WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)
SHIP OBSERVATIONS TEAM (SOT)

SEVENTH SESSION

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REPORT FROM THE SECRETARIAT

(Submitted by the Secretariat)

Summary and purpose of the document

This document provides information on actions taken since the sixth session of the SOT, and on decisions and priorities by both WMO and IOC executive bodies and emerging topics that SOT should be aware related to activities under the JCOMM Observations Programme Area (OPA), and the Data Management Programme Area (DMPA). Of particular interest will be outcomes of the Fourth Session of JCOMM (JCOMM-4, Yeosu, Republic of Korea, May 2012) and the OPA and DMPA priorities for this JCOMM intersessional period.

ACTION PROPOSED

The Team will review the information contained in this report, and comment and make decisions or recommendations as appropriate. See part A for the details of recommended actions.

Appendices:
- A. Summary outcome of JCOMM-4 regarding the Observations (OPA) and Data Management (DMPA) Programme Areas
- B. Excerpt of IOC-EC-XLV Decision the most relevant to the SOT (EC-XLV/Dec.3.2)
- C. Terms of Reference of JCOMMOPS
- D. Terms of Reference of the Ship Observations Team
- E. WIGOS Implementation Activities
- F. DBCP-WIO3 Resolution #6 on VOS Pilot Project
- G. Draft white paper and proposed workplan for the VOS Pilot Project for WIO

- A - DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

3.1.1 Forty-fifth Session of the IOC Executive Council

3.1.1.1 The IOC Secretariat representative reported on results on decisions made at the Forty-Fifth Session of the IOC Executive Council (EC-XLV[1]), 26-28 June 2012, Paris, France, which were related to the work of GOOS, JCOMM and of the SOT. The decisions and recommendations from the fourth Session of JCOMM (JCOMM-4, Yeosu, Republic of Korea, 23-31 May 2012) and the first meeting of the interim GOOS Steering Committee (iGSC-1, 20 - 22 June 2012, Paris, France) were endorsed by the IOC-EC (IOC Decision EC-XLV/Dec.3.2 II, see Appendix B).

3.1.1.2 The Team noted that the IOC Executive Council noted a continuing commitment to GOOS and the further development of operational oceanography and sustained observations. The IOC Executive Council made note of the key role of JCOMM in supporting operational oceanography programmes. The IOC Executive Council emphasized the need for IOC contributions to the success of these programmes.

3.1.1.3 Noting the staffing changes in JCOMMOPS and the IOCCP, the IOC Executive Council highlighted concerns about the potential permanence of the 'temporary' transfer of staff to other institutions such as WMO, and Member States were encouraged to contribute resources in order to maintain the Commission's capacity and strength in ocean science, services and observations.

3.1.1.4 The Executive Secretary reaffirmed GOOS as a priority for IOC, and noted the outcome of the meeting of the recently created iGSC, held in Paris, from 20 to 22 June. Concerns were expressed about the geographic balance of the new GOOS Steering Committee. The Executive Secretary pointed out that the group was close to geographic balance, exceeded gender balance goals, had an appropriate scientific and technical discipline balance, and most importantly was committed to working with all GOOS Regional Alliances.

3.1.2 Sixty-fourth Session of the WMO Executive Council

3.1.2.1 The WMO Secretariat representative reported on the outcome of the sixty-fourth Session of the WMO Executive Council (WMO EC-64, Geneva, Switzerland, 25 June - 3 July 2012)[2]. In particular, the Team noted the following decisions of EC-64 and urged its members to take them into account when developing their activities in support of the Team (***action; Team members; ongoing***):

- The Council noted that the updated JCOMM Observations Programme Area Implementation Goals as presented to the fourth JCOMM session are fully responding to the requirements of WMO Application Areas (in particular climate monitoring, NWP, and ocean applications), and requested Members to consider contributing to the achievement of these goals, as well as to support the JCOMM in situ Observing Programme Support Centre (JCOMMOPS).
- The Council noted the initiative to develop a Marine Climate Data System (MCDS) that will fully address the requirements of the Global Framework for Climate Services (GFCS). It requested Members to contribute to the MCDS developments by providing appropriate infrastructure to ensure the flow of operational and research marine meteorological and oceanographic data through the MCDS centres, as well as to contribute data to the MCDS according to the agreed standards, and assist in data rescue activities.

1: http://www.ioc-unesco.org/index.php?option=com_oe&task=viewEventRecord&eventID=697
2: https://sites.google.com/a/wmo.int/ec-64-main-page/

3.1.3 JCOMM Activities

3.1.3.1 The Secretariat reported briefly on activities under or associated with JCOMM that had taken place since SOT-6, and were of direct interest to the Team. Of primary interest, the Team noted the relevant outcome of the Fourth Session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), Yeosu, Republic of Korea, 23-31 May 2012, which is summarized in Appendix A.

SOT contribution to JCOMM OPA priority activities for 2012-2016

3.1.3.2 The Team agreed with the following regarding the JCOMM Observations Programme Area (OPA) priority activities for this JCOMM intersessional period (2012-2016):

a) Implementation of WIGOS: The Team agreed again to respond to the Legacy Recommendations of the JCOMM Pilot Project for WIGOS as agreed at the previous SOT Session (see paragraph 10.2 of SOT-6 Final Report);

b) Requirements setting, and priorities: The Team recalled that it is committed to respond to the goals sated in the JCOMM Observations Programme Area (OPA) Implementation Goals (OPA-IG), as stated in the draft SOT Implementation Strategy (see item 10). The Team is also contributing to the WMO Rolling Review of Requirements, and responding to the Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP[3]);

c) Global observing effort with more contributors: The Team is encouraging more partners to joint its activities, and contribute to the SOT implementation effort; the SOT Capacity Building activities (PMO workshops, “Buddy” and VOS donation programmes) are also meant to bring new partners from developing countries in the area of ship observations.

d) New ocean observing platform types: The Team is looking at using new technologies (e.g. AWS systems onboard ships; autolaunchers; TSG, pCO_2), and is collaborating with other groups for the deployment of existing and new types of instruments from ship (e.g. drifters, Argo floats, surface wave gliders, etc.). The cooperation with the World Ocean Council will also bring new opportunities for the recruitment of new vessels to participate in the activities of the SOT.

e) Synergies: The Team is a strong supporter of the JCOMMOPS, including through financial contributions. JCOMMOPS is a key resource for developing synergies between observing systems to exploit the potential of joint deployment opportunities, and to foster a common approach to sensor development and best practices. The SOT Tasks Teams, and Pilot Projects also play a key role in this regard.

f) Pilot Projects: The Team is supporting establishment of pilot projects which are meant to explore new ocean sensor, ocean observing platform, and data telecommunication technologies, promote the most cost-effective use of the existing resources, and optimal use of potential synergies between various observing systems (e.g. in situ // satellite integration with the HRSST Pilot Project). The Team is encouraging a more pro-active approach of its members for promoting such pilots. The Team also noted the Resolution from the third DBCP Capacity Building workshop for countries of the Western Indian Ocean region (Mombasa, Kenya, 16-20 April 2012) to establish an SOT Pilot Project to act as co-operative venture among countries within the Indian Ocean to enhance the provision of marine meteorological and oceanographic data in support of a diversity of national, regional and global programmes (see Appendices F

3 http://www.wmo.int/pages/prog/www/OSY/Publications/EGOS-IP-2025/EGOS-IP-2025-en.pdf

and G for details). The Team designated [TBD] to lead this Pilot Project, set up a Steering Team tasked to develop a workplan for the Pilot Project, and to report at the next SOT Session on the outcome (***action; [TDB]; SOT-8***).

g) Capacity building: The Team is committed to develop partnerships between developed countries and developing countries, and organize PANGEA[4] type capacity building activities, including training workshops (e.g. international PMO workshops) on implementation of ship-based observation programmes, and data use.

h) Standards and best practices: The Team is committed – through its Task Team on Instrument Standards (see item 6.5) – to review the requirements for documenting standards and best practices regarding the making of ship-based observations, including the review of the Technical Regulations as documented in the relevant WMO and IOC Publications. The Team also invited its members to make use of the Regional Marine Instrumentation Centre (RMIC[5]) facilities in their respective regions to ensure traceability of data buoy observations (***action; SOT members; ongoing***).

i) Data & metadata exchange: The Team is committed to collect and share instrument/platform metadata concerning observations made from ships (see items 6.4 and 9.3).

SOT contribution to JCOMM DMPA priority activities for 2012-2016

3.1.3..3 The Team agreed with the following regarding the JCOMM Data Management Programme Area (DMPA) priority activities for this JCOMM intersessional period (2012-2016):

a) Ocean Data Standards: The Team (i) invited its members to review ocean data standards submitted through the JCOMM-IODE Ocean Data Standards Process (ODS[6]) (***action; SOT members; ongoing***).

b) IODE Ocean Data Portal: The Team invited its members holding ship observation data sets to provide the corresponding discovery metadata in the appropriate search standard ISO 23950, and discovery metadata standard ISO 19115, and make them available through the WMO Information System (WIS) or the IODE Ocean Data Portal (ODP) (***action; Team members; ongoing***).

c) Marine Climate Data System (MCDS): The Team invited its members to follow the development of the MCDS closely (see for example the final report of the 4th Session of the ETMC), and make sure that delayed mode and historical ship data will comply with the requirements of the MCDS. Team members, may also consider collaborating with the ETMC through participation in its Task Team on the MCDS so that the SOT requirements are also considered in these developments (***action; SOT members; ongoing***).

d) Instrument/Platform metadata: See item (i) under paragraph 3.1.3.2 above.

e) Marine Climatology workshops (CLIMAR[7], MARCDAT[8]): The Team invited its members to consider participating at the CLIMAR and MARCDAT workshop once planned.

3.1.3..4 The Team agreed to include the above perspectives regarding the JCOMM Observations (OPA) and Data Management (DMPA) Programme Area priority activities for this JCOMM intersessional period (2012-2016) into the SOT Implementation Strategy (***action: SOT***

4 Partnership for new GEOSS Applications - http://www.jcomm.info/pangea-concept
5 There are currently two RMICs in Mississippi, USA for RA-IV, and in Tianjin, China for RA-II and the Asia Pacific region. Plans are underway to establish an RMIC for RA-I in Casablanca, Morocco.
6 http://www.oceandatastandards.org/
7 CLIMAR: JCOMM Workshop on Advances in Marine Climatology; next workshop is tentatively planned in 2014
8 MARCDAT: International workshop on Advances in the Use of Historical Marine Climate Data; next workshop is tentatively planned in 2016

chair; ASAP).

Rigs and Platform metadata

3.1.3..5 The Team recalled that at its sixth Session It had requested the TT-Pub47, the ETMC, and the DBCP Task Team on Moored Buoys to coordinate between themselves in liaison with the DMCG and make sure that the requirements for Rigs and Platforms metadata and for automated systems installed on offshore platforms in particular are well considered. As a result of those discussions, the DBCP took over full responsibility for all types of Rigs and Platforms reporting meteorological and/or oceanographic measurements, and for all related aspects, and the DBCP Terms of Reference have been updated accordingly in 2012. The Team also acknowledged that the fourth Session of JCOMM urged the Team and the OPA in general to continue to investigate all possible means to recruit to additional ocean observing platforms (including Rigs and Platforms operated by the offshore industry).

Integration of data management centres

3.1.3..8 The Team noted that through Recommendation 2, JCOMM-4 strongly supported the development of the new Marine Climate Data System (MCDS) by 2020 to eventually replace the current Marine Climatological Summaries Scheme (MCSS). It viewed the MCDS as an opportunity to better integrate existing WMO and IOC data infrastructures serving the requirements for climate applications, including climate services, and provide for the required high quality marine meteorological and oceanographic climate data. JCOMM-4 requested ETMC in close cooperation with the International Oceanographic Data and Information Exchange (IODE) of the IOC and the Ocean Data Portal (ODP) Task Team of the IODE/JCOMM Expert Team on Data Management Practices (ETDMP), and other appropriate partners such as the ICSU World Data System (WDS) to review and update the MCDS strategy (as proposed by the Hamburg 2011 workshop), and to develop an implementation plan (including performance indicators for participating centres) for achieving the Vision for a new MCDS.

JCOMM in situ Observations Programme Support Centre (JCOMMOPS)

See item 11.1.

3.1.4 WMO Integrated Global Observing System (WIGOS)

WIGOS Implementation

3.1.4.1 The Secretariat reported on the recent development with regard to the WMO Integrated Global Observing System (WIGOS), in particular with regard to the implementation of WIGOS per decisions of the WMO Sixteenth Congress (Geneva, Switzerland, 16 May – 3 June 2011). The Team noted that the WIGOS framework Implementation Plan (WIP) drafted by the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) has been approved by the Sixty-Fourth Session of the WMO Executive Council (Geneva, Switzerland, 25 June – 3 July 2012). It identified a number of implementation activities (see Table 2 in Appendix E) where the Team could contribute, and urged its members to collaborate as needed (***action; Team members; 2016***). See also item (i) under paragraph 3.1.3.2 regarding the SOT response to the legacy recommendations of the JCOMM Pilot Project for WIGOS per JCOMM-4 guidance and priority activities.

WMO-IOC Regional Marine Instrument Centres (RMICs)

3.1.4.2 The Team recalled that two Regional Marine Instrumentation Centres (RMICs) have been established in USA (for Regional Association IV) and in China (for the Asia Pacific region). It further noted with appreciation that efforts to establish another RMIC for the Regional Association I (Africa) in Casablanca, Morocco, are well underway, and a JCOMM Marine Instrumentation Workshop planned in Casablanca in mid 2013. In addition, JCOMM-4 urged Members/Member States to offer RMIC facilities 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. The Team invited its members to use the existing RMIC facilities to ensure traceability of ship-based observations.

International forum of Users of Satellite Data Telecommunication

3.1.4.3 The Team noted recent developments with regard to the establishment of an international Forum of users of satellite data telecommunication systems (Satcom Forum). A preparatory workshop was held in Toulouse, France, from 23 to 27 April 2012. The workshop agreed that the current Argos Joint Tariff Agreement (JTA) should eventually operate as an independent operating sub-group of the future Forum. The workshop reviewed the draft Terms of Reference of the Satcom Forum and drafted operating principles of the Satcom Forum, including governance, roles and responsibilities of the Satcom Forum Chair, and Executive Committee, frequency of meetings, reporting procedures. The Team also noted that a first *ad hoc* Forum workshop is planned in late 2013. It invited its members to participate at this workshop once announced.

3.1.5 Global Framework for Climate Services (GFCS)

3.1.5.1 The meeting noted the recent developments with regard to the Global Framework for Climate Services (GFCS), and the outcome of the Extraordinary Session of the World Meteorological Congress (Cg-Ext.(2012)), which was held in Geneva from 29 to 31 October 2012.

3.1.5.2 The Team noted that Global Framework for Climate Services will bring together providers of climate services, researchers and users to make sure that the information provided by meteorologists and climate scientists is understandable and relevant to climate-sensitive activity. The initial focus will be on improved service delivery for disaster risk reduction, health, water management, agriculture and food security.

3.1.5.3 The Team noted that the development of the Marine Climate Data System (MCDS) by the ETMC in collaboration with the IODE will be one important element of JCOMM's contribution to the GFCS.

- B - BACKGROUND INFORMATION

1 Forty-fifth Session of the IOC Executive Council

The forty-fifth session of the IOC Executive Council (IOC EC-XLV) was held in Paris, France, from 26 to 28 June 2012). Details of EC-XLV decisions the most relevant to the Team, are provided in Appendix B.

2 Sixty-fourth Session of the WMO Executive Council

2.1 The sixty-fourth WMO Executive Council (WMO EC-64) was held in Geneva, Switzerland, from25 June to 3 July 2012. The following decisions of WMO EC-64 are of particular interest to the Team.

Marine Meteorology and Oceanography Programme (MMOP)

2.2 The Council recalled that the fourth session of JCOMM took place in Yeosu, from 28 to 31 May 2012, hosted by the Republic of Korea through the Korean Meteorological Administration, the Expo 2012 Yeosu Korea Organizing Committee, the government of Jeollanamdo Province and the city of Yeosu.

2.3 The Council noted, and agreed, with the future priority activities of the JCOMM Programme Areas as proposed by JCOMM-4 for the next JCOMM intersessional period.

2.4 The Council congratulated Dr Johan Stander (South Africa) and Dr Nadia Pinardi (Italy) on their election as meteorology and oceanography co-presidents, respectively. It also paid tribute to Dr Peter Dexter (Australia) and Dr Alexander Frolov (Russian Federation) for their excellent work in support of JCOMM over the past intersessional period.

2.5 The Council noted the summary report of the fourth session of JCOMM presented by the co-president of JCOMM, including the resolutions and recommendations and recorded its decisions on the recommendations in Resolution 2.5/1 (EC-64).

WMO Integrated Global Observing System (WIGOS)

2.6 Cg-XVI (Geneva, May-June 2010), through its resolution (Res. 50 (Cg-XVI) – Implementation of the WMO Integrated Global Observing System (WIGOS), decided to implement the WMO Integrated Global Observing System. It further decided that implementation activities will be undertaken during the next financial period as one of the major efforts of the Organization with the goal that WIGOS should become operational from 2016 onwards. Cg-XVI provided an overall guidance and determined responsibilities for all constituent bodies to ensure WIGOS implementation. The tasks assigned by Congress to technical commissions are of direct relevance to JCOMM, and the SOT in particular.

2.7 Cg-XVI in particular requested *technical commissions* to:

(a) Guide the technical aspects of WIGOS implementation;

(b) Incorporate WIGOS implementation activities in their operating plan and work programme;

(c) Provide technical guidance and advice to Members and the regional associations on WIGOS;

(d) Develop guidance for the design and evolution of observing components of WIGOS;

(e) Develop standards to support WIGOS in collaboration with partner organizations and programmes;

(f) Update WMO Regulatory Material, including development of the Manual on WIGOS;

(g) Provide the technical lead for WIGOS through the Commission for Basic Systems (CBS) and the Commission for Instruments and Methods of Observation (CIMO).

2.8 Congress emphasized that the implementation of WIGOS should build upon and add value to the existing WMO observing systems with emphasis on integration of surface- and space-based observations in an evolutionary process to satisfy requirements of WMO and WMO co-sponsored Programmes. Congress noted that, since all WMO Programmes would benefit, each should actively participate and contribute its own expertise and resources in implementing WIGOS.

2.9 Congress recognized the important role of WIS in WIGOS implementation, in relation to data exchange and discovery, and the provision of effective standards and practices for data management. Congress stressed the importance of coordination between WIGOS and WIS implementation activities.

2.10 Congress stressed the importance of the development of an implementation plan for the evolution of WIGOS beyond 2015 including technical guidance on how to design, develop and implement integrated national observing systems to provide comprehensive observations in

response to the needs of all WMO Members and Programmes.

2.11 Congress agreed that the implementation of WIGOS must be reflected in the revised WMO Technical Regulations, documenting the WIGOS concept of operations and contributions of all observing components. In this regard, the Congress endorsed the inclusion of the Manual on WIGOS in the list of mandatory publications.

2.12 Following the decision by Cg-XVI, EC-LXIII (May, 2011) established the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) under the chairmanship of Mr Fred R. Branski (USA), the president of CBS, with representatives of regional associations and international partner organizations during the implementation process. ICG-WIGOS was specifically tasked to develop and submit the WIGOS Implementation Plan (WIP) for approval by the EC-64.

2.13 The first session of the ICG-WIGOS was held at the WMO Secretariat in Geneva, Switzerland, from 26 to 30 September 2011.

2.14 Based on the decisions by Cg-XVI and EC-LXIII, ICG-WIGOS-1 addressed all key components of WIGOS implementation:

(a) WIGOS Concept of Operations - Functional Architecture;
(b) Manual on WIGOS;
(c) WIGOS Communications and Outreach Strategy;
(d) WIGOS Capacity Building Strategy;
(e) WIGOS Implementation Plan (WIP);
(f) Guidance on WIGOS activities to be implemented by Members

2.15 ICG-WIGOS-1 formulated recommendations and guidance on the above WIGOS implementation components[9] and established, inter-alia, the following Task Teams (TT): TT on WIGOS Regulatory Material (JCOMM represented by Mr Pierre Blouch, France), TT on WIGOS Metadata (JCOMM represented by Mr Richard Crout, USA) and TT on WIGOS Implementation Plan (WIP) (JCOMM represented by Dr Ali Mafimbo, Kenya).

2.16 The Task Team on WIP (TT-WIP) met in Geneva from 27 to 30 March 2012 under the chairmanship of F. Branski and developed a draft WIP, which has then been submitted to EC-64 for approval through the document EC-64/Doc. 4.4(1)[10].

2.17 In elaborating the WIP, TT-WIP-1 addressed major technical issues, and made appropriate changes/edits to ensure full compliance with the guidance and recommendations made by Cg and EC. Table 2 of section 4.1 of the draft WIP presents the description of implementation activities, associated deliverables, timelines, responsibilities, costs and associated risk.

2.18 Particular attention of the SOT is invited to Sections 2.2 (co-sponsored observing systems), 2.3 (design, planning, and evolution of obs. components), and 2.4 (operation and maintenance) of the draft WIP- Key Activity Areas for WIGOS Implementation; and related Sections of the Table 2 of section 4.1 (See Appendix E, which reproduces that table, and where Activities of interest of the SOT, and where the Team can contribute are highlighted in yellow). It was also recommended that for each activity listed in that table, a detailed activity plan be developed by the responsible entity(s) with support of the WIGOS Project Office and guidance from ICG-WIGOS.

2.19 Following the task on further alignment of Programme activities to support WIGOS implementation, a proposal for a possible new structure of CBS OPAG-IOS (2012-2016) was developed jointly by the Secretariat with the President of CBS and the Chair and co-Chair of the OPAG-IOS. Subsequently, the view has been expressed by the Chair and co-Chair of the OPAG that retaining ET-AWS and ET-SBRSO as separate ETs may be preferred, due to a lack of

9 Final report of the ICG-WIGOS-1 is available at http://www.wmo.int/pages/prog/www/WIGOS-WIS/reports.html
10 https://sites.google.com/a/wmo.int/ec-64-main-page/start-here/english/d04-4%281%29-draft-1-WIGOS_en.doc

perceived overlap, and that further discussion may be warranted regarding the WIGOS-related ETs identified as part of the possible new structure.

2.20 The Meeting is invited to note the information contained in this document when considering its recommendations.

International forum of Users of Satellite Data Telecommunication

2.21 The preparatory workshop for the establishment of an international Forum of users of satellite data telecommunication systems (Satcom Forum) was held in the international conference centre of Météo France in Toulouse, France, from 23 to 27 April 2012, and was chaired by Mr David Meldrum (United Kingdom).

2.22 The future Forum is meant to provide an international mechanism covering a wide user basis from the co-sponsoring Organizations, to address remote data communication requirements – including tariff negotiations as needed – for automatic environment observing systems using satellite data telecommunication systems (Satcom systems).

2.23 The workshop reviewed the WMO and IOC user requirements for the collection of meteorological data from remote areas (including Automatic Weather Stations, Polar Observations, Buoys and Floats, Ships, Sea Level, etc.). It reviewed satellite data telecommunication systems that are currently being used for the collection of environmental data from remote areas, and discussed the role that they could play in the future Forum. The meeting noted that the future Forum is meant to provide guidance to the WMO and IOC users on the use of Satcom systems, including guiding them on how to get the best deal for the airtime. The Forum will be providing detailed information on the satellite systems capabilities so that users will be able to make informed decisions on what system to use. The meeting agreed that discussions will have to take place regarding the need for centralized system (One-Stop Shop) for data processing, quality control, formatting of collected observations in WMO&IOC formats, and distribution to end users (e.g. GTS). The workshop acknowledged the value of the One-Stop Shop proposal, and agreed that this should eventually be a matter of discussion of the future Forum.

2.24 Regarding Tariff negotiation issues, the workshop agreed that the current Argos Joint Tariff Agreement (JTA) should eventually operate as an independent operating sub-group of the future Forum.

2.25 The workshop reviewed the draft Terms of Reference of the Satcom Forum as proposed by the WMO Commission for Basic Systems (CBS) Management Group. Based on discussions under previous agenda items, the workshop proposed some changes to the Terms of Reference of the Forum. These are reflected in Annex III.

2.26 The workshop discussed and drafted operating principles of the Satcom Forum, including governance, roles and responsibilities of the Satcom Forum Chair, and Executive Committee, frequency of meetings, reporting procedures.

2.27 The workshop reviewed, discussed, and updated the workplan leading to the formal establishment of the Forum by the co-sponsoring Organizations. This includes in particular timing and organizing plan for organizing the first ad hoc Forum workshop in 2013, including agenda, and invited participants. The workshop established an organizing committee for the [informal] ad hoc Satcom workshop to be held in 2013.

2.28 The workshop agreed that the draft Terms of Reference of the future Forum as proposed by this workshop should be presented to the forthcoming session of the CBS Implementation Coordination Team on Information Systems and Services (ICT-ISS) and the CBS Implementation/Coordination Team on Integrated Observing Systems (ICT-IOS) with the goal to submit them to the sixteenth Session of the CBS-XVI in late 2012. The workshop requested Mr Meldrum to liaise with the WMO Secretariat, and draft the required documentation according to the

outcome of this workshop.

Global Framework for Climate Services (GFCS)

Cg-Ext.(2012)

2.29 Per decision of the WMO Sixteenth Congress (Cg-XVI, 2011), an Extraordinary Session of the World Meteorological Congress (Cg-Ext.(2012)), was held in Geneva, Switzerland, from 29 to 31 October 2012.

GFCS Implementation Plan

2.30 Cg-Ext.(2012) welcomed the Draft Implementation Plan produced by the Executive Council Task Team on the Global Framework for Climate Services (ECTT-GFCS) and thanked the writers for their effort in developing the document. Through Resolution 1 (Cg-Ext.(2012)), the WMO Congress adopted the draft Implementation Plan of the Global Framework for Climate Services (Annex to this resolution) for the subsequent consideration by the Intergovernmental Board on Climate Services.

2.31. The implementation structure includes five components across which activities will be coordinated and integrated: (i) User Interface Platforms (forums for the engagement of climate providers and users); (ii) Climate Services Information System; (iii) Observations and Monitoring; (iv) Research, Modelling and Prediction; and (v) Capacity building.

2.32. Cg-Ext.(2012) entrusted the Intergovernmental Board on Climate Services with the responsibility to oversee implementation of priority activities as set out in Chapter 4 of the draft Implementation Plan, with the involvement of relevant stakeholders, including other United Nations bodies. It also entrusted the Intergovernmental Board on Climate Services to regularly review the draft Implementation Plan of the GFCS, and to inform any changes to the subsequent session of Congress.

2.33. Cg-Ext.(2012) urged governments to provide resources to their NMHSs and national institutions, especially those in the designated four priority areas of the GFCS – namely water, health, disaster risk reduction and agriculture and food security - for the production, availability, delivery and application of relevant science-based climate prediction and services and for recruiting and training experts with the technical skills required for understanding and applying climate services in enhanced decision making. Governments were also urged to support the implementation of priority projects and activities as proposed in the Implementation Plan of the GFCS.

Observations and Monitoring component of the GFCS-IP

2.34. The sixty-fourth Session of the WMO Executive Council (EC-64, Geneva, 25 June – 3 July 2012) recognized the importance of the implementation of the WMO Integrated Global Observing System (WIGOS) as a key WMO contribution to GFCS, and noted that various activities specified in the Observations and Monitoring Annex to the GFCS Implementation Plan (IP) relate to the further development of WIGOS. EC-64 also recognized that a fully functioning WMO Information System (WIS), which provides the information sharing and management basic structure within the CSIS component of GFCS, is essential to the success of the GFCS.

Governance

2.35. Cg-Ext.(2012) adopted Resolution 2 (Cg-Ext.(2012)) on the GFCS and decided to establish the Intergovernmental Board on Climate Services (the Board) as an additional body accountable to the Congress under the Article 8 (h) of the Convention of the WMO. The Board will ensure coordination at the regional and global levels and engage the entire UN system and other stakeholders to deliver needs-based climate services all over the world. It will seek to ensure that

the programmes of partners and the activities of GFCS are aligned, and that a broad range of expertise is mobilized in order to serve the users' interests. Cg-Ext.(2012) also approved the Terms of Reference, and rules of procedure of the Board, and requested the Board to inform the WMO Executive Council and make recommendations on any matters relating to WMO Programmes and constituent bodies, and to report to the Seventeenth World Meteorological Congress on the implementation of the GFCS and provide recommendations on the ways to enhance the operational implementation for the period 2016-2019 and beyond. Cg-Ext.(2012) also agreed on funding requirements for the Intergovernmental Board functioning and secretariat support.

GFCS Office

2.36 To facilitate the range of activities to support the development of the GFCS Implementation Plan; a GFCS Office was established within the WMO Secretariat. As part of Annex 3 to Resolution 2 (Cg-Ext.(2012)), the GFCS Office is described as an integral part of the WMO Secretariat.

Data policy

2.37. EC-64 felt that it would be important to develop an appropriate mechanism to address WMO's contribution to the exchange of climate data and products necessary for the implementation of the GFCS. Members reflected the benefits of assessing the practical application of Resolution 40 (Cg-XII) and Resolution 25 (Cg-XIII) in NMHSs, and identifying what is working well and where there are gaps, particularly with respect to the needs for data and products including historical and processed data to support operational climate services through the GFCS. The Council agreed to establish an "EC Task Team on WMO Policy for International Exchange of [Climate] Data and Products to support the implementation of the GFCS", reporting to the Executive Council.

2.38. Noting that this Task Team has been requested to report back to EC-65, Cg-Ext.(2012) was of the view that the outputs from the work of this Task Team would provide valuable input to, and a starting point for, the deliberations on data requirements and policies for implementation of the GFCS by the Intergovernmental Board.

User Interface Platform

2.39. EC-64 noted that WMO, through its Technical Commissions for Hydrology (CHy), Agricultural Meteorology (CAgM), Basic Systems (CBS), Aeronautical Meteorology (CAeM), Oceanography and Marine Meteorology (JCOMM) and Climatology (CCl), has developed many programmes that share information, knowledge and best practices among users, and between users and service providers (see for example the development by JCOMM of the Marine climate Data System - MCDS). EC-64 recognized these activities have resulted in successful, yet disparate, user interface mechanisms between climate providers and various socio-economic sectors. The Council emphasized the need for WMO to further develop and consolidate lessons learnt through such interfaces in these sectors, within the context of the GFCS.

Appendices: 7

APPENDIX A

SUMMARY OUTCOME OF JCOMM-IV (YEOSU, REPUBLIC OF KOREA, 23-31 MAY 2012) REGARDING THE OBSERVATIONS (OPA) AND DATA MANAGEMENT (DMPA) PROGRAMME AREAS

1. OCEAN OBSERVATIONS (INCLUDING REQUIREMENTS)

Climate monitoring requirements

1.1 The Commission appreciated the ongoing work of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC) in defining requirements for deep ocean observations, and asked the OOPC to begin work on revisiting the requirements for upper ocean thermal observations, emphasizing the importance of including relevant JCOMM bodies and experts from the Observations Coordination Group in the review. The Commission recognized the importance of implementing these plans to address the requirements of climate science, support the Global Framework for Climate Services (GFCS), and to support informed decisions on climate change mitigation and adaptation.

JCOMM Observations Programme Area Implementation Goals

1.2 The Implementation Goals (OPA-IG) of the JCOMM Observations Programme Area (OPA) in developing and supporting a climate-quality composite ocean observing system are defined by the GCOS Implementation Plan (GCOS-138). As such, the OPA is acting as an umbrella for a diverse range of observing programmes, some supported by national met-ocean services, some supported largely by research funding with sustained intent but uncertain continuity. JCOMM is also mindful of the emerging requirements for new technologies and observations, especially of biogeochemical variables, that have been outlined during the OceanObs'09 conference (Venice, Italy, September 2009). Coordination of this would be developed through the GOOS Framework for Ocean Observations.

1.3 The Commission considered the recent WMO initiative to establish a Global Framework for Climate Services and asked the OPA to engage fully with this process and to establish a dialogue regarding any additional observing requirements that the GFCS might in due course identify.

1.4 The Commission noted with concern that the status of the observing system, expressed as a percentage of the *in situ* implementation goals, had not significantly increased since JCOMM-III in 2009, and that some networks have decreased compared to these goals. The Commission urged Members / Member States to commit towards achieving and sustaining the initial implementation goals.

1.5 The Commission noted with appreciation the activities of the Observations Programme Area during the intersessional period since JCOMM-III, and stressed the need for continuous action towards the goals identified by the OPA. The Commission encouraged further action in improving observations in high latitudes and in marginal seas, while recognizing that barriers related to procedures for access to territorial waters and Exclusive Economic Zones would have to be recognized and overcome. The Commission expressed concern about the sustainability of the research funding sources that are supporting much of the observations coordinated in the OPA, and encouraged further engagement with operational agencies that may be better able to sustain ocean observations.

Responding to WMO Application Area observational requirements

1.6 The Commission requested the OCG to continue proactively engaging with the WMO Rolling Review of Requirements process in setting its goals and metrics for implementation. The

Commission requested the OPA to make sure that the ocean observational requirements for WMO application areas are also included in the OPA-IG (i.e. Ocean Applications and Marine Services, Global Numerical Weather Prediction, High Resolution Numerical Weather Prediction, Synoptic Meteorology, Seasonal to Inter-annual Forecasts, Climate applications and services).

1.7 The Commission regarded the issue of metrics to be of central importance in identifying shortcomings in the observing system and in demonstrating progress and value in JCOMM's activities and the contributions of Members / Member States thereto. In commending the efforts that had been made in maintaining these metrics, it urged the OPA, through JCOMMOPS and the NOAA Observing System Monitoring Center (OSMC), to further develop its capability in this regard and to draw up metrics by Essential Ocean Variable (EOV) and by individual Member/ Member State, as well as by platform type, as had been the practice so far.

1.8 The Commission urged Members/Member States to make sure that all ocean observations related actions which are part of the new Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) should be properly addressed once the new EGOS-IP is approved by the WMO Executive Council (in principle EC-65 in 2013). The Commission emphasized the importance of working on a strategy for properly engaging JCOMM in various implementation plans, such as EGOS-IP, WIGOS-IP, GFCS, to avoid duplication of effort.

Sustaining the ocean observation networks

1.9 The Commission recognized the efforts of Members/Member States that had contributed to sustaining a number of components of the initial ocean observing network for climate that have reached their design goals (Argo, VOSClim, and the DBCP surface drifter networks). It agreed that these should be sustained as a priority and that a number of others required increased contributions in order to reach their design goals. The Commission therefore urged Members/Member States to implement the actions, coordinated through JCOMM, called for in the GCOS Implementation Plan and satellite supplement updates. It asked the Management Committee and the Programme Area Coordinators to address the 23 actions for JCOMM in the GCOS Implementation Plan (2010 update) in reviewing and assessing progress, in developing their work plans, and in setting priorities.

Integration of in situ and satellite products

1.10 The Commission emphasized the importance of an integrated approach between in situ and remotely sensed (space-based and surface-based) observations when considering requirements. Noting that in situ and remotely-sensed (space-based and surface-based) observations are complementary for most areas of met-ocean applications, the Commission agreed that further consistent quality control between in situ and remotely-sensed data must be promoted as a matter of priority, together with appropriate feedback mechanisms. The Commission agreed to develop and document best practices and standards for data and product integration. The Commission requested the DMPA to continue to take steps towards an integrated in situ/satellite data management system, and improve the integration and comparison of satellite and in situ data, e.g. address the climatic and non-climatic requirements for in situ and satellite data, and consider data homogenization and interoperability issues.

1.11 The Commission, while recognizing that the core mission of JCOMM remains the sustained provision of basic observational data, agreed that efforts should be made to improve integrated products, through gap analysis if necessary, to meet end user requirements. In this context, the Commission agreed to coordinate the development of integrated Surface Vector Wind (SVW) products, in close collaboration with the interested satellite and surface-based observation communities. This would substantially improve operational applications (including those of maritime safety, sea state forecasting and warnings, and coastal applications) that provide societal benefit. The Commission recognized that integrated data products extended beyond SVW, and asked that during the inter-sessional period the Task Team should develop a plan to address those additional requirements.

JCOMM Contribution to the implementation of the WMO Integrated Global Observing System (WIGOS)

1.12 The Commission recalled that the WMO Integrated Global Observing System (WIGOS) has entered in its Implementation Phase per Resolution 50 (Cg-XVI), and agreed that JCOMM should be fully involved in this activity. Particularly, considering the successful outcome of the JCOMM Pilot Project for WIGOS, the Commission requested the OPA and DMPA to address the legacy recommendations of the Pilot Project during the next intersessional period (JCOMM/TR-No. 48) as JCOMM's contribution to WIGOS implementation. See also item 6.2 for further details.

Instrument standards, and traceability

1.13 The Commission recalled that the now completed Pilot Project for the Integration of Marine Meteorological and other appropriate oceanographic Observations into the WMO Integrated Global Observing System (WIGOS) – also referred to as the "JCOMM Pilot Project for WIGOS" – had called for a better integration of ocean instrument practices in order to harmonize instrument standards across ocean observing system components and achieve traceability of the observations to international standards. The Commission concurred with the legacy recommendations of the Pilot Project, and particularly those related to instrument practices (see JCOMM Technical Report No. 48).

1.14 The Commission noted with appreciation the establishment of Regional Marine Instrument Centres (RMICs) in WMO Regional Association (RA) IV (N. America, Central America and the Caribbean) and RA II (Asia), addressing observing instrument best practices and standards (see agenda item 6.2), and decided to pursue these initiatives. In so doing, the Commission urged Members / Member States to consider offering new RMIC facilities in other regions. It also noted with appreciation an offer made by Morocco during JCOMM-III to host an RMIC for WMO Regional Association I at the National Meteorological Service in Casablanca. The Commission urged Members/Member States to offer RMIC facilities 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.

1.15 The Commission was pleased to note the progress, through joint efforts of the Data Buoy Cooperation Panel (DBCP) and the Expert Team on Wind Waves and Storm Surges (ETWS), on the evaluation of wave measurement systems, in support of a wide range of applications, including the monitoring of extreme wave events for disaster risk reduction, wave modelling, and the calibration and validation of satellite wave measurements [see http://www.jcomm.info/wet]. The Commission noted that there were presently eight participants in the Pilot Project, and invited additional Members/Member States to assist in the development of technology through deployment, testing of prototypes, and evaluation of wave measuring instruments.

Coordination for the implementation of ocean observing systems

1.16 The Commission was pleased to note that most OPA programmes had benefited from the dedicated technical support of the Technical Coordinators based at the JCOMM *in situ* Observations Programme Support Centre (JCOMMOPS) in Toulouse. Nonetheless, financial support for JCOMMOPS remained fragile and fragmentary, and the Commission agreed on the need to increase and diversify Members / Member States contributions to the technical coordination to operators provided at JCOMMOPS, and urged its Members / Member States to examine whether contributions might be initiated or increased.

1.17 The Commission applauded a pilot project that would combine the Technical Coordinator function with activities dedicated to securing and coordinating vessels for deployment of multi-platform observing system activities. It noted that this "Ship Logistics Coordinator" would be an international focal point for ship logistics for the implementation of global observing networks, and

would focus on (i) deployment opportunities, (ii) technical support and expertise on platforms, technology, and deployment methods, (iii) collection of metadata and information on ship based observation, including cruise plans, (iv) coordination for the SOT, and (v) development of international cooperative arrangements. The Commission noted that this would proceed as a pilot experiment in 2012 and 2013 based on existing funds, and should integrate with other similar national and regional efforts. The Commission urged Members / Member States to additionally support this effort and ensure its sustainability if successful.

JCOMM Observations Programme Area priorities for the forthcoming intersessional period (2012-2017)

1.18 The Commission noted its potential role in the emergence of Africa in the domains of oceanography and marine meteorology, through the development of synoptic observations. It recognized that Africa was ready to face a number of challenges to human security through marine scientific research, and recognized the ambition of young African researchers wishing to work in oceanography and marine meteorology. Africa was ready to contribute through the involvement of the navies and other national agencies of Members / Member States which could support climate research and operational oceanography by the installation of real-time observing networks in coastal and the high seas, assuring their security and maintenance. The Commission recognized that it could provide a way to attract more coastal African states to its programmes and activities, and urged developed Members / Member States to cooperate with African Members / Member States in the framework of equitably shared operational programmes.

1.19 The Commission endorsed the future priority activities for the next intersessional period for the Observations Programme Area (OPA), as proposed by the Observations Coordination Group (OCG). These are described below, in no particular order:

a) Contribute to WIGOS Implementation;
b) proactively engage and establish dialogue with requirements setters and writers of implementation plans (such as OOPC, the WMO RRR, and the GFCS) to set realistic priorities for the future composite ocean observing system, establish practical ways of moving forward, and together seek routes for funding;
c) recruit additional Members / Member States, institutions and agencies, in a way that allows their activities to progress on their own priorities and to contribute to the global observing effort;
d) identify other ocean observing communities (e.g. ocean glider operators) and marine industry fora (e.g. the World Ocean Council) that might be recruited to extend the scope and capability of ocean observation;
e) develop synergies between observing systems to exploit the potential of joint deployment opportunities, and to foster a common approach to sensor development and best practices;
f) develop pilot projects as a means towards the rolling out of the new platforms, sensors and technologies that will in due course become routine components of the observing network;
g) continue capacity development activities, including training workshops, that will assist developing countries to better use ocean products and to participate more fully in the global observing effort;
h) encourage identification and implementation of observing standards and best practices, with particular focus on developing countries, including through encouraging JCOMM members to offer new Regional Marine Instrumentation Centre (RMIC) facilities; and
i) continue to document institutional data and meta-data management practices for each component of the observing system to advance consistent, climate-quality, seamless data delivery both in near real time and delayed mode.

2. DATA MANAGEMENT PROGRAMME AREA

2.1 The Commission requested the Data Management Programme Area (DMPA) to keep the Data Management Plan (JCOMM TR No. 40, Rev. 1) and its implementation details[11] under review, and to update them as needed.

2.2 The Commission invited Members/Member States to consider implementing Quality Management Systems (QMSs) for their ocean data centres and data management systems if that was not already the case, noting also that the lack of sharable Quality Control tools applicable in different environments will be a barrier for many Members/Member States, especially in these times of financial constraint.

Migration to table driven codes

2.3 Regarding migration to table driven codes, plans are underway for sharing tools for BUFR[12] encoding/decoding software within the oceanographic community, and example of BUFR reports have been produced for training purposes. The Commission requested the DMPA to keep the "Cookbook for submitting ocean data in real-time and delayed mode" under review, and continue to maintain the BUFR templates for ocean data under review so that they continue to take end-user requirements into account. Highlighting the importance of BUFR, the Commission further requested the DMPA to finalize the BUFR Master Table 10 (Oceanographic Data)

Ocean Data Standards

2.4 The Commission stressed he importance of standards for all aspects of JCOMM's work and in particular to ensure interoperability arrangements between data systems such as the Ocean Data Portal (ODP) and the WMO Information System (WIS), and emphasized that the success of this process is highly dependent on active participation of all WMO/IOC Members/Member States, programmes and related organizations through submitting suitable standards for consideration through the JCOMM-IODE Standards Process [13] . The Commission therefore requested Members/Member States to participate actively in identifying and submitting standard proposals through that process for wide community adoption. The Commission also encouraged Members/Member States to participate actively in reviewing the candidate standards. The Commission noted with appreciation that the "Standards Process" was being revised so as to be published during the second semester of 2012, and that priorities for future candidate standards had been identified.

Platform/Instrument metadata

2.5 The Commission urged Members/Member States to collect, distribute and record instrument/platform metadata together with the ocean observational data, and adopted Recommendation 7/1 (JCOMM-4) – Provision of Ocean/Instrument Metadata.

2.6 The Commission also endorsed the proposals from the Ship Observations Team (SOT) relating to modifications to the WMO-No. 47 (International List of Selected, Supplementary and Auxiliary Ships), including metadata requirements, as documented in the final report of SOT-VI (available at http://www.jcomm.info/sot6), and urged that these be considered by the WMO Executive Council, at its sixty-fourth session (Geneva, June 2012) for promulgation as a new version (version 4.0) of Pub47, with an implementation date of 1 January 2013. The Commission, also noted with appreciation that E-SURFMAR is maintaining a parallel version[14] of the Pub. 47, which is kept up to date on a more timely basis than the WMO website version[15].

Marine Climatology

11 http://www.jcomm.info/dmp-id
12: FM-94 BUFR : Binary Universal Form for the Representation of Meteorological Data (used for distribution of time critical data onto the Global Telecommunication System – GTS.
13 http://www.oceandatastandards.org/
14 http://esurfmar.meteo.fr/doc/vosmetadata/index.php
15 http://www.wmo.int/pages/prog/www/ois/pub47/pub47-home.htm

2.7 Through Recommendation 7.2/1 (JCOMM-4), the Commission strongly supported the development of a new Marine Climate Data System (MCDS) by 2020 to eventually replace the current Marine Climatological Summaries Scheme (MCSS), viewing it as an opportunity to better integrate existing WMO and IOC data infrastructures serving the requirements for climate applications, including climate services, and provide for the required high quality marine meteorological and oceanographic climate data. WMO-IOC Centres for Marine Meteorological and Oceanographic Climate Data (CMOCs) covering specific JCOMM data domains, will form a key component of the MCDS, and will further facilitate interoperability with, and seek to internationally formalize the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) and eventual similar existing domain-specific international archives, within the remit of JCOMM. The Commission decided that the National Marine Data and Information Service (NMDIS) of the China State Oceanic Administration (SOA) I Tianjin, China, and the Deutscher Wetterdienst (DWD) in Hamburg, Germany could begin filling the role of CMOCs on a trial basis immediately.

2.8 As a first step towards the modernization of the MCSS, the Commission agreed to amend the Manual on, and the Guide to Marine Meteorological Services (WMO-No.558, and WMO-No.471 respectively). In particular, the Commission agreed that while the form of the tabular/graphic Marine Climatological Summaries (MCS) products would continue to be standardized as documented in the Manual and Guide, their production by the Responsible Members could now become optional under the MCSS. The Commission also agreed on changes to the International Maritime Meteorological Tape (IMMT) format, and the Minimum Quality Control Standard (MQCS).

2.9 The Commission welcomed the initial work funded by the US National Oceanic and Atmospheric Administration (NOAA) Climate Observation and Monitoring Program, to develop a value-added version of ICOADS that capitalizes on the marine climate community's decades of work on bias adjustments, data quality control, and metadata enhancements. IVAD will provide a mechanism to link community-developed adjustments back to the individual marine reports in ICOADS.

2.10 The Commission noted the essential importance of the ICOADS reference dataset to many experts and users for applications and analysis amongst Members/Member States, and heard concerns that its future might be uncertain. ICOADS observations (currently dating from 1662 to the present day), together with their associated metadata and basic gridded products, were critical for many areas of research. It greatly welcomed a statement by the US that it remained committed to the continued vitality of ICOADS through the U.S. National Center for Atmospheric Research (NCAR) and the NOAA National Climatic Data Center (NCDC), and that near-real-time updates to ICOADS would continue without disruption. Longer-term plans and resourcing for ICOADS delayed-mode processing were still under development in conjunction with potential new national/international partnership arrangements, and it was envisioned by the US that ICOADS would eventually be formalized as a CMOC under the MCDS.

2.11 The Commission reiterated its appreciation to the NOAA National Oceanographic Data Centre (NODC) for agreeing to host the Extreme Waves Dataset. The Commission requested the ETMC and the Expert Team on Waves and Coastal Hazards Forecasting Systems (ETWCH) to revisit and possibly restructure the project, with a simpler (less costly to implement) initial design and product.

2.12 The Commission asked the OPA and DMPA to give urgent consideration to the ship identification masking issue, and to accelerate the development of encryption or similar schemes, that could replace the current masking scheme and overcome the difficulties in quality controlling ship data in climate databases while also addressing the ship operators' security concerns

2.13 The Commission strongly encouraged Members / Member States to continue their support for data rescue—through the development of more robust institutional arrangements, possibly linked with the Global Framework for Climate Services (GFCS), and through inter-Commission

collaboration with the WMO Commission for Climatology (CCl) — to provide ongoing resources to recover, image, digitize, and preserve historical marine and oceanographic climate data. The Commission requested the ETMC to develop a strategy for the further encouragement and coordination of these efforts by Members / Member States.

2.14 The Commission noted that the JCOMM Workshops on Advances in Marine Climatology (CLIMAR), and Advances in the Use of Historical Marine Climate Data (MARCDAT) series provide a valuable ongoing contribution to the development of the activities assigned to the Expert Team on Marine Climatology (ETMC). The Commission requested the DMPA to proceed with organizing a fourth CLIMAR around 2014, and a fourth MARCDAR in 2016.

Data exchange, WMO Information System (WIS), and IODE Ocean Data Portal (ODP)

2.15 The Commission noted with appreciation the ongoing development, by IODE, of a revised version of the IOC Strategic Plan for Oceanographic Data and Information Exchange (2013-2016) as well as a quality management framework for IODE National Oceanographic Data Centres (NODCs) which will be complementary to the WMO Quality Management Framework (QMF). Meanwhile, the Commission noted with concern the low number of data centres providing data through ODP and urged Members/Member State to actively participate in ODP. The Commission also called on other national, regional or international distributed ocean data systems to actively pursue interoperability with the ODP.

2.16 The Commission recalled that as part of the activities of the JCOMM Pilot Project for WIGOS, a number of datasets have been made discoverable and accessible via the Ocean Data Portal (ODP) and the WMO Information System (WIS) (see list in JCOMM/TR-No. 48). The Commission recommended that the work of WIGOS be as an interface of cooperation between the WMO WIS and the IODE ODP. The Commission noted with satisfaction that full interoperability has been built between the ODP and WIS, where the ODP would meet the functional requirements of a WIS Data Collection and Production Centre (DCPC), and thereby contribute ocean datasets from the IODE National Oceanographic Data Centre (NODC) network to the WIS. The Commission urged Members / Member States, through relevant programmes of WMO and IOC, to support and actively participate in this process. The Commission also agreed to further develop synergies between ODP and WIS, especially in terms of (i) WMO and IOC data policies, and (ii) implementation of ODP and the implementation of WIS nodes so as to avoid duplication. The Commission recommended to continue work on the interoperability of WIS/WIGOS and IODE Ocean Data Portal (ODP) as these systems further develop and evolve. The Commission adopted Recommendation 7.3/1 JCOMM-4 – The IODE Ocean DataPortal (IODE ODP).

2.17 The Commission encouraged those centres that had not yet submitted applications and wished to become DCPCs, to arrange demonstrating their compliance with CBS through the secretariat as soon as possible. The Commission encouraged Members / Member States to take maximum benefit from the network of data centres under development for the collection and dissemination of marine data and products. Noting that WIS is open to designation of national centres (Appendix B.3 of the Manual), it invited Members / Member States to consider registering relevant national data or centres and services as NCs and advising the Secretariat accordingly through correspondence from the Permanent Representative. The Commission encouraged Members / Member States to establish regional and sub-regional mechanisms for the exchange of marine related data, and products through DCPCs for specific ocean areas and seas. In this regard, the Commission noted with appreciation the successful initiative by Croatia towards that goal for the Adriatic Sea, as highlighted by the outcome of the WMO Workshop on Establishing WIS-DCPC / WIGOS Marine Meteorological Centre as a RA VI Sub-regional Facility for Adriatic Sea Area (Zagreb, Croatia, 17-18 May, 2012).

JCOMM Data Management Programme Area (DMPA) priorities for the forthcoming intersessional period (2012-2017)

2.18 The Commission endorsed the future priority activities for the next intersessional period for

the Data Management Programme Area (DMPA) as described below, with no particular order:

a) Continue to adopt standards/best practices for use by the marine meteorological and oceanographic community through the IODE-JCOMM Ocean Data Standards Process in support of the Global Framework for Climate Services (GFCS), the IOC-WMO-UNEP-ICSU Global Ocean Observing System (GOOS), IODE, and the WMO Integrated Global Observing System (WIGOS) implementation;

b) Assist in the further development of the IODE Ocean Data Portal, its linkages with other ocean data systems (e.g. SeaDataNet, IMOS, OBIS, GEOSS), its interoperability with the WMO Information System (WIS),and its capacity development activities to ensure full participation of Members/Member States;

c) Develop a strategy and implementation plan in the next two years for achieving a vision for a new MCDS and start implementation preparation of the new JCOMM Marine Climate Data System (MCDS);

d) Improve the management of instrument/platform metadata;

e) Organize the fourth JCOMM Workshop on Advances in Marine Climatology (CLIMAR-IV), possibly in 2014, and the fourth International workshop on Advances in the Use of Historical Marine Climate Data (MARCDAT-IV), possibly in 2016.

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APPENDIX B

EXCERPT OF IOC-EC-XLV DECISION THE MOST RELEVANT TO THE SOT (EC-XLV/DEC.3.2)

I. Report of the Executive Secretary

The Executive Council,

Having examined documents IOC/EC-XLV/2 Annex 2 and IOC/EC-XLV/2 Annex 2 Add.,

Takes note of the report of the Executive Secretary on the implementation of the programme and budget since the 26th Session of the Assembly.

II. Ocean Observations and Services

The Executive Council,

Having examined the report of the recent session of the Steering Committee of the Global Ocean Observing System (GOOS-SC-I),

Accepts document IOC/GOOS-SC-I/3s and the recommendations contained therein;

Having examined the report of the recent session of the WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM-4),

Accepts document JCOMM-IV/3s and the recommendations contained therein.

Having considered the report of the Executive Secretary on the evolution of the International Polar Decade into a concept note for an International Polar Initiative, and the proposed timeline for adoption of the Initiative,

Decides that the International Polar Initiative concept document should be considered by the Assembly at its 27th session, with a view to determining modalities and the level of IOC participation and giving further guidance in its development in close coordination and consultation with the States Parties to the Antarctic Treaty.

III. Tsunami and Other Coastal Hazards Warning Systems

The Executive Council,

Having considered the reports of the recent sessions of the Intergovernmental Coordination Groups for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS-VII), for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS-VIII), and the report of the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG-V),

Acknowledges the Executive Summary Reports ICG/CARIBE-EWS-VII/3s and ICG/NEAMTWS-VIII/3s and the recommendations contained therein;

Decides to continue the TOWS-WG for the next intersessional period with the existing terms of reference and membership.

IV. Regional Subsidiary Bodies

The Executive Council,

Having considered the reports of the recent sessions of the Sub-Commission for Africa and the Adjacent Island States (IOCAFRICA-I) and of the Sub-Commissions for the Western Pacific (WESTPAC-IX),

Accepts the Executive Summary Reports of IOCAFRICA-I/3s and WESTPAC-IX/3s and the recommendations contained therein.

V. Recruitment Process of the IOC Executive Secretary

The Executive Council,

Having examined document IOC/EC-XLV/2 Annex 4 and the timeline of the process for the recruitment of the IOC Executive Secretary suggested in document IOC/EC-XLV/2 Annex 2,

Notes the need to review and update the post announcement for Executive Secretary of IOC in what concerns its functions and the agreed post grade of ADG, common to the United Nations system, acting at the service of the Commission;

Agrees with the suggested timeline and requests the Secretariat to include this as an agenda item for the 46th Session of the Executive Council, and prepare the necessary documents.

APPENDIX C

TERMS OF REFERENCE OF JCOMMOPS

RECOMMENDATION 2 (JCOMM-III)

NEW TERMS OF REFERENCE FOR AN EXPANDED 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 JCOMM terms of reference and especially those related to the development of observing networks,

(2) Recommendation 4 (JCOMM-II) – New terms of reference for JCOMMOPS,

(3) The final reports of the fifth (JCOMM/MR-No. 45), sixth (JCOMM/MR-No. 55) and seventh (JCOMM/MR-No. 62) sessions of the JCOMM Management Committee,

(4) The final reports of the twenty-second (JCOMM/MR-No. 42), twenty-third (JCOMM/MR-No. 54) and twenty-fourth (JCOMM/MR-No. 61) sessions of the Data Buoy Cooperation Panel,

(5) The final report of the fourth session of the JCOMM Ship Observations Team (SOT) (JCOMM/MR-No. 52),

(6) The final report of the second session of the JCOMM Observations Programme Area Coordination Group (JCOMM/MR-No. 53),

Noting further the decision by the Executive Secretary of UNESCO/IOC and the Secretary-General of WMO, regarding the agency selected to host the Observations Programme Support Centre,

Considering:

(1) The requirement for JCOMM to be active in a process in which oceanographic and marine meteorological observing system elements make the transition to a fully integrated system,

(2) The need to integrate at the international level a number of activities regarding operation and implementation of in situ marine observing systems,

(3) The success of the JCOMM In Situ Observing Platform Support Centre (JCOMMOPS) development and work, based on resources provided by Members/Member States through the Data Buoy Cooperation Panel, SOT and Argo,

(4) The potential value of extending JCOMMOPS activities to include services to support coordination for the Ocean Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES), the International Ocean Carbon Coordination Project (IOCCP), and the Global Sea-level Observing System (GLOSS),

(5) The recommendation by the Management Committee to consider enhancing links to the satellite information services,

Recommends:

(1) That the JCOMMOPS expand its activities to enable: (i) the provision of support to the DBCP, Argo, the SOT, the IOCCP, GLOSS, and the OceanSITES coordination; and (ii) disseminates information on Satellite Data Requirements, and satellite information services on its Website;

(2) That the terms of reference of the expanded JCOMMOPS should be as given in the annex to this recommendation;

(3) That JCOMMOPS should be based in Toulouse, France, under the supervision of the WMO and UNESCO/IOC Secretariats;

(4) That the JCOMMOPS workplan would be provided by the Observations Coordination Group and relevant panels, and associated programmes;

(5) That the expansion of JCOMMOPS activities take place only as new funding is provided for this expansion or it can be demonstrated that there is no impact on present levels of support, in order to protect the interests of the Members/Member States who presently provide funding for specific activities at JCOMMOPS;

Invites France to consider increasing its support to JCOMMOPS through national mechanisms;

Encourages Members/Member States, where possible, to commit the resources required to support JCOMMOPS.

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Note: This recommendation replaces Recommendation 4 (JCOMM-II), which is no longer in force.

Annex to Recommendation 2 (JCOMM-III)

TERMS OF REFERENCE FOR AN EXPANDED 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 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 International Ocean Carbon Coordination Project and the Commission for Basic Systems Expert Team on Satellite Utilization and Products, and under the supervision of the WMO and UNESCO/IOC Secretariats, and executing the workplan provided by the Observations Coordination Group and relevant panels, and associated programmes, the JCOMM In Situ Observing Platform Support Centre (JCOMMOPS) shall promote an integrated framework for deployment and further development of ocean observing networks.

Specifically, JCOMMOPS shall:

(a) Act as a focal point for implementation and coordination of observing programmes 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 information on relevant observational requirements in support of the Global Ocean Observing System, the Global Climate Observing System and the World Weather Watch as provided by the appropriate international scientific panels, JCOMM experts participating in the Commission for Basic Systems Expert Team on Satellite Utilization and Products, and other JCOMM expert teams and groups;

(d) Routinely collect and distribute information on: (i) the performance of the observing system networks relative to requirements, in cooperation with the Observing System Monitoring Centre; (ii) instrumentation and telecommunication systems; and (iii) functional status and data quality of individual observing platforms;

(e) Act as a focal point for instrument and data management standardization by collecting and distributing information on current and best practices from across all elements of the observing system and by representing the observing system interest in international standardization processes;

(f) 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 select platform/instrument metadata and as a source of information on other metadata and data distribution services;

(g) Facilitate the flow of data and metadata to the archiving centres;

(h) Provide a gateway for information on observing platform deployment plans and servicing opportunities, and on operator contact information, to maximize deployment opportunities and sharing of resources;

(i) Encourage cooperation between communities, observing programmes and Members/Member States to develop synergies between and to promote the observing systems.

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APPENDIX D

TERMS OF REFERENCE OF THE SHIP OBSERVATIONS TEAM

(Excerpt of Annex to Resolution 3 (JCOMM-4), Terms of Reference and General Membership of the Coordination Group and Teams of the Observation Programme Area)

(2) Ship Observations Team

TERMS OF REFERENCE

The Ship Observations Team shall:

(a) Respond to requirements for ship-based observational data expressed by relevant existing 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) Develop methodology 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)/ship greeting operations globally, propose actions to enhance PMO standards and operations, and contribute as required to PMO and observers training;
(f) Review, maintain and update as necessary technical guidance material relating to ship observations and Port Meteorological Officers;
(g) Liaise and coordinate as necessary with other JCOMM programme areas and expert teams, as well as with other interested parties;
(h) Participate in the planning activities of the appropriate observing system experiments and major international research programmes as the specialist group on observations based onboard ships, including Voluntary Observing Ships, Ships-Of-Opportunity and research ships;
(i) Seek new opportunities for deploying various kinds of measuring devices as recommended by the relevant panels and widely publicise those opportunities;
(j) Develop as necessary new pilot projects and/or operational activities and establish new specialized panels as required;
(k) Carry out other activities as agreed by participating Members/Member States to implement and operate the SOT programme and to promote and expand it internationally.

GENERAL MEMBERSHIP

- Chairperson of the Ship Observations Team, selected by the Commission
- Chairpersons of the SOOPIP and Voluntary Observing Ship Panel, selected by the Commission
- Open membership, comprising operators of VOS and SOOP, representatives of monitoring centres, data management centres and bodies, representatives of the International Mobile Satellite Organization 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.

TERMS OF REFERENCE OF COMPONENT PANELS

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) Review, recommend on and, as necessary, coordinate the implementation of specialized shipboard instrumentation and observing practices dedicated, but not limited, to temperature and salinity measurements;
(b) Coordinate the exchange of technical information on relevant oceanographic equipment and expendables, development, functionality, reliability and accuracy, and survey new developments in instrumentation technology and recommended practices;
(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 data in real time from participating ships; ensure that delayed mode data are distributed in a timely manner (within 24 hours of the observations) to data processing centres;
(e) Maintain, through the SOT chairperson, appropriate inventories, monitoring reports and analyses, performance indicators and information exchange facilities;
(f) Provide guidance to the coordinator in supporting the Ship-of-Opportunity Programme (SOOP);
(g) Prepare annually a report on the status of SOOP operations, data availability and data quality;
(h) Where relevant, serve as a platform for other observational programmes;
(i) Maintain close communications with the scientific community;
(j) Support the formation of an XBT Science Team dedicated to meet and discuss on a periodic basis results and ongoing research performed with XBT observations.

Voluntary Observing Ship Panel

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 VOSClim standard, and encourage other new ships to be recruited to the VOSClim class;
(d) Develop and implement activities to enhance ship recruitment, including promotional brochures and training videos;
(e) Prepare annually a report on the status of VOS operations, data availability and data quality.

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APPENDIX E

WIGOS IMPLEMENTATION ACTIVITIES

(Table 2, WIGOS Implementation Activities of the WIGOS Implementation Plan)

Activities of interest of the SOT, and where the Team can contribute are highlighted in yellow in the table below.

Activities in bold are considered the most critical for WIGOS to gain operational acceptance by 2015.
Depending on the implementation scale, planned activities are specified as follows: **G** = Global activity, **R** = Regional activity and **N** = National activity.
Key to activity numbers: **a.b.c**, where **a** is number of respective sub-section of section 2, **b** is for a global (1), regional (2) or national (3) activity, and **c** is a sequential number to distinguish activities from one another. ARB = Available Regular Budget. RB = Regular Budget.

No	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012-2015) K CHF			*Potential Risks*
					Total	***ARB***	**Shortfall**	
1. Management of WIGOS Implementation								
1.1.1 G	**Develop/Revise/Update WMO Regulatory Material (Technical Regulations, WIGOS Manual). Develop WIGOS Guide. Develop WIGOS Functional Architecture (FA)**	**Updated WMO Technical Regulation No. 49 WIGOS Manual for Cg-17 approval WIGOS Guide and Functional Architecture**	**Cg-17 (2015)**	**ICG-WIGOS**	**400K**	**245K**	**155K**	**Coordination, communities' interest**
1.1.2 G	**Incorporate technical aspects of WIGOS Implementation and continuing evolution into existing/new TCs and RAs working structures and procedures**	**1) RA &TC working structure adjusted to address WIGOS activities. 2)Cross body coordination mechanisms in place**	**2012-2014**	**CBS, CIMO CAS, CHy, CAgM JCOMM,CCl RAs ICG-WIGOS**	**RB from relevant departments**			**Low**
1.1.3 **G**	Provide annual reports and recommendations to EC and Cg on progress in WIGOS implementation	Annual reports to EC, Cg on WIGOS implementation status	EC-65, EC-66, Cg-17	ICG-WIGOS	**RB from relevant departments**			Low
1.2.1 **R**	**Develop regional WIGOS Implementation Plans**	**Regional WIGOS Implementation Plans**	**2012/13**	**RAs**	**RB from relevant departments**			**Low**
2. Collaboration with WMO and co-sponsored observing systems16								

16 Congress emphasized that strong support and close collaboration among Members were needed to advance scientific knowledge and technical infrastructure to meet the WIGOS requirements. Within the Regions, it would be desirable to strengthen cooperation and partnership through Region-wide organizations or sub-regional groupings overseeing the WIGOS observing components. It specifically refers to enhanced cooperation among meteorological, hydrological and marine/oceanographic institutions/services where they are separated at the national level.

2.1.1 G	**Develop guidance, mechanisms and procedures for engagement coordination and collaboration with partner organizations**	**1) Partner Strategy is published & available on the Portal 2) Appropriate bodies have responsibilities in their TORS**	**1) 2014 2) 2014**	**ICG-WIGOS Partners**	**RB from relevant departments**			**Med**
2.1.2 G	**Develop the Architecture for Climate Monitoring from Space (ACMS) focusing on GFCS four priorities**	**1) ACMS design docs 2) Initial implementation**	**1) 2013 2) 2015**	**CGMS, CEOS WSP, CBS**	**RB from relevant departments**			**Low**
2.2.1 **R**	Examine and recommend areas where closer regional cooperation and coordination would be beneficial	Recommendations to be included in regional WIPs	2013-2015	RAs	**RB from relevant departments**			Low
2.3.1 **N**	Establish closer collaboration at the national level, within NMHS, with other government agencies, and with potential external data providers	Reports from Members (individually or through RAs) to CBS and CIMO	2012, 2014	Members, RAs	**RB from relevant departments**			Medium
3. Design, planning and optimized evolution of WIGOS and its regional, sub-regional and national observing components								
3.1.1 G	**Complete RRR practices, procedures, responsibilities and mechanisms for all systems and agreed application areas**	**1) RRR included in the Manual 2) Responsible bodies have RRR responsibilities identified in their TORs**	**1) 2013 2) 2014**	**CBS other TCs**	**RB from relevant departments**			**High**
3.1.3 **G**	Using the RRR process & capitalizing on relevant experience of Members, develop procedures for and carry out a design for WIGOS at the global scale	Initial global-scale specification for WIGOS observing infrastructure	2012 -2015	ET-EGOS, ICG-WIGOS, TCs	250	0	250	High
3.2.1 **R**	Evolve and implement observing systems in the Region following the technical guidance of the technical commissions as represented in the EGOS-IP and other observation system implementation plans	1) Report back to ET-EGOS on the actions detailed in the EGOS-IP. 2) Initiate the EGOS-IP within the Region.	1) 2013 2) 2015	RAs	80	0	80	High
3.2.2 **R**	Validate current global RRR against regional user requirements and update WMO database	Refined RRR database	2014-2015					
3.3.1 **N**	Contribute to the collective regional effort to evolve and implement observing systems following the EGOS-IP and other observation system implementation plans	1) Report back to ET-EGOS on the actions detailed in the EGOS-IP. 2) Initiate the EGOS-IP at a National level.	1) 2013 2) 2015	Members	Members			High

3.3.2 **N**	Update the global RRR database to take into account sub-regional and national user requirements	Refined RRR database	2014-2015	Members	Members			High
4. Integrated Observing System Operation and Maintenance								
4.1.1 **G**	**Develop guidance, mechanisms and procedures for improved integration of observational data and products**	**1) Integration Strategy is published & available on the Portal** **2) Appropriate bodies have responsibilities in their TORS** **3) Work is underway for some specific product integration activities**	**2015**	**ICG-WIGOS**	**RB from relevant departments**			**High**
4.1.2 **G**	Develop guidance for the process of sharing, between component observing systems, operational experiences, of expertise and for resourcing joint activities.	Proposed text for inclusion in Guide on WIGOS.	2013	ICG-WIGOS	Expert + Sec Time			Medium
5. Integrated Quality Management								
5.1.1 **G**	**Develop WIGOS Quality Management guidance, mechanism, practices and procedures to include monitoring**	**1)WIGOS QMF to be incorporated into WIGOS Manual and Guide** **2) Appropriate bodies responsibilities identified in their ToRs**	**2014**	**ICG-WIGOS** **Relevant TCs**	**RB from relevant departments**			**Medium**
5.1.2 **G**	Examination of current quality management practices being used by WMO observing programmes.	Report which documents processes used and identifies areas for improvement.	2013	ICG-WIGOS	Expert + Sec Time			Medium
6. Standardization, System Interoperability and Data Compatibility								
6.1.1 **G**	**1) Develop guidance for WIGOS standards** **2) Document the implemented standards, including best practices, procedures on instruments, methods of observations, data products, etc.**	**1) Guidance to WIGOS standardization** **2) Implemented standards and best practices incorporated into WIGOS Manual, Guide and Portal as appropriate**	**2013**	**Relevant TCs** **WIGOS PO**	**RB from relevant departments**			**Low**

6.1.2 **G**	Develop and maintain the Standardization, Operational and RRR databases.	Operational Acceptance of the databases in the WIGOS Information Resource.	Cg-17	ICG-WIGOS	**RB from relevant departments**			High
7. The WIGOS Operational Information Resource								
7.1.1 **G**	**Design and develop the WGOS Information Resource**	**1) Technical Specification** **2) Make decision on developments of WIGOS Information Resource (internal vs. call for tender)** **3) Operational Acceptance**	**1) 2013** **2) 2013-14** **3) 2015**	**Secretariat in cooperation with Members**	**330**	**97**	**233**	**Medium**
7.1.2 **G**	Investigate the need for a database describing the Global Observations Products (Satellite Data, Weather Radar)	Documented requirements for the database	2012	ICG-WIGOS, TCs	**RB from relevant departments**			Low
7.1.3 **G**	Survey WMO Members on what they could offer to support development and operations of WIGOS Information Resource.	Survey results and resulting decisions	2012	WIGOS-PO	**RB from relevant departments**			Low
7.3.1 **N**	Collect, maintain and provide the metadata required by WIGOS support tools.	Compliance on requirements for metadata by all Members.	Cg-17	Members	Members			Medium/ High
8. Data discovery, delivery and archival								
8.1.1 **G**	**Develop WIGOS metadata standards and guidance practices for maintenance of and access to WIGOS metadata**	**1) Initial WIGOS Metadata standard approved** **2) Initial access to WIGOS Metadata through portal** **3) Practices established in manual & guide** **4) Body(s) created or identified for maintenance of MD standard**	**1) 2015** **2) 2013** **3) 2015** **4) 2013**	**CBS, CIMO CAS, CHy JCOMM ICG-WIGOS Members**	**RB from relevant departments**			**Medium**
8.1.2 **G**	To initiate and develop a mechanism and outreach strategy for the integration of more relevant observation data and associated interpretation metadata.	Mechanism and outreach strategy in place	2012-2013	ICG-WIGOS	**RB from relevant departments**			Low
8.3.1	Outreach activities targeting more	More relevant observational	2014-2015	WMO Members with	Nationally funded activities;			Low/ Medium

N	observational data available through WIS	data made visible and accessible trough WIS		support from the WMO Secretariat	WMO Secretariat activities covered in RB budget	
9. Capacity development17						
9.1.1 G	**Develop a WIGOS Capacity Development (WCD) strategy including education and training**	**1) WCD Strategy is published & available on the WIGOS Information Resource. 2) Appropriate bodies have responsibilities in their ToRs 3) WCD activities underway**	**1) 2013 2) 2014 3) 2015**	**ICG-WIGOS ETR, RAs**	**RB from relevant departments**	**Medium**
9.1.2 **G**	Assistance to WMO Members regarding WIGOS integration	National observational networks better responding to WMO Applications requirements	2012-2015	WMO Secretariat	**RB from relevant departments**	Medium
9.1.3 **G**	Develop WIGOS related guidelines and training materials and other relevant documentation	Training materials and guidelines available	2013	WIGOS-PO	**RB from relevant departments**	Low
9.3.1 **N**	Resource mobilization	More resources made available to NMHSs and partner organizations for better integration of observational networks contributing to WMO Applications	2012-2015	WMO Members with assistance from the WMO Secretariat	Nationally funded activities; WMO Secretariat activities covered in RB budget	Medium
9.3.2 **N**	Tools from the WIGOS Information Resource to be used nationally for the design and management of national WIGOS networks.	WIGOS Operational Information Resource and tools used by WMO Members	2014	WMO Members	Nationally funded activities; WMO Secretariat activities covered in RB budget	Medium
10. Communication and outreach						
10.1.1 G	**Develop an effective communication, outreach, capacity development, and education strategy**	**WIGOS Communication and outreach Strategy**	**2012**	**ICG-WIGOS**	**RB from relevant departments**	Medium
10.1.2	Develop communication and outreach materials (see Annex 1 for	Communication and outreach materials available	2012-2013	WIGOS-PO	**RB from relevant departments**	Low

17 Congress stressed that an effective capacity-building strategy is an essential component of the WIGOS implementation. Specialized education, training activities and improvement of necessary observing infrastructure should be reflected in the regional, sub-regional and national WIGOS implementation plans, especially for NMHSs of LDCs, LLDCs and SIDS. Hence, capacity building is not to be limited to scientific and technological concerns, but also to strategic and management consideration including human resources development, resource mobilization and communications and outreach activities.

G	suggestions) and make them available via the WIGOS Portal					

APPENDIX F

RESOLUTION NO. 6 FROM THE THIRD DBCP CAPACITY BUILDING WORKSHOP FOR COUNTRIES OF THE WESTERN INDIAN OCEAN REGION

(Mombasa, Kenya, 16-20 April 2012)

Resolution 6

WIO JCOMM Ship Observation Team (SOT) Pilot Project

Noting the marginal or worse coverage of the data streams required for met/ocean applications and the limited deployment opportunities of observing equipment in the Western Indian Ocean (WIO) region.

Noting also that Voluntary Observing Ships (VOS) and Ships of Opportunity (SOOP) Programmes and meteorological and oceanographic moored buoys provide observations of acceptable frequency globally, the third DBCP Western Indian Ocean Capacity Building Workshop recommends the development of a JCOMM Ship Observations Team (SOT) Pilot Project to act as co-operative venture among countries within the Indian Ocean to enhance the provision of marine meteorological and oceanographic data in support of a diversity of national, regional and global programmes. This Pilot Project will establish a pool of ships to provide the opportunity for deployment of drifters (DBCP) and Argo floats in the WIO Region. VOS-DBCP Donation Program could provide hardware in support of the Pilot Project.

Lead KMD

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APPENDIX G

DRAFT WHITE PAPER AND PROPOSED WORKPLAN FOR THE WESTERN INDIAN OCEAN VOLUNTARY OBSERVING SHIP AND SHIP OF OPPORTUNITY PROGRAMME PILOT PROJECT (WIO-VOS/SOOP)[18]

PILOT PROJECT PROPASAL DOCUMENT

(Submitted by Ali Mafimbo, KMS, Kenya)

1.0 INTRODUCTION.

The Western Indian Ocean region is constituted by the Island states of Comoros, Madagascar, Mauritius, Seychelles and La Reunion (France) as well as mainland states of Kenya, United Republic of Tanzania, Mozambique, Somalia and the Republic of South Africa.

This region forms one of the least monitored areas in terms of sourcing real-time meteorological and oceanographic data and information. While satellite observations provide good coverage over the region, such data need to be complemented by *in situ* observations, in particular to provide ground truthing and to improve the integrated satellite and *in situ* products. From that perspective, there isn't enough activity in terms of Voluntary Observing Ship, programme as well as data buoy deployments in the region to properly monitor marine meteorological and oceanographic variables over the oceans in order to address the WMO and IOC observational data requirements, in particular for climate monitoring, climate services, numerical weather prediction, and marine forecasting.

The Pilot Project proposal is in line with the terms of reference of the JCOMM Observations Programme Area (OPA) Ship Observing Team (SOT) and its voluntary Observing Ship Panel (VOSP) and Ship of Opportunity Implemenentation Panel (SOOPIP) as provided in the Annex .

By addressing the climate monitoring requirements while at the same time recognizing the need of operational applications for real-time data, it is believed that most of the requirements of the targeted WMO and IOC applications will be met. Yet some specific additional requirements derived from the WMO Rolling Review of Requirements (RRR) are being considered by the SOT. The following Application Area being particularly relevant to marine meteorological and ocean observations:

- Climate Monitoring (GCOS)
- Seasonal to Inter-annual Forecasts (SIAF);
- Ocean Applications;
- Global Numerical Weather Prediction (GNWP);
- High Resolution Numerical Weather Prediction (HRNWP);
- Nowcasting and Very Short Range Forecasting (NVSRF).

Looking at the Statements of Guidance 19 (i.e. gap analysis) for the above applications, the requirements where gaps have been identified could be addressed by increasing the number of VOS and thereby providing more surface meteorological data required by GNWP, HRNWP, and NVSRF, and heat surface flux data as required by SIAF. Equatorial areas, where the atmospheric pressure signal is typically weak, would benefit from a greatly increased density of wind observations but requirements for accurate in situ pressure measurements from these regions have also been expressed by NWP at a resolution of 500km x 500 km. Spatial surface air pressure coverage is marginal for marine services applications. Mean sea level pressure is vital to detect and monitor atmospheric phenomena over the oceans (e.g., tropical cyclones) that

18 Per Resolution No. 6 from the Third DBCP Capacity Building workshop for countries of the Western Indian Ocean region, Mombasa, Kenya, 16-20 April 2012, see Appendix F.

19 See http://www.wmo.int/pages/prog/www/OSY/GOS-RRR.html#SOG

significantly constrain shipping. Even very isolated stations may play an important role in synoptic forecasting, especially when they point out differences with NWP model outputs.

RATIONALE FOR VOS/SOOP ENHANCEMENT IN WESTERN INDIAN OCEAN OF RA 1.

The Pilot Project to enhance the VOS activities in the region is necessary because:

- It will be addressing the data gaps for many WMO Application Areas (see above);
- It will act as co-operative venture to enhance the provision of marine meteorological and oceanographic data in support of a diversity of national, regional and global programmes.
- During the 1982-84 la Niña episode the Indian Ocean gave a strong signal as compared to the Pacific Ocean, which is informative that a thorough study of the ocean's physical processes in the region can help a better understanding of the global climate change.
- Currents within the WIO region do not give any indication of how they are distributed with depth due to limited data sets. This information is crucial to understanding how heat and other properties are transported in the ocean. The Indonesian through flow, which originate from west Pacific and flows westwards into the Indian Ocean, affects the ocean's heat budget and is thought to be significant in predicting El Nino and Lanina episodes.
- Fresh water inputs in an ocean region can modify the surface heat budget whose interannual variations are of primary interest to the ocean observing system for climate. However no attempt has yet been made to understand the pattern of fresh water transports in the region due to limited data sets.

3.0 CURRENT PROBLEMS TO BE ADDRESSED BY THE PILOT PROJECT.

The problems expected to be addressed by the implementation of the WIO-VOS/SOOP Pilot Project in the region are.

- Lack of equipment for the recruitment of ships into the VOS and SOOP and programs
- Lack of well developed capacity for making data quality control monitoring of the VOSand SOOP data sets
- Lack of coordination of VOSand SOOP activities within the region.
- Lack of technical know-how of the Port Meteorological Officers (PMOs) in the region.

Latest records show the status of VOS recruited by the countries of the region as shown on the table below: (requires updating) -

COUNTRY	**VOS STATUS**	
	SHIPS (NUMBER)	**PMO'S**
COMOROS	NIL	NIL
FRANCE (LA REUNION)	-	1
KENYA	NIL	1

MADAGASCAR	NIL	-
MAURITIUS	2(AUXILLARY)	1
MOZAMBIQUE	NIL	-
SYCHELLES	NIL	NIL
SOUTH AFRICA	27(SELECTED) 20(AUXILLARY)	2
TANZANIA	NIL	1

However, most of the recruited ships accounted in the table above do not ply within the ocean of the region. At least they have not yet been monitored at the Port of Mombasa.

4.0 POTENTIAL FOR VOS AND SOOP IN THE REGION.

The potential for VOS/SOOP Programme in the region exists. There is a strong shipping circuit, which has developed within the Indian Ocean linking the various Indian Ocean Rim countries in Africa, the Middle East, the Indian sub-continent and the Indian Ocean islands. There are a number of unrecruited ships monitored at the Port Meteorological Office Mombasa, Kenya and operating within the Rim and beyond which are willing to be recruited in the programme.

5.0 STRATEGY.

It is proposed to develop the WIO-VOS/SOOP as a Pilot Project monitoring 10 ships plying within the region. These ships will be selected in consultation with the PMOs in the region.

5.1 SELECTION OF SHIPS

The proposed criteria for the selection of Ships to be Recruited in this Pilot Project are:

- Their willingness to be recruited;
- Their regularity at the regional Ports where we have PMOs;
- Their appreciation for the expected Meteorological services to be offered to them in the region;
- Their duration of operation within the region.

5.2 EQUIPMENTS AND STATIONERY FOR TEN SHIPS

It is proposed that electronic logbooks (e-logbook) made available to this Pilot Project would be committed to the participating countries as a whole, and thereby receive the regional WIO logo of the Pilot Project. From that perspective, the e-logbooks could be shifted between participating vessels as needed, irrespective of the recruiting country.

All equipments and stationery necessary for VOS and SOOP operations in a ship.
The equipments to loan to ships will include:

- Precision aneroid barometers;
- Barographs;
- Sheathed thermometers (air and wet bulb);
- Screens;

- Sea thermometers;
- Rubber buckets;
- XBT'S. etc

6.0 PILOT PROJECT MANAGEMENT.

A Steering Team for the Pilot Project will be set up (see proposed Terms of Reference in Annex II). It shall be responsible for all aspect of the Pilot Project implementation during its duration, and provide coordination as needed.

The Pilot Project will require the involvement of all the national meteorological and oceanographic Services of the countries of this region. In particular the active participation of at least of one country the West coast mainland and one country in the Island states of the region will be required. It will however be necessary that the Steering Team comprise representatives from all participating countries.

The Pilot Project Steering Team will require the support of the WMO/IOC secretariats in implementing its objectives.

7.0 ACTIVITIES (embryo workplan).

The Steering Team will draw up the activities of the Pilot Project, but may consider the following

1. Identification of the Management Team

   Implementer - Countries' Directors and PR with WMO by request from WMO

   Time frame - immediately

2. Meeting of the Steering Team with JCOMM experts on an opportunistic basis, or via teleconference for coordination and guidance purposes

   Implementer - JCOMM/Team Leader
   Host - Identified member country
   Time frame - immediately

3. Identification of the ten ships

   Implementer - Focal points

   Time frame - Immediately

4. Provision of Meteorological and Oceanographic Equipment to loan to the ships and printing of logbooks with regional outlook.

   Implementer - Member states in collaboration with Friendly countries through WMO's VCP Programme eg (UK, USA, NETHERLANDS etc).

   Time frame - After identification of Ships

5. Networking of all PMO's within the region through an interactive website

   Implementer – WMO/participating States.

   Time frame - on going within the Pilot Project duration.

6. Data Monitoring and Training

- All PMO's in the region on data quality control monitoring.
- Trainers for ships crews on board ships or at maritime colleges in respective countries in basic knowledge on interpretation of met products to ships.
- On public relations management.
- Data and information transmission techniques through INMARSAT or other Satcom systems as appropriate.
- Latest software on electronics logbooks etc.

SUMMARY

	ACTIVITY	***RESPONSIBILITY***	***TIMING***	***OUTPUT***
1	Identification of Steering Team	Country Directors and PR with WMO by request from WMO	Immediately	• Steering Team in Place
2	Meeting of Steering Team and JCOMM	Chair of the SOT (or his delegate) and host country	Immediately	• Getting Team Leader • Confirming country focal points • Drawing a timetable and a budget
3	**Identification of the ten (10) ships**	PMOs of Participating Countries	Immediately	Ships ready for recruitment
4	Provision of Meteorological and Oceanographic Equipment to loan to the ships and printing of logbooks with regional outlook.	Member states in collaboration with Friendly countries through WMO's VCP Programme eg (UK, USA, NETHERLANDS etc).	**After identification of Ships**	Availability of equipments
5	Networking of all PMO's within the region through an interactive website	Individual participating States.	On going within the Pilot Project duration	Good monitoring of the ships and Pilot Project progress
6	Data monitoring and training.	WMO/IOC, Friendly countries, member countries.	Ongoing	Enhanced capacity to manage data

ANNEX I OF APPENDIX F

TERMS OF REFERENCE OF THE JCOMM SHIP OBSERVATIONS TEAM

(Excerpt from the Annex to Resolution 3 (JCOMM-4), Terms of Reference and General Membership of the Coordination Group and Teams of the Observations Programme Area)

(3) Observations Coordination Group

…

(4) Ship Observations Team

Terms of Reference

The Ship Observations Team shall:

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

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

(n) Develop methodology for constantly controlling and improving the quality of data;

(o) 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;

(p) Coordinate Port Meteorological Officer (PMO)/ship greeting operations globally, propose actions to enhance PMO standards and operations, and contribute as required to PMO and observers training;

(q) Review, maintain and update as necessary technical guidance material relating to ship observations and Port Meteorological Officers;

(r) Liaise and coordinate as necessary with other JCOMM programme areas and expert teams, as well as with other interested parties;

(s) Participate in the planning activities of the appropriate observing system experiments and major international research programmes as the specialist group on observations based onboard ships, including Voluntary Observing Ships, Ships-Of-Opportunity and research ships;

(t) Seek new opportunities for deploying various kinds of measuring devices as recommended by the relevant panels and widely publicise those opportunities;

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

(v) Carry out other activities as agreed by participating Members/Member States to implement and operate the SOT programme and to promote and expand it internationally.

Terms of Reference of Component Panels

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:

(k) Review, recommend on and, as necessary, coordinate the implementation of specialized shipboard instrumentation and observing practices dedicated, but not limited, to temperature and salinity measurements;

(l) Coordinate the exchange of technical information on relevant oceanographic equipment and expendables, development, functionality, reliability and accuracy, and survey new developments in instrumentation technology and recommended practices;

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

(n) Ensure the transmission of data in real time from participating ships; ensure that delayed mode data are distributed in a timely manner (within 24 hours of the observations) to data processing centres;

(o) Maintain, through the SOT chairperson, appropriate inventories, monitoring reports and analyses, performance indicators and information exchange facilities;

(p) Provide guidance to the coordinator in supporting the Ship-of-Opportunity Programme (SOOP);

(q) Prepare annually a report on the status of SOOP operations, data availability and data quality;

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

(s) Maintain close communications with the scientific community;

(t) Support the formation of an XBT Science Team dedicated to meet and discuss on a periodic basis results and ongoing research performed with XBT observations.

Voluntary Observing Ship Panel

The Voluntary Observing Ship (VOS) Panel shall:

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

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

(h) Oversee the upgrade of ships to VOSClim standard, and encourage other new ships to be recruited to the VOSClim class;

(i) Develop and implement activities to enhance ship recruitment, including promotional brochures and training videos;

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

General Membership

- Chairperson of the Ship Observations Team, selected by the Commission
- Chairpersons of the SOOPIP and Voluntary Observing Ship Panel, selected by the Commission
- Open membership, comprising operators of VOS and SOOP, representatives of monitoring centres, data management centres and bodies, representatives of the International Mobile Satellite Organization 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.

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ANNEX II OF APPENDIX F

TERMS OF REFERENCE AND MEMBERSHIP OF THE WIO-VOS/SOOP PILOT PROJECT STEERING TEAM

1. Terms of Reference

In support of the WWW, GOOS, GCOS, and Natural Disaster Prevention and Mitigation applications, the Pilot Project will evaluate and demonstrate the operational use of marine meteorological and oceanographic observations made from Voluntary Observing Ships (VOS) and Ships of Opportunity (SOO) in the Western Indian Region (WIO) with active support form WMO Members and IOC Member States contributing to the Pilot Project.

The Pilot Project will run for an initial two-year period as of June 2013 and will report to the Ship Observations Team at its eighth Session on progress and achievements.

The WIO-VOS/SOOP Pilot Project Steering Team shall be responsible for all aspect of the Pilot Project implementation during its duration, and provide coordination as needed. In particular, the Team shall:

1. Set up a detailed workplan for the pilot project with clear targets and deliverables;
2. Seek active participation from WMO Members and IOC Member States in the region, and identify a focal point in each participating country;
3. Seek resources in the region and beyond for the purpose of implementing the pilot project (PMOs, ships to be recruited, equipment & instruments, calibration service, satellite data telecommunication, data and quality management, data distribution);
4. Provide guidance to the focal points regarding to the recruitment of vessels, and seek feedback from them on the pilot project implementation aspects;
5. Monitor progress, and publish status reports on a quarterly basis (number of recruited vessels, ship routes, number of observations reported on GTS, data quality, timeliness);
6. Keep the SOT Task Team on VOS Programme Promotion and Recruitment informed of its developments;
7. Report progress and achievements to the eighth Session of the SOT;

2. Membership

The Pilot Project Steering Team shall be comprised of:

- Representative from the WIO region (Chair) – TBD
- Representatives of participating countries – TBD
- Chair of the SOT Task Team on VOS Recruitment and Programme Promotion
- SOT Technical Coordinator
- Representative of the WMO Secretariat (*ex-officio*)
- Representative of the IOC Secretariat (*ex-officio*)