Commission,

Having considered that the JCOMM Programme and Planning for the next intersessional period need to take into consideration the decisions of Congress and EC and key drivers influencing the directions of the Organization,

Endorses the high-level recommendations of the Ad Hoc Working Group for Marine Services (as outlined in document JCOMM-5/INF 3.1(1));

Encourages Members to provide the relevant support necessary for WMO to strengthen their marine and coastal safety services;

Notes the information provided by the Deputy Secretary-General on progress with the preparation of the draft WMO Strategic Plan 2020-2023 by the EC Working Group on Strategic and Operational Planning, noting that JCOMM programme areas would provide key contributions to all Long-Term Goals, in particular Long-Term Goals 1 (services), 2 (observation), 3 (research) and 4 (capacity development).

Notes also the information provided by the Deputy Secretary-General on progress with the formulation of recommendations on the WMO constituent body reform by the EC Working Group on Strategic and Operational Planning, noting that a consultation is ongoing between the WMO Bureau and the IOC Officers on the role of JCOMM within a potentially revised WMO governance structure.

Requests the JCOMM Co-President and the Management Committee to provide the required contribution in the fields of expertise for JCOMM to the Working Group on Strategic and Operational Planning in regard to the Preparation of WMO Strategic Plan 2020-2023.

Decision 4 (JCOMM-5)

PARTICIPATION IN THE WORK OF OTHER WORLD METEOROLOGICAL ORGANIZATION TECHNICAL COMMISSIONS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) Resolution 11 (Cg-17) – Towards a future enhanced integrated and seamless Data-processing and Forecasting System,

(2) Resolution 8 (EC-69) – Strategy and governance for the WMO Information System – that endorsed the WIS 2.0 strategy and the terms of reference for the Inter-commission Task Team on the WMO Information System (ITT-WIS) to oversee the development of the WIS,

(3) Decision 55 (EC-68) – Towards implementation of the seamless Data-processing and Forecasting System,

(4) Resolution 17 (EC-69) whereby EC decided that the designation criteria of partner systems related to the Global Data-processing and Forecasting System (GDPFS) should be included in the *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485), or the inclusion of references and links to the relevant partner manuals and to continue to coordinate collaboration between constituent bodies to create the documentation requested in Resolution 11 (Cg-17),

(5) Resolution 6 (CHy-15) The Flood forecasting initiative and the contribution of the Commission for Hydrology (CHy) for the Disaster Risk Management Programme,

Noting:

(1) That the Commission can only achieve its objectives through the international creation and exchange of information using agreed technical standards and procedures,

(2) That efforts in Earth System modelling (atmosphere, ocean, cryosphere, land vegetation and chemical interaction) would benefit the seamless data-processing and forecasting,

Noting further that the WMO Integrated Global Observing System (WIGOS) has introduced a system for identifying observing stations and platforms that cannot be represented in the Traditional Alphanumeric Codes and that uses more characters than the traditional station identifiers,

Considering the need for establishing synergies among the various Earth System components, in particular the Oceans,

Convinced that the Commission should seek to use standards that are interoperable with other aspects of the work of the IOC and WMO, and should participate in the development of those standards,

Decides:

(1) To continue to participate in the development and operation of the WMO Information System (WIS) through the Inter-programme Expert Team for Integrated Marine Meteorological and Oceanographic Services within WMO and IOC Information Systems (IPET-MOIS);

(2) To nominate experts to assist in those activities of the Commission for Basic Systems (CBS) that develop standards and operating procedures that contribute to the work of the Commission;

(3) To provide full support for the implementation of the Seamless GDPFS to ensure all JCOMM related issues are addressed and integrated;

(4) To integrate marine GDPFS related matter in the *Manual on GDPFS* (WMO-No. 485) as described in Recommendation 14 (JCOMM-5);

(5) To support the decision regarding the future of the WMO Coastal Inundation Forecasting Demonstration Project (CIFDP) as described in Decision 17 (JCOMM-5);

(6) To provide full support for the implementation of the WMO Operational Mechanisms to provide Operational El Niño Southern Oscillation (ENSO) information;

Reminds Members that amendments to their processing systems may be required in order to use observation reports that include WIGOS station identifiers.

Decision 5 (JCOMM-5)

PARTICIPATION IN THE WORK OF WORLD METEOROLOGICAL ORGANIZATION PROJECTS, PROGRAMMES AND CO-SPONSORED PROGRAMMES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) Decision 52 (EC-68), Polar Regional Climate Centres (PRCC),

(2) Decision 53 (EC-68), Year of Polar Prediction,

(3) Decision 28 (EC-69), Tropical Pacific Observing System (TPOS-2020),

(4) Decision 48 (EC-69), Polar and high Mountain Regions Priority Activity, inviting Members to actively participate in cooperation with the research community in the Year of Polar Prediction (YOPP) activities, and particularly in its Special Observing Periods (SOPs) between 2017 and 2019,

Noting the Arctic PRCC Network Implementation Plan,

Noting further that the Polar Prediction Project and YOPP activities are based on voluntary contributions and there is a strong need to ensure the funding especially during YOPP,

Convinced that TPOS 2020 provides an excellent example for similar initiatives in other ocean basins,

Decides to support implementation of:

(1) Arctic PRCC Network;

(2) TPOS 2020 and facilitate implementation of Decision 28 (EC-69);

(3) YOPP and its SOPs, and promote the participation to YOPP activities through all communication channels of JCOMM;

Requests:

(1) The Management Committee to take practical steps for promoting participation to YOPP;

(2) The Expert Team on Sea Ice to collaborate with the WMO Executive Council Panel of Experts on Polar and High Mountain Observations, Research and Services (EC-PHORS), Services Task Team on defining what sea-ice products could be developed and/or offered in support of the Arctic PRCC Network;

(3) The Observations Programme Area to support (i) YOPP campaign and its SOPs and (ii) TPOS 2020 implementation and work with GOOS to ensure that similar activities can be undertaken in other ocean basins based on the example of TPOS 2020.

Decision 6 (JCOMM-5)

COLLABORATION WITH THE GLOBAL CRYOSPHERE WATCH

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) Resolution 43 (Cg-17), Global Cryosphere Watch (GCW), deciding to mainstream and implement GCW in WMO Programmes as a cross-cutting activity, and that the implementation activities will be undertaken during the seventeenth financial period as one of the major efforts of the Organization with the goal that GCW should become operational,

(2) Decision 45 (EC-69), on the development and implementation of the GCW, inviting the WMO Technical Commissions to consult with GCW in defining the requirements for observations in polar and high mountain regions, and on the preparation of GCW Best Practices guide and Manual,

Noting the reports of:

(1) The seventh session of the Executive Council Panel of Experts on Polar and High Mountain Observations, Research and Services (EC-PHORS-7, Ushuaia, Argentina, March 2017),

(2) The fourth session of the Global Cryosphere Watch Steering Group (GSG-4, Cambridge, United Kingdom, January 2017),

Noting the long-term goals of:

(1) Detecting climate-driven physical and ecological change, especially due to changes in sea ice extent and duration,

(2) Providing an accurate record of changes in sea ice thickness and an estimate of changes in sea ice volume, as sensitivity of the Arctic and Antarctic environment to climate variability and change provide early indications of the future progression of climate change,

Noting with satisfaction the appreciation from the GCW Steering Group for the active engagement between GCW and JCOMM Expert Team on Sea Ice,

Having considered:

(1) The recommendations of EC-PHORS-7, regarding the need for an optimum use of expert resources across different programmes,

(2) The recommendation made by GSG-4, regarding the strengthening of the collaboration between the GCW programme and JCOMM focusing on Arctic and Antarctic observing systems and services,

Decides to continue its close collaboration with GCW focusing on the sea ice activities and on the Arctic and Antarctic buoy programs;

Requests the Expert Team on Sea Ice to collaborate with the GCW on joint activities for developing standards and best practices for observations and data exchange for sea ice, satellite products validation, and the derivation of relevant products, on the role of sea ice in the global climate system;

Requests the Data Buoy Cooperation Panel (DBCP) to collaborate with WCRP-SCAR and the GCW in particular for developing standards and best practices for observations and data exchange for sea ice;

Invites the GCW to organize joint work planning with the relevant expert teams of JCOMM, on matters related to sea ice.

Decision 7 (JCOMM-5)

PARTICIPATION IN THE WORK OF REGIONAL ASSOCIATIONS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling the decision by Cg-16 to reconsider the roles of the WMO structure and Programmes under the auspices of WMO in supporting provision of services, including the ones in coastal areas, and therefore the participation in the work of the corresponding Regional Associations,

Noting the synergies being established between the WMO Coastal Inundation Forecasting Demonstration Project (CIFDP), the Flash Flood Guidance System and the Severe Weather Forecasting Demonstration Project (SWFDP), and the progress in the scope of services emanating from the CIFDP, and the interdependencies on technical commissions (Commission for Basic Systems, JCOMM, Commission for Hydrology) and WMO service-oriented Programmes that could complement and support the CIFDP,

Agrees that the activities in marine meteorology of Members should be focused on implementation areas described in Decision 16 (JCOMM-5), including the need:

(1) To strengthen metocean forecasting services through the delivery of the Worldwide Met-Ocean Information and Warning Service (WWMIWS) and the nomination of National Marine Focal Points;

(2) To support the introduction of competency standards into marine forecasting and supporting compliance to these standards within their National Meteorological and Hydrological Services (NMHS);

(3) To support the development of multi-hazard, impact-based services in the marine sector by working with the Coastal Inundation Forecasting Demonstration Project (CIFDP) and to account for inundation, tsunami, tide and storm surge and impact assessment due to sea-level rise and saline ingress and coastal zones including shoreline changes;

Requests presidents of Regional Associations to work with the Coordinator of the SFSPA in particular, and other JCOMM Programme Area Coordinators as appropriate, to promote activities in marine meteorology in the regions through appropriate mechanism in the Regional Associations.

Decision 8 (JCOMM-5)

PARTICIPATION IN ACHIEVING INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION OBJECTIVES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) IOC Resolution XXVII-2 B (2013) - IOC Medium Term Strategy for 2014-2021,

(2) IOC Resolution XXIX-1 (2017) - International (UN) Decade of Ocean Science for Sustainable Development,

Noting:

(1) The contributions of the Commission to several IOC high-level objectives, most notably: effective early warning systems, and increased resiliency to climate change and variability,

(2) The contributions of the Commission to several IOC functions, including: scientific understanding, observing systems and data management, early warning and services, and capacity development,

(3) The role of the Commission in promoting coordination at national, regional, and global levels between meteorological and oceanographic bodies,

(4) The important roles in regional implementation of IOC objectives played by the IOC Subcommissions for the Western Pacific (WESTPAC), for the Caribbean and Adjacent Region (IOCARIBE), for Africa and the Adjacent Island States (IOCAFRICA), and the IOC Regional Committee for the Central Indian Ocean (IOCINDIO),

(5) The important role in regional implementation of the Global Ocean Observing System (GOOS) played by thirteen GOOS Regional Alliances,

(6) The internationally agreed frameworks such as the UN Convention on the Law of the Sea, the Sendai Framework for Disaster Risk Reduction, the Small Island Developing States (SIDS), Accelerated Modalities of Action (SAMOA) Pathway and the Paris Agreement under the United Nations Framework Convention on Climate Change, which inform the proposed International Decade of Ocean Science for Sustainable Development (2021-2030),

Decides:

(1) To continue to identify the Commission's contributions to the IOC's high-level objectives and functions, including through appropriate regional mechanisms;

(2) To participate actively in the development of the International Decade of Ocean Science for Sustainable Development.

Decision 9 (JCOMM-5)

PARTICIPATION IN THE WORK OF OTHER INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION PROGRAMMES AND CO-SPONSORED PROGRAMMES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) Decision IOC-XXIX/6.1.1, Global Ocean Observing System (GOOS) Work Plan,

(2) Decision IOC-XXIX/6.2.1, International Oceanographic Data and Information Exchange (IODE),

(3) Decision IOC-XXIX/6.2.2, IOC Strategic Plan for Data and Information Management, 2017-2021,

(4) Decision IOC-XXIX/7.2, Tsunami and other coastal hazards warning systems,

(5) Decision IOC-XXIX/8.1, Improving the availability of bathymetric data worldwide, and II. IHO-IOC General Bathymetric Chart of the Oceans (GEBCO) Project Guiding Committee,

Noting the development of a GOOS Strategy,

Noting further the development of a concept IOC Ocean Data and Information System (ODIS),

Convinced that the Commission's work can contribute,

Decides:

(1) To support implementation of an integrated GOOS serving societal objectives for climate mitigation and adaptation, operational oceanographic services, and sustained ocean health;

(2) To participate actively in the development of the concept for the Ocean Data and Information System (ODIS), drawing where possible on existing structures and activities;

(3) To promote and participate in the development of multi-hazard coastal early warning systems;

(4) To promote the collection and availability of bathymetric data worldwide, and interact with the IOC Working Group on User Requirements and Contributions to IHO-IOC GEBCO Products;

Requests the Management Committee to maintain active liaison with the relevant IOC programmes and co-sponsored programmes.

Decision 10 (JCOMM-5)

RELATIONSHIPS TO OTHER BODIES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling that the WMO Cg-17 reaffirmed the Marine Meteorology and Oceanography Programme as the key operational programme providing assistance to Members in the sustained provision of global and regional coverage of marine observational data, products and services to address the continued and expanding requirements of the maritime and coastal user communities for metocean services and information, focusing on safety of life and property at sea, integrated coastal management and societal impacts,

Recalling further that Cg-17 encouraged the continuing strong partnership and collaborative development and delivery of JCOMM activities and services with the International Maritime Organization (IMO) and the International Hydrographic Organization (IHO),

Noting that similar recognition were expressed during the JCOMM Intersessional period by the corresponding IOC Assemblies at its 27, 28 and 29 session,

Recognizing that to accomplish its objectives and those of WMO and IOC, the Commission needs to cooperate with a number of programmes and bodies of the WMO and IOC, as well as external organizations, as described in the annex to the present decision,

Noting further that UN-Oceans is an inter-agency mechanism that seeks to enhance the coordination, coherence and effectiveness of competent organizations of the United Nations system and the International Seabed Authority, within existing resources, in conformity with the United Nations Convention on the Law of the Sea, the respective competences of each of its participating organizations and the mandates and priorities approved by their respective governing bodies, and that WMO and IOC are actively participating in such coordination mechanism,

Requests the JCOMM Co-President and the Management Committee to ensure and maintain the existing relationships with a number of other programmes and organizations, and to keep these under regular review, particularly for those identified joint activities.

Annex to Decision 10 (JCOMM-5)

ORGANIZATIONS WITH WORKING RELATIONSHIPS WITH THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

(1) The International Maritime Organization (IMO), the International Hydrographic Organization (IHO), the International Mobile Satellite Organization (IMSO) and Inmarsat on safety-related marine meteorological services, and with the International Atomic Energy Agency, on the Marine Environmental Emergency Response.

(2) The Group on Earth Observations (GEO) and its Global Earth Observing System of Systems, where the Commission in its role as coordinating implementation of ocean and marine meteorological observations, data management, and services, provides an important contribution to the Societal Benefit Areas of the Global Earth Observing System of Systems. It is represented in GEO through the participation of WMO, IOC, and GOOS.

(3) The World Ocean Council, which brings together a wide range of ocean industries in an international coalition to coordinate industry support for ocean science and other environmental action. Cooperation with the Commission is expected to improve opportunities for collaboration in ocean and marine meteorological observations.

(4) The International Ice Charting Working Group (IICWG), which brings the national ice services together with their partners and clients to address issues of common concern. Since 1999, the IICWG has served as an active advisory body to the JCOMM Expert Team on Sea Ice.

(5) The International Telecommunication Union (ITU), which together with WMO and IOC, is exploring the use of undersea cables for ocean observations supporting tsunami and climate monitoring.

(6) The Satellite Telecommunications Forum (Satcom), which aims to engage other satellite service providers in a synergistic way on issues related to data transmission from in situ metocean platforms, and in particular autonomous platforms.

Decision 11 (JCOMM-5)

GLOBAL CLIMATE OBSERVING SYSTEM IMPLEMENTATION PLAN

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling Decision 14 (EC-69) – support of the development of actions based on the GCOS Implementation Plan, and to provide guidance to Members and WMO constituent bodies on actions pertaining to the systems and networks coordinated by WMO to monitor and review progress in implementation,

Recalling also Decision 6.1.2 (IOC-XXIX) - that urges all IOC programmes to address relevant actions in their workplans and invites Member States to contribute to the implementation of actions as discussed in the GCOS Implementation Plan; and which requests provision of guidance to Member States and IOC programmes on actions pertaining to the systems and networks coordinated by IOC to monitor and review progress in implementation,

Recognizing Decision 23 (CBS-16) - to support Members in the implementation of the actions identified in the GCOS Implementation Plan, and especially those identified as important components of the WMO Integrated Global Observing System (WIGOS),

Recognizing also Resolution 1 (CHy-15) – the recommendation that, in view of the complexity of the GCOS Implementation Plan, one or more members of the Open Panel of CHy Experts (OPACHE) explore what actions might be needed to help GCOS make better use of CHy observing capabilities, particularly to WMO Hydrological Observing System, in its hydrology and water resources-related actions,

Recognizing further the need for consistent, coordinated, high-quality climate observations to support the Parties to the UNFCCC in planning adaptation and mitigation, the development of climate science and also support to other multilateral environmental agreements,

Acknowledging that planning and coordinating these observations requires a partnership between those observing in the atmospheric, oceanic and terrestrial domains, covering physical, chemical and biological parameters,

Acknowledging also that these observations recommended in the GCOS Implementation Plan are required also in other applications areas such as numerical weather prediction and ocean applications, including marine services,

Having considered the document on the Global Observing System for Climate and its implementation needs (GCOS-200, GOOS-214),

Having examined the GCOS report *Status of the Global Observing System for Climate* (GCOS-195),

Noting that many of the GCOS actions for the ocean and the maritime atmosphere are addressed in the JCOMM OCG workplan and supported by the observing networks that OCG coordinates,

Noting also that JCOMMOPS has agreed to track progress against GCOS actions (by network, and in future by variable),

Observes that ongoing effort is required to sustain the observing system and also to expand to new frontiers, and new variables to meet requirements;

Decides that WMO Members and IOC Member States who contribute to ocean monitoring should ensure that this monitoring contributes to sustainable climate observations that support mitigation and adaptation to climate change and the UNFCCC, by implementing, as appropriate, the actions identified in the GCOS Implementation Plan, and especially those identified in JCOMM-5/INF 4.1(1), as important oceanographic parts of global climate monitoring system.

Decision 12 (JCOMM-5)

CONTRIBUTION OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY TO THE GLOBAL FRAMEWORK FOR CLIMATE SERVICES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Emphasizing that:

(1) The Global Framework for Climate Services (GFCS) provides a worldwide mechanism for coordinated actions to enhance the quality, quantity and application of climate services,

(2) The Climate Services Information System (CSIS) is the principal GFCS mechanism through which information about climate – past, present and future – is archived, analysed, modelled, exchanged and processed,

(3) GFCS, guided by the Intergovernmental Board on Climate Services, constitutes an essential contribution to the implementation of the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction, Small Island Developing States (SIDS) Accelerated Modalities of Action (SAMOA) Pathway, and especially the United Nations Framework Convention on Climate Change, and Paris Agreement,

(4) UNESCO (and therefore IOC) is part of the GFCS Partner Advisory Committee,

(5) While GFCS has no specific marine priority area, marine aspects are important and cross-cutting through at least three of the five priority areas: Disaster risk reduction, Water, and Agriculture and Food Security,

(6) The design and implementation of programmes for climate services implementation requires the support of WMO technical commissions including JCOMM,

(7) GFCS has a special focus on observational requirements including for the polar and tropical regions that have strong and critical marine aspects,

Recognizing the intricate connection between ocean and atmosphere in shaping climate and weather patterns, the slowly varying boundary conditions characterized by oceans forming the scientific basis for seasonal forecasting, and thus the critical role of marine observations and data for optimizing the ocean input:

(1) To improve forecasting and early warnings on sub-seasonal to seasonal scales based on climate drivers operating on intra-seasonal to interannual time scales (e.g., Madden-Julian Oscillation, El Niño/Southern Oscillation (ENSO), etc.),

(2) To expand the seasonal forecast outputs to cover the relevant oceanic variables to support sectors that need marine climate information,

Recalling:

(1) Decision 10 (EC-69) - Climate Services Information System Products to Support United Nations System Planning and WMO Members on Seasonal to Interannual Timescales,

(2) Decision 46 (EC-69) - Development and Implementation of the Arctic Polar Regional Climate Centre Network and of Polar Regional Climate Outlook Forums,

(3) Decision 16 (EC-68) - Country-Focused Results-Based Framework and Mechanism for WMO Contributions to the Global Framework for Climate Services,

(4) Decision 27 (EC-68) - Exchange of Data and Products for the Implementation of the Climate Services Information System,

(5) Resolution 6 (EC-67) – A Mechanism to Advance WMO Contributions to the Global Framework for Climate Services,

(6) Resolution 60 (Cg-17) – WMO Policy for the International Exchange of Climate Data and Products to Support the Implementation of the Global Framework for Climate Services, and the explicit references made therein, inter alia, to (i) Essential Climate Variables for the ocean (as defined by the GCOS Implementation Plan) and (ii) Climate relevant coastal interface data, in particular sea level, waves and storm surges,

Recalling also Recommendation 2 (JCOMM-4) - Marine Climate Data System, whereby the Commission adopted the Vision for a Marine Climate Data System (MCDS) to address in particular the requirements of the GFCS,

Considering that Regional Climate Outlook Forums (RCOFs) and RCCs, active in several parts of the world, routinely provide real-time regional climate outlook products, however none have an explicit marine focus,

Noting:

(1) That JCOMM is an important mechanism to support WMO contributions to the GFCS and particularly on marine-related aspects,

(2) That the 45th session of the United Nations Framework Convention on Climate Change Subsidiary Body for Scientific and Technical Advice invited submissions from WMO on the state of the global climate on a regular basis,

(3) JCOMM's potential role in providing the relevant inputs to the WMO annual climate statements on oceanic aspects,

Noting further the modernization and full re-write of Chapter 3, Marine Climatology, of the WMO-No. 471, Guide to Marine Meteorological Services (JCOMM-5/Doc. 9.2), which provides a description of the general purpose of marine climatology and societal applications, and related draft Technical Regulations,

Decides:

(1) To continue development of an inventory of products and services reflecting marine aspects to be incorporated into the review of GFCS-relevant data and products led by CCl;

(2) To support integration of JCOMM related data and products into RCC/RCOF operations;

(3) To continue existing, and develop activities, in support of WMO-coordinated operational seasonal climate information systems, and contribute to early warning of seasonal climate extremes associated with planetary-scale drivers such as ENSO, within available resources;

Agrees:

(1) To assist Members/Member States to improve operational systems and service delivery through better marine meteorological inputs within existing resources;

(2) To support developing countries, Least Developed Countries (LDCs) and Small Island Developing States (SIDS) through the provision of observations, data and/or products and expertise that improves predictions for storm surges, coastal inundation and sea-level changes within existing resources;

(3) To support the inclusion of sea-ice products in the Arctic Polar Regional Climate Centre Network operations;

(4) To promote the implementation of the Marine Climate Data System (MCDS) being developed by JCOMM, to be an integral part of the CSIS;

Requests the co-presidents to make appropriate arrangements within the JCOMM working structures to ensure:

(1) Internal coordination to facilitate JCOMM contributions to the GFCS;

(2) Verification of the ocean-related indicators in the WMO Annual Statement on Climate;

(3) The above agreement related to the MCDS implementation in support of CSIS.

Decision 13 (JCOMM-5)

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY AND THE SENDAI FRAMEWORK

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Emphasizing that high-impact weather, marine weather, climate and hydrological events such as storms, floods, landslides caused by heavy rain, and droughts cause most natural disasters, represent the highest risk both in terms of impacts and likelihood, also due to their cascading and often transboundary effects, and have devastating effects throughout the world, resulting in injury and loss of life, setting back economic and social development with huge economic losses, health degradation, poverty, damaging/destroying infrastructures, displacement of people, job destruction and destruction of communities,

Noting that unprecedented changes in the climate system observed since the 1950s and the rapid changes taking place, especially in high latitudes, are likely to continue to increase risks associated with climate and hydrometeorological hazards (inclusive of marine),

Noting that the growth of human settlements – particularly in flood plains and low lying coastal regions – urbanization, the rise of megacities, economic interdependencies and obsolescence of infrastructure, increase the vulnerability of people and infrastructure and thus increase the risk and subsequent impacts of weather and climate extremes,

Noting also that geophysical hazards such as tsunamis can have a devastating impact on loss of life and property in the marine and coastal zones,

Noting further the impact of environmental disasters in the marine space, such as harmful algal blooms and oil spills,

Reaffirming that the overarching priorities for the WMO and IOC communities are to produce information that assists in reducing losses of life and property from marine and coastal hazards, and support action that promotes resilience to climate variability and change, and enhances the socioeconomic value of hydrometeorological and climate services,

Recalling the *Third United Nations World Conference on Disaster Risk Reduction* (Sendai, 2015), which led to the establishment of the International Network for Multi-Hazard Early Warning Systems (IN-MHEWS), and the *Sendai Framework for Disaster Risk Reduction 2015-2030* (Sendai Framework) with four particular priorities for action:

(1) Understanding disaster risk;

(2) Strengthening disaster risk governance to manage disaster risk;

(3) Investing in disaster risk reduction (DRR) for resilience;

(4) Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction,

Noting furthermore that both the IOC and WMO have aligned themselves with the Framework and list DRR as a strategic priority in order to strengthen Member States’/Members’ capabilities for improved early warning of natural disasters in the marine and coastal zones, while supporting action that promotes resilience to climate variability and change from marine and coastal hazards,

Noting moreover that the Framework’s seventh global target –‘Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030’, is particularly relevant to WMO and IOC,

Taking note that the Disaster Risk Reduction Roadmap (DRR Roadmap) for the World Meteorological Organization, approved by the President of WMO in April 2017, outlines the role of WMO, working with partners such as the IOC, for implementation of international planning processes such as the Sendai Framework. For WMO and the NHMSs of its Members, the vision of the DRR Roadmap is to be recognized as an authoritative voice and effective support mechanism within the global, regional and national DRR arena with regard to weather, water and climate related hazards. This includes working towards making knowledge products (standards, guidelines, tools, methods, competencies etc.,) accessible to Members, to support their local, national, regional and global DRR activities through initiatives such as the Worldwide Met-Ocean Information and Warning Service (WWMIWS) and the Global Meteo Alarm System (GMAS),

Noting additionally that the UNISDR/WMO/IOC Multi-Hazard Early Warning Conference (MHEWC) and Global Platform for DRR (22-23 May 2017, Cancún, Mexico) led to clear direction that all countries should strive to ensure that their MHEWS be designed to provide relevant impact and risk information to enable individuals, communities and organizations threatened by a hazard, or hazards, to prepare and to act appropriately in sufficient time to reduce the possibility of harm or loss. This is directly linked to the achievement of the Sendai Framework, in particular its seventh global target,

Noting with satisfaction the role that both WMO and IOC played at the international meetings in May 2017,

Considering that:

(1) JCOMM has a DRR Focal Point who is responsible for keeping abreast of JCOMM activities and their links to other WMO and IOC DRR activities,

(2) JCOMM proposes a new expert team focused on DRR to support such related marine services in JCOMM (for details see Decision 16 and Resolution 5),

Considering also the JCOMM role to provide technical expertise and support to IOC Member States and WMO Members is crucial to advance the goals and objectives of the Sendai Framework, WMO and IOC priorities in DRR, and associated implementation plans, especially in relation to the increasing number of disasters being experienced in marine and coastal zones,

Requests the co-presidents to ensure that the JCOMM workplan is aligned with the WMO DRR Roadmap and IOC Medium Term Strategy 2014-2021, and that experts continue to contribute to the activities that support DRR;

Decides that the Chairperson of the proposed Expert Team for Disaster Risk Reduction will act as the DRR Focal Point for WMO and IOC;

Urges IOC Member States and WMO Members to develop or strengthen their multi-hazard early warning systems and marine services through increasing investments and sharing of information and good practices, through international cooperation mechanisms such as the IN-MHEWS and the WWMIWS Committee, and especially to address impacts on coastal areas and safety of life at sea from tropical cyclones, storms, abnormal El Niño, tsunamis and other extreme events;

Urges also the IOC Member States/WMO Members to engage further in international humanitarian activities through the provision of relevant data, products and expertise that support the preparedness and response to natural disasters and their impacts in marine and coastal zones.

Decision 14 (JCOMM-5)

CONTRIBUTION TO THE ROLLING REVIEW OF REQUIREMENTS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting the *Manual on WIGOS* (WMO-No. 1160) and its section 2.2 on Design, Planning and Evolution,

Noting the *Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP)*, and particularly actions G49 to G58, (WIGOS Technical Report No. 2013-4),

Noting also the *Global Observing System for Climate: Implementation Needs*, GCOS-200 (GOOS-214),

Noting further:

(1) The Statement of Guidance for Ocean Applications developed in the framework of the WMO Rolling Review of Requirements,

(2) The Tropical Pacific Observing System 2020 project (TPOS-2020) - A WIGOS Pre-Operational Regional Pilot, that is developing improved requirements,

Considering that marine meteorological and oceanographic observations are not only required by climate monitoring and ocean applications, but also by other WMO applications areas such as numerical weather prediction and ocean applications, including marine services, which are of equally great importance to IOC Member States,

Recognizing that the Observations Programme Area is focusing on addressing the observational user requirements of the ocean domain of GCOS-200 (GOOS-214), and that in doing so the requirements of other Application Areas are also covered to a large extend,

Recognizing also that:

(1) It is critical to make sure that additional observational user requirements where gaps remain, in particular for ocean applications, including marine services are better addressed,

(2) Some critical marine meteorological and oceanographic variables (see annex), as stated in the Statement of Guidance for Ocean Applications, are not currently adequately measured to address the requirements of that Application Area,

Recognizing further the development by JCOMM of new implementation targets for the ocean observing networks, and the need for Members/Member States to contribute to addressing these targets,

Requests the Observations Programme Area to consider in its workplan, and in dialogue with funders and implementers of the observing networks, how the critical variables identified in the Ocean Applications Statement of Guidance, listed in the Annex, could be better observed in order to address the noted gaps;

Requests the Services and Forecasting Systems Programme Area to assist the Point of Contact for Ocean Applications in reviewing the Statement of Guidance for Ocean Applications, and updating it as needed in order for this document to continue reflecting the reality of the gaps while the ocean observing system is being implemented; in particular, consideration

should be given to identifying whether additional critical variables such as sea ice and snow could be added to the list in the Annex;

Requests the RRR to note the efforts and work of TPOS-2020 and consider how to incorporate their recommendations;

Urges Members/Member States:

(1) To contribute to the implementation of marine meteorological and oceanographic observing systems for achieving the implementation targets of ocean observing networks, as proposed by JCOMM;

(2) To pay attention to the critical variables listed in the Annex and take steps to address the gaps using appropriate observing technology.

Annex to Decision 14 (JCOMM-5)

CRITICAL VARIABLES CURRENTLY NOT ADEQUATELY MEASURED FOR ADRESSING THE REQUIREMENTS OF OCEAN APPLICATIONS

The Statement of Guidance for Ocean Applications has identified the following critical variables which are not adequately measured for addressing the observational user requirements of Ocean Applications, including Marine Services:

– **Sea surface height anomaly** - Noting the high impact of this observation on ocean forecasting systems to derive both the ocean state and circulation of the upper ocean, supporting a large number of applications, it is recommended that the observing system capabilities be given high priority and that a minimum service level target be agreed and sustained;

– **Sea level** – Noting the wide range of requirements for sea-level data (from early detection of tsunamis to long-term trends of sea-level rise), the requirements for this variable should be carefully addressed;

– **Wave parameters** (significant wave height, dominant wave period, Wave 1-D and wave directional energy frequency spectrum) - Noting that extreme wave and wind gust events significantly constrain shipping and other marine operations, it is recommended to collocate wind and wave sensors;

– **Surface pressure** – Noting that sea-surface pressure data from drifting and moored buoys are still limited, particularly in tropical regions where these data are vital to detect and monitor atmospheric phenomena over the oceans (e.g. tropical cyclones) that significantly constrain shipping, it is recommended to install barometers on all deployed drifters;

– **Visibility** – Noting that visibility data are critical for operations and, as these are still very limited, the NMHSs are encouraged to measure variables related to visibility.

Decision 15 (JCOMM-5)

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOAL 14

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development that were adopted by world leaders in September 2015 at an historic UN Summit; these new Goals universally apply to all with the aim that, over 15 years, countries will mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind,

Recalling also that SDG 14 is directly related to the ocean: *Conserve and sustainably use the oceans, seas and marine resources for sustainable development* , and, in particular:

(1) Target 14.A is specific to 'improved technology transfer and capacity development',

(2) Target 14.1 related to preventing and significantly reducing marine pollution;

(3) As well as Targets 14.4 and 14.6 related to sustainable fisheries,

Further recalling that ocean observations, data and services, also contribute to the other SDGs,

Mindful that the UN Ocean Conference (New York, 5-7 June 2017) was held to identify ways and means to support and advance the implementation of SDG 14, with an overall objective to reverse the decline in health of the ocean for people, planet and prosperity,

Noting with satisfaction the contribution of both WMO and IOC at the UN Ocean Conference, where particular areas of interest to WMO and IOC included:

(1) Minimizing and addressing ocean acidification,

(2) Increasing scientific knowledge, and developing research capacity and transfer of marine technology,

(3) Addressing marine weather impacts in the polar regions,

(4) Addressing oceans and climate and building the Blue Economy,

Noting further with satisfaction the launch of voluntary commitments by IOC and WMO at the UN Ocean Conference, including:

(1) IOC launched:

   (a) A proposal for an International Decade of Ocean Science for Sustainable Development (2021 to 2030),

   (b) A Global Ocean Science Report,

   (c) And further voluntary commitments related to ocean observations, Ocean Literacy, Blue Carbon, Western Pacific research capacity, Marine Spatial Planning, Deep Ocean Sustainability, World Oceans Day, Small Island Developing States, Ocean Acidification, Coral Reefs, an Ocean Knowledge-Action Network, and ocean climate,

(2) WMO launched:

(a) Weather and climate services for African, Caribbean and Pacific SIDS, which are vulnerable to marine weather events and the impacts of climate change,

(b) Strengthening international coordination for improved early warning of El Niño events and subsequent preparedness for its impacts, for example on food security, human safety and health,

(c) The Year of Polar Prediction to foster observations and forecasting capabilities in polar regions, which are changing rapidly due to climate change,

Noting the UN Ocean Conference adoption of the Outcome 'Our Ocean Our Future: Call for Action',

Taking note that the Call for Action is being considered at the 72nd Regular Session of the UN General Assembly (UNGAS72) commencing 12 September 2017,

Encourages the co-presidents of JCOMM to foster the contribution of JCOMM experts in assisting WMO Members and IOC Member States in implementation of the Call for Action (especially in relation to SDG 14a), voluntary commitments, and other goals and targets in Agenda 2030, as appropriate;

Requests the co-presidents of JCOMM to engage in the proposed *International Decade of Ocean Science for Sustainable Development;*

Urges IOC Member States and WMO Members to:

(1) Strengthen their ocean observations as contribution to the Global Ocean Observing System and commitment to SDG Goals and targets;

(2) Consider joint acquisition and procurement of meteorological and ocean observing infrastructure at regional levels through WMO Regional Associations, IOC Subcommissions, and GOOS Regional Alliances;

(3) Assist the WMO and IOC in their voluntary commitments, as appropriate.

Annex to Decision 15 (JCOMM-5)

UNITED NATIONS OCEANS REPORT AND CALL FOR ACTION

(1) Report of the United Nations Conference to Support the Implementation of the SDG-14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development (unedited advance version, 2017 Ref A/CONF.230/14).

(2) United Nations Conference to Support the Implementation of Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development. Outcome of the Conference: Our ocean, our future: call for action. (A/CONF.230/L.1).

Decision 16 (JCOMM-5)

APPROVAL OF THE SERVICES AND FORECASTING SYSTEMS PROGRAMME AREA VISION, NEW STRUCTURE AND GOVERNANCE

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling that WMO Cg-17 (2015):

(1) Urged Members to renew their focus on marine services through the strengthening of their marine meteorological and oceanographic services in support of safety, life and property at sea as required under the *International Convention for the Safety of Life at Sea (SOLAS)*,

(2) Noted that operational, sustained funding for the national ocean observing systems was critical to the provision of these services. The important responsibilities of METAREA coordinators were acknowledged and Members were encouraged to provide them with appropriate training and support,

Considering the recommendations and scenario options for WMO to strengthen marine services, as outlined in the Report of the Marine Services Assessment (see document JCOMM-5/INF 3.1(1)), which was prepared by an Ad Hoc Working Group to carry out an assessment of marine services at WMO, following the request by Cg-17 that WMO needed to improve its role in marine services,

Acknowledging that Marine services do not just contribute to shipping, they also provide essential information to coastal communities for transport, safety and environmental management,

Noting that population trends and changing climate conditions have increased the vulnerability of coastal populations and infrastructure to the effects of weather and ocean,

Noting also that the global situation is rapidly changing and emerging issues are driving the need for maritime safety services to modernize approaches to ensure appropriate capabilities to address issues such as:

(1) An increasing global population (especially urban and coastal, with 40% of the global population currently living within 100km of the coast),

(2) An increasing use of the coastal and marine area through increased transportation (industry and leisure),

(3) Increased risk exposure in the marine environment (e.g. new shipping in the Arctic area with melting sea ice, increasing trend in the proportion of shipping losses related to weather),

(4) The emerging blue economy (fourfold increase in last 40 years),

(5) Dependency on maritime transport to contribute to the global supply chain (more than 90% of world trade is delivered by sea),

(6) The growing interest in unmanned vessels and their operational needs concerning marine safety services,

(7) Increased storminess in a changing climate and subsequent impacts on people, infrastructure and maritime operations at sea and on the coast,

(8) Increased focus on developing countries in tropical regions, Small Island Developing States (SIDS) and Polar regions, all of which rely on marine services for safety and sustainability,

(9) Global interest in environmental health and food security, and

(10) The existing international global frameworks that are driving global priorities, and which marine is inherent in (e.g. Sendai, Sustainable Development Goals (SDGs), *Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway for SIDS* etc.),

Considering the IOC's strengthened focus on ocean forecasting services, especially through the work of the Global Ocean Observing System (GOOS) and their Regional Alliances (GRAs), and the recent Decision IOC-XXIV/6.1.3 committing it to the JCOMM work programme,

Taking note that WMO Members:

(1) Wish for an investigation of the implementation of cost recovery for marine, to add value to services; and

(2) And their NMHSs need to strengthen the provision of maritime safety services and that the coordination of these services internationally and nationally will be enhanced through the National Marine Services Focal Points (Annexes 1 and 2 to the present decision and Resolution 8 (JCOMM-5));

Noting further the growing expectations for supporting heightened maritime safety activities related to climate change and climate variability impacts, especially in the polar regions with diminished sea ice, increased transport in the Arctic shipping lanes as well as growing expeditionary and tourist activities in the Antarctic waters,

Considering also the increased shipping and coastal activities, there is a growing requirement to support those agencies addressing environmental emergencies (e.g. oil spills, nuclear fallout and other noxious hazards) and search and rescue,

Acknowledging:

(1) That JCOMM-4 established a Task Team for Marine Environmental Emergency Response (MEER) to consider and revise the work of the Marine Pollution Emergency Response Support System (MPERSS) and recommended a solution for a broader mandate beyond oil spills and in coordination with other agencies such as IMO and International Atomic Energy Agency (IAEA),

(2) The work of the Task Team and their recommendation to establish an Expert Team for MEER, with more dedicated and sustained Terms of Reference for this issue,

Recalling IMO Assembly Resolution A.1051(27) relating to WMO's obligation to meet the UN Convention for SOLAS, and support operations under the Worldwide Met-Ocean Information and Warning Service (WWMIWS), the WWMIWS Committee (see Resolution 8 (JCOMM-5)) would continue the work of the Expert Team of Maritime Safety Services (ETMSS), and coordinate closely with the World-Wide Navigation Warning Service (WWNWS) Subcommittee responsible for global Navigational Warnings, under the responsibility with IHO,

Noting the decision by IMO in 2016 to mandate the implementation of the IMO Instruments Code for Coastal States, as stated in IMO Resolution A.1070 (28), where metocean forecasting requirements under SOLAS will be part of the IMO Audit program for every country,

Noting further the Modernization Plan of the Global Maritime Distress and Safety System (GMDSS) being implemented by the IMO, which has amended the regulations, equipment and methods used for marine communications within the GMDSS, and the work by WMO, IHO and IALA to progress the IMO e-Navigation framework using the data standards and formats of the IHO S-100 (Universal Hydrographic Data Model) for the display of communication information on integrated bridge displays,

Considering the Sendai Framework (2012), that both WMO and IOC have disaster risk reduction (DRR) as a Strategic Priority, and that increasing coastal populations and infrastructure, and associated vulnerability are resulting in increased demands for more specific information in the coastal zones supporting marine operations in high risk, high traffic regions, the Expert Team for DRR (see Resolution 8 (JCOMM-5)) will provide the expertise to support these issues,

Endorses the Vision for the Services and Forecasting Systems Programme Area (SFSPA) as given in Annex 1 to the present decision, which provides the rationale for the new structure to the SFSPA;

Requests the JCOMM Management Committee to ensure rationalization of the Expert Teams in the SFSPA, thereby keeping up with progress and emerging issues, and to work with WMO and IOC Secretariats to review this prior to every JCOMM session;

Adopts the structure of the SFSPA as given in Annex 2 to the present decision, with the Terms of References described in Resolution 8 (JCOMM-5);

Requests JCOMM Members to appoint National Marine Services Focal Points (see Terms of Reference in Resolution 8 (JCOMM-5)) who would act as the key communication point per WMO Member on maritime safety issues;

Requests the WWMIWS Committee to develop and implement, with the cooperation of the IHO, WMO, IMO and IOC, the metocean requirements under the International Code for Ships Operating in Polar Waters (Polar Code, in effect 01 January 2017) within SOLAS and assist Members with the implementation of this new code;

Requests that the Chairperson and Vice-Chairpersons of the SFSPA:

(1) Investigate, with other appropriate bodies, cost recovery methods and implementation in marine services;

(2) Consider the development of guidance on the cost recovery methods and implementation in marine services;

(3) Develop the result to be used in guidance by Members.

Annex 1 to Decision 16 (JCOMM-5)

SERVICES AND FORECASTING SYSTEMS PROGRAMME AREA VISION

1. SFSPA Vision

1.1 The JCOMM Services and Forecast Systems Programme Area (SFSPA) acts as the main delivery area for JCOMM products and services, including those for the safety of ships and persons at sea and in the coastal zone. In meeting many of its objectives, SFSPA works

very closely with other agencies in the provision of meteorological Maritime Safety Information (MSI), including other UN Agencies (such as the International Maritime Organization (IMO)) and Intergovernmental Organizations (IGO) such as the International Hydrographic Organization (IHO). In addition, the SFSPA also works closely with the International Atomic Energy Agency (IAEA) in the provision of information to support operations related to nuclear incidents.

1.2 The vision for SFSPA is to focus resource primarily on its key outputs, which include responsibilities under the UN Convention on the Safety of Life at Sea (SOLAS) that obliges Members to provide forecasts at least twice daily. Until now, these key outputs have been managed through its Expert Team on Maritime Safety Services (ETMSS), and in the future, it would be managed by JCOMM's Worldwide Met-Ocean Information and Warning Service (WWMIWS) Committee. The WWMIWS Committee has been proposed to reflect the governance of the IHO/IMO World-Wide Navigational Warning Service through the IHO WWNWS Subcommittee. In addition, the Expert Team on Sea Ice (ETSI), in close cooperation with its technical and scientific advisor, the International Ice Charting Working Group (IICWG), would continue to provide a wide-ranging and comprehensive range of information for ships operating in the Polar regions, which are likely to become more relevant as the waters become less ice-bound through the year. This includes the implementation of Polar Code for vessels operating the in polar regions.

1.3 A further element of the Vision is to enhance JCOMM's role in providing support and response in the event of Marine Environmental Emergencies. It is becoming apparent that for this work to progress successfully, an increased level of collaboration would be required with other agencies. To facilitate this anticipated level of collaboration, there is a change in the status of the team engaged in this from a task team, which, by definition, has a finite lifespan, to an expert team, which will allow more collaboration and enable strategic and resource planning to consider options for a number of years ahead.

1.4 The JCOMM SFSPA, through the proposed WWMIWS Committee would continue to provide oversight of meteorological services to the maritime sector, primarily that part of the sector operating under the SOLAS Convention, which obliges daily forecasts of winds, waves and other marine meteorological elements. In particular, it would retain guardianship of key Technical Regulations relating to the provision of this information within the WMO *Manual on Marine Meteorological Services* (WMO-No. 558) and the WMO *Guide to Marine Meteorological Services* (WMO-No. 471) and advise the World-Wide Navigational Warning Service Subcommittee (WWNWS-SC) Document Review Working Group on meteorological aspects of the Joint IMO/WMO/IHO manuals relating to the provision of MSI. The Committee would have oversight to the redesign of the WWMIWS website (maintained by France) planned for 2018 and to its regular updates. Additionally, it would undertake the oversight of nominations for National Marine Services Focal Points within Members who are providing marine services. This would ensure worldwide consistency and oversight of marine services within Members.

1.5 The role of the Expert Team on Waves and Coastal Hazard Forecasting Systems (ETWCH) would be refreshed, through the Expert Team on Disaster Risk Reduction (ETDRR), to provide more focus on DRR implications associated with both the marine and coastal zone, including the SOLAS Convention, storm surge and inundation issues (see Resolution 8 (JCOMM-5) for terms of reference). This would include leading, on behalf of JCOMM, on issues relating to the Sendai Framework and liaison with appropriate bodies and Technical Commissions in relation to other hazards, for example tsunami forecasts and warnings, and the WMO Coastal Inundation Forecasting Demonstration Project (CIFDP) (joint technical support by JCOMM and CHy). It is also anticipated that for specific issues, Task Teams – with a defined Task - will be formed to focus on solutions, for example, in the absence of an Expert Team on Waves, a Task Team could focus on this aspect if required.

1.6 JCOMM SFSPA would continue to work, through the WWMIWS Committee, towards the introduction of a range of competencies relating to the issuing of services to the marine sector. This is closely related to the work being undertaken to ensure that Quality Management

principles are also introduced throughout the production process. A part of the Vision for SFSPA is that these elements become integral to the provision of services and become an underlying requirement, through IMO, for any Member wishing to provide any form of marine meteorological services.

1.7 With the introduction of Vice-Chairpersons within the SFSPA, these, along with the Chairperson, would focus on strategies to improve the status and positioning of NMHS as the authoritative voice on marine services in their country, for example, through improved JCOMM support to Members to fully implement the IMO Instruments Code for Coastal States, as stated in IMO Resolution A.1070 (28) - reference to Part 3 - Coastal States.

1.8 A further focus on improving the resilience of maritime service delivery would be a priority for the WWMWIS Committee with focus on developing arrangements for backup and implementation of marine specific Global Data-processing and Forecasting Centres (GDPFS). To improve the quality of service delivery, a Task Team would be required to develop plans for full implementation of the Marine Forecaster Competency Framework (WMO Resolution 6, Cg-17). The WWMWIS Committee would be charged with developing performance reporting guidelines to improve feedback to marine customers about the reliability of marine services.

1.9 Effective implementation of the Vision requires improved engagement with all WMO Members. To facilitate communication and coordination within the framework of the Worldwide Met-Ocean Information and Warning Service (WWMIWS), a new role will be developed for National Marine Services Focal Points to work alongside the existing METAREA coordinator roles and the WWMIWS Committee. It is expected that the National Marine Services Focal Points will be involved in regular coordination meetings with the WWMIWS Committee, receive communication on maritime safety activities, and provide input on national requirements into service standards.

Annex 2 to Decision 16 (JCOMM-5)

SERVICES AND FORECASTING SYSTEMS PROGRAMME AREA STRUCTURE AND GOVERNANCE

1. SFSPA STRUCTURE AND GOVERNANCE

1.1 To enable the SFSPA to undertake the roles outlined in its Vision, the structure of the Programme Area is adjusted. An outline of these changes is shown in Figure 5.1 below, and encompasses the following changes:

1.1.1 The introduction of a range of Vice-Chairs specializing in specific disciplines appropriate to the SFSPA. These include IOC Ocean Systems, Quality Management and Competency, (which includes the investigation and ultimate implementation of cost recovery) Regulatory Materials, and WMO Systems (to include GDPFS, WIS, and others). The Chair and Vice-Chairs of the SFSPA would also take ownership of work on any strategic issues, for example, strengthening the role of NMHS as an authoritative voice on marine services in their country, and working with other bodies, such as IMO and IHO as appropriate. While not a Vice-Chairperson, the Co-Chairs of the Project Steering Group for the WMO's Coastal Inundation Forecasting Demonstration Project (CIFDP) (jointly supported with technical expertise from WMO Commission for Hydrology (CHy) and JCOMM) will also be included in the SFSPA Coordination Group for the lifetime of the CIFDP.

1.1.2 The refocusing of ETWCH to become the Expert Team on Disaster Risk Reduction (ETDRR), to take a more focused approach to services related to disasters in the marine and coastal zone, guided by the Sendai Framework and other relevant frameworks such as the SOLAS Convention, and with links to other bodies and Technical Commissions working on DRR activities, for example UN-Oceans, the IOC's Tsunami Programme, and the WMO's CIFDP.

1.1.3 Creating an Expert Team on Marine Environmental Emergency Response (ETMEER) support, to provide a more stable framework in this area, enabling a more integrated approach to this, working with the Commission for Basic Systems (CBS) concerning the Emergency Response Activities programme, and other agencies, such as IAEA and IMO as appropriate. This team needs to review the Marine Pollution Response Support System for the high seas (mperss), including its website.

1.1.4 Routine services to shipping being managed by a Worldwide Met-Ocean Information and Warning Service (WWMIWS) Committee, replacing the name of the existing Expert Team on Maritime Safety Services (ETMSS). This committee would work closely with the Expert Team on Sea Ice (ETSI) and with the National Marine Services Focal Points within each JCOMM Member.

1.1.5 Creating National Marine Services Focal Points, to play an important role in the implementation of metocean information services within national waters, under the framework of the WMO-IMO Worldwide Met-Ocean Information and Warning Service (WWMIWS). The National Focal Points will gather user requirements, foster partnerships, and monitor service delivery at the national level; share these user requirements with the WWMIWS Committee and WMO Marine Meteorology and Oceanography Program Office; and contribute to the maintenance of national service information in relevant international documentation. The National Marine Services Focal Points should have a direct role in the delivery of marine services within the responsible national organization.

1.1.6 The Expert Team on Operational Ocean Forecasting Systems (ETOOFS) would be retained, but would be closely aligned with marine focused GDPFS centres, within the context of the seamless GDPFS (see Recommendation 14 (JCOMM-5)).

1.1.7 The Cross-cutting Task Team for Weather Climate and Fisheries (TT-WCF) would be moved to the SFSPA, noting its focus to develop relevant services to fisheries agencies, and Member States/Members with fisheries/aquaculture interests. For detail see Resolution 2 (JCOMM-5).

1.1.8 additional task teams may be set up, as appropriate, to consider specific items from time to time, not generally covered under the expert teams' guidance.

1.1.9 The WWMIWS Committee would lead a training and capacity-building effort for the National Marine Services Focal Points to transfer knowledge and skills to developing member states, so that they can benefit from the knowledge and experience of other NMHS for the generation of MSI and to ensure harmonized standards and correct application of the regulations and guidance already in place. This will help to ensure the maritime customer receives the necessary and required information in a timely manner in the appropriate and easily understood standard format.

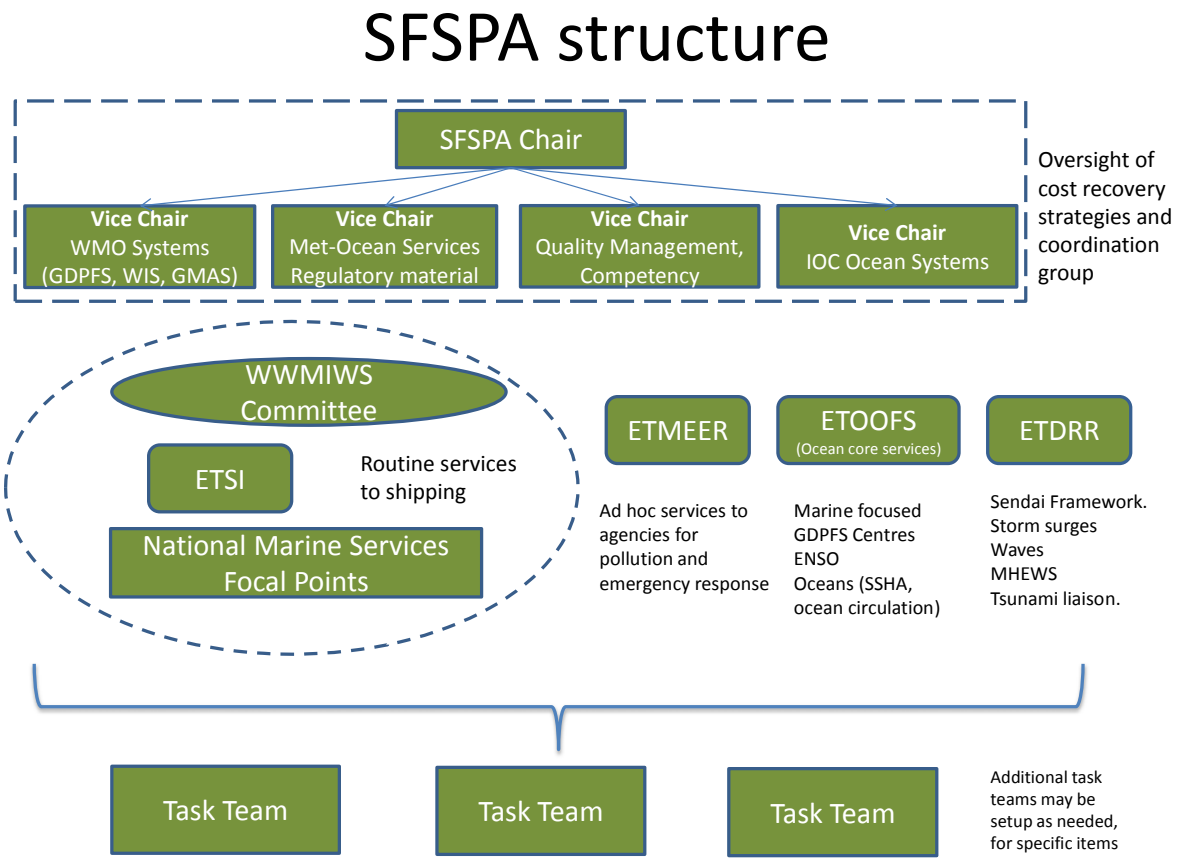

Figure 5.1. Approved SFSPA structure and governance

Decision 17 (JCOMM-5)

FUTURE OF THE COASTAL INUNDATION FORECASTING DEMONSTRATION PROJECT

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Considering that:

(1) CHy-15 adopted Resolution 6 requesting the president of CHy, with the assistance of the appropriate members of the CHy Advisory Working Group and the Open Panel of Commission for Hydrology Experts (OPACHE), to coordinate with the co-presidents of JCOMM a joint assessment of the initial phase of CIFDP and, depending on its results, to consider the desirability of developing a governance structure and procedures that would transition the Coastal Inundation Forecasting Demonstration Project (CIFDP) to a more sustainable platform, for the strengthening of national multi-hazard early warning systems to address flooding in coastal areas,

(2) The CIFDP Project Steering Group at its 7th Meeting (2017) concurred with Resolution 6 (CHy-15) calling for an independent joint assessment of the initial phase of CIFDP,

(3) The JCOMM Management Committee (2015) at its 12th session considered the future of CIFDP as 'Demonstration' and agreed that an evaluation of CIFDP and user acceptance should be conducted to understand its value and use before any commitment is made to continue in the future,

(4) CIFDP is a WMO Demonstration Project led jointly by two Technical Commissions (CHy and JCOMM), and that CHy-15 through Resolution 6 has already requested to coordinate with JCOMM a joint assessment as expressed in (1),

Recognizing:

(1) The support expressed by Congress (WMO Cg-17) and the Executive Council (WMO EC-68) for the CIFDP and its ongoing demonstration sub-projects in Bangladesh, Caribbean, Fiji and Indonesia,

(2) That to enhance multi-hazard early warning systems, the individual components of early warning systems must be based on sound technical and scientific information as can only be provided by the respective specialists (eg hydrologists, oceanographers and meteorologists),

(3) The growing interest in the enhancement and delivery of coastal and inundation early warnings by Members not currently included in the demonstration sub-projects that are being implemented by the integrated approach of the CIFDP,

Acknowledging the important collaboration, coordination and progress of the CIFDP overall, and the sub-projects led by WMO, with support from both JCOMM and CHy experts, and especially the Project Steering Group,

Considering the expected completion of all CIFDP sub-projects by WMO Cg-18 (2019),

Considering also the need to integrate a multi-hazard early warning perspective, including other complementary WMO Programmes and IOC Programmes such as tsunami early warning,

Decides to ask the JCOMM Management Committee to initiate coordination with CHy, with support from the WMO Secretariat, for a joint independent assessment of the CIFDP, as stipulated in Resolution 6 (CHy-15) and, depending on the results, to consider developing a governance structure and procedures that would transition the CIFDP to a more sustainable platform for the strengthening of national multi-hazard early warning systems to address flooding in coastal areas;

Requests JCOMM co-presidents in coordination with participants, project sponsors and the CHy president to report the results of the assessment, and any proposed future governance structure to WMO Cg-18 (2019);

Recommends the continued sharing of information across all the CIFDP Project Steering Group, which is already in process through the CIFDP Project Steering Group, and to extend the sharing of this information to related experts, donor and beneficiary countries.

Annex to Decision 17 (JCOMM-5)

COASTAL INUNDATION FORECASTING DEMONSTRATION PROJECT

The Coastal Inundation Forecasting Demonstration Project (CIFDP) is a multi-hazard warning system that promotes an integrated approach in the enhancement and delivery of early warnings, no matter what the causes for coastal inundations are, in line with the concept of impact-based forecasting and the UN Sendai Framework for Disaster Risk Reduction (DRR). Implementation will demonstrate how integrated coastal inundation forecasting and warnings

can be improved and effectively coordinated by the National Meteorological and Hydrological Services (NMHSs). The CIFDP is led by WMO, jointly coordinated by the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) and the WMO Commission for Hydrology (CHy) with support from the WMO Secretariat (Marine Meteorology and Ocean Affairs Division, and the Hydrological Forecasting and Water Resources Division). The strategic approach for the CIFDP was formally adopted by JCOMM-4 (2012) and since, four sub-projects have commenced, with expected completion by Cg-18 in 2019. Cg-17 noted its continued support of the CIFDP sub-projects currently underway. Further information about the CIFDP is available on the JCOMM website, including the CIFDP Implementation Plan (JCOMM TR-64).

I. Key achievements

- The CIFDP is currently underway in four sub-projects (Bangladesh, Caribbean, Fiji and Indonesia), three of which are in urban coastal settings. Substantial progress has been made to date in each of these CIFDP sub-projects since 2013 (mostly Phases 1 to 2);

- The CIFDP directly relates to four of the five WMO Strategic Priorities (Disaster Risk Reduction, Service Delivery, Global Framework for Climate Services, and Capacity-building);

- The Flood Forecasting Initiative Advisory Group, established by Cg-XVI in Resolution 15, met in Geneva from 1 - 3 December 2015, and adopted a new workplan that includes, inter alia, activities to ensure that all major demonstration projects and components, including but not limited to CIFDP, include the requirements and reflect best practices for effective and sustainable flood forecasting in their design and implementation;

- CIFDP experts have been instrumental in carrying out the activities towards improving multi-hazard warning systems and in particular the efforts of the CIFDP to integrate with other WMO Programmes, including the Severe Weather Forecast Demonstration Project (SWFDP), the Flood Forecasting Initiative , the Tropical Cyclone Programme and Disaster Risk Reduction (DRR)

- The technical commissions, in particular JCOMM and CHy, have put in place mechanisms to ensure the flow of science and technology to operations for the CIFDP sub-projects;

- Relevant WMO regional associations (RA II, IV and V) and Members have facilitated and supported the progress of the CIFDP sub-projects underway.

II. Remaining gaps and challenges

- The CIFDP should integrate as much as possible with the existing complementary WMO Programmes and activities, and where possible, with international tsunami forecasting and warning systems (facilitated by UNESCO-IOC Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG));

- The UN Sendai Framework for Disaster Risk Reduction 2015-2030 includes, as one of its key priorities, implementing multi-hazard early warning systems, providing integrated and seamless services for simultaneously reducing disaster risk from different types of hazards, and making a shift to impact-based forecasts and risk-informed warnings. On completion, the CIFDP should provide a seamless and integrated impact-based service that enables people (public), local communities and emergency responders to make timely and effective decisions to reduce vulnerability to coastal inundation. This will be accomplished through relevant WMO initiatives and technical commissions (e.g. JCOMM, CHy, CBS), Hydrology and Water Resources Programme, Global Data-processing and Forecasting System (GDPFS), Public Weather Service Programme, Tropical Cyclone Programme and Disaster Risk Reduction Programme (DRR);

– To ensure full completion of the CIFDP, the relevant technical commissions, regional associations and experts must remain engaged and WMO also needs to maintain resources (human and financial) to facilitate the completion of the four sub-projects by Cg-18.

III. Partnerships and resources mobilized

– USAID funding has been used for the CIFDP sub-projects in the Caribbean and Bangladesh. This funding commitment will continue to the completion of the projects;

– Korean funding has been secured for the completion of the CIFDP sub-project in Fiji (Phases 2 to 4) commencing in 2016;

– Indonesia has committed to funding the completion of the sub-project in Indonesia;

– WMO regular budget funds are also being used, complemented by the extrabudgetary funds, when needed;

– Members continue to offer in-kind support for expert advice and data needs for the sub-projects.

Decision 18 (JCOMM-5)

GLOBAL MULTI-HAZARD ALERT SYSTEM

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling WMO Decision 3 (EC-69) – WMO Global Multi-hazard Alert System, wherein EC-69 discussed the rationale for the WMO Global Multi-hazard Alert System (GMAS), and endorsed the GMAS vision as an initial draft statement which will be further advanced through the guidance of the WMO Executive Council Working Group on Disaster Risk Reduction (ECWG/DRR),

Noting that impacts related to marine weather-related hazards (including storm surges and high waves) affect an increasingly exposed and vulnerable population, especially in coastal areas,

Recognizing that early warnings for marine weather-related hazards, as part of a multi-hazard approach, have demonstrated to be very effective in reducing loss of life and property,

Acknowledging the important contribution by JCOMM to the advancements in the accuracy, reliability and timeliness of observing, forecasting and warnings of marine weather-related phenomena, as well as in the exchange of marine weather-related information,

Invites WMO Members / IOC Member States to share best practices of their multi-hazard early warning systems, which include marine weather-related aspects, as a contribution to the development of GMAS;

Requests the JCOMM co-presidents, with the support of the SFSPA chairperson and vice-chairperson on WMO Systems, to participate in, and contribute to, the development of the GMAS concept and project plan, as appropriate, and keep WMO Members/IOC Member States informed of its progress.

Decision 19 (JCOMM-5)

JOINT WORLD METEOROLOGICAL ORGANIZATION AND INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION STRATEGY FOR MARINE METEOROLOGICAL AND OCEANOGRAPHIC DATA MANAGEMENT (2018–2021)

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling JCOMM-4 report, paragraph 7.07, requesting the Data Management Coordination Group to keep the JCOMM Data Management Plan and its Implementation Details under review, and to update them as needed,

Noting that the primary objective of the JCOMM Data Management Programme Area (DMPA) is to implement and maintain a fully integrated end-to-end data management system across the entire marine meteorology and oceanographic community,

Noting also the draft Joint WMO and IOC strategy for marine meteorological and oceanographic data management for the period 2018 to 2021, given in the annex to the present decision (hereafter referred to as “Strategy”),

Noting further that the seventeenth World Meteorological Congress in Resolution 33 (Cg-17) decided to develop “Part C” of the WMO Information System (WIS) to provide guidance and standards for information management for which the first step of development was the WMO Workshop on Information Management held 2-4 October 2017,

Considering:

(1) The need to have a holistic and strategic approach with regard to marine meteorological and oceanographic data management in the WMO and IOC frameworks, involving all Programme Areas and the International Oceanographic Data and Information Exchange (IODE),

(2) That such strategic approach should be consistent with the current 2016-2019 and future 2020-2023 WMO Strategic Plans, and the IOC Medium Term Strategy 2014-2021, including in particular the WMO Information System 2.0 Strategy and the IOC Strategic Plan for Data and Information Management (2017-2021),

(3) The need to be able to respond to fast technological developments in the area of data management, information systems, and emerging data issues (e.g. big data),

Acknowledging that JCOMM and the IODE will be able to offer their expertise to assist other groups (e.g. the Ocean Observations Panel for Climate) to specify and implement their own data management requirements, with the overall goal of integrating their data management into the overall end-to end data management system,

Noting with satisfaction the work of the Data Management Programme Area, guided by the Management Committee, in collaboration with the IODE and the Observations Programme Area to develop the new Strategy,

Agrees that the format of the JCOMM Data Management Plan, adopted by JCOMM-4 and further updated during the intersessional period, no longer allows to address the current challenges;

Concurs with the Vision, Mission, Outcomes and Activities outlined in the draft Strategy;

Decides that the Strategy will replace the current JCOMM Data Management Plan once approved by WMO and IOC Executive Bodies;

Requests:

(1) The DMPA to then keep the Strategy under review and develop an implementation plan responding to the Strategy in consultation with the other Programme Areas and the IODE;

(2) The WMO Secretary-General and the IOC Executive Secretary to promote the Strategy and its implementation with WMO Members and IOC Member States;

(3) The DMPA to assist the Commission for Basic System in developing the information management component of WIS, engaging with the implementation of WIS 2.0, and to seek to implement the Strategy in a way compatible with it;

(4) The co-presidents in coordination with the JCOMM MAN to provide additional oversight, and encourage integration of, data management activities across all Programme Areas;

(5) All Programme Areas to update their work plans in response to the Strategy once approved;

(6) The Management Committee to keep the Strategy under review on an annual basis;

Authorizes the co-presidents to recommend the updated draft Strategy to be adopted by the WMO and IOC Executive Councils following consideration of item (5) under “requests” above;

Invites the IODE to collaborate in the implementation of the Strategy;

Urges Members/Member States and all other contributors identified in the Strategy to collaborate with JCOMM with the view of realizing the outcomes expected from the Strategy.

Annex to Decision 19 (JCOMM-5)

JOINT WORLD METEOROLOGICAL ORGANIZATION AND INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION STRATEGY FOR MARINE METEOROLOGICAL AND OCEANOGRAPHIC DATA MANAGEMENT (2018–2021)

The draft Joint WMO and IOC strategy for marine meteorological and oceanographic data management document is available in six languages at http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=19895.

Decision 20 (JCOMM-5)

FULL REVISION OF THE *GUIDE TO THE APPLICATIONS OF MARINE CLIMATOLOGY* (WMO-No. 781) AND ASSOCIATED *ADVANCES IN THE APPLICATIONS OF MARINE CLIMATOLOGY – THE DYNAMIC PART OF THE WMO GUIDE TO THE APPLICATIONS OF MARINE CLIMATOLOGY* (JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY TECHNICAL REPORT No. 13, WMO/TD-No. 1081)

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling the establishment of the JCOMM Marine Climate Data System (MCDS) through Recommendation 2, (JCOMM-4),

Noting:

(1) Recent modernizations and full re-write of Chapter 5, Marine Climatology, of the *Manual on Marine Meteorological Services* (WMO-No. 558), as recommended during this JCOMM session,

(2) Recent modernizations and full re-write of Chapter 3, Marine Climatology, of the *Guide to Marine Meteorological Services* (WMO-No. 471), as recommended during this JCOMM session,

(3) The full review of and revision suggestions to *The Guide to the Applications of Marine Climatology* (WMO-No. 781), provided by the JCOMM Expert Team on Marine Climatology,

Observes the need to modernize the associated Marine Climatology publication, *The Guide to the Applications of Marine Climatology* (WMO-No. 781) and associated JCOMM Technical Report No 13. – Advances in the Applications of Marine Climatology – The Dynamic Part of the WMO Guide to the Applications of Marine Climatology;

Decides to endorse the update and modernization of *The Guide to the Applications of Marine Climatology* (WMO-No. 781) and associated JCOMM Technical Report No. 13 – Advances in the Applications of Marine Climatology – The Dynamic Part of the WMO Guide to the Applications of Marine Climatology;

Requests the JCOMM Expert Team on Marine Climatology to facilitate the revision of the publication WMO-No. 781, taking into account recent updates to marine climatology chapters in The Manual on and Guide to Marine Meteorological Services (Chapter 5 of WMO-No. 558 and Chapter 3 of WMO-No. 471, respectively) and further development and implementation of the MCDS.

Decision 21 (JCOMM-5)

MARINE CLIMATOLOGY WORKSHOPS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) The report of the Proceedings of the Fourth JCOMM Workshop on Advances of Marine Climatology (CLIMAR-4) and of the First ICOADS Value-added Database (IVAD-1) Workshop (JCOMM-TR-79), (Asheville, North Carolina, USA, 9-12 June 2014, and 13 June 2014), respectively, with recommendations,

(2) The report of the Fourth International Workshop on the Advances in the Use of Historical Marine Climate Data (JCOMM-MR-131), (MARCDAT-4, Southampton, UK, 18-22 July 2016), with recommendation,

(3) With appreciation the offer of Germany to host CLIMAR-5 around 2018,

Recognizing the productive and useful outcomes of the CLIMAR and MARCDAT series of workshops to the applications of marine climatology and the Marine Climate Data System (MCDS), and for users and developers of marine climatological data and datasets in particular,

Decides to organize a CLIMAR-5 session around 2018 in Germany and MARCDAT-5 session around 2020;

Requests the JCOMM Data Management Programme Area (DMPA) and Expert Team on Marine Climatology (ETMC) to proceed with required preparations and organization of these meetings.

Decision 22 (JCOMM-5)

ENDORSEMENT OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY OBSERVATIONS PROGRAMME AREA VISION

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting the reports of the fifth, sixth, seventh and eighth sessions of the JCOMM Observations Coordination Group (OCG) in 2013, 2015, 2016 and 2017 respectively,

Noting further the draft forward vision set out for the Observations Programme Area in the annex to this Decision as developed by OCG,

Noting with satisfaction the strategic focus on areas of synergy across the networks, responding to evolving research and operational requirements and applications, and opportunities to engage new technologies and new networks,

Decides to endorse the draft JCOMM OPA vision for the next five years (annex to the present decision), as the guiding framework for the JCOMM OPA Workplan and organizational structure.

Annex to Decision 22 (JCOMM-5)

JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY OBSERVATIONS PROGRAMME AREA VISION

1.1 The JCOMM Observations Coordination Group (OCG) is charged to review, advise on, and coordinate the effective operation of the ocean and marine observing systems and related activities. Notable progress during the last intersessional period has been made in six different strategic foci (addressing many of the JCOMM OPA Terms of Reference) that are key to the following:

(a) Improving the fit for purpose of the observing system against numerous requirements and the needs of JCOMM sponsors and stakeholders;

(b) Encouraging technical development of existing observing networks and engaging emerging networks and communities of practice that are the key to addressing new requirements and needs; including the availability, completeness and timeliness of instrumental metadata;

(c) Developing metrics and targets to assess and report observing system performance and progress over time;

(d) Advancing exchange of international data and metadata and system-wide monitoring capabilities through JCOMMOPS;

(e) Encouraging system-wide integration and quality standards through development of community best practices and standards;

(f) Improving integration of data and information through data management standards and integration pilot projects.

1.2 The vision for OPA is to contribute towards a fit-for-purpose, integrated, and coherent ocean observing system that supports 1) a rapidly expanding set of weather, climate, marine and ocean services targeting stakeholders across the globe; 2) a vibrant international research community (e.g. the World Climate Research Programme (WCRP), the World Weather Research Programme (WWRP), and the International Ocean Carbon Coordination Project developing knowledge and solutions for the next decade. Key OPA objectives, capabilities, and outputs target key timelines:

2016: WMO–IOC-UNEP-ICSU Global Climate Observing System (GCOS) Implementation Plan Update: update network implementation targets;

2016 - 2019: WMO Integrated Global Observing System (WIGOS) Pre-Operational Phase 2016-2019 Implementation Plan;

2017: JCOMM-5 session: 1) revisit JCOMM and OCG organizational structure; 2) seek support for observational plans/targets; 3) demonstrate new capabilities under the JCOMM In Situ Observations Programme Support Centre (JCOMMOPS) to monitor the progress of, and risks to, the global ocean observing system; 4) demonstrate pilot activities to improve delivery of data to and access from the GTS;

2019: OceanObs19: revisit the performance of the observing system, and opportunities to better meet current and emerging requirements (e.g. through potential new technologies and regional pilot projects like the Tropical Pacific Observing System (TPOS) 2020 Project, initial recommendations resulting from the WMO-WWRP Polar Prediction Project including coordinated special observing efforts as part of the Year of Polar Prediction (YOPP) 2017-2019 and the EU-H2020 AtlantOS project on Optimizing and Enhancing the Integrated Atlantic Ocean Observing Systems).

1.3 The JCOMM OPA will continue to coordinate and encourage delivery of fit-for-purpose ocean-based data and information, addressing JCOMM stakeholders' requirements and needs.

1.4 The JCOMM OPA will continue to contribute to the WIGOS Implementation Phase through improving the timely delivery of marine and ocean data to the Global Telecommunication System (GTS), of metadata (through JCOMMOPS) to the Observing System Capability Analysis and Review tool (OSCAR), promoting and leading instrument intercomparisons, the development of guidance materials (standards and best practices) and the establishment of Regional Marine Instrument Centres (RMICs).

1.5 The JCOMM OPA will continue to monitor and report on the progress of, as well as risks to, the ocean observing system. JCOMMOPS presently serves a central role in this endeavour; however, its support is fragile, has grown to a point where management approaches need further consideration, and organizational placements are problematic jeopardizing efficient management and sponsorship.

1.6 The JCOMM OPA will engage with the GOOS Regional Alliances (GRAs) to encourage integration of coastal and open-ocean systems. Such integration will help develop advanced observing strategies for JCOMM stakeholders; improve integration of ocean observing to address existing (e.g. sea level) and emerging requirements (e.g. biogeochemistry/ocean acidification), and exploit satellite and in situ observing systems. It will strengthen and formalize the relationship with the IOC–WMO–UNEP–ICSU Global Ocean Observing System (GOOS) to more efficiently address JCOMM requirements through coordination with GOOS activities.

1.7 The JCOMM OPA will scan the ocean observing enterprise and approaches and engage emerging and transitional observational networks that support JCOMM requirements, particularly those that are sufficiently mature and/or use technical approaches/platforms similar to those already in use under the JCOMM OPA. For some observing systems (e.g. biological observing systems), there may be other international organizations better positioned to coordinate international activities. In such cases, JCOMM OPA will coordinate activities with such networks through GOOS, regional networks, etc.

1.8 JCOMM OPA will monitor and coordinate testing and assessments of ocean observing technologies as they mature and approach readiness for sustained operation.

1.9 JCOMM OPA will also support assessments/studies that consider the mix of platforms/technologies to best meet JCOMM requirements. Technological change, improved satellite capabilities and coverage, and shifts in use of platforms (especially from ships due to their high cost) are likely to evolve due to market pressures and economies. This will require JCOMM OPA to coordinate strategic changes to the observing systems.

1.10 JCOMM OPA will also work with other JCOMM Programme Areas to address new frontiers (e.g. Arctic, deep ocean, and poles) and regionally focused observing pilots (e.g. TPOS-2020, YOPP and the EU-H2020 AtlantOS and INTAROS projects) that are motivating observing expansion in response to new requirements and potential new stakeholders/sponsorship. These are good opportunities to pilot new approaches and increased levels of integration.

1.11 JCOMM OPA will work with other JCOMM Programme Areas to address the increased demand for informational products. Data integration/interoperability is an intrinsic requirement, and the OPA will develop strategic perspectives leading to the development of suitable products for relevant Essential Ocean Variables (EOVs).

Decision 23 (JCOMM-5)

ENDORSEMENT OF THE NEW JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY OBSERVATIONS PROGRAMME AREA STRUCTURE AND WORKPLAN

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting the reports of the fifth, sixth, seventh and eighth sessions of the JCOMM Observations Coordination Group (OCG) in 2013, 2015, 2016 and 2017 respectively,

Noting further the draft OPA Workplan proposed by OCG, and developed to implement the OPA Vision for the next five years,

Noting with satisfaction the task areas identified to capitalize on the synergies across the observing system to improve overall observing system performance,

Observing that the key task areas are focused around responding to requirements, implementation including new networks and technologies, and the development of improved performance metrics,

Recognizes with satisfaction the proposed changes to governance of the OCG, comprising a Chairperson and four Vice-Chairpersons to lead tasks on engagement with WIGOS/WIS, New Technologies, Standards and Best Practices, Data and Integration and to oversee and support the implementation of the Workplan (annex to this Decision include the proposed Terms of Reference for the Vice-Chairpersons);

Decides to endorse the draft JCOMM OPA Workplan and the proposed changes to the OCG Governance (annex to the present decision) to ensure its full implementation;

Authorizes the OCG to select the Vice-Chairpersons, after receiving any nominations for these positions from the JCOMM-5 nomination process, which closes on 15 November 2017.

Annex to Decision 23 (JCOMM-5)

OBSERVATIONS COORDINATION GROUP VICE-CHAIRPERSON TERMS OF REFERENCE

1. WMO/WIGOS

The role of the OCG WMO Integrated Global Observing System (WIGOS)/WMO Vice-Chairperson will be to bring the WMO, and therefore WIGOS, perspective into the OCG Workplan. This will essentially involve addressing the role of JCOMM and OPA with regard to the five WIGOS pre-operational phase (2016-2019) priority areas:

(i) JCOMM Observations Programme Area (OPA) contribution to WIGOS related WMO Regulatory Materials;

(ii) Provision through the JCOMM In Situ Observations Programme Support Centre (JCOMMOPS) of metocean observing systems metadata to the Observing System Capability Analysis and Review tool (OSCAR) according to the WIGOS Metadata Standard;

(iii) Bringing JCOMM experience and contribution to the WIGOS Data Quality Monitoring System;

(iv) Addressing the role of JCOMM and its Regional Marine Instrument Centres (RMICs) to the activities of the Regional WIGOS Centres that will be established;

(v) Promoting enhanced role of National Meteorological and Hydrological Services (NMHSs) with regard to metocean observing systems at the national level.

In addition, the Vice-Chairperson will coordinate with the Ocean Applications point of contact for the WMO Rolling Review of Requirements, and assist in providing JCOMM input to the new WIGOS Vision for 2040.

Governance: The Vice-Chairperson assume responsibility for relevant actions in the OCG Workplan; report as necessary to the OCG Chairperson, and JCOMM Management Committee (MAN); represent JCOMM OCG at appropriate committees/meetings, etc.

Meetings/travel: Vice-Chairperson participate in all OCG management teleconferences (frequency to be defined) and meetings. The Vice-Chairperson will also participate in selected WMO and/or IOC meetings.

2. Standards and Best Practices

The role of the OCG Standards and Best Practices Vice-Chairperson will be to promote development of standards and best practices across the marine/ocean observing networks, working with the community of networks under the JCOMM Observations Coordination Group (OCG).

More specifically, the Vice-Chairperson will:

(i) Identify existing relevant documents on marine/ocean observing standards and best practices focused on sensors and methods of observations linked to platforms, with input from the OCG members;

(ii) Coordinate their review to identify gaps and opportunities for coordination across existing OCG networks;

(iii) Develop a strategy within the OCG to update these important resources through their publication in WMO regulatory materials (such as manuals and guides on/to the Global Observing System – GOS, Meteorological Instrument and Methods of Observation, and WIGOS), as IOC Manuals and Guide, and/or JCOMM Technical Reports, as appropriate;

(iv) Promote the use of these standards and best practices through activities to harmonize and improve the standards and best practices within and across the marine/ocean observing networks, and other opportunities developed in consultation with OCG;

(v) Make recommendations to JCOMM OCG for future actions to address these needs;

(vi) Contribute towards JCOMM OCG management decisions, meeting planning, reporting on progress, interactions with JCOMM MAN, and others as required.

The goal is to provide the standards and best practices framework to assure the standardization of practices and traceability of ocean data, so that the quality of systems and resulting data are maintained at the highest possible levels of quality.

A number of areas of potential coordination are identified:

(i) The Vice-Chairperson will work with JCOMM OCG members and representatives, Regional Marine Instrument Centres (RMICs), WMO and IOC Secretariats, the Data Management Programme Area (on data quality standards), and other communities such as the WMO Commission on Instruments and Methods of Observation (CIMO) (including intercomparison activities), and on establishing or cataloguing ocean observing and quality-review standards, to insure JCOMM standards are accessible and consistent with other international efforts.

(ii) Ensuring the International Oceanographic Data and Information Exchange (IODE) Clearing House of ocean data standards and best practices, OceanBestPractices (OBP), is informed and tracks development of relevant JCOMM OPA documents, to OCG members and observing networks.

Governance: Vice-Chairperson assume responsibility for relevant actions in the OCG Workplan; report as necessary to the OCG Chairperson, and JCOMM-MAN; represent JCOMM OCG at appropriate committees/meetings, etc.

Meetings/travel: Vice-Chairperson participate in all OCG management teleconferences (frequency TBD) and meetings. The Vice-Chairperson will also participate in selected WMO and/or IOC meetings.

3. Data and Information

The role of the OCG Data and Information Vice-Chairperson will be to coordinate data management activities of interest to the Observations Programme Area (OPA) of JCOMM, and particularly the OPA response to the Joint WMO and IOC Strategy for Marine Meteorological and Oceanographic Data Management (2018–2021); including promoting adoption of consistent standards and practices for oceanographic and marine meteorological observations data sharing and exchange; and identify and encourage development of integrated and interoperable solutions[1] in this regard for the benefit of JCOMM stakeholders. This shall be done in coordination with the JCOMM Data Management Coordination Group (DMCG).

The OCG coordinates numerous networks, with interest on how their data systems are managed. The OCG ensures all ocean observations under JCOMM have known quality and are reported through appropriate data systems, in particular to operational users. It encourages networks to adopt consistent and documented data management standards and practices to facilitate access to, and integration of, JCOMM ocean data through online tools for all users, including the research community. Of immediate concern to the WMO, IOC, and wider community is the challenge of discovering/identifying available observational data; gaining access to near-real-time data; and accessing like data (integrated[2]/served across disparate systems) using online tools.

(i) The Vice-Chairperson should identify necessary actions; recommend and encourage development of pilot activities; and coordinate activities/actions identified in OCG and JCOMM-MAN workplans in consultation with the Data Management Coordination Group (DMCG).

(ii) The Vice-Chairperson will work with JCOMM OCG members and representatives, and liaise with JCOMM Data Management Programme Area, its Coordination Group (DMCG) (including expert teams and task teams).

[1] Integrated/integration should be clarified, with regard to 1) near-real-time data, or 2) delayed mode/high-quality data, such as Marine Climate Data System (MCDS), or 3) time-critical data distribution, discovery, and instrument metadata etc.

[2] See footnote no. 1.

(iii) The Vice-Chairperson will work with other groups as necessary.

(iv) He/she will identify opportunities (and challenges) to advance JCOMM OCG objectives.

(v) Works with the Chairperson, taking into account the guidance to OCG from JCOMM MAN in developing strategies, materials for WMO meetings, conferences; and responds as needed regarding areas of responsibility noted above.

(vi) The Vice-Chairperson will contribute towards JCOMM OCG management decisions, meeting planning, reporting on progress, interactions with JCOMM MAN, and others as required.

Governance: Vice-Chairperson assume responsibility for relevant actions relating to the OCG Workplan; report as necessary to the OCG Chairperson, and JCOMM-MAN; represent JCOMM OCG at appropriate committees/meetings, etc.

Meetings/travel: The Vice-Chairperson participate in all OCG management teleconferences (frequency TBD) and meetings. The Vice-Chairperson will also participate in selected WMO and/or IOC meetings.

Decision 24 (JCOMM-5)

IOC–WMO–UNEP–ICSU GLOBAL OCEAN OBSERVING SYSTEM CO-SPONSORSHIP OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY OBSERVATIONS COORDINATION GROUP

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting the reports of the fifth, sixth, seventh and eighth sessions of the JCOMM Observations Coordination Group (OCG) in 2013, 2015, 2016 and 2017 respectively,

Noting also the strong and important relationship with the IOC–WMO–UNEP–ICSU Global Ocean Observing System (GOOS), and observing the desire for regular communication between the Observations Coordination Group (OCG) and the GOOS Steering Committee, panels, GOOS Regional Alliances, and projects,

Noting further the decision of the 6th session of the GOOS Steering Committee (Singapore, 11-13 September 2017), agreeing to jointly sponsor the OCG, pending this parallel decision of JCOMM-5,

Noting with satisfaction the close interactions between JCOMM OCG and GOOS structures, including in:

(1) Observing System design and the development of network missions and targets,

(2) Observing system tracking and performance assessment and evolution,

(3) Communicating and advocating for sustained observations,

Recognizing the need for closer coordination and regular interaction between GOOS and JCOMM in the development of sustained observations, particularly in engaging new communities, networks, and technologies,

Further recognizing potential mutual benefits, including:

(1) Jointly bringing new observing networks and data of interest to NMHSs into the framework of the WMO Integrated Global Observing System (WIGOS),

(2) Enhancing the work of OCG with new resources and coordination opportunities,

(3) Growth of the establishment of observing standards and best practices across observing networks,

(4) Opportunities to improve the availability and latency of ocean data streams,

(5) Avoiding the creation of duplicative coordination mechanisms,

(6) Promoting the re-use of ocean data for multiple purposes,

Decides to recognize that OCG is jointly sponsored by GOOS.

Decision 25 (JCOMM-5)

INCLUSION OF NEW NETWORKS INTO THE OBSERVATIONS COORDINATION GROUP MEMBERSHIP

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting the progress made towards global coordination of ocean glider activities including the formation of an OceanGliders steering committee, a data management task team and mission oriented task teams,

Noting also the existing Group on Earth Observations (GEO) High-frequency (HF) Radar (marine meteorological remote sensing) community of practice and its synergies with other networks, and interest in the task areas of the OCG Workplan,

Recognizing the mutual importance of bringing emerging networks into the OCG, building on the expertise and experience of the established observing networks through the OCG Workplan,

Observing the increasing importance of, in particular of bridging the gap between, the open ocean and coastal observations,

Noting with appreciation the proactive role of the IOC–WMO–UNEP–ICSU Global Ocean Observing System (GOOS) Regional Alliances in supporting coastal observations, including the promotion of globally coordinated coastal observation networks,

Noting further the work done by the Joint Task Force of ITU, WMO and UNESCO-IOC to integrate environmental monitoring sensors into transoceanic commercial submarine telecommunication cables in order to provide tsunami warnings as well as climate-quality data from the oceans,

Encourages the Joint Task Force (JTF) of ITU, WMO and UNESCO-IOC to continue its efforts to bring to fruition a global network of ocean sensors and requests Member States to report to their Ministries, Agencies and Institutes, to draw particular attention to the activities of the JTF and the significant societal benefits that might flow from the realization of its objectives, notably in the field of reliable and timely tsunami warning as well as climate-quality data from the oceans, and urges all stakeholders in the endeavour to proactively contribute to the effort.

Decides to approve the expansion of OCG membership to include OceanGliders and HF Radar as associated members;

Advocates that emerging observing networks improve their readiness for sustained observing development (drawing on the framework for ocean observing) by:

(1) Working towards sustained observations through self-organized global engagement, supported by a mature community;

(2) Developing design missions and observation targets, which respond to key observing requirements;

(3) Developing agreed standards and best practices, including data standards with coordinated data delivery;

(4) Working proactively with other observing networks;

Requests OCG to continue to work proactively with GOOS Regional Alliances and GOOS Expert Panels and the broader ocean observing community by:

(1) Reaching out to emerging networks and assess their maturity against the Framework for Ocean Observing readiness levels for requirements, coordination of observations and data management;

(2) Engaging those considered approaching 'mature';

(3) Assessing readiness of new observing technologies, their utility across the observing system, and how they could be considered within the ocean observing system.

Decision 26 (JCOMM-5)

OPEN-ACCESS GLOBAL TELECOMMUNICATION SYSTEM PILOT PROJECT

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting the reports of the fifth, sixth, seventh and eighth sessions of the JCOMM Observations Coordination Group (OCG) in 2013, 2015, 2016 and 2017 respectively,

Noting also the importance of the GTS as an effective mechanism for the exchange of real-time data in support of operational marine, weather, climate services, and ocean research,

Noting with satisfaction that a growing number of research, academic and other organizations and communities outside National Meteorological and Hydrological Services (NMHSs) are making their data available through the GTS,

Noting further the limited access to GTS data outside NMHSs is hampering the verification of their models as well as the uptake and use of real-time data,

Noting furthermore the Open Access GTS Pilot Project proposal (hereafter referred to as 'Pilot Project') of the JCOMM Observations Coordination Group (OCG),

Recognizing that:

(1) The Pilot Project aims to take well understood data (i.e., physical ocean data) from known platform types and demonstrate more accessible pathways to prepare and inject the data in near real time onto the GTS for distribution globally,

(2) The Pilot Project has identified ways of retrieving these data and other "observational" products from the GTS through interoperable and accessible web services for public access,

Recognizing also that the goal of the pilot project is to prototype a workflow providing ocean data producers a simpler method of distributing their real-time data through the GTS infrastructure and, for ocean data consumers, a simpler method of accessing that data,

Recognizing further the sponsors and contributors towards the Pilot Project,

Observing that by improving access to the GTS, a broader community of users and contributors will increase the quantity, quality, and uptake of data from the GTS thereby enabling the GTS to better support its stakeholders,

Decides to encourage the formation of an Open Access GTS node to expand access to GTS data streams through further exploitation of the capabilities demonstrated by the Pilot Project.

Decision 27 (JCOMM-5)

TROPICAL PACIFIC OBSERVING SYSTEM 2020 TRANSITION AND IMPLEMENTATION

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting Decision 28 (EC-69), which decided that the Tropical Pacific Observing System (TPOS) 2020 is now a WMO Integrated Global Observing System (WIGOS) Pre-operational Regional Pilot, and that its implementation and transition into the global sustained observing system should be coordinated by the TPOS 2020 JCOMM Transition and Implementation Task Team,

Noting also the reports of the fifth, sixth, seventh and eighth sessions of the JCOMM Observations Coordination Group (OCG) in 2013, 2015, 2016 and 2017 respectively,

Noting further the draft terms of reference for the Joint TPOS 2020 JCOMM Cross-Cutting Transition and Implementation Task team as proposed by OCG, and provided in the annex to this Decision,

Considering that the Tropical Pacific Observing System, TPOS 2020 Project was formed in 2014 to oversee the redesign of the TPOS as an outcome of an international review,

Recognizing that the review was precipitated by challenges sustaining the Tropical Moored Array, and a recognition that both requirements and observing technologies had evolved since its initial design,

Noting with appreciation that the first report on the Tropical Pacific Observing System 2020 project was published at the end of 2016 following community review,

Acknowledging the TPOS 2020 first Report includes recommendations for the sustained backbone observing system, and identification of pilots and process studies to further refine its future design and targeting forecast model systematic errors, and that key actions include:

(1) Addressing degraded sampling in the West Pacific,

(2) Staged reconfiguration of the tropical Pacific moored buoy array,

(3) A step-by-step increase in Argo sampling (beginning in the western Pacific),

(4) Retargeted flux measurements (and a series of assessments and sensitivity experiments to better inform future recommendations),

(5) Improvements to tropical Pacific surface winds and wind stress, which remain a significant issue,

Decides that TPOS 2020 implementation and transition into the global sustained observing system will be coordinated by the TPOS 2020 JCOMM cross-cutting Transition and Implementation Task Team, with the Terms of Reference of the task team in the annex to the present decision;

Requests members to collaborate and contribute towards implementing the recommendations of the first report on the Tropical Pacific Observing System 2020 project;

Encourages consideration of the need for further regional coordination mechanisms under JCOMM in the future.

Annex to Decision 27 (JCOMM-5)

TERMS OF REFERENCE FOR THE TROPICAL PACIFIC OBSERVING SYSTEM 2020 JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY TRANSITION AND IMPLEMENTATION TASK TEAM

The TPOS 2020 JCOMM Transition and Implementation Task Team (T&I-TT) exists and operates as a sub-project of the TPOS 2020 Project and is supported by the Distributed Project Office of TPOS 2020. The JCOMM Management Committee (MAN) is the primary external sponsor. The task team provides advice and recommendations on implementation and transition arrangements for governance to its sponsors and partners. Initially the TPOS 2020 SC will be a key partner but, over time, as action and responsibility becomes focused in intergovernmental and other standing processes, this role will diminish and sponsors like JCOMM (and its Observations Coordination Group) will take greater responsibility.

TERMS OF REFERENCE

The TPOS 2020 JCOMM Transition and Implementation Task Team will act as an open-ended group with the following Terms of Reference:

(1) To serve as the advisory group within the TPOS 2020 Project to the Steering Committee and Resources Forum, and to JCOMM, on implementation and associated transition arrangements for contributions to the TPOS;

(2) To act as the focal point within the TPOS 2020 Project for matters related to implementation including: reconfiguration of the tropical mooring network, enhanced Argo profiling, improved monitoring of key surface variables, consideration of implications for data management, capacity-building and services and coordination with other parts of the global observing systems;

(3) To keep informed of and, as appropriate, review potential new technologies that might contribute to the backbone of the TPOS;

(4) To keep informed of and, as appropriate, review the progress and outcomes of relevant TPOS 2020 Pilot Projects, particularly those targeting the backbone of the TPOS;

(5) To consider governance options for maintenance and implementation of the TPOS, both during and beyond the TPOS 2020 Project with focus on regional mechanisms, taking into account strategies and plans of JCOMM, the WMO Integrated Global Observing System (WIGOS) and the IOC–WMO–UNEP–ICSU Global Ocean Observing System (GOOS);

(6) To develop implementation plans in response to the first and subsequent TPOS 2020 Reports;

(7) To collaborate in, as appropriate, the work of the Steering Committee and other relevant task teams of TPOS 2020;

(8) To consult and work with other groups and expert teams of the T&I-TT sponsors, as appropriate;

(9) To keep informed of the work of other relevant international organizations and programmes and to advise the TPOS 2020 Steering Committee and Resources Forum, as required;

(10) Provide reports to the annual sessions of the JCOMM MAN and TPOS 2020 Steering Committee.

MEMBERSHIP

WIGOS, GOOS and WMO–IOC-UNEP-ICSU Global Climate Observing System (GCOS) are recognized as key bodies for implementation and transition and should participate as necessary in an *ex officio* capacity. The TPOS 2020 Resources Forum and Steering Committee will participate initially through the TPOS 2020 SC Co-Chairperson.

The T&I-TT will initially have a single Chairperson and Vice-Chairperson but this may be varied as the activity matures. They will be nominated by the TPOS 2020 sponsors and JCOMM MAN.

Membership should be limited to around 10, with a balance between scientific and technical advice (TPOS 2020 Project advice) and implementation expertise, but shifting more towards the latter as we approach 2020.

The TPOS 2020 Distributed Project Office will support task team activity.

Decision 28 (JCOMM-5)

IMPLEMENTATION GOALS AND TARGETS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling that the United Nations 70th General Assembly, in its resolution 70/303, decided to Support the Implementation of Sustainable Development Goal (SDG) 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development,

Recalling also that the United Nations Ocean Conference, to support the implementation of SDG 14, convened in New York from 5 to 9 June 2017, supported a call for action to "dedicate greater resources to marine scientific research, such as interdisciplinary research and sustained ocean and coastal observation, as well as the collection and sharing of data and knowledge, including traditional knowledge, in order to increase our knowledge of the ocean, to better understand the relationship between climate and the health and productivity of the ocean, to strengthen the development of coordinated early warning systems on extreme weather events and phenomena, and to promote decision-making based on the best available science, to encourage scientific and technological innovation, as well as to enhance the contribution of marine biodiversity to the development of developing countries, in particular SIDS and LDCs",

Recalling further the approval of the Global Climate Observing System Implementation Plan (GCOS-200) by the United Nations Framework Convention on Climate Change (UNFCCC) articulating a comprehensive observing system (including significant ocean elements) to describe and monitor a changing climate system,

Noting with appreciation the interest from the G7, whose Science and Technology Ministers 2016 Communiqué on The Future of the Seas and Oceans, noted an action to: Support the development of an initiative for enhanced global sea and ocean observation required to monitor inter alia climate change and marine biodiversity, e.g. through the Global Argo Network and other observation platforms, while fully sustaining and coordinating with ongoing observations, while stressing the importance of coordination across a multi-platform and global observing system to ensure benefits for all WMO Members and IOC Member States,

Noting also that requirements for a global ocean observing system are articulated through:

(1) GCOS Essential Climate Variables (ECVs), which assess the adequacy of the earth observing system, and develop forward plans to inform science, assessment and policy,

(2) GOOS Essential Ocean Variables (EOVs) which assess the network in terms of ability to deliver to three societal benefit areas: climate, services and ocean health,

(3) WMO Rolling Review of Requirement (RRR) process that identifies the observational user requirements and gaps for each WMO Application Area,

Noting further that the objective of JCOMM Observations Coordination Group (OCG) is to implement and maintain a fully integrated, sustained, multi-platform, ocean observing system across the global marine meteorology and oceanographic communities,

Recognizing the increasing relevance of the growing multinational Global Drifter Array (GDA) to service areas, the GDA provides accurate and critical observations of essential climate variables, including but not limited to sea surface temperature, near-surface currents, and ocean waves directional spectra,

Noting with satisfaction the development, by JCOMM OCG networks, partner networks and emerging networks, of key network performance measures to give information on the status, health and trend of the networks to improve their management and performance, and track progress over time, as described in the JCOMM and IOC–WMO–UNEP–ICSU Global Ocean Observing System (GOOS) Network Specification Sheets (http://www.goosocean.org),

Decides:

(1) To endorse the work of the OCG networks, partner networks, projects and emerging networks in developing implementation goals and targets to address the requirements developed under the WMO–IOC-UNEP-ICSU Global Climate Observing System (GCOS), GOOS, and the WMO Integrated Global Observing System (WIGOS), and other relevant bodies;

(2) To support implementation of the global ocean observing system to address these goals and targets;

Endorses the work of the JCOMM In Situ Observations Programme Support Centre (JCOMMOPS) to maintain performance measures reflecting progress towards implementation goals and targets for each observing network and to provide an integrated perspective; including online visualizations and the production of a regularly published JCOMM Report Card to provide an authoritative view of the status and health of the sustained elements of the Global Ocean Observing System implemented under JCOMM.

Decision 29 (JCOMM-5)

WMO INTEGRATED GLOBAL OBSERVING SYSTEM IDENTIFICATION NUMBERS FOR WORLD METEROLOGICAL ORGANIZATION MARINE PLATFORMS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting *Manual on WIGOS (*WMO-No. 1160*)*, Attachment 2.1, WIGOS Station Identifiers,

Recalling that the WMO Secretariat and WMO Members are the authoritative bodies to manage the WMO identification numbers for ocean platforms,

Considering that:

(1) Unique identifiers are the key to metadata interoperability, and in particular to fully realizing the benefits of the WMO Integrated Global Observing System (WIGOS) initiative and its Observing Systems Capability Analysis and Review tool (OSCAR),

(2) WMO numbers are allocated for ocean platforms reporting on the Global Telecommunication System(GTS), depending upon platform type and deployment area (considered platform types are drifting buoys, moored buoys, ocean reference sites, gliders, profiling floats (e.g. Argo), and marine animals equipped with instrumentation for measuring geophysical variables),

(3) WMO has introduced the WIGOS Station Identifiers (WIGOS IDs) where existing WMO numbers can be extended to provide a unique identifier,

Noting that the eighth session of the Observations Coordination Group (OCG) and the JCOMM Management Committee has recommended that WIGOS IDs issuance for ocean platforms should be delegated to JCOMMOPS with responsibilities as indicated in Annex 1 to the present decision,

Noting further that issuance of ocean platform numbers by JCOMMOPS was central to the success of the JCOMM Open Access Global Telecommunication System (GTS) Pilot project suggesting that much more ocean observational data of importance to the IOC and WMO could potentially be made available to the GTS,

Recognizing that JCOMMOPS has the necessary tools to implement the WIGOS ID allocation through the JCOMMOPS Information System and web interface, is in an ideal position to do so through day to day relationships with platform operators, and has expertise in marine metadata,

Recognizing further that some of the Members may choose to issue the WIGOS IDs for their own platforms, in coordination with JCOMMOPS, to protect the uniqueness of IDs,

Decides that JCOMMOPS will have delegated authority to issue WIGOS IDs for ocean observation platforms for Members following the WIGOS Regulatory and Guidance material and the terms listed in the Annex to the present decision;

Requests Members willing to allocate WIGOS IDs themselves to inform JCOMMOPS accordingly in order to avoid allocation of duplicate IDs.

Annex to Decision 29 (JCOMM-5)

WMO INTEGRATED GLOBAL OBSERVING SYSTEM IDENTIFICATION NUMBERS FOR WORLD METEROLOGICAL ORGANIZATION MARINE PLATFORMS

Where Members are not willing to allocate WIGOS IDs themselves, JCOMMOPS has the delegated authority to issue WIGOS IDs for WMO Ocean Observing systems under the following terms:

(i) Allocate WIGOS IDS for ocean observing platforms on behalf of WMO, and in close cooperation with the WMO Observing Systems Division(OSD),

(ii) Assure the uniqueness of these identifiers,

(iii) Follow the regulations and guidance on WIGOS IDs allocation as stipulated in the Manual on WIGOS and in the Guide to WIGOS,

(iv) Implement an operational procedure and appropriate web-based interface to allocate WIGOS IDs and facilitate a machine to machine interface to OSCAR/Surface (the Observing Systems Capability Analysis and Review Tool for surface-based observing systems) in order to most efficiently deliver metadata on ocean observing platforms operated by WMO Members and IOC Member States,

(v) Provide appropriate privileges for the WMO Secretariat to access/operate this web interface,

(vi) Provide regular reports to WMO Secretariat on the allocation of WMO IDs in agreed format,

As a consequence:

(i) WMO national focal points for observing networks of Countries not willing to allocate WIGOS IDs themselves will be relieved from this task,

(ii) OSD will oversee the management of WIGOS IDs for ocean observing platforms and be relieved from the majority of tasks,

(iii) Platform operators will receive identifiers as soon as possible (and preferably in advance so that this unique identifier is used early in creating the platform metadata) and at the latest during platforms registration of the platforms at JCOMMOPS,

(iv) When allocating WIGOS identifiers, JCOMMOPS will have a dedicated range of values as an Issuer of Identifier (second block of the WIGOS IDs structure),

JCOMMOPS will keep track of the countries willing to allocate WIGOS IDs themselves in order to avoid allocation of duplicate IDs.

Decision 30 (JCOMM-5)

PROVISION OF WMO INTEGRATED GLOBAL OBSERVING SYSTEM METADATA TO THE OBSERVING SYSTEMS CAPABILITY ANALYSIS AND REVIEW TOOL THROUGH THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY IN SITU OBSERVATIONS PROGRAMME SUPPORT CENTRE

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting WMO-No. 1160, Manual on WIGOS, Appendix 2.4, the WIGOS Metadata Standard,

Noting further that WMO-No. 1160, paragraph 2.5.1, stipulates that for all WIGOS observations they make available internationally, Members shall record and retain the observational metadata specified as mandatory in the WIGOS Metadata Standard defined in Appendix 2.4,

Recognizing that

(1) JCOMMOPS, being the coordination mechanism for Ocean Observing programs, has developed capacity to submit WIGOS metadata to OSCAR for all oceanographic and marine meteorological platforms through an integrated, operational, and WIGOS-compliant procedure,

(2) JCOMMOPS has the capacity for harmonizing/standardizing metadata, vocabulary and ontologies for the ocean observing networks and their Data Teams, and in close collaboration with the WMO Commission for Basic Systems,

(3) all oceanographic and marine meteorological platforms are registered and updated by their operators through the JCOMMOPS web interface, which provides a central gateway, where the information submitted is quality controlled by JCOMMOPS,

Mindful that

(1) JCOMMOPS is currently funded to provide support to JCOMM Observations Programme Area (OPA) networks and establish, maintain and verify mechanisms for the timely exchange of data and WIGOS metadata,

(2) Obligations to provide OSCAR with WIGOS metadata imposes new tasks on JCOMMOPS for which sustained financial resources have not been identified,

Decides to endorse JCOMMOPS as the authoritative source through which WIGOS metadata are submitted to OSCAR for all oceanographic and marine meteorological platforms and encourages Members and Member States to ensure all platform WIGOS metadata are registered with JCOMMOPS;

Requests JCOMMOPS to continue collaborating with the WMO in order to allow the complete range or mandatory and conditional WIGOS metadata to be recorded in OSCAR;

Invites Members/Member States to consider providing support to JCOMMOPS to facilitate implementation of this Decision.

Decision 31 (JCOMM-5)

CALL FOR NEW REGIONAL MARINE INSTRUMENT CENTRES IN OTHER REGIONS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting IOC Resolution EC-XLIII.5 and WMO Resolution 4 of EC-62, approving the Recommendation 1 (JCOMM-III), establishing IOC-WMO Regional Marine Instrument Centres (RMICs),

Recalling that WMO–IOC Regional Marine Instrument Centres (RMICs) have been established by JCOMM as a mean to provide:

(1) Facilities for the calibration and maintenance of marine instruments and the monitoring of instrument performance,

(2) Assistance with regard to instrument intercomparisons,

(3) Appropriate training facilities,

Recalling further that:

(1) The goal of RMICs is to facilitate adherence of observational data and metadata and processed observational products to higher level standards for instruments and methods of observation (RMIC Terms of Reference are available in the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Annex 4.A),

(2) Two Regional Marine Instrumentation Centres (RMICs) have been established in the United States of America (for Regional Association IV, RMIC/RA-IV) and in China (for the Asia Pacific region, RMIC/AP),

(3) Morocco offered at JCOMM-III to host an RMIC for WMO Regional Association I at the National Meteorological Service in Casablanca,

Noting with satisfaction the progress that has been made by the RMIC/AP and RMIC/RA-IV with regard to (i) supporting capacity development in their respective regions and (ii) facilitating instrument inter-laboratory comparison activities,

Taking note with appreciation that the USA National Oceanographic and Atmospheric Administration (NOAA) has hosted JCOMM Marine Instrumentation workshops at the RMIC for RA-IV in Mississippi (USA) in February 2016 and China State Oceanic Administration had organized and hosted series of workshops and provided in-house training and guidance on marine standards and laboratory management in particular to the National Institute of Oceanography, Pakistan in 2016,

Requests RMICs to establish coordination mechanisms in their regions to allow Members/Member States to benefit from their facilities, and assure that such mechanisms will:

(1) Be consistent with the overall capacity development implementation plans of WMO and IOC;

(2) Have strong connection to the existing regional observing efforts, such as the IOC–WMO–UNEP–ICSU Global Ocean Observing System (GOOS) Regional Alliances and the regional observations activities organized under the auspices of WMO Regional Associations;

(3) Take into account the guidance of the Observations Coordination Group (OCG) with regard to instrumentation standards and best practices;

Urges Members and Member States to investigate the feasibility of offering additional RMIC facilities or specific RMIC functions (e.g. to contribute to a distributed RMIC in a region) in other regions, especially within Regional Association III (South America), Regional Association V (Southwest Pacific), and Regional Association VI (Europe), and to collaborate with the existing RMICs.

Decision 32 (JCOMM-5)

SHIP OBSERVATIONS TEAM IDENTIFIER SCHEME

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) The report of the ninth session of the Ship Observations Team (SOT-9) (London, United Kingdom, 27-31 March 2017), where SOT recommended to adopt the SOT identifier (SOT-ID) scheme for platforms and instrument systems as described in the Annex to this decision,

(2) The report of the eighth session of the Observations Coordination Group (OCG, Qingdao, China, 22-25 May 2017), where OCG concurred with SOT recommendations in this regard,

Considering that:

(1) The SOT proposal with regard to SOT-ID would provide unique identifiers for marine platforms and instrument systems / packages on ships as follows:

   (a) The SOT-ID list would be maintained by JCOMMOPS and the platform IDs would be issued according to the wider JCOMM ship list within the WIGOS metadata scheme (that is, SOT instrument packages would get IDs assigned by JCOMMOPS),

   (b) Instrument packages with SOT-ID are mounted on hosting ships; the hosting ships may also contribute to more than one observing programme such as the Voluntary Observing Ship Scheme (VOS), the Ship-of-Opportunity Programme (SOOP) and the Automated Shipboard Aerological Programme (ASAP); therefore, all instruments should refer to a shared JCOMM ship list, which SOT proposed should use the ICES code as unique identifier,

   (c) VOS, SOOP and ASAP could continue using traditional WMO identifiers for ships, but eventually all could be assigned by JCOMMOPS (on behalf of the Members),

(2) The link between an instrument package with an SOT-ID and hosting ship could be hidden from the public if a ship must be “masked” per national requirement, meaning that all instrument metadata are then available, but not the ship metadata,

Concurs with the SOT proposal for new SOT-IDs;

Requests GO-SHIP and Global Temperature and Salinity Profile Program (GTSPP) and other observing platforms to consider implementing the SOT-ID system for subsurface oceanographic instrument packages;

Decides to adopt the SOT-ID proposal as described in the annex to the present decision and to promote the use of the JCOMM Ship list across all networks.

Annex to Decision 32 (JCOMM-5)

SHIP OBSERVATIONS TEAM IDENTIFIER SCHEME

Recommendations from SOT

SOT-9 recommended to adopt a new scheme that would provide unique identifiers for marine platforms and instrument systems / packages on ships (SOT-ID)s. The Recommendation includes the following:

(a) JCOMMOPS will issue WIGOS Platform Identifiers for marine platforms and instrument systems / packages on ships (hereafter called system(s)) (SOT-ID) with a dedicated <issuer of identifier> assigned to JCOMMOPS;

(b) The local identifier will be exactly seven characters: $n_1n_2n_3n_4n_5n_6n_7$; n_1,n_4,n_5,n_6 will be letters or digits; n_2,n_3,n_7 will be letters. This will also form the SOT-ID;

(c) No information, such as type of platform, link to ship, operator, etc., will be encoded into the SOT-ID;

(d) Changes to the assigned SOT-ID will be governed according to decision trees below (Figures 1 – 4);

(e) Each platform or ship hosting or deploying instruments shall be assigned a unique hull or platform ID as part of a wider JCOMM station metadata list. The ICES Ship Code should be used for this purpose, with new codes requested when a new platform is recruited.

The usage of the proposed SOT-ID scheme would mean that:

With the new ID scheme, every marine platforms and instrument systems / packages on installed on, or deployed from, a specific vessel or platform will be able to be uniquely identified, even when there are several systems installed on that vessel. Changes (e.g. flag, callsign, name of the vessel, etc.,) will not trigger a change of the SOT-ID, therefore the data from that specific system and vessel can always be distinguished from other data by use of the unique SOT-ID. With the new SOT-ID scheme the direct link to the vessel making the observations can be hidden – effectively acting as a vessel masking scheme. However, the link, between the vessel hosting the system and the system, will be maintained through a separate JCOMM ship metadata list and the hull or platform ID.

Background information:

Boundary conditions considered in the new scheme:

(a) IDs in TurboWin allow a maximum of seven characters. Increasing this will increase the cost of transmission;

(b) IDs need to be unique, therefore other ID schemes need to be considered to avoid duplicates. Schemes to be considered:

  (i) ITU callsign regulation;

  (ii) JCOMM/WMO identifier schemes (such as buoys);

  (iii) Third-party systems and masking schemes.

(c) Requirements of different SOT panels need to be considered (multiple systems in single ship);

(d) WIGOS identifier scheme:

<WIGOS identifier series>-<issuer of identifier>-<issue number>-<local identifier>

JCOMMOPS will issue IDs for marine platforms and instrument systems / packages on ships with dedicated <issuer of identifier>

Local identifier: $n_1n_2n_3n_4n_5n_6n_7$ (n_1,n_4,n_5,n_6: letters or digits, n_2,n_3,n_7: letters)

(e) Decision tree:

(i) Instrumentation moved to different platform: new SOT-ID;

(ii) Change in network operator or recruiting country: new SOT-ID;

(iii) Significant instrumentation change (likely to change bias or error characteristics): new SOT-ID;

(iv) Replacement of instruments (like for like, no change to bias or error characteristic): no new SOT-ID;

(v) Change of platform owner, flag, callsign, name, etc. but no change of instrumentation: no new SOT-ID;

(vi) Additional instrument installed or removal of instrument: no change of SOT-ID.

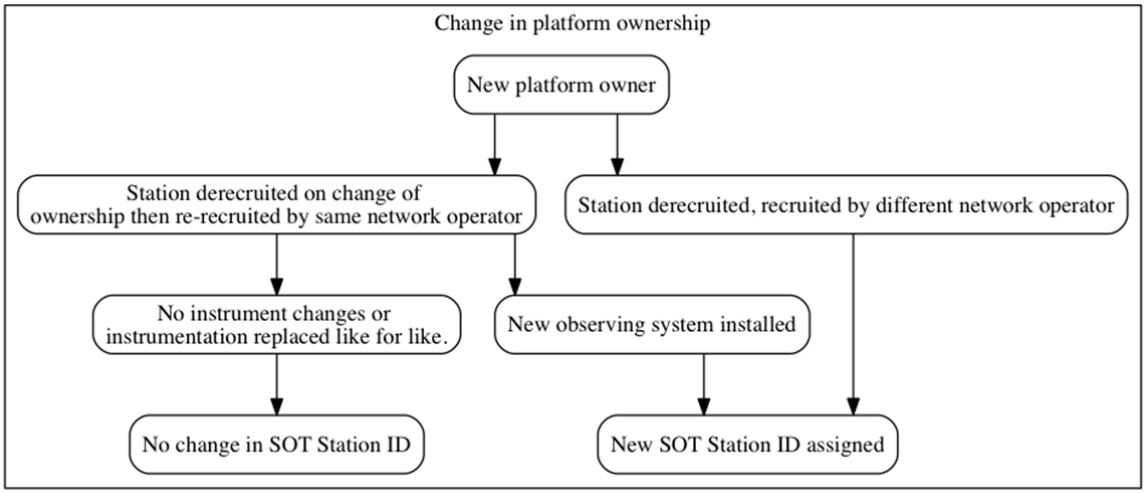

Figure 1. Decision tree governing changes to the SOT-ID when there is a change in ownership of the hosting platform

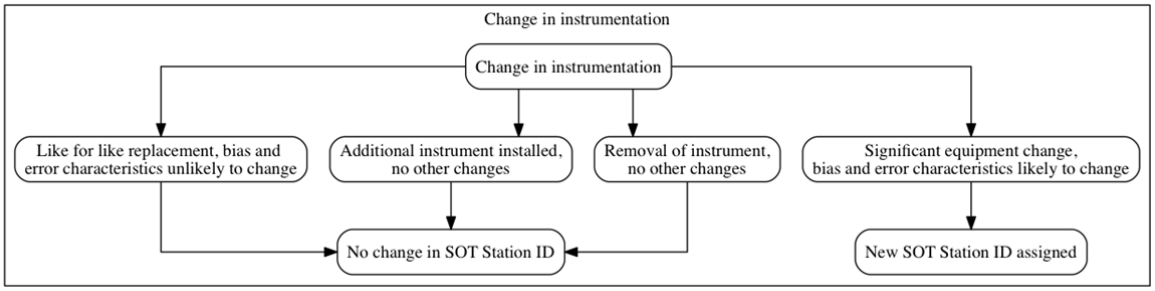

Figure 2. As figure 1 but for a change in instrumentation

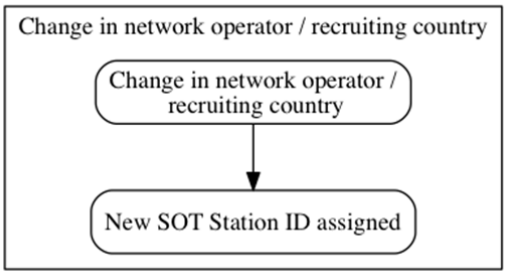

Figure 3. As Figure 1 but for a change in network operator / recruiting country

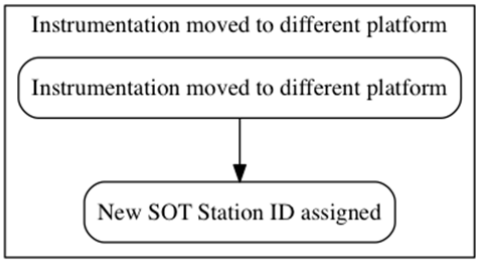

Figure 4. As Figure 1 but for a change in hosting platform

Decision 33 (JCOMM-5)

APPROVAL OF JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY CAPACITY DEVELOPMENT VISION

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling that, at JCOMM-4, the Commission requested the Management Committee to carry out an assessment of the effectiveness of training courses, workshops and capacity-building efforts undertaken by JCOMM and its associated bodies in order to better understand the success of these initiatives, their impact, gaps, evaluate the sustainability of the learning, and make proposals for future work,

Noting the *JCOMM Capacity Development Assessment* carried out, as provided in JCOMM-5/INF. 8.1, to respond to the Commission's request,

Having reviewed the IOC and WMO Capacity Development Strategies,

Noting also the JCOMM capacity development activities in the 2012-2017 intersessional period,

Takes note that metocean services and products will grow at a fast pace in the next ten years due to the growing ocean economy, and that JCOMM has to serve the means of nations to develop their own capacity and help to coordinate efforts for teaching and capacity development across nations;

Decides to endorse the JCOMM Capacity Development Vision, as provided in the Annex to the present decision.

Annex to Decision 33 (JCOMM-5)

JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY CAPACITY DEVELOPMENT VISION

The JCOMM Capacity Development (CD) Vision can be synthesized into eight points:

(1) Improve the collaboration between IOC CD activities and WMO Education and Training (ETR) to leverage the CD expertise and experience in both organizations and to advise the JCOMM Programme Area in developing and implementing their CD work plans, making use of existing mechanisms, facilities (e.g., WMO Global Campus and Regional Training Centres (RTCs, for example the International Centre for Operational Oceanography ITC-ocean), IOC regions, GOOS Regional Alliances (GRAs), IODE Ocean Teacher Global Academy (OTGA), IODE RTCs, WESTPAC Regional Training and Research Centres (RTRCs), etc.);

(2) Establish a JCOMM institutional process to identify capacity required at the national level, to effectively participate in the JCOMM Programme Area projects and activities. Existing IOC and WMO mechanisms (IOC regional subcommissions, WMO regions, GOOS Regional Alliances) can assist with the development of regional CD work plans, that can then be implemented through existing IOC and WMO mechanisms (GRAs, RTCs, RTRCs);

(3) Increase the activity to raise awareness not only on the new metocean observations, monitoring and forecasting services and build connections between oceanographic and meteorological institutions to sustain the observing system, but also for the end user to have better understanding on metocean information;

(4) Promote the availability, re-use and downscaling of metocean analyses and forecasts, also taking into consideration small seas, closed seas and coastal phenomena;

(5) Promote the availability of the open source systems of sea ice and iceberg analyses, generation of GMDSS bulletins in Polar METAREAs and facilitate the exchange of expertise between sea ice services and centres;

(6) Support local economies, train users in Member States/Members on the usage of operational meteorological and oceanographic services, demonstrate their application for large socioeconomic sectors and provide assistance in encouraging broad governmental users' and civil society access to data, products and services at national level such that the services contribute to human welfare and sustainable development;

(7) Facilitate the uptake of data management practices for real-time and delayed-mode data following IOC and WMO standards;

(8) Facilitate the transition of research systems into operational monitoring and forecasting systems.

Decision 34 (JCOMM-5)

APPROVAL OF NEW CAPACITY DEVELOPMENT STRUCTURE AND WORKPLAN

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Takes note of the *JCOMM Capacity Development Assessment* (JCOMM-5/INF. 8.1), at the request of the Commission at JCOMM-4;

Decides to endorse the JCOMM Capacity Development Structure and Workplan as provided in the Annex to the present decision.

Annex to Decision 34 (JCOMM-5)

JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY CAPACITY DEVELOPMENT STRUCTURE AND WORKPLAN

The JCOMM Vision (8.1/1) needs to be implemented by a cross-cutting Capacity Development (CD) Team composed of a chairperson and vice-chairperson under the supervision of whom a new workplan will be defined. Such document should be made in coordination with the Programme Areas' (PAs) chairpersons and vice-chairpersons, and should contain:

(a) A comprehensive needs assessment (including a global as well as a regional assessment) for Members and Member States in terms of metocean operational services and products;

(b) A workplan to develop, together with the PA chairpersons as well as IOC and WMO regional entities, CD activities that take into account the needs assessments as well as existing CD mechanisms and tools (IOC OTGA and RTCs, IOC RTRCs, WMO global campus and WMO regional training centres, etc.);

(c) The design of an evaluation system for the CD activities and their effectiveness to satisfy the needs of Members and Member States;

(d) A track of the activities undertaken by JCOMM;

(e) A report to the JCOMM Management Committee on the progress, and to JCOMM-6 session.

Decision 35 (JCOMM-5)

INTEGRATION OF MARINE METEOROLOGICAL AND OCEANOGRAPHIC SERVICES IN WORLD METEOROLOGICAL ORGANIZATION AND INTERGONVERNMENTAL OCEANOGRAPHIC COMMISSION INFORMATION SYSTEMS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling the eleventh session (2014) of the JCOMM Management Committee, where it was decided to establish a JCOMM Cross-cutting Task Team for Integrated Marine Meteorology and Oceanographic services within WIS (TT-MOWIS) with the task of: 'Building on existing systems and strategies, TT-MOWIS shall take all steps within its powers to suggest a JCOMM strategy (including technology and governance) for building and activating the interfaces between Marine Meteorology and Oceanographic services and the WMO Information System (WIS)',

Noting IOC Manual and Guides No. 77, *IOC Strategic Plan for Oceanographic Data and Information Management* (2017-2021),

Noting with satisfaction:

(1) The successful work of TT-MOWIS and especially their completion in 2016 of the *Guidance Document for Integrating Marine Meteorological and Oceanographic Services within WIS,* presenting the process to be followed for the appliance, assessment and endorsement of JCOMM centres as WIS registered centres,

(2) That TT-MOWIS prepared a list of potential marine meteorological and oceanographic centres that could become candidate WIS National Centres (NCs) or Data Collection and Production Centres (DCPCs),

Considering the draft Joint WMO and IOC strategy for marine meteorological and oceanographic data management for the period 2018 to 2021, adopted through Decision 19 (JCOMM-5), and its outcome 5, "Making oceanographic and marine meteorological data sets discoverable using WMO and IOC information systems",

Considering also the steps taken by IOC of UNESCO to develop the future IOC Ocean Data Information System (ODIS),

Recalling the approval by the JCOMM Management Committee at its thirteenth session (2017), of the *Guidance Document* and recommendation for candidate WIS NCs to be created,

Recalling also the decision of the JCOMM Management Committee at its thirteenth session (2017), that the work should be continued through a dedicated Expert Team who can take charge of all technical aspects related to the registration within WIS of marine candidate centres,

Having been informed that CBS-16 (2016) welcomed the initiative of JCOMM to nominate experts that could take part in the CBS-WIS expert teams,

Decides to establish the Inter-Programme Expert Team for Integrated Marine Meteorological and Oceanographic Services within WMO and IOC Information Systems (IPET-MOIS) under the Data Management Programme Area, with the Terms of Reference provided in Resolution 7 (JCOMM-5);

Recommends that the new IPET-MOIS work closely with the IODE Intersessional Working Group for the Ocean Data and Information System (IODE IWG for ODIS) to leverage the success of the WIS operating model;

Recommends further, these teams (IPET-MOIS and IODE IWG for ODIS) to work closely with CBS on the implementation and further development of WIS, in order to ensure greater interoperability of operational marine meteorological data and services;

Requests the co-presidents of JCOMM to coordinate with the CBS president to strengthen the collaboration and benefit between integrating marine meteorology and oceanographic information into WIS.

Decision 36 (JCOMM-5)

FUTURE SATELLITE DATA ACTIVITIES IN THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling that JCOMM-4 agreed to maximize interactions with utilization of the existing mechanisms for dealing with satellites and satellite products (e.g. CBS ET-SAT & ET-SUP, CEOS, CGMS), in order to streamline the Commission's activities in this area and to efficiently deliver the requirements identified for ocean data acquisition and improved applications for service delivery,

Recalling also that, at JCOMM-4, the Commission was asked to enhance the partnership and develop joint activities with these groups and, in response, a revised Terms of Reference for the JCOMM Cross-Cutting Task Team on Satellite Data Requirements (TT-SAT) was established in 2012,

Noting the significant changes during 2016 in the governance of JCOMM TT-SAT with the resignation of the Chairperson, Vice-Chairperson and liaison to the CBS Inter-Programme Expert Team on Satellite Utilization and Products (IPET-SUP),

Noting also the significant role of IPET-SUP in collecting user requirements for satellite data, products, and related training and capacity-building across all WMO application areas, and in effectively communicating these requirements to satellite operators,

Acknowledging that, without leadership, the activities of the TT-SAT have been dormant for several years, and this includes an incomplete report regarding the requirements of the marine and oceanographic community for satellite data, products, and related building of capacity,

Considering the importance of satellite observations for marine services and oceanography,

Recognizing that a complete statement of requirement of the marine and oceanographic community for satellite data, products, and related training and capacity-building, would significantly strengthen the influence of JCOMM with the CBS community and with satellite agencies,

Considering also that the CBS IPET-SUP has no marine representation at present, and therefore marine interests are not well represented,

Authorizes the Services and Forecasting Systems Program Area (SFSPA) to establish a TT-SAT with the task of continuing and completing a satellite-specific statement of requirement of the marine and oceanographic community, by 2019;

Decides to establish the position of a coordinator on satellite data requirements to coordinate such activities within JCOMM and act as a JCOMM liaison with the CBS ET-SAT and IPET-SUP and with CEOS and CGMS;

Urges Members/Member States to nominate experts to the Coordinator position, and potentially to the TT-SAT.

Decision 37 (JCOMM-5)

DEVELOPMENT AND PUBLICATION OF THE SATCOM HANDBOOK

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling Resolution 31 (Cg-17), which established the International Forum of Users of Satellite Data Telecommunication Systems (Satcom Forum) as a joint effort of both WMO and the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO),

Noting the objective of the Satcom Forum to address remote data communication requirements for automatic environment observing systems,

Noting also that the Satcom Forum has developed a draft handbook intended to provide decision makers within environmental monitoring projects with the information necessary to evaluate the suitability of the available satellite communications systems on the market (hereafter referred to as the “Satcom Handbook”),

Having considered the report and recommendations of Satcom2016 (Madrid, Spain, September 2016),

Decides to contribute, in collaboration with the Commission for Basic Systems, to the further development of the Satcom Handbook and supporting Web pages by the Satcom Forum, paying particular attention to the Satcom requirements of marine meteorological and oceanographic observing systems;

Invites the Commission for Basic Systems to consider and make arrangements for the inclusion of the Satcom Handbook as a WMO numbered Guide attached to the *Manual on the WMO Information System* (WMO-No. 1060) for the consideration of EC-70 and IOC Council.

Decision 38 (JCOMM-5)

GUIDE TO OPERATIONAL OCEAN FORECASTING SYSTEMS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling Recommendation 5 at JCOMM-III to develop a *Guide to Operational Ocean Forecasting Systems*, with the objective of documenting the current practices for ocean forecasting, in order to: (a) provide existing centres with alternative approaches to promote discussion on the best practice; and (b) serve as an aid for developing centres,

Noting the significant progress achieved by the Expert Team on Operational Ocean Forecast Systems (ETOOFS) in developing the *Guide*,

Noting also that the *Guide* was further advanced by an expert consultant, however is not complete and requires additional drafting and then a review process,

Agrees that the *Guide to Operational Ocean Forecasting Systems* is of priority and requests the Management Committee, Secretariats and ETOOFS to complete the activity as a priority.

Decision 39 (JCOMM-5)

CONTRIBUTION OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY TO THE WMO INTEGRATED GLOBAL OBSERVING SYSTEM REGULATORY AND GUIDANCE MATERIAL

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) Resolution 23 (WMO Cg-17) – Pre-Operational Phase of the WMO Integrated Global Observing System, which requested Technical Commissions to develop technical guidelines and related guidance material incorporated in the *Guide to WIGOS*, to assist Members in implementing and operating their observing networks and systems in accordance with the WMO Technical Regulations,

(2) Resolution 2 (WMO EC-68) – Plan for the WMO Integrated Global Observing System Pre-Operational Phase 2016-2019,

(3) Recommendation 4 (CBS-16), Revised *Manual on the Global Observing System* (WMO-No. 544) and *Guide to the Global Observing System* (WMO-No. 488),

(4) Resolution 3 (WMO EC-69), Revised *Manual on the Global Observing System* (WMO-No. 544) and *Guide to the Global Observing System* (WMO-No. 488),

Noting:

(1) Manual on Marine Meteorological Services (WMO-No. 558),

(2) Guide to Marine Meteorological Services, Chapter 6, the WMO Voluntary Observing Ship Scheme (WMO-No. 471),

(3) Manual on the Global Observing System (GOS) (WMO-No. 544),

(4) Guide to the Global Observing System (GOS) (WMO-No. 488),

(5) Manual on the WMO Integrated Global Observing System (WIGOS) (WMO-No. 1160),

(6) Guide to the WIGOS (WMO-No. 1165),

(7) Guide to Meteorological Instruments and Methods of Observation (CIMO guide) (WMO-No. 8),

Noting further efforts of the Commission for Basic Systems (CBS) to transfer GOS regulatory and guidance material to WIGOS material according to the Plan for the WIGOS Pre-Operational Phase 2016-2019,

Having considered the proposal of the Observations Programme Area (OPA) and its Ship Observations Team (SOT) to transfer regulatory and guidance material related to the WMO Voluntary Observing Ship (VOS) Scheme from WMO-No. 588 and WMO-No. 471 to WMO-No. 544 and WMO-No. 488 respectively,

Concurs with Recommendation 4 (CBS-16), adopted by WMO EC-69 through Resolution 3 (EC-69), to transfer regulatory and guidance material related to the WMO Voluntary Observing Ship (VOS) Scheme to GOS/WIGOS material;

Requests the OPA to:

(1) Assist CBS in transferring regulatory and guidance material relevant to marine meteorological observations from the GOS material to WIGOS material, and to propose update to such material if necessary;

(2) Assist the Commission for Instruments and Methods of Observations (CIMO) to review and propose update to the marine observations related sections of WMO-No. 8, taking into account WIGOS needs.

Decision 40 (JCOMM-5)

WORKPLAN AND RESOURCES FOR THE FIFTH SESSION OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting the ongoing need to fund the meetings and activities of the JCOMM Management Committee, three Programme Area Coordination Groups, and eleven additional groups and expert teams; as well as the alternating responsibility to fund JCOMM sessions once every four years; estimated as an annual requirement of approximately 448 000 CHF/USD,

Notes with concern a shortfall of approximately 160 138 CHF / USD per year when compared to the actual budget allocation made available for JCOMM in 2016-2017 from WMO and IOC of 287 862 CHF / USD;

Notes with appreciation the ongoing extrabudgetary support provided to JCOMMOPS at approximately 700 000 CHF / USD per year;

Urges Members/Member States to provide adequate resources to cover the activities of the JCOMM Work Plan, both on a national basis by providing the time of experts to participate in the work of JCOMM, and through the budgetary decisions of WMO and IOC governing bodies;

Requests the Secretariats to develop a detailed operating plan for the upcoming four-year intersessional period, based on resources made available through WMO and IOC, to fund activities of JCOMM, based on priorities advised by the Management Committee.

Annex to Decision 40 (JCOMM-5)

EXPLANATORY DETAIL AND CALCULATIONS

This document uses USD and CHF interchangeably, since at the time of publication, the exchange rate was virtually 1 to 1.

The Commission re-established a Management Committee, three Programme Area Coordination groups, and eleven groups and expert teams, as well four Task Teams expected, requiring support from the Secretariats. This is two expert teams more than in the previous intersessional period, and an additional task team. It also maintains liaison with other WMO Technical Commissions and Programmes, GOOS, IODE, and a growing number of ocean observing networks.

The typical cost to the secretariat of a Commission session, once every four years, is 400,000. The responsibility to cover this cost is alternated between WMO and IOC.

Estimated budget requirements for JCOMM activities in intersessional period

Group	*Frequency of meeting (times/year)*	*Typical cost (CHF or USD)*	*Notes*	*Cost per year for regular programme budget*
Management Committee	1	45 000		45 000
Observations Coordination Group	1	20 000	Co-funded with GOOS	20 000
Data Buoy Cooperation Panel	1	12 000	Largely self-funded	12 000
Sea-level Observations Team (GLOSS/GE)	1	12 000	Largely self-funded	12 000
Ship Observations Team	0.75	12 000	Largely self-funded	9 000
Data Management Coordination Group	0.5	40 000		20 000
Expert Team on Data Management Practices	0.5	30 000	Co-funded with IODE	15 000
Expert Team on Marine Climatology	0.5	30 000		15 000
Inter-programme Expert Team on Marine Meteorological and Oceanographic Services within WMO and IOC Information Systems	0.5	30 000		15 000
Services and Forecasting Systems Coordination Group	0.5	40 000		20 000

Group	***Frequency of meeting (times/year)***	***Typical cost (CHF or USD)***	***Notes***	***Cost per year for regular programme budget***
Committee for the Worldwide Met-Ocean Information and Warnings	0.5	30 000		15 000
Expert Team on Disaster Risk Reduction	0.5	30 000		15 000
Expert Team on Sea Ice	0.5	30 000		15 000
Expert Team on Operational Ocean Forecasting Systems	0.5	30 000		15 000
Expert Team on Marine Environmental Emergency Response	0.5	30 000		15 000
Services Task teams (4)	2	20 000		40 000
Other liaison activities	1	50 000		50 000
JCOMM session	0.25	400 000		100 000
TOTAL REQUIREMENT for JCOMM activities (annual)				**448 000**
2016–2017		***Annual budget allocation***		
2016–2017 IOC Regular Programme budget for activities of JCOMM		80 493		
WMO RP for activities of JCOMM (OBS)		62 829		
WMO RP for activities of JCOMM (WDS)		111 415		
WMO RP for JCOMM session (1/8 years)		33 125	[Estimated from cost 265kCHF / 8]	
TOTAL of IOC and WMO annual regular programme resources		**287 862**		
SHORTFALL between annual JCOMM requirement and actual annual resources		***160 138***		

Group	*Frequency of meeting (times/year)*	*Typical cost (CHF or USD)*	*Notes*	*Cost per year for regular programme budget*
2016				
JCOMMOPS extrabudgetary cost		714 699		
JCOMMOPS extrabudgetary contributions total		712 763		

The estimated yearly requirement for regular programme funding to support the activities of the Commission is 448 000 CHF/USD

In 2017, the amount available from combined WMO and IOC Secretariat regular programme budget was 287 862 CHF/USD.

While WMO maintains a separate budget allocation for Technical Commission sessions, the IOC does not, with a largely fixed biennial envelope for JCOMM activities. For IOC, this makes the once-in-8 year responsibility of funding the JCOMM session an extraordinary financial burden requiring extrabudgetary fundraising.

The activities of JCOMMOPS in 2016 were largely in balance with contributions received. Extrabudgetary donors provided 712 763 CHF / USD, which was used for the staff support, staff travel, operational infrastructure, software development, communications, and administrative charges (overhead).

APPENDIX 4. RECOMMENDATIONS ADOPTED BY THE SESSION

Recommendation 1 (JCOMM-5)

REVIEW OF RELEVANT RESOLUTIONS OF THE GOVERNING BODIES OF THE WORLD METEOROLOGICAL ORGANIZATION AND THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) Regulation 191 of the WMO General Regulations,

(2) With satisfaction the actions taken by the WMO and IOC governing bodies on the previous recommendations made by or concerning the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology,

Considering that a number of previous resolutions of the governing bodies of WMO and IOC are still valid,

Recommends that:

(1) WMO Resolution 2 (EC-64) and IOC Decision EC-XLV/Dec.3.2 (II), no longer be considered necessary;

(2) WMO Resolutions 8 (Cg-16), 24 (Cg-16), 25 (Cg-16), 43 (Cg-16), 6 (Cg-17) and 36 (Cg-17) be kept in force;

(3) IOC Assembly Resolutions IOC-XX-12, IOC-XXVI-6, IOC-XXVI-7, and IOC-XXVI-8 be kept in force.

Recommendation 2 (JCOMM-5)

THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION OCEAN DATA AND INFORMATION SYSTEM

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting that:

(1) The IOC Committee on International Oceanographic Data and Information Exchange (IODE) at its twenty-fourth session recommended that IOC work with existing stakeholders, linked and not linked to IOC, to improve the accessibility and interoperability of existing data and information, and to contribute to the development of a global ocean data and information system, to be referred to as the Ocean Data and Information System (ODIS),

(2) An Intersessional Working Group for the Ocean Data and Information System to develop a concept paper for ODIS was established by IODE through Decision IODE-XXIV.4 – IODE Ocean Data and Information System,

(3) The IOC Assembly at its twenty-ninth session, through Decision IOC-XXIX/Dec.6.2.1 – International Oceanographic Data and Information Exchange, expressed its support for the proposed development of an ODIS concept paper and stressed that ODIS should focus on leveraging existing efforts,

Recalling the new Decision 19 (JCOMM-5) – Joint World Meteorological Organization and Intergovernmental Oceanographic Commission Strategy for Marine Meteorological and Oceanographic Data Management (2018–2021),

Recommends that:

(1) The Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) projects and participating organizations participate in the development of an ODIS concept paper to ensure ODIS is inclusive and supports stakeholders at all levels, and is supported by a cost-benefit analysis as feasible;

(2) JCOMM teams on data, service and forecasting support and assist the development of the ODIS concept paper, considering fundamental issues ranging from infrastructure, standards and strategies for harmonization, with consideration of requirements expressed in the JCOMM Data Management Strategy.

Recommendation 3 (JCOMM-5)

OCEAN DATA STANDARDS AND BEST PRACTICES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling the work of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM)–Committee for International Oceanographic Data and Information Exchange (IODE) Expert Team on Data Management Practices Task Team for Ocean Data Standards, the JCOMM–IODE Ocean Data Standards Pilot Project, and the IODE Ocean Data Standards and Best Practices Project (ODSBP), to review and recommend adoption of ocean and marine meteorological standards,

Noting the challenges to find volunteer experts to review proposed data standards and best practices,

Noting also that the IODE Ocean Best Practice repository (previously named Ocean Data Practices repository), which replaced the JCOMM Catalogue of Practices and Standards, contains a wide variety of best practices to enable discovery of existing methodologies and best practices, and can be used for best practices gap analyses in areas of ocean and marine meteorology observation systems,

Recalling the new Decision 19 (JCOMM-5) – Joint World Meteorological Organization and Intergovernmental Oceanographic Commission Strategy for Marine Meteorological and Oceanographic Data Management (2018–2021), and its outcome number 4 – to be achieved in collaboration with IODE – for more comprehensive, consistent and standardized distribution of oceanographic and marine meteorological data to end users in real time and near-real time as needed,

Recommends that:

(1) JCOMM projects and participating organizations identify and propose relevant standards to ODSBP;

(2) The IODE Ocean Best Practices repository be used by all JCOMM programme areas as the repository of choice for best practice documents;

(3) JCOMM projects nominate experts, upon invitation by the IODE Steering Group for the Ocean Data Standards and Best Practices Project, to review proposed data standards and best practices.

Recommendation 4 (JCOMM-5)

ESTABLISHMENT OF DATA ACQUISITION CENTRES, GLOBAL DATA ASSEMBLY CENTRES AND CENTRES FOR MARINE METEOROLOGICAL AND OCEANOGRAPHIC CLIMATE DATA WITHIN THE NEW MARINE CLIMATE DATA SYSTEM

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) WMO Resolution 2 (EC-64), Report of the fourth session of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology, which approved Recommendation 2 (JCOMM-4) on the Marine Climate Data System (MCDS),

(2) WMO Resolution 36 (Cg-17) – Designation of the Centre for Marine Meteorological and Oceanographic Climate Data in Tianjin, China,

(3) Decision IOC-XXVIII/7.1.3 (II) – Establishment of a Centre for Marine Meteorological and Oceanographic Climate Data, which established the Centre for Marine Meteorological and Oceanographic Climate Data in Tianjin (CMOC-China),

(4) Document IOC/IODE-XXIV/3.4.3 – World Ocean Database, in which the IOC Committee on International Oceanographic Data and Information Exchange (IODE) agreed that the World Ocean Database (WOD) (National Centres for Environmental Information, National Oceanic and Atmospheric Administration) should submit an application to become a CMOC within MCDS,

(5) Recommendation 2 (JCOMM-4) – Marine Climate Data System, which established the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) MCDS,

Recalling the request of JCOMM at its fourth session for Canada and France to operate as provisional Global Data Assembly Centres (GDACs) for drifting buoys under JCOMM and IODE,

Noting also:

(1) The JCOMM terms of reference, especially in relation to the development of standards and procedures regarding 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 climate change impact and adaptation strategies, are based,

(2) The report of the sixth session of the *Expert Team on Marine Climatology* (JCOMM Meeting Report No. 133),

(3) IODE Recommendations IODE-XXII.13 – IODE Global Data Assembly Centres, and IODE-XXII.14 – The Marine Climate Data System,

(4) The evaluation process, including evaluation criteria, for CMOC applications proposed by the Expert Team on Marine Climatology and the Data Management Coordination Group (DMCG), consistent with the governance adopted through Recommendation 4 (JCOMM-4) – Enhancement of capability for marine environmental emergencies, and approved by the Committee on IODE at its twenty-second session,

(5) The terms of reference and evaluation criteria of the CMOCs set out in the forthcoming revision of the *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I – Global Aspects, provisionally Part VII,

(6) The terms of reference for MCDS Data Acquisition Centres (DACs) and GDACs set out in the forthcoming revision of the *Guide to Marine Meteorological Services* (WMO-No. 471), provisionally Chapter 8,

(7) The terms of reference of DACs and GDACs together with their evaluation process and criteria set out in the forthcoming revision of the *Guide to Marine Meteorological Services* (WMO-No. 471), provisionally Chapter 3, Marine climatology,

Having considered:

(1) The application of WOD to host a CMOC,

(2) The outcome of the evaluation and review by DMCG of the application of WOD to host a CMOC according to the CMOC evaluation process and criteria set out in the forthcoming revision of the *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I – Global Aspects, provisionally Part VII, and the recommendation by DMCG to establish the WOD MCDS CMOC,

(3) The application of the Marine Environmental Data Section of the Ocean Science branch of Fisheries and Oceans Canada to operate an MCDS GDAC for drifting buoys,

(4) The outcome of the evaluation and review by DMCG according to the process and criteria set out in the forthcoming revision of the *Guide to Marine Meteorological Services*, provisionally Chapter 8, and its recommendation to establish the centre operated by Canada as an MCDS GDAC for drifting buoys,

(5) The application of the Coriolis Data Center operated by Ifremer, France, to operate as an MCDS GDAC for drifting buoys,

Considering that there has not been enough time to evaluate the proposal from the Coriolis Data Center, France in time for approval by JCOMM at its fifth session,

Requests the JCOMM Data Management Programme Area (DMPA) to undertake as soon as possible, and according to the approved governance, the evaluation of the application of the Coriolis Data Center, France, with the view to have it possibly established by the time of the seventieth session of the WMO Executive Council and the fifty-first session of the IOC Executive Council;

Authorizes the co-presidents of JCOMM, on behalf of JCOMM, and according to the recommendation of DMPA as per the above evaluation, to recommend establishing the Coriolis Data Center of Ifremer, France, as an MCDS GDAC for drifting buoys during the intersessional period;

Decides to endorse establishment of DACs, GDACs and CMOCs within MCDS, as set out in the forthcoming revisions of the *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I – Global Aspects, provisionally Part VII, and of the *Guide to Marine Meteorological Services* (WMO-No. 471), provisionally Chapter 8, to continue implementation of MCDS according to MCDS Vision 2020, as adopted by Recommendation 2 (JCOMM-4) – Marine Climate Data System;

Requests the co-presidents of JCOMM to promote establishment of additional DACs, GDACs, and CMOCs within the MCDS as appropriate;

Requests DMPA to evaluate existing potential candidates for MCDS centres and invite them to be part of it;

Urges Members and Member States to support MCDS activities, use the facilities and provide feedback to JCOMM on its effectiveness and the potential for improvement;

Recommends the WMO and IOC Executive Councils to establish:

(1) The operation of WOD as an MCDS CMOC;

(2) The operation of the Marine Environmental Data Section as an MCDS GDAC for drifting buoys.

Recommendation 5 (JCOMM-5)

EDUCATION AND OUTREACH STRATEGY FOR DATA BUOY VANDALISM

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting WMO Decision 49 (EC-68) – Technical assessment of the Marine Meteorology and Oceanography Programme, WMO Decision 29 (EC-69) – Education and outreach strategy for buoy vandalism, and IOC Working Group on Tsunamis and Other Hazards Related to Sea-level Warning and Mitigation Systems (TOWS-WG) tenth meeting (IOC/TOWS-WG-X/3) Recommendation 7 on data buoy vandalism,

Noting also IOC Decision EC-XLIX/3.4 (III) – Working Group on Tsunamis and Other Hazards Related to Sea-level Warning and Mitigation Systems, which requested IOC and WMO, working through the Data Buoy Cooperation Panel (DBCP) and TOWS-WG, to develop a regionally relevant education and outreach strategy (for discussion in 2017), that could be jointly implemented by IOC and WMO and their Member States and Members, by the Food and Agriculture Organization of the United Nations, the fisheries sector and other relevant organizations, to substantially reduce damage through vandalism or interference with ocean data buoys,

Noting further the outreach strategy to reduce damage to ocean data buoys from vandalism or interference, provided in the annex to the present recommendation, developed by DBCP as per Decision 49 (EC 68) and submitted for review by TOWS-WG, the intergovernmental coordination groups, DBCP Working Group on Data Buoy Vandalism, and other international partners that expressed interest in the strategy such as the Council of Ministers of the Central American Commission for the Environment and Development,

Endorses the outreach strategy to reduce damage to ocean data buoys from vandalism or interference as provided in the annex to the present recommendation;

Recommends the WMO Executive Council and the IOC Assembly to adopt the outreach strategy to reduce damage to ocean data buoys from vandalism or interference;

Requests DBCP to continue to seek further input from relevant national and regional organizations to promote the strategy and raise awareness about the issue of data buoy vandalism and its impacts on forecasting climate, weather and tsunamis;

Urges Members and Member States to actively engage, support and collaborate in the efforts of DBCP and its Working Group on Data Buoy Vandalism to collect existing education and outreach materials related to national or regional mitigation of data buoy vandalism efforts.

Annex to Recommendation 5 (JCOMM-5)

OUTREACH STRATEGY TO REDUCE DAMAGE TO OCEAN DATA BUOYS FROM VANDALISM OR INTERFERENCE

The outreach strategy to reduce damage to ocean data buoys from vandalism or interference is provided in DBCP Technical Document No. 58 at http://www.jcomm.info/DBCP-TD-58.

Recommendation 6 (JCOMM-5)

MANAGEMENT OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY IN SITU OBSERVATIONS PROGRAMME SUPPORT CENTRE

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) The Joint WMO–IOC Technical Commission for Oceanograph and Marine Meteorology (JCOMM) terms of reference and especially those related to the development of observing networks,

(2) Recommendation 2 (JCOMM-III) – New terms of reference for an expanded Joint WMO–IOC Technical Commission for Oceanograph and Marine Meteorology In Situ Observing Platform Support Centre,

(3) The report *Observations Programme Area Coordination Group (OCG) First Session*, JCOMM-MR-13,

(4) The report *Observations Coordination Group Eighth Session*, JCOMM-MR-132,

(5) IOC Assembly Resolution XX-6 – The Argo Project,

(6) IOC Resolution EC-XLI.4 – Guidelines for the implementation of Resolution XX-6 of the IOC Assembly regarding the deployment of profiling floats in the high seas within the framework of the Argo Programme,

Acknowledging the successful transfer during the last JCOMM intersessional period of JCOMM In Situ Observations Programme Support Centre (JCOMMOPS) from Toulouse to Brest, France,

Noting with satisfaction:

(1) Voluntary contributions from Members and Member States towards JCOMMOPS and observing panels and networks such as the Data Buoy Cooperation Panel (DBCP), Ship Observations Team (SOT), Argo profiling float programme, Ocean Sustained Interdisciplinary Timeseries Environment Observation System (OceanSITES), Global Ocean Ship-based Hydrographic Investigations Programme (GO-SHIP), and Global Sea-level Observing System (GLOSS),

(2) The contribution of France, which is hosting JCOMMOPS and providing the required facilities to its staff through in-kind contribution,

(3) The role of the IOC Secretariat during the previous intersessional period with regard to the management of JCOMMOPS, including financial resources and staff,

(4) The contribution of local authorities in Brittany, France, that has facilitated the firm establishment of JCOMMOPS in Brest,

(5) The successful establishment of the ship coordinator position within JCOMMOPS to facilitate the ship coordination activities across the ocean observation programmes,

Recognizing:

(1) That JCOMMOPS occupies a unique place as the focal point for the practical coordination of the (in situ) ocean observing systems under the auspices of JCOMM,

(2) That management of JCOMMOPS can be divided into:

   (a) Financial administration,

   (b) Administration of human resources (contracts),

   (c) Work programme management,

(3) The complexity of the current JCOMMOPS construct and the difficulties in sustaining the role of the IOC Secretariat with regard to the lead administrative oversight of JCOMMOPS,

(4) The effective transfer of most of JCOMMOPS human resources and financial administration functions to the WMO Secretariat,

(5) The need to assure appropriate coordination of JCOMMOPS activities locally, in particular with regard to the synergistic aspects of JCOMMOPS, and liaison with the local hosts, the IOC and WMO Secretariats and other parties,

Satisfied that:

(1) JCOMMOPS has been running successfully since its establishment by JCOMM at its first session and has served the needs of Members and Member States according to its terms of reference thanks to ongoing voluntary contributions from them,

(2) The leadership of JCOMMOPS has, de facto, been provided informally in the last few years by Mr Mathieu Belbéoch in the most effective way and to the satisfaction of the JCOMM Observations Coordination Group (OCG) and JCOMMOPS contributing panels and networks,

Considering:

(1) The requirement for JCOMM to continue to be active in a process in which oceanographic and marine meteorological observing system elements make the transition into a fully integrated system,

(2) The need to integrate at the international level a number of activities regarding operation and implementation of the in situ marine observing systems,

(3) The additional requirements being addressed by several networks (for example, SOT support of ocean biogeochemistry measurements) and the need to monitor performance indicators and engage with new stakeholders,

(4) The value of extending JCOMMOPS activities to support coordination for additional OCG panels and networks, such as recent inclusion and increasing participation of GLOSS and other emerging global observing networks in the activities coordinated by OCG, such as the subsurface glider network (OceanGliders), animal-borne instruments, the global high-frequency radar network, and polar and other regional or coastal observing systems,

Recommends that:

(1) An external review of JCOMMOPS be undertaken to assess:

   (a) The future role of JCOMMOPS;

   (b) Organizational relationships with sponsors and stakeholders;

   (c) Future sponsorship and management;

(2) Pending the outcome and recommendations of the review and further recommendations from JCOMM with regard to JCOMMOPS management:

   (a) JCOMMOPS expands, within the envelope of available resources, its activities to enable:

      (i) The provision of support to DBCP, Argo, SOT, OceanSITES, GO-SHIP, GLOSS, OceanGliders, and other observing networks taking part in the activities coordinated by OCG;

      (ii) The compilation and dissemination of information on satellite data requirements, and satellite information services on its website;

      (iii) The evaluation of mechanisms to support further regional and coastal observing systems;

   (b) The terms of reference of JCOMMOPS, as given in Annex 1 to the present recommendation, should be updated to this recommendation;

(c) JCOMMOPS should continue to be based in Brest, France, under the lead administrative (financial and human resources administration) responsibility of the WMO Secretariat, in consultation with IOC Secretariat;

(d) A JCOMMOPS lead position be established, pending availability of any required resources, according to the functions and rules defined in Annex 2 to the present recommendation;

(e) A JCOMMOPS work plan should be developed, and regularly reviewed, by OCG in consultation with the relevant panels and networks, and associated programmes;

(f) The expansion of JCOMMOPS activities should take place only as new funding is provided for this expansion or if it can be demonstrated that there is no impact on present levels of support, in order to protect the interests of the Members and Member States that presently provide funding for specific activities at JCOMMOPS;

Urges Members and Member States to investigate how they could strengthen their support to JCOMMOPS and assist in making the funding of JCOMMOPS more stable and sustainable;

Requests the WMO Secretary-General to monitor and contribute to the JCOMMOPS review;

Encourages Members and Member States, where possible, to commit the resources required to support an extended JCOMMOPS.

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Note: This recommendation replaces Recommendation 2 (JCOMM-III), which is no longer in force.

Annex 1 to Recommendation 6 (JCOMM-5)

NEW TERMS OF REFERENCE OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY IN SITU OBSERVATIONS PROGRAMME SUPPORT CENTRE

Under the overall guidance of the JCOMM Observations Coordination Group (OCG) and following the direction of:

- The Data Buoy Cooperation Panel,
- The Ship Observations Team,
- The Argo Steering Team,
- The OceanSITES Science Team,
- The Global Sea-level Observing System Group of Experts,
- The Global Ocean Ship-based Hydrographic Investigations Programme Committee,
- The OceanGliders Steering Team,
- Other ocean observing network steering bodies coordinated by the JCOMM OCG (e.g. animal-borne instruments, global high-frequency radar network, polar and other regional/coastal observing systems), and

Under the lead administrative supervision of the WMO Secretariat consulting with the IOC of UNESCO Secretariat, and executing the Work Plan provided by the OCG and relevant panels, and associated programmes,

The JCOMM In Situ Observations Programme Support Centre (JCOMMOPS) shall support the implementation of an integrated framework for the ocean observing networks as promoted by the OCG.

Under the currently established “vision”, JCOMMOPS will undertake 1) assistance for implementation/deployment; 2) mechanisms for exchange of data/metadata; 3) develop observation system monitoring tools.

Specifically,

1. Implementation/deployment:

    (a) Act as a focal point and assist in implementation, deployment and coordination of the oceanographic and marine meteorological observing networks by clarifying and assisting in resolving technical issues between platform operators, data centres, manufacturers and satellite data telecommunication providers;

    (b) Assist in demonstrating the scientific value of global ocean observing programmes in support of WMO and UNESCO/IOC Programmes and co-sponsored Programmes by compiling materials and assisting ocean observation science teams as appropriate;

    (c) Maintain an operational awareness, and where feasible, share observing platform deployment planning and servicing opportunities and operator contact information, to maximize deployment opportunities and sharing of resources;

    (d) Encourage cooperation to develop synergies between relevant actors and to promote the observing system/networks;

    (e) Contribute towards capacity development, educational and outreach initiatives fostering the participation of Members/Members States in the implementation of marine/ocean observing networks;

    (f) Implement and maintain the observing platform deployment notification procedures required by IOC Resolutions XX-6 and EC-XLI.4;

2. Support consistency and mechanisms for exchange of data/metadata:

    (a) To assist in instrument and data management standardization through supporting the collection and distribution of information on current and best practices from OCG networks, and monitoring information in metadata;

    (b) Facilitate free and unrestricted data and metadata exchange in real time, by providing appropriate technical assistance to platform operators, and serving as a collection and distribution point for selected platform/instrument metadata and as a source of information on other metadata and data distribution services;

    (c) Promote integrated access to data and metadata through close cooperation with the US NOAA Observing System Monitoring Centre and the JCOMM Data Management Programme Area;

    (d) Promote the flow of data and metadata to archiving centres, and facilitate routine provision of WMO Integrated Global Observing System (WIGOS) metadata to the Observing System Capability Analysis and Review tool (OSCAR);

(e) Allocate unique identifiers to all observing platforms registered at JCOMMOPS, including in particular when delegated authority to issue WIGOS identifiers on behalf of WMO Members;

3. Develop observation system monitoring tools:

(a) Routinely collect and distribute information on: (i) the performance of the observing system networks relative to targets, (ii) attributes of platform, instrumentation, and telecommunication systems, and (iii) functional status of and data quality from individual observing platforms;

(b) Develop a consistent set of tools needed to monitor the status of the observing system and its attendant data and metadata distribution, so as to identify areas to improve the overall transparency, effectiveness and development of the system;

(c) Develop and maintain performance measures for each observing network and provide an integrated perspective. Publish regularly a "JCOMM Observations Report Card" to inform as appropriate Member/Member States on the status and benefits of the observing system.

Annex 2 to Recommendation 6 (JCOMM-5)

LEAD OF THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY IN SITU OBSERVATIONS PROGRAMME SUPPORT CENTRE

To assure appropriate coordination of JCOMMOPS activities, and achieve synergies between the contributing Panels in the most effective way, the JCOMMOPS Lead position is established with the following responsibilities:

(a) To provide guidance to JCOMMOPS staff regarding JCOMMOPS synergistic aspects;

(b) To assist during periods where there are staff gaps at JCOMMOPS, help for the transition, and assist in training new JCOMMOPS staff when they are recruited;

(c) To manage development and evolution of the JCOMMOPS Information System and web-based services;

(d) To assist the Secretariats to liaise and negotiate with host country and local institutions and authorities and assist for strengthening the infrastructure for the benefits of observing networks;

(e) To promote JCOMMOPS and assist with regard to seeking voluntary contributions from Members/Member States for JCOMMOPS and its staff;

(f) To officially represent JCOMMOPS at various venues and occasions, and report specifically to the JCOMM Observations Coordination Group (OCG) on JCOMMOPS activities, and progress against the work plan;

(g) To assist the Secretariats in developing the JCOMMOPS budget and contribute to its reporting requirements;

(h) To liaise with the Secretariats on JCOMMOPS synergistic aspects;

Also, the following rules shall apply:

(a) For the above functions, the JCOMMOPS Lead, is receiving guidance from the Chairperson of the JCOMM Observations Coordination Group (OCG) or delegated member of the OCG Executive;

(b) The JCOMMOPS Lead may delegate all or part of his/her functions to JCOMMOPS staff on an ad hoc basis if necessary;

(c) Guidance to JCOMMOPS staff regarding Panel/Network specific issues is provided by the Chairperson of the relevant Panel/Network;

(d) Direct supervision of the JCOMMOPS Lead is provided by the supervisor designated by the Secretariat employer (at present, the Chief of the WMO Observing Systems Division (OSD)), in consultation with the OCG Chairperson;

(e) Direct supervision of the Panel/Network Technical Coordinators is provided by the supervisor designated by the Secretariat employer (at present the OSD) in consultation with the Panel/Network Chairs;

(f) Direct supervision of other JCOMMOPS staff is provided according to contractual conditions for such staff in consultation with the JCOMMOPS Lead;

(g) The JCOMMOPS Lead shall undertake his/her functions in all fairness to the Panels/Networks supporting JCOMMOPS;

(h) The JCOMMOPS Lead is nominated from the JCOMMOPS staff by the JCOMM Co-Presidents according to recommendation of the OCG Chairperson, and in consultation with the Panel/Network Chairs and the Secretariats.

The current lead of JCOMMOPS is Mr Mathieu Belbéoch.

Recommendation 7 (JCOMM-5)

LONG-TERM SHIP OBSERVING STATIONS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling that the Ship Observations Team (SOT) was re-established by the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) at its fourth session,

Noting:

(1) That SOT was created to build on synergies between the three panels involved in coordinating global ship-based observing programmes, that is, the Voluntary Observing Ships (VOS) Scheme, the Ship-of-Opportunity Programme, and the Automated Shipboard Aerological Programme, with a view to an eventual full integration of ship-based observing systems on commercial and research vessels,

(2) The long history of ship observations and their valuable contribution especially to maritime safety, weather forecasting and climate studies, and that some of the ships have been providing observations data for many decades,

(3) WMO Decision 40 (EC-68) – WMO mechanism for the recognition of long-term observing stations, which states that in collaboration with JCOMM, VOS and moored buoys could be recognized as long-term observing stations,

(4) That WMO has not yet developed an evaluation mechanism to recognize the longstanding service of VOS to marine observations,

Requests the JCOMM Observations Coordination Group, in consultation with SOT, to establish an evaluation process to identify the long-serving ships in marine observations and establish a process to award certificates to those ships that have provided ocean observations for a longer period of time.

Recommendation 8 (JCOMM-5)

CHANGES TO SHIP MASKING SCHEMES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling WMO Resolution 27 (EC-LIX) – Ship owners and masters' concerns with regard to VOS data exchange,

Noting:

(1) The report of the ninth session of the Ship Observations Team (SOT), in which SOT recommended (a) to move forward with the implementation of a new seven-digit WMO Integrated Global Observing System SOT ship identifier (SOT-ID) scheme and (b) to discontinue both development and use of ship identifier masking and encode/decode schemes,

(2) The report of the eighth session of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) Observations Coordination Group (OCG), in which OCG concurred with the recommendations made by SOT at its ninth session in this regard,

Considering that:

(1) The structure of the proposed new SOT-ID scheme associated with a separation of platform metadata (such as sensor information) from ship metadata (such as the International Maritime Organization number) permits the ship reference in the platform metadata to be hidden from non-authorized users,

(2) Implementing an encode/decode solution for ship identifiers within FM-94 BUFR reports would require a complex governance and procedure with the nomination of a JCOMM focal point for the management and regular submission of public and private encryption keys,

(3) Changes to national procedures in ship identifier masking schemes are being considered, for example:

   (a) Canada is investigating ending the use of the "SHIP" masking scheme and using other options instead, such as encode/decode or the new SOT-IDs,

   (b) Australia, Japan, the United Kingdom of Great Britain and Northern Ireland and the United States of America are considering ending use of all ship identifier masking schemes and using SOT-ID instead,

Recognizing that:

(1) Security issues (piracy) as initial driver for the implementation of ship identifier masking schemes are less important today,

(2) Progress with the satellite Automatic Identification System (AIS) now allows for global and continuous ship tracking on public websites, and shipping companies are now more open to softening security policies,

(3) The use of current ship identifier masking schemes such as SHIP does not facilitate quality monitoring of ship data, and is, de facto, limiting access to Voluntary Observing Ship (VOS) data to some users,

Having been informed that:

(1) The transition to SOT-ID and the use of AIS for tracking vessels, along with the full transition to FM-94 BUFR-formatted data distributions, results in existing ship identifier masking schemes being no longer effective in hiding ship identities and tracks,

(2) The use of the proposed SOT-ID allows all masking schemes to eventually be discontinued as SOT-ID can also serve as a pseudo mask,

(3) Due to the above considerations, many National Meteorological and Hydrological Services are now moving away from masking altogether,

Recommends the WMO Executive Council:

(1) To no longer keep in force WMO Resolution 27 (EC-LIX);

(2) To adopt a new resolution and request Members to discontinue using existing ship identifier masking and encode/decode schemes, and to use the proposed new SOT-ID scheme instead;

Calls upon SOT to consider the timing and procedure of new scheme introduction and draft a resolution to be submitted to the WMO Executive Council at its seventieth session through the JCOMM Management Committee.

Recommendation 9 (JCOMM-5)

REDUCING THE NUMBER OF VOLUNTARY OBSERVING SHIP CLASSIFICATIONS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) The report of the ninth session of the Ship Observations Team (SOT), in which SOT recommended a reduction in the number of voluntary observing ship (VOS) classes from eight to three,

(2) The report of the eighth session of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology Observations Coordination Group (OCG), in which OCG concurred with recommendations made by SOT at its ninth session in this regard,

Considering the SOT proposal to consider the following three classes of VOS as follows:

(1) National Meteorological and Hydrological Service (NMHS) operated: Ships that are recruited by an NMHS that also supplies the necessary observing instruments, sensors and equipment,

(2) NMHS cooperative: Ships that are recruited by an NMHS but use their own instruments, sensors and equipment,

(3) Independent: Third-party support ships that are not recruited by an NMHS but that contribute to the VOS Scheme,

Considering also that adoption of the three new classes will require modifications to the VOS metadata scheme and how these classes are reported and documented by port meteorological officers (PMOs),

Concurs with the reduction of VOS classes to the three proposed by SOT;

Requests SOT to:

(1) Fully define the new classes, propose required changes to VOS metadata formats and reporting procedures for PMOs, and make proposals on how the new third-party ships should be administered and supported in the future;

(2) Develop and propose the required changes to the *Manual on the Global Observing System* (WMO-No. 544), Volume I – Global Aspects, the *Guide to the Global Observing System* (WMO-No. 488), and the *Manual on Codes* (WMO-No. 306), Volume I.2;

Invites the Commission for Basic Systems to accept the changes proposed by SOT to the above regulatory and guidance material;

Recommends the WMO Executive Council:

(1) To approve the recommended changes to VOS classifications to be reflected in the *Manual on the Global Observing System* and the *Guide to the Global Observing System*, and transitioned to the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160) and the *Guide to the WMO Integrated Global Observing System* (WMO-No. 1165) as appropriate per WMO Integrated Global Observing System pre-operational phase implementation;

(2) To make appropriate amendments to the code tables of the *Manual on Codes*, Volume I.2 using the “simple (fast-track) procedure” described in WMO Resolution 12 (EC-68).

Recommendation 10 (JCOMM-5)

FREEZING THE *INTERNATIONAL LIST OF SELECTED, SUPPLEMENTARY AND AUXILIARY SHIPS* (WMO-No. 47) AND MOVING TO WMO INTEGRATED GLOBAL OBSERVING SYSTEM METADATA STRUCTURES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) The report of the ninth session of the Ship Observations Team (SOT), in which SOT recommended that the publication *International List of Selected, Supplementary and Auxiliary Ships* (WMO-No. 47) should be frozen at the current version 4.2, be archived and the contents transferred to the Joint WMO–IOC Technical Commission for

Oceanography and Marine Meteorology In Situ Observations Programme Support Centre (JCOMMOPS) database (with an appropriate subset to be submitted to the Observing Systems Capability Analysis and Review tool (OSCAR)/WMO Integrated Global Observing System (WIGOS) framework),

(2) The report of the eighth session of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology Observations Coordination Group (OCG), where OCG concurred with the recommendations made by SOT at its ninth session in this regard,

Mindful that:

(1) By freezing the current version of WMO-No. 47, metadata format, and creating and implementing a new, composite format, SOT observing networks will be better positioned to make the changes required to comply with WIGOS metadata requirements,

(2) By offering the flexibility currently available to other marine meteorological and oceanographic observing networks (for example, data buoys) and not being subject to the specific WMO regulations such as WMO-No. 47, modification of the metadata structure would be much faster and more efficient and would ensure that changes are possible within the WIGOS implementation period,

(3) By establishing JCOMMOPS as the main metadata repository, this would not only reduce the need for duplication of effort by national VOS operators, but would also reduce the need for national metadata databases altogether, and would ensure that all relevant WIGOS metadata are directly uploaded into the OSCAR database,

Concurs with the transfer of WMO-No. 47 database from E-SURFMAR to JCOMMOPS;

Recommends that theWMO Executive Council:

(1) Approve the freezing and archival of publication WMO-No. 47 at version 4.2 and discontinue the publication;

(2) Approve the submission of ship metadata from Members and Member States directly to JCOMMOPS;

(3) Approve the full integration of publication WMO-No. 47 within the WIGOS Metadata Standard, and the transfer of the WMO-No. 47 database to OSCAR/Surface via JCOMMOPS.

Recommendation 11 (JCOMM-5)

NEGOTIATION OF SATELLITE COMMUNICATIONS TARIFFS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Recalling:

(1) WMO Resolution 31 (Cg-17) – Report of the extraordinary session (2014) of the Commission for Basic System relevant to centres and networks of the WMO Information System, which established the Satcom forum as a joint effort of both WMO and IOC,

(2) Decision 37 (EC-69) – Satcom user forum, that endorsed the elected Satcom Forum Executive Committee (Satcom-EC), which included the Chairperson of the Argos Joint Tariff Agreement (JTA) as a member of Satcom-EC,

Noting the objective of the Satcom forum according to its terms of reference to address remote data communication requirements – including tariff negotiations as needed – for automatic environment observing systems,

Having considered the reports and recommendations of Satcom2016 (Madrid, 27–29 September 2016), the fourteenth meeting of the JTA Executive Committee (Abu Dhabi, 24–26 April 2016), the thirty-sixth session of the JTA (La Jolla, United States of America, 24–26 October 2016), and the fiteenth meeting of the JTA Executive Committee (Toulouse, France, 18–19 July 2017),

Acknowledging that:

(1) The Satcom forum has conducted a survey of National Meteorological and Hydrological Services to estimate their total expenditure on satellite data communications airtime and equipment (Satcom-Survey2017),

(2) JTA provides for an international mechanism to find cost-effective locations and data processing of data collected through the Argos system,

(3) There is growing provision from Satcom providers of fixed-price satellite data communication tariffs for environmental monitoring applications,

Recommends the Executive Councils of WMO and IOC:

(1) To approve the inclusion of JTA as a subprogramme of the Satcom forum;

(2) To give their authority to the Chairperson of JTA to approve the JTA Argos Global Tariff Agreement on behalf of WMO and IOC, as negotiated on a yearly basis within the JTA framework;

Invites the Satcom forum, based on the results of the Satcom-Survey2017, to pursue, with Satcom providers, negotiation of a "WMO–IOC branded disaster alerting tariff".

Recommendation 12 (JCOMM-5)

REVISED *MANUAL ON MARINE METEOROLOGICAL SERVICES* (WMO-No. 558), VOLUME I – GLOBAL ASPECTS

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Considering the *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I – Global Aspects, 2012 edition,

Recognizing:

(1) The obligation of countries that are signatories to the International Convention for the Safety of Life at Sea to provide meteorological warning and forecast services for shipping as specified in the Convention, for the safety of life and property at sea,

(2) That the International Maritime Organization (IMO)–WMO Worldwide Met-Ocean Information and Warning Service (WWMIWS) needs to be constantly reviewed and updated to best meet the user requirements expressed by IMO, and in full harmony with the World-Wide Navigational Warning Service for the Global Maritime Distress and Safety System (GMDSS) coordinated by the International Hydrographic Organization (IHO),

Recalling:

(1) Recommendation 6 (JCOMM-4) – Amendment to the *Manual on Marine Meteorological Services* (WMO-No. 558), the *Guide to Marine Meteorological Services* (WMO-No. 471) and WMO-No. 9, Volume D, *Information for Shipping*, wherein the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) endorsed amendments to the *Manual on Marine Meteorological Services* (WMO-No. 558, 2012 edition), Volume I – Global Aspects,

(2) WMO Resolution 26 (EC-64) – Amendments to the Technical Regulations, wherein the WMO Executive Council instructed that an ongoing review and revision of WMO Technical Regulations should be carried out by relevant technical commissions,

Acknowledging the progress and productive work of the JCOMM Expert Team on Maritime Safety Services, as well as the collaboration and coordination with relevant WMO technical commissions and programmes, and other international organizations, in relation to the revision of the *Manual on Marine Meteorological Services*,

Acknowledging also that the draft version of the revised Manual has undergone an independent review, and that these comments have been incorporated into the current version,

Noting that amendments to the Manual would have implications for WMO *Technical Regulations* (WMO-No. 49),

Noting also that *Guidelines on the Preparation and Promulgation of the WMO Technical Regulations* (WMO-No. 1127) provides guidance on how standard procedures and recommended practices should be described in the Manual,

Recommends the WMO Executive Council to adopt the revised *Manual on Marine Meteorological Services*, as provided in the annex to the present recommendation, to take effect as per WMO Resolution 12 (Cg-17) and Regulation 127 of the WMO General Regulations;

Requests the co-presidents of JCOMM to ensure alignment of the Technical Regulations with the revised Manual and present an amendment to the Technical Regulations to the WMO Executive Council at its seventieth session together with the present recommendation;

Urges WMO Members to take note of the revised Manual so that the modifications can be incorporated into the marine services of their National Meteorological and Hydrological Services;

Authorizes the co-presidents of JCOMM, in consultation with the WMO Secretariat, to make any necessary editorial amendments with respect to the revised Manual;

Requests the expert teams of JCOMM to continue to review and propose further amendments to the *Manual on Marine Meteorological Services*, and to provide technical assistance to the Members and Member States concerned, as required;

Requests the Secretary-General of WMO:

(1) To provide technical advisory assistance to Members concerned, as required and within available resources, in the implementation of the revised regulations and standards;

(2) To ensure consistency among the various publications, including those of partner organizations (such as IMO, and the like), noting that the publication WMO-No. 558 is referenced in external publications and particularly in IMO Resolution A.1051(27) regarding WWMIWS;

(3) To continue interaction with IMO, IHO, Inmarsat and other organizations and bodies concerned regarding the operation of GMDSS.

Annex to Recommendation 12 (JCOMM-5)

REVISED *MANUAL ON MARINE METEOROLOGICAL SERVICES* (WMO-No. 558), VOLUME I – GLOBAL ASPECTS

Revised WMO-No. 558

Recommendation 13 (JCOMM-5)

REVISED *GUIDE TO MARINE METEOROLOGICAL SERVICES* (WMO-No. 471)

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Considering:

(1) The WMO *Guide to Marine Meteorological Services* (WMO-No. 471, 2001 edition),

(2) The revised WMO *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I – Global Aspects, as given in the annex to Recommendation 12 (JCOMM-5),

Recalling:

(1) Recommendation 6 (JCOMM-4) – Ammendment to the *Manual on Marine Meteorological Services* (WMO-No. 558), the *Guide to Marine Meteorological Services* (WMO-No. 471) and WMO-No. 9, Volume D, *Information for Shipping*, wherein the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) endorsed the amendments to the WMO *Guide to Marine Meteorological Services* (WMO-No. 471), as an accompaniment to the WMO *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I – Global Aspects,

(2) Resolution 26 (EC-64) – Amendments to the Technical Regulations, wherein the WMO Executive Council instructed that an ongoing review and revision of WMO Technical Regulations should be carried out by relevant technical commissions,

Acknowledging the progress and productive work of the JCOMM Expert Team on Maritime Safety Services, as well as the collaboration and coordination with relevant WMO technical commissions and programmes, and other international organizations, in relation to the revision of the *Guide to Marine Meteorological Services* (WMO-No. 471),

Acknowledging also that the draft version of the revised WMO-No. 471 has undergone an independent review, and that these comments have been incorporated into the current version,

Recommends the WMO Executive Council to adopt the revised WMO-No. 471, as provided in the annex to the present recommendation, to take effect as per WMO Resolution 12 (Cg-17) and Regulation 127 of the WMO General Regulations;

Requests the co-presidents of JCOMM to ensure alignment of the Technical Regulations with the WMO-No. 471, and present an amendment to the Technical Regulations to the WMO Executive Council at its seventieth session together with the present recommendation;

Urges WMO Members to take note of the revised WMO-No. 471 that provides user requirements and additional procedures to WMO-No. 558, Volume I and describes recommended practices;

Authorizes the co-presidents of JCOMM, in consultation with the WMO Secretariat, to make any necessary editorial amendments with respect to WMO-No. 471;

Requests the expert teams of JCOMM to continue to review and propose further amendments to WMO-No. 471, and to provide technical assistance for marine services to the Members and Member States concerned, as required;

Requests the Secretary-General of WMO:

(1) To provide technical advisory assistance to Members concerned, as required and within available resources, in the implementation of the revised guide;

(2) To ensure consistency with the publication WMO-No. 558;

(3) To continue interaction with the International Maritime Organization, International Hydrographic Organization, Inmarsat and other organizations and bodies concerned regarding the operation of the Global Maritime Distress and Safety System.

Annex to Recommendation 13 (JCOMM-5)

REVISED *GUIDE TO MARINE METEOROLOGICAL SERVICES* (WMO-No. 471)

Revised WMO-No. 471

Recommendation 14 (JCOMM-5)

CRITERIA FOR, AND DESIGNATION OF, MARINE-RELATED GLOBAL DATA-PROCESSING AND FORECASTING SYSTEM CENTRES

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Considering:

(1) The revised WMO *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I – Global Aspects, as given in the annex to Recommendation 12 (JCOMM-5),

(2) The WMO *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485),

Recalling:

(1) WMO Resolution 6 (Cg-XVI) – Revised *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485), wherein the World Meteorological Congress agreed that this manual is the single source of technical regulations for all operational data-processing and forecasting systems operated by WMO Members, including its designated centres,

(2) WMO Resolution 12 (Cg-17) – Report of the extraordinary session (2014) of the Commission for Basic Systems concerning the introduction of the new *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485), wherein Congress requested the WMO Secretary-General to arrange for coordination among WMO Programmes and relevant technical commissions to ensure that all WMO relevant operational centres that provide weather, climate, water and environmental products and services are included in the Manual,

(3) WMO Resolution 18 (EC-69) – Revised *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485), wherein the Executive Council adopted the revised Manual as provided in the annexes to WMO Recommendations 19 to 22 (CBS-16),

Acknowledging the important collaboration and coordination between the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) and the Commission for Basic Systems (CBS) Open Programme Area Group on Data-processing and Forecasting Systems in relation to the introduction of the criteria for designation of marine-related Global Data-processing and Forecasting System (GDPFS) centres into the *Manual on the Global Data-processing and Forecasting System* as per Resolution 18 (EC-69), namely the Regional Specialized Meteorological Centres (RSMCs) for:

(1) Numerical ocean wave prediction,

(2) Global numerical ocean prediction,

(3) Marine meteorological services,

(4) Marine environmental emergencies,

(5) Coordination of wave forecast verification,

Acknowledging also that this is aligned with WMO Resolution 11 (Cg-17) – Towards a future enhanced integrated and seamless Data-processing and Forecasting System, and constitutes a major contribution by JCOMM to the development of the system,

Having examined the additional recommendation by the co-presidents of JCOMM and the president of CBS to amend the provisions related to marine meteorological services and marine environmental emergencies in the revised Manual adopted by the Executive Council at its sixty-ninth session, to improve clarity and provide concrete criteria with respect to the designation of such types of RSMCs,

Noting that the METAREA Issuing Services and Preparatory Services have already obtained a SafetyNET certificate based on recognition and recommendation from WMO, which demonstrates evidence of compliance and engagement from WMO Members that operate such services,

Noting also that all Services that contribute to the operational wave forecast verification meet the criteria for designation as RSMCs for numerical ocean wave prediction and therefore are eligible for formal designation,

Considering the endorsement by JCOMM Expert Team on Waves and Coastal Hazards Forecasting Systems of the candidature of the European Centre for Medium-range Weather Forecasts (ECMWF) for designation as RSMC for coordination of wave forecast verification,

Recommends to the WMO Executive Council:

(1) The adoption of amendments to the revised *Manual on the Global Data-processing and Forecasting System*, as given in Annexes 1 and 2 to the present recommendation concerning, respectively, marine meteorological services and marine environmental emergencies, to take effect as per WMO Resolution 12 (Cg-XII) and Regulation 127 of the WMO General Regulations;

(2) The formal designation of RSMC ECMWF for coordination of wave forecast verification; and the formal designation of all METAREA Issuing Services and Preparatory Services as RSMCs for marine meteorological services and contributing centres, respectively, and their inclusion in the revised Manual;

(3) The formal designation of the Meteorological Service of Canada, Météo-France and the Japan Meteorological Agency as RSMCs for numerical ocean wave prediction; and of other services that satisfy the requirements, including the contribution to the operational wave forecast verification, that express interest and formal commitment as RSMCs for numerical ocean wave prediction, and their inclusion in the revised Manual;

Invites WMO Members and IOC Member States to consider applying for the designation as a GDPFS centre, following the designation process described in the revised Manual;

Authorizes the Secretary-General to make any necessary editorial amendments with respect to the above aspects in the publication WMO-No. 485.

Annex 1 to Recommendation 14 (JCOMM-5)

AMENDMENT TO THE *MANUAL ON THE GLOBAL DATA-PROCESSING AND FORECASTING SYSTEM* (WMO-No. 485) CONCERNING MARINE METEOROLOGICAL SERVICES

2.2.2.X. Marine Meteorological Services

Notes:

1) Operations, including practices, procedures and specifications are described in the *Manual on Marine Meteorological Services* (WMO-No. 558);

2) This activity includes a network of National Meteorological Services.

2.2.2.X.1 National Meteorological Centres (including the Preparatory Services, which are contributing centres) conducting marine meteorological services shall:

(a) Issue forecasts of marine environmental conditions for coastal and offshore areas;

(b) Issue warnings of marine meteorological hazards for coastal and offshore areas;

(c) Coordinate with national agencies responsible for marine matters, including for disaster risk reduction, and search and rescue.

2.2.2.X.2 Members holding METAREA responsibility under the WMO/IMO Worldwide Met-Ocean Information and Warning Service (WWMIWS), shall provide the following services in compliance with the Joint IMO/IHO/WMO Manual on Maritime Safety Information:

(a) Issue forecasts of marine environmental conditions for the high seas;

(b) Issue warnings of marine meteorological hazards for the high seas;

(c) Organize the broadcast of marine forecasts and warnings on broadcast systems compliant with the Global Maritime Distress and Safety System (GMDSS);

(d) Undertake the METAREA coordinator responsibilities.

Note:

The bodies in charge of managing the information contained in the *Manual* related to marine meteorological services are specified in the Table below.

RESPONSIBILITY			
CHANGES TO ACTIVITY SPECIFICATION			
To be proposed by:	JCOMM/WWMIWS		
To be approved by:	JCOMM	CBS	
To be decided by:	EC / Congress		
CENTRES DESIGNATION			
To be approved by:	JCOMM	CBS	
To be decided by:	EC / Congress		
COMPLIANCE			
To be monitored by:	JCOMM/WWMIWS		
To be reported to:	CBS	JCOMM	

Annex 2 to Recommendation 14 (JCOMM-5)

AMENDMENT TO THE *MANUAL ON THE GLOBAL DATA-PROCESSING AND FORECASTING SYSTEM* (WMO-No. 485) CONCERNING MARINE ENVIRONMENTAL EMERGENCIES

2.2.2.X. Marine Environmental Emergencies

Notes:

1) Operations, including practices, procedures and specifications are described in the Manual on Marine Meteorological Services (WMO-No. 558);

2) Functions and responsibilities to be defined by the JCOMM/ETMEER during the intersessional period;

3) The bodies in charge of managing the information contained in the *Manual* related to marine environmental emergencies are specified in the Table below.

RESPONSIBILITY			
CHANGES TO ACTIVITY SPECIFICATION			
To be proposed by:	JCOMM/ETMEER		
To be approved by:	JCOMM	CBS	
To be decided by:	EC / Congress		
CENTRES DESIGNATION			
To be approved by:	JCOMM	CBS	
To be decided by:	EC / Congress		
COMPLIANCE			
To be monitored by:	JCOMM/ETMEER		
To be reported to:	CBS	JCOMM	

Recommendation 15 (JCOMM-5)

UPDATE OF THE *MANUAL ON SEA-LEVEL MEASUREMENT AND INTERPRETATION*, VOLUME V – RADAR GAUGES (IOC MANUALS AND GUIDES No. 14, VOLUME V; JCOMM TECHNICAL REPORT No. 89; 2016)

THE JOINT WMO–IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting with appreciation the update of the *Manual on Sea-level Measurement and Interpretation*, Volume V – Radar Gauges (IOC Manuals and Guides No. 14, Volume V; JCOMM Technical Report No. 89; 2016),

Recommends the Global Sea-level Observing System Group of Experts to continue to review the Manual and amend as appropriate in light of evolving technological developments and observing requirements, and to provide technical assistance to the Members and Member States concerned, as required;

Calls upon IOC Member States and WMO Members to take note of and use the Manual as appropriate.

APPENDIX 5. LIST OF PARTICIPANTS

1. Officers of the session

Nadia PINARDI (Ms)	Co-president of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM)
Johan STANDER	Co-president of JCOMM

2. WMO Members represented in the technical commission

Argentina

Alicia Guadalupe CEJAS (Ms)	Delegate

Australia

Neal MOODIE	Principle delegate
Lucienne BLOM (Ms)	Alternate

Belgium

Serge SCORY	Principal delegate

Belize

Shanea YOUNG (Ms)	Principal delegate

Brazil

Emma Giada MATSCHINSKE (Ms)	Principal delegate
Nero Cunha FERREIRA	Delegate

Bulgaria

Atanas PALAZOV	Principal delegate
Snejanka MONCHEVA (Ms)	Delegate

Canada

John PARKER	Principal delegate
Andrew STEWART	Alternate
Laura MEDEIROS (Ms)	Delegate
Val SWAIL	Delegate

Chile

Luis VIDAL	Principal delegate

China

Baogui BI	Principle delegate
Wenxi XIANG	Alternate
Zheqing FANG	Delegate
Yerong FENG	Delegate
Zhuo HUANG	Delegate
Yongchao PANG	Delegate
Jun SUI	Delegate
Bingui WU (Ms)	Delegate
Xianghua XU	Delegate
Jinkun YANG	Delegate
Xiaolei YI (Ms)	Delegate
Tianyu ZHANG	Delegate
Wei ZHAO	Delegate

Croatia

Dijana KLARIC (Ms)	Principal delegate

Denmark

Steffen Malskær OLSEN	Principal delegate

Ecuador

Edwin Belisario PINTO USCOCOVICH	Principal delegate

Finland

Marja AARNIO-FRISK (Ms)	Principal delegate
Heidi PETTERSSON (Ms)	Delegate

France

Mireille MAYOKA (Ms)	Principal delegate

Germany

Bernd BRUEGGE	Principal delegate
Axel ANDERSSON	Alternate

Greece

Michail MYRSILIDIS	Principal delegate

Honduras

Jennifer Marlen BANEGAS HERNANDEZ (Ms)	Principal delegate

Hong Kong, China

Sai Tick CHAN	Principal delegate

India

Sudheer JOSEPH	Principal delegate

Indonesia

Nelly Florida RIAMA (Ms)	Principal delegate
Anni Arumsari FITRIANY (Ms)	Alternate
Ressa MAHARDHIKA (Ms)	Delegate
Andri RAMDHANI	Delegate
Evi Rumondang Suryati SINAGA (Ms)	Delegate

Italy

Alessandra GIORGETTI (Ms)	Principal delegate
Nadia PINARDI (Ms)	Delegate
Georg UMGIESSER	Delegate

Japan

Takashi YOSHIDA	Principal delegate
Yoshiaki KANNO	Delegate
Koji KATO	Delegate
Ayako TAKEUCHI (Ms)	Delegate

Mexico

Johan Espinoza ORTIZ	Principal delegate

Morocco

Hassan BOUKSIM	Principal delegate
Karim HILMI	Delegate

Netherlands

Sandra VAN DIJKE-LANGEZAAL (Ms)	Principal delegate

New Zealand

Ramon OOSTERKAMP	Principal delegate
Elke LOUW (Ms)	Alternate
Graeme SMART	Delegate

Nigeria

Glory Amarachi ONYEGBULE (Ms)	Principal delegate

Norway

Wehde HENNING	Principal delegate

Pakistan

Bilal Akram SHAH	Principal delegate

Peru

Luis CASTAÑEDA DI NATALE	Principal delegate
Myrian TAMAYO INFANTES (Ms)	Alternate

Philippines

Maria Cecilia MONTEVERDE (Ms)	Principal delegate
Evelyn M. DIEZMO (Ms)	Delegate

Poland

Janusz FILIPIAK	Principal delegate

Portugal

Joao VITORINO	Principal delegate

Qatar

Abdulla Mohammed AL MANNAI	Alternate
Mohammad ALKUBAISI	Delegate

Republic of Korea

Sunghyup YOU	Principal delegate
Kun-Young BYUN	Delegate
Hyunmin EOM	Delegate
Yunsun JUNG (Ms)	Delegate

Russian Federation

Vasily SMOLYANITSKIY	Principal delegate
Sergey BELOV	Alternate

Saudi Arabia

Ayman Salem GHULAM	Principal delegate
Abu Bakur BAGAZI	Delegate

Senegal

Mouhamadou Moustapha KAMARA	Delegate
Massata NDAO	Delegate

Seychelles

Chantale Ruth BIJOUX (Ms)	Principal delegate

South Africa

Johan STANDER	Principal delegate

Spain

Alicia LAVÍN MONTERO (Ms)	Principal delegate
María José GUERRERO TRUJILLO (Ms)	Alternate
Elena TEL PEREZ (Ms)	Delegate

Sweden

Patrick GORRINGE	Principal delegate

Thailand

Wattana KANBUA	Principal delegate

Turkey

Onur OZKECELI	Principal delegate
Ozan CAKIR	Delegate

Ukraine

Valeriya OVCHARUK (Ms)	Principal delegate

United Kingdom of Great Britain and Northern Ireland

Nick ASHTON	Principle delegate
Kevin HORSBURGH	Alternate
Alistaire PRICE	Delegate
Emma STEVENTON (Ms)	Delegate
Jane WARDLE (Ms)	Delegate

United Republic of Tanzania

Agnes KIJAZI (Ms)	Principal delegate
Mohamed NGWALI	Alternate
Wilbert Timiza MURUKE	Delegate
Abilah Hassani NAMWAMBE	Delegate

United States of America

David LEGLER	Principal delegate
Thomas CUFF	Alternate
Timothy BOYER	Delegate
Shelby BRUNNER (Ms)	Delegate
Brittany CROLL (Ms)	Delegate
Jennifer LEWIS (Ms)	Delegate
Emily SMAIL (Ms)	Delegate
Sidney THURSTON	Delegate

3. WMO Members not represented in the technical commission

Mozambique

Simão Antonio MUNGUAMBE	Principal delegate

Namibia

Martin Marthinus PHILANDER	Principal Delegate

Togo

Abalo AFFO-DOGO	Delegate

4. Invited experts

Fatima Zahra BENSAID (Ms)
Andres Miguel CAMPUSANO LASOSE
Rabia MERROUCHI

5. Representatives of international organizations and other bodies

International Hydrographic Organization

David WYATT	Observer

International Mobile Satellite Organization

Halil KESKIN	Observer

International Telecommunication Union

Reinhard SCHOLL	Observer

Pacific Community

Jens KRÜGER	Observer

APPENDIX 6. LIST OF RECIPIENTS OF CERTIFICATES OF APPRECIATION

Recognition to the previous co-presidents, for their dedication and outstanding contributions as co-presidents of the WMO–IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) and who have not been formally acknowledged during a session before:

Johannes GUDDAL	2002–2005	Norway
Savithri NARAYANAN	2002–2005	Canada
Jean-Louis FELLOUS	2005–2009	France
Alexander FROLOV	2009–2011	Russian Federation
Peter DEXTER	2005–2012	Australia

Certificates for leadership and innovation, awarded for those who have shown strong leadership of a body of experts to carry on JCOMM business – perhaps through chairing a session of their programme area, expert teams or groups – as well as consistent performance in providing their expert knowledge to JCOMM issues during the intersessional period, or who have provided advice and innovation concerning new ideas and methods:

Graeme BALL	Australia
David BERRY	United Kingdom of Great Britain and Northern Ireland
Pierre BLOUCH	France
Bryan BOASE	Australia
Paula ETALA	Argentina
David MELDRUM	United Kingdom
Mark MERRIFIELD	United States of America
Nick MIKHAILOV	Russian Federation
Jon MUNGAI	Kenya
Sara NORTH	United Kingdom
John PARKER	Canada
Yuri SIMONOV	Russian Federation
Jon TURTON	United Kingdom
Al WALLACE	Canada

Certificates for outstanding service, awarded for those whose contributions are very clearly above expectations, and who have had significant positive impact on accomplishing the activities of JCOMM:

Nick ASHTON	United Kingdom
Erik BUCH	Denmark
Candyce CLARK	United States
Robert KEELEY	Canada
David LEGLER	United States

Rabia MERROUCHI	Morroco
Neal MOODIE	Australia
Don RESIO	United States
Val SWAIL	Canada
R. VENKATESEN	India
Scott D WOODRUFF	United States
Aina WU	China
Ting YU	China

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JN 171786