World Meteorological Organization

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WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

JCOMM DATA MANAGEMENT COORDINATION GROUP (DMCG) SIXTH SESSION

Ostend, Belgium
27-31 June 2016

2016

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NOTES

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C O N T E N T S

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1 ORGANIZATION OF THE SESSION

1.1 Opening

The Sixth Session of the JCOMM Data Management Coordination Group (DMCG) was opened by Ms Sissy Iona (Greece), Chairperson of the DMCG, at 09:00hrs, on Monday 27 June, 2016 at the Project Office for International Oceanographic Data Exchange of the Intergovernmental Oceanographic Commission (IODE/IOC), Ostend, Belgium. Ms Iona welcomed participants to the meeting, and she stressed it would be the last DMCG meeting before JCOMM-5 (October 2017, Indonesia), and invited participants to pay close attention to deliverables and recommendations to the JCOMM-5 and wished a successful session at Ostend.

Mr Peter Pissierssens, head of the IODE welcomed all participants on behalf of the IODE/IOC. Dr Long Jiang, gave an opening remark on behalf of the WMO and thanked IODE for the excellent organization. Dr Jiang highlighted the Priorities of the WMO Seventeenth Congress (Cg-17, May 2015, Geneva, Switzerland), in particular the WMO Integrated Global Observing System and Information System (WIGOS/WIS) that underpins other priorities. Dr Jiang also recalled the ongoing efforts of establishment of the Marine Climate Data System (MCDS), including designation of Global Data Assembly Centres (GDACs), and a network of WMO-IOC Centres for Marine-meteorological and Oceanographic Climate Data (CMOCs). He stressed the co-ownership of the MCDS and expressed WMO willingness to strengthen collaboration with the IODE on MCDS and integration of GDAC concepts within both JCOMM and IODE.

1.2 Adoption of the Agenda

The Group adopted the provisional agenda(Annex I) with minor adjustment to include report of the JCOMM in-situ Observing Programmes Support Centre (JCOMMOPS) under agenda 6.2. Upon proposal of Sissy Iona, the Group agreed to discuss agenda item 7 on the first day.

1.3 Working arrangements and local logistics

The IODE Secretariat informed the Group on the working arrangements of the meeting, local and other practical arrangements. The Group agreed on the arrangements. The meeting was conducted in English. The Group went through introductions before the discussions.

2 REPORT OF DMPA CHAIR

The DMCG Chairperson, Ms Iona, reported on the activities under the JCOMM Data Management Programme Area (DMPA) since last session of the DMCG-5 (2014, Geneva).

The report included: 1) the development of the JCOMM Data Management Plan (published February 2015), 2) the development of the UNESCO/IOC Strategic Plan for Oceanographic Data and Information Management, 3) the status of the Ocean Data Portal, 4) the status of the development of the Marine Climate Data System in collaboration with the IODE, data exchange formats and interoperability with the WMO Information System (WIS); 5) the development of cross cutting Task Team for Integrated Marine Meteorological and Oceanographic Services within WIS (TT-MOWIS), 6), the development of Marine Climate Data System (MCDS), including establishment of

CMOC/China by WMO and IOC (June 2015), etc.

The DMCG Chairperson reported on the 23rd Session of the IOC Committee on the International Oceanographic and Information Exchange (Bruges, Belgium, 17-20 March 2015). The DMCG noted that IODE agreed to include a new page on products and services of IODE data centres for the information under "products and services", and the documents under "strategies and policies" to be uploaded in the repository[1].

The DMCG welcomed the IODE Committee recommendation for IODE data centres to actively liaise with JCOMM/IODE Expert Team on Data Management Practises(ETDMP) with regard to standards and best practices, metadata management and broad data share and exchange.

Ms Iona attended the 12th Session of JCOMM Management Committee (MAN-12, Bologna, Italy 17-20 November 2015). The JCOMM Management Committee recognized the cross-cutting nature of the DMPA, and its work complemented by work within the Observation Program Area(OPA) on best practices and metadata, the launching of Task Team for Integrated Marine Meteorological and Oceanographic Services(TT-MOWIS), work on marine climatology, and work in the context of the WMO Information System (WIS), IODE, andGlobal Ocean Observing System (GOOS).

The DMCG noted that JCOMM Management Committee agreed to have more than one CMOC, and that there should be a pro-active approach within JCOMM to have other CMOCs established (2 or 3 more). The Committee noted that the EMODnet, Global Digital Sea Ice Data Bank (GDSIDB) (sea-ice), Integrated Marine Observing System (IMOS) and International Comprehensive Ocean-Atmosphere Data Set (ICOADS)/ National Oceanographic Data Centers (NODC) (NOAA), could potentially become CMOCs, and encouraged the DMPA to investigate the feasibility of their submitting proposals. The DMCG requested ETMC and Secretariat to follow up with these potential candidate centres on the applications and evaluation processes.

The DMCG was also briefed on outcomes of the IODE Officers meeting (Ostende, Belgium 20-22 January 2016), including the ongoing restructuring of the IODE, communication strategy and IOC Strategic Plan for Oceanographic Data and Information Management. The DMCG welcomed IODE's plan of Ocean Data Portal to leverage global infrastructures and portal frameworks, such as EMODNet, WIS, World Data System(WDS), etc. The DMCG was invited to draw attention to the IODE restructuring and its potential impact on the joint data management activities of JCOMM and IODE.

The Chairperson invited participants to concentrate on major deliverables and future work plans for preparation of JCOMM-5, including development of Data Management Strategy and its Implementation Plan (agenda item 7), development of MCDS, data management standards and best practices, interoperability of Ocean Data Portal(ODP) and WIS, and integration of marine meteorological and oceanographic products into WIS, etc.

The WMO secretariat went through DMCG-5 work plan with the Group, and made updates to the action items (see update in Annex II).

3 GUIDANCE OF WMO/IOC/JCOMM

3.1 Seventeenth Session of WMO Congress

The WMO Secretariat reported on the 17th WMO Congress (25 May – 12 June, 2015, Geneva, Switzerland) relevant to the work of JCOMM DMPA, including Priorities of

[1] http://www.oceandatapractices.net

WIGOS Pre-operational Phase (2016-2019) and JCOMM contributions, WIGOS Metadata Standards, development of WIGOS Data Quality Monitoring System (WDQMS), etc.

The DMPA, through its work of ETDMP, ETMC and other groups, contributes to the WIGOS Pre-operational Phase in data and metadata management.

These include:

1) Regional Specialized Meteorological Centre (RSMC) Exeter, UK Met Office leads monitoring quality of surface marine meteorological data, observed from ships, buoys, and other in situ marine platforms.
2) Met Office, Exeter as the Real Time Monitoring Centre (RTMC) provides monthly monitoring statistics of Voluntary Observing Ships(VOS) Climate fleet data for all ships to the Data Assembly Centre (DAC) and sends monthly report to national focal points.
3) The European Centre for Medium-range Weather Forecast (ECMWF) provides Automated Shipboard Aerological Programme (ASAP) monitoring reports on a daily and monthly basis
4) Meteo France conducts ASAP on a yearly basis.
5) The VOS Quality Control tools developed by Meteo France have been widely used in JCOMM.
6) NOAA National Centers for Environmental Prediction (NCEP/NOAA) also provides exchange of global quality monitoring information on a trial period.
7) Quality Information Relay Mechanism by JCOMM in-situ Observations Programm Support (JCOMMOPS) facilitates monitoring centres and National Meteorological Sservices(NMSs) to send advisory messages about suspect ship data for corrective actions.
8) JCOMMOPS is tasked to further develop metadata system for full compliance with WIGOS metadata standards, and to make sure these are then routinely submitted to Observation Systems Capability Analysis and Review tool (OSCAR) via Machine to Machine interface.
9) JCOMM Regional Marine Instrument Centres (RMICs) facilitate adherence of observational data and metadata, and products for higher level standards of instruments and methods of observation.

The DMCG requested RMIC in Asia Pacific(RMIC/AP) to consult DMCG and Observation Coordination Group(OCG) when developing workplan and training materials and to feed into Ocean Teacher Global Academy (OTGA) modules.

3.2 Twenty-eighth Session of IOC Assembly, and Forty-eighth Executive Council (including the IODE restructuring)

The IODE Co-Chair, Mr Yutaka Michida (Japan) reported on this item.

The Twenty Eighth Session of IOC Assembly (IOC-28)

Dr. Cyndy Chandler (USA), Co-chair of IODE, attended the Assembly and reported on the results of IODE-XXIII, including:

i) The Committee elected Dr. Cyndy Chandler (USA) and Dr. Yutaka Michida (Japan) as co-chairs for the next inter-sessional period until IODE-XXIV to be held in 2017;
ii) The increased attention to data/information management during the past inter-sessional period (2013–2015), with the establishment of 14 Associate Data Units (ADUs) that complement the network of 67 NODCs
iii) At the regional level the IODE decided that the Ocean Data and

Information Networks (ODINs) should focus (where that is not the case yet) on linking with on-going projects that have a data and information management component or require data and information management expertise. Regarding global activities, the Committee streamlined all activities into projects with specific terms of reference and management structures.

iv) The Committee adopted 4 decisions and 5 recommendations.

The IOC Assembly noted the high importance of oceanographic data and information management for research and policy-making, and welcomed the integration of IODE across several other IOC programmes. The IOC Assembly, while welcoming the increasing focus on the development of products and services, called on IODE not to forget its important role in long-term secure archival of oceanographic data and information.

IODE restructuring

IODE at its 23rd Session adopted the Decision IODE-XXIII.1 to establish an inter-sessional working group on IODE restructuring. The group has been chaired by Dr. Hernan Garcia of USA (initially Dr. Margarita Gregg) and Dr. Yutaka Michida of Japan. The group carried out its work electronically, by exchanging emails and through regular webex meetings at monthly basis. The group will finalize these documents by the end of December 2016, for discussion at the next IODE Session (first quarter of 2017). The DMCG requested that JCOMM should be kept well involved in the ongoing discussion by the IODE Working Group on its restructuring, and evaluate potential impacts on the work of DMPA.

By far, the group has decided on drafting discussion papers on the following 4 themes:

1) Evolving IODE: Developing a realistic and decision-making strategic plan
2) Develop a process-orients and peer-reviewed funding cycle for IODE projects and activities
3) Defining IODE management structure
4) Sustainable budget

3.3 Twelfth Session of JCOMM Management Committee

The WMO Secretariat briefed on decisions and recommendations regarding DMPA at the 12th JCOMM Management Committee (MAN-12), and updated action items accordingly.

Besides updates reported by Ms Iona under agenda item 2, the DMCG was informed that consultation was conducted regarding IODE GDACs and JCOMM GDACs, noting both GDACs are contributing to the MCDS and the co-ownership of JCOMM GDACs of the WMO and IODE/IOC.

The DMCG appreciated that preliminary communication has been conducted with potential candidate JCOMM GDACs for specific observing platforms, including Argo, drifting and moored data buoy centres. The DMCG requested ETMC and Secretariat to proceed on the designation process with a view to be approved by JCOMM-5.

The DMCG was informed that the IODE Clearing House Services was well received at the Seventh session of the JCOMM Observations Coordination Group (OCG-7, 4-6 April 2016, Majorca, Spain). The DMCG welcome that the OCG will coordinate with the IODE for identification and documentation of standards and best practices with support of the Secretariat.

The DMCG noted with appreciation that TT-MOWIS has formulated a draft work plan to develop a standard process and guidelines for registration of WIS centres (DCPCs) under JCOMM, as well as the identification of potential candidate centres.

4 EXPERT TEAM ON DATA MANAGEMENT PRACTICES (ETDMP)

4.1 Report of Expert Team on Data Management Practices (ETDMP) Chairperson

This agenda item was introduced by Dr Sergey Belov, Chair of the ETDMP. Dr Belov recalled that the Joint JCOMM/IODE ETDMP focuses on adopting or developing principles and practices for the end-to-end data management processes, also including required data management best practices and standards for such subjects as metadata, common codes, vocabularies, etc. These data practices include tools and services developed under IODE projects such as ODP, Ocean Data Standards and Best Practices Project (ODSBP), OceanExpert, Ocean Biogeographic Information System (OBIS). ETDMP also assists the development of tools and services within Ocean Data Portal project to serve better for the development of distributed data network according to the end-to-end data managing principles, including data provider and end-user levels.

Dr Belov informed about the progress of the Task Team for ODS. Number of submissions for standards and best practices have been received by ODSBP from SeaDataNet and ODIP projects, while there were no any submissions from IODE and IOC communities. He noted that little progress has been made in reviewing and recommending the submitted proposals due to the inability to find suitable external reviewers. He invited JCOMM to be more active in terms of the JCOMM Data Management Plan Recommendation 7.1c – "JCOMM should collaborate with the IODE with regard to the Ocean Data Standards and Best Practices Project". He noted that activities of ODSBP to be discussed under agenda item 4.3.

Dr Belov reported on results of Task Team for Metadata. He noted the Task Team was able to identify links and best practices related to metadata through the use of NOAA metadata training and GEO-IDE wiki, provide links to transforms used by NOAA to transform ISO metadata to the internal standard used by DOI issuing body, provide links to netCDF templates used by NOAA.

Dr Belov informed the Group about the progress of the Task Team for IODE ODP. He noted that Task Team is focused on tasks of following categories – governance, ODP management, metadata in regards to practical application within ODP, ODP user portal and capacity building. He noted that Partnership Centre carries out activities related to implementation of ODP for IODE ODP, hosted in NODC of Russia (Obninsk, Russian Federation) to be discussed under agenda item 4.5. He also informed the Group about the communication with the ODINAFRICA project to establish the regional data providers.

The DMCG welcomed the results of the ETDMP and new member of the ETDMP.

The Group proposed following recommended actions:

1) Continue to develop standards/best practices for submitted proposals in the marine community through the IODE/JCOMM Standards Process;
2) Encourage, by preparing and distributing an invitation for submissions, experts in respective communities to propose standards and best practices to be submitted to the ODSBP;
3) Continue to review and compare metadata standards, netCDF templates, specific vocabularies and code lists used in other projects, programmes and initiatives and recommend them as standards and best practices;

4) Assess the deployment of the IODE ODP nodes with assistance of the Partnership Centre for IODE ODP by providing a required technical and training support;
5) Continue to support existing IODE ODP nodes with assistance of the Partnership Centre for IODE ODP by providing a required technical developments and capacity activities;
6) Ensure implication of standards and best practises published via ODSBP in IODE ODP;
7) Invite nominated experts to actively participate in the activities of ETDMP and its sessions;
8) Request JCOMM members to contribute ODSBP by submitting proposals for community standards and best practices;
9) Encourage JCOMM members to volunteer to provide an expert review for submitted standards and best practices in respect with their field of expertise.

4.2 Outcome of Fifth Expert team on Data management Practices (ETDMP-5)

Dr Sergey Belov, Chairperson of the Expert Team on Data Management Practices reported on the outcome of the fifth Session of JCOMM/IODE Expert Team on Data Management Practices (ETDMP-5, Oostende, Belgium on 22-24 June 2016).

The ETDMP agreed that standards submissions are needed from other IODE and IOC programmes, such as OBIS and GOOS, and requested TT leaders to compile a list of possible submissions from these programmes. The ET restated the importance of completing the external and community review of submitted standards in a timely manner. Ms Kate Roberts agreed to volunteer as an external expert for the review of the metadata submissions.

The Expert Team welcomed the progress made by Task Team on IODE ODP in collaboration with Partnership Centre for IODE ODP, and requested to increase the visibility of ODINWESTPAC and the ODP in the region through the participation of its members in 10th IOC/WESTPAC International Scientific Symposium.

ETDMP noted that US NCEI (former US NODC, NGDC and NCDC) has developed extensive training material on metadata and this material could be made available through OceanTeacher. NCEI metadata training focus is on the development of ISO 19115 and related standards and training material is available online at http://www.ncddc.noaa.gov/metadata-standards/metadata-training/. ETDMP will discuss with the IODE Training Coordinator the best way to make this materials available.

The European network of computing infrastructures (EUDAT) will cooperate with SeaDataNet to provide a distributed cloud as a common storage environment. It is recommended that members of ETDMP attempt to participate in the RDA plenaries where possible in Denver, USA, September 2016 and Barcelona, Spain, April 2017. These opportunities will promote the IODE/JCOMM and to bring knowledge back to the IODE/JOMM community.

The ET noted ODP can assist EMODnet by liaising with IODE data providers from developing countries, particularly in Africa and South America. EMODnet relies on SDN and Copernicus for data standards and best practices. These standards can be incorporated into ETDMP ODSBP. The ET also discussed possibility of extending EMODnet collaboration to include EMODnet Chemistry, with a view to achieve interoperability with each of the EMODnet infrastructure projects

Dr Belov reminded the DMCG that ETDMP and its TT-Metadata can contribute to the JCOMM Data Management Plan in mornitoring netCDF developments, vocabulary

developments, preparing overview on formats in IODE network for ocean data and metadata, on DOI and its applications within IODE domain, etc. The DMCG requested ETDMP and TT-Metadata to continue reviewing and comparing metadata standard, netCDF templates and initiatives and then recommend them as standards and best practices.

It was noted that many NODC do not have access to GTS and therefore are unable to share data through GTS. WIS needs to become more open and interoperable with other systems. The Team agreed that further discussion are required with WMO Secretariat to explain the existing capabilities of NODCs to contribute to WIS.

One possible option for ETDMP could be to improve the interoperability of near real time and delayed mode marine meteorological and oceanographic data standards and ocean analysis and forecasting product standards in line with the WIS requirements both in terms of formats, distribution mechanisms, and infrastructure.

4.3 Ocean Data Standards and Practices (incl. IODE Clearing House Service)

Dr Sergey Belov reported on this agenda item.

IODE Ocean Data Standards and Best Practices project (ODSBP) was established at IODE-XXII through Recommendation IODE-XXII.6, replacing the former JCOMM/IODE Ocean Data Standards Pilot Project.

The objective of the ODSBP is to achieve broad agreement and commitment to adopt a number of standards and best practices related to ocean data management and exchange.

The DMCG noted that activities of the Project includes:

1) develop and manage a process for the reception, reviewing and recommending of standards and best practices, based upon the process developed by the Ocean Data Standards Pilot Project;
2) actively liaise with all relevant communities, programmes and projects such as Ocean Data Portal (ODP), ETDMP Metadata Task Team, SeaDataNet Technical Task Team, Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BICH), Group of Experts on Marine Information Management (GE-MIM), Steering group for Ocean Biogeographic Information System (SG-OBIS), Global Temperature-Salinity Profile Program (GTSPP), International Council for Science - World Data System (ICSU-WDS), Group on Earth Observations/ Global Earth Observation System of Systems (GEO/GEOSS), International Council for the Exploration of the Sea (ICES);
3) promote and monitor the usage of recommended standards and practices in the relevant communities, including those mentioned under (2);
4) regularly review and revise recommended standards and best practices based upon feedback from the relevant communities, including those mentioned under (2);
5) maintain an online catalogue of best practices, enabling easy discovery and downloading of these documents by users (e.g. JCOMM Catalogue of practices and standards).On this web site you will find information on the Ocean Data Standards and Best Practices process, on the adopted Standards, the Partners and a wealth of background information on methods and guidelines for oceanographic data management.

The Project is managed by a Steering Group involving members of the former JCOMM/IODE ETDMP Task Team for the ODS Pilot Project and other experts of JCOMM and IODE. Project web site, http://www.oceandatastandards.org/.

At present moment one standard has been reviewed and accepted - the Recommendation for Quality Flag Scheme for the Exchange of Ocean and Marine Meteorological Data was published in April 2013 (IOC MG 54 Vol. 3); The following six proposals from SeaDataNet and ODIP have been submitted:

1) SeaDataNet Common Data Index (CDI) metadata model for Marine and Oceanographic Datasets; (submitted in May 2015)
2) SeaDataNet Common Data Index (CDI) metadata model for Marine and Oceanographic Datasets – XML encoding; (submitted in April 2015)
3) SeaDataNet Cruise Summary Report (CSR) metadata model for Cruise Reporting; (sent in November 2014, submitted in May 2015)
4) SeaDataNet Cruise Summary Report (CSR) metadata model for Cruise Reporting – XML encoding; (sent in November 2014, submitted in May 2015)
5) SeaDataNet Controlled Vocabularies for describing Marine and Oceanographic Datasets - A joint Proposal by SeaDataNet and ODIP projects (submitted in April 2015)
6) SeaDataNet NetCDF (CF) data transport model for Marine and Oceanographic Datasets (submitted in May 2015)

The IODE Clearing House Service for Data/Information Management Practices Project will enable research groups that wish to embark on a new project and need to prepare a data management plan, to look for methodology already used by other projects or data/information centres ("best practices"). The service will be an e-repository of documents and links to related web sites. The service is aimed to promote the use of common methodologies in ocean data and information management and improved interoperability between these systems.

The IODE Clearing House Service for Data/Information Management Practices Project (OceanDataPractices) has been established by the 22nd Session of the IODE Committee (2013) through Recommendation IODE-XXII.19. Project web site - http://www.oceandatapractices.net/.

The ET discussed the need for better linkages between standards and best practices. A best practice document, describing the techniques or methodology used by the submitted standard, should accompany each standard submission. The ET discussed the use of the terms "best practice" and "community practice" and requested the TT-ODS to consider the appropriate term as part of defining the Terms of Reference.

To better evaluate the effectiveness of ODSBP, project indicators should be developed to monitor the lifecycle of the standards process, for example, "number of submissions received", "number of reviews completed", "number of invitations/contact for submissions issued", etc.

The DMCG welcomed the work plan of ETDMP-5 (see Annex IV), in addition, the DMCG:

1) Requested OCG vice chair for SBP to work closely with TT-ODS of ETDMP;
2) Requested ETDMP to continue to develop standards/best practices for submitted proposals in the marine community through the IODE/JCOMM Standards Process;
3) Encouraged experts in respective communities to propose standards and best practices to be submitted to the ODSBP by preparing and distributing an invitation for submissions;

4) Invited JCOMM communities to establish a collaboration with IODE Ocean Data Portal by sharing of metadata, data and services.

4.4 Quality Management

Mr Greg Reed reported on the Quality Management.

IODE Quality Management Framework

The IODE Quality Management Framework (IODE-QMF) provides an overall strategy, advice and guidance for National Oceanographic Data Centres (NODCs) to design and implement quality management systems for the successful delivery of oceanographic and related data, products and services. The main objectives of the IODE-QMF are:

1) Promote accreditation of NODCs according to agreed criteria;
2) Provide assistance to NODCs to establish organizational quality management systems;
3) Initiate and review existing standards and Manuals and Guides with respect to the inclusion of quality management procedures and practices; and
4) Provide regular feed-back to the IODE Committee.

The IODE-QMF addresses the implementation of quality management systems by its NODCs, as well as providing an overall strategy for IODE to deliver oceanographic data, products and services.

NODC accreditation

To ensure NODCs can demonstrate their capabilities to provide data and services in compliance with established standards and responsibilities, the IODE Committee has agreed a minimum set of requirements to ensure compliance with IODE standards and to establish a mechanism to regularly monitor and assess the quality of data and service. The IODE encourages NODCs to implement a Quality Management System (QMS) and to demonstrate they are in conformity with ISO 9001, the international standard for quality management. The IODE has established accreditation criteria to ensure NODCs meet these requirements which can be found in *IODE Quality Management Framework for National Oceanographic Data Centres*. *(IOC Manuals and Guides 67)*. NODCs seeking formal accreditation will need to demonstrate their ability to provide secure long-term storage of and access to marine data. Two NODCs have met the accreditation requirements and have been formally recognized as an ***Accredited IODE National Oceanographic Data Centre***. Other NODCs and Associate Data Units (ADUs) are in the process of preparing accreditation submissions.

Capacity Development

The IODE, through the Ocean Teacher Global Academy, provides an annual training course on Quality Management System Essentials for NODCs and ADUs. This training workshop provides an introduction in the development, implementation and management of a Quality Management System which will assist in the adoption of comprehensive management practices and increased confidence in the quality of their data, products and services which will lead to the accreditation of NODCs.

The DMCG appreciated the report by Mr Reed and requested the IODE to encourage accreditation applications by more NODCs, using the *IODE Quality Management Framework for National Oceanographic Data Centres*. Acknowledging the role of IODE in Capacity Development, the DMCG requested IODE to continue annual training on Quality Management System Essentials for the NODCs and ADUs.

4.5 Ocean Data Portal

Dr Sergey Belov reported on the status of the ODP.

Development and technical support of the IODE Ocean Data Portal is provided by Partnership Centre for IODE ODP (PC-ODP), officially opened in 2013 hosted by NODC of Russia.

The PC-ODP is responsible for:

1) developing, hosting and maintaining the tools and specifications for the portal and its distributed marine data system operation
2) assisting IODE's Ocean Data Information Networks (ODINs), NODCs and other IODE ODP nodes to achieve their regional and thematic objectives
3) developing, strengthening and maintaining the IODE ODP data management training programmes and tools
4) monitoring and reporting on the status and availability of the IODE ODP portal, websites, tools and specifications used by the IODE ODP node
5) providing an infrastructure to develop and test the web-based technologies and tools and also to generate new ideas and perspectives of the IODE ODP
6) promoting collaboration between relevant experts in integrated marine data management in IOC programmes and projects, other organizations and systems (e.g. OBIS, WIS, GEOSS)

ODP Communications Materials

A set of communications materials consisting of a brochure and an overview of the ODP have been created for the ODP and are now published on the ODP home page on the IODE web site[2]. Presentations delivered by the ODP team at training sessions are currently available on the ODP web site[3] and included to OceanTeacher[4]. Presentations from other venues are available on the ODP web site[5]

ODP Technology and Support

The ODP technology is supported by the PC-ODP[6]. Updated data view application and subscription services has been developed, including new components for GIS[7] and data cache[8] at ODP global node. The PC-ODP has completed development and packaging of the version 2 implementation of the technology stack and has greatly simplified the deployment of new ODP nodes through the support of packaged virtual machine images which can be downloaded and run on commodity hardware using VMWare software (free-license version). Support to node providers has been improved through bug tracking and management tools accessible to both the ODP technical team and technical staff operating the regional nodes. New components – GIS and Data Cache (example of application -) as at ODP global node.

A long-standing issue has been the need to review and upgrade ODP metadata to support ISO 19139 (XML encoding for ISO 19115 metadata) as a defacto standard within the Marine community. A draft mapping of the internal ODP metadata content to ISO 19115-2 has been completed. ODP to WMO Core Profile 1.2 conversion tool has been

[2] http://www.iode.org/index.php?option=com_content&view=article&id=26&Itemid=64
[3] http://www.oceandataportal.org/
[4] http://classroom.oceanteacher.org/course/view.php?id=174
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[7] http://www.oceandataportal.net/portal/portal/odp2/map
[8] http://www.oceandataportal.net/dataview/viewresource?resourceId=RU_RNODC_08

developed. ODP metadata in ISO 19139 metadata standard is available from ODP Geonetwork and OAI-PMH catalogues.

ODP Training Materials

ODP technical and non-technical presentations, videos, and training materials have been developed and are available on the ODP web site and the IODE OceanTeacher web site[9]. The ODP training materials include full end-to-end set up, configuration, administration, and management of ODP light data providers and full node implementations.

ODP Node Implementations and Support

The PC-ODP continues to provide support for the ODP Global Node[10] (). During the previous inter-sessional period, the following regional ODP nodes have been implemented:

1) Sistema Nacional de Datos del Mar (SNDM) Regional Node[11]
2) ODINWESTPAC Regional Node[12]
3) ODINAFRICA Regional Node[13], expected in December 2016

ODP Interoperability Arrangements

The ODP attempts to leverage interoperability with established systems where these exist. An example is the ability to search for selected data hosted within the WMO Information System (WIS). The ODP continues to support its existing test interoperability arrangement with the WIS and a new interoperability arrangement has been established with SeaDataNet, US-NODC and AODN via ODP Brokering solution[14] through the participation in ODIP project.

ODP Data Contributions

As of June 2016, the ODP hosts 161 data sets on the ODP global node, 46 data sets on ODP SNDM (Argentina) regional node, and 7 data sets on ODP ODINWESTPAC regional node for a total of 214 data sets. (+56% compare to the end of 2014).

PC-ODP will strive the technical developments as requested by contributing nodes and collaborative initiatives. It will provide further support for existing nodes (SNDM, ODINAFRICA, and ODINWESTPAC) and seek for further contributions from them. Detailed work plan on ODP is presented in the working document 4.2.

The DMCG appreciated progress made in ODP, and made the following recommendations:

1) The DMCG encouraged ODP and OCG to collaborate closely on interoperability issues.
2) The DMCG encouraged the deployment of more IODE ODP nodes with assistance of the Partnership Centre for IODE ODP by providing a required technical and training support.
3) The DMCG requested TT-Metadata and TT-ODP to provide support for existing nodes and seek for more contributions in particular from the IODE/ODP ODINAFRICA regional node.

5 EXPERT TEAM ON MARINE CLIMATOLOGY (ETMC)

Dr Lydia Gates, vice chair of the Expert Team on Marine Climatology (ETMC)

[9] http://classroom.oceanteacher.org/course/search.php?search=ODP
[10] http://www.oceandataportal.net/portal/
[11] http://www.oceandataportal.net/portal/
[12] http://portal-odp.nmdis.gov.cn/portal/
[13] http://portal.odp.odinafrica.co.ke/portal/
[14] http://www.oceandataportal.net/portal/portal/odp2/interoperability

reported on the work of ETMC regarding development of Marine Climate Data System (MCDS) under agenda item 5.1, development of a network of the WMO-IOC Centres for Marine-meteorological and Oceanographic Climate data (CMOCs) under agenda item 5.2, and progress of designation of Global Data Assembly Centres (GDACs) under agenda item 5.3.

5.1 Development of Marine Climate Data System (MCDS)

Dr Gates reminded the DMCG that the Vision for the new Marine Climate Data System (MCDS) was adopted by JCOMM-4 (Yeosu, Republic of Korea, 28-31 May 2012) per Recommendation 2.

The MCDS is an outcome of the modernization of the Marine Climatological Summaries Scheme (MCSS) taking into account new sources of historical marine-meteorological and oceanographic climate data, as well as state of the art data management techniques. The goal is to develop a standardized international data management system across JCOMM, integrating collection, rescue, quality control, formatting, archiving, exchange, and access—for marine-meteorological and oceanographic real-time and delayed-mode data and associated metadata of known quality, and products that satisfy the needs of WMO and IOC applications, in particular, ocean data. Requirements for long term climate monitoring, and climate services are to be addressed.

Dr Gates also reported on the outcome of the Fifth Session of the Data Management Coordination Group (DMCG-5, Geneva, Switzerland, 29-31 January 2014), in particular with regard to the definition of evaluation process and criteria for MCDS candidate centres. DMCG-5 expressed satisfaction of the integration of the former IODE Responsible National Oceanographic Data Centre for Drifting Buoys (RNODC/DB) and JCOMM Specialized Oceanography Centre for Drifting Buoys (SOC/DB) operated by Canada and France respectively, and encouraged both centres to strongly contribute to the MCDS developments, and invited them to submit applications for DAC/GDACs as appropriate for their formal evaluation and establishment. Recommendations were also made to CMOC-China regarding their work plan and proposed scope of duties.

MCDS PROGRESS

CMOC-China

Dr Gates reported that a group of experts was invited to NMDIS, Tianjin, China in November 2014, to review the work plan and make further suggestions. The group provided guidance in many areas with a heavy focus on the following tasks:

1) Data and metadata collection and cooperation with existing and future MCDS GDACS.
2) Historical data and metadata rescue.
3) Making data from China publicly available.

ETMC-V Updates

At ETMC-V (Geneva, Switzerland, 22-25 June 2015) the ETMC identified Centres that would be appropriate candidates for DACs, GDACs and CMOCs within the new MCDS and began the 2nd phase of the MCDS – implementing the MCDS.

In doing so, discussions are underway to recruit those Centres identified for the MCDS implementation and will be finalized at the ETMC-6 meeting in July 2016. Details on how to apply will be drafted and prepared for adoption at JCOMM-5. The Secretariat

has drafted a letter of invitation for new GDACs, which is under review, and DACs will follow similar processes.

Marine Climatology chapters in the WMO Publications No. 471 and 558 (Manual and Guides) are being updated to reflect the status of the MCDS, to provide guidance on how to be a part of the MCDS, and to remove legacy information regarding the MCDS predecessor scheme, the Marine Climatological Summaries Scheme (MCSS). These updates will be submitted to JCOMM-5 for approval.

Regarding CMOC establishment, CMOC-China is operating and has produced a detailed report for their first year. They are progressing in their establishment. CMOC applications for a CMOC-ICOADS and a CMOC-WOD are underway and are being prepared for submission in 2016.

The DMCG requested ETMC to consult with ICOADS and WOD to ensure progress of their application by JCOMM-5 (October 2017, Indonesia).

ETMC-VI

The Sixth meeting of ETMC (ETMC-6) is being held in 19-20 July in Southampton UK as a side meeting to the Fourth International Workshop on the Advances in the Use of Historical Marine Climate Data (MARCDAT-4). The meeting will have a heavy focus on implementing the MCDS and updating associated Marine Climatology chapters in WMO No. 471 and 558.

The DMCG appreciated great progress made by ETMC, and urged ETMC to develop updated work plan for the 558/471 marine climatology chapters in order to have the texts submitted to the JCOMM-5 session for approval in October 2016.

Mr Nick Ashton, coordinator for JCOMM Services Coordination Group (SCG) reminded the DMCG, that Expert Team on Marine Safety and Services(ETMSS) takes lead in the update of 558/471, and ETMC needs coordination with ETMSS in this regard. The DMCG requested ETMC to consult with ETMSS to ensure timely delivery of the work.

5.2 Development of CMOCs network

CMOC-China

Recalling the approval by JCOMM-4, with guidance from WMO Congress Cg-17, on the establishment of CMOC-China, details on the progress of CMOC-China are noted.

Following the initial meeting, an updated work plan was adopted and NMDIS began operating as a CMOC. Progress in the first year was reported in a draft annual report for 2015.

Progress was noted in the following areas:

1) Proper staffing, setting up systems, and CMOC-China documentation preparation
2) Processing of marine meteorological and oceanographic data for various data types/platforms and parameters.
3) Research and development of statistical climate products and reanalysis products are underway
4) Organizing technical training and capacity building efforts
5) Data rescue in the Asia-Pacific area
6) Increasing the visibility of CMOC-China

In 2015, the WMO Congress (Cg-17) and IOC Assembly (IOC-28) approved the establishment of CMOC/China. CMOC/China is hosting a workshop in August 2016, where delegates are invited to review their work plan 2015-2016 and progress, and to provide further guidance and discuss capacity building and cooperation with the expected future CMOCs – ICOADS and World Ocean Database (WOD).

Status of Future CMOC Establishment

Following recommendations from ETMC-V, two additionally proposed CMOCs are preparing applications and evaluation criteria to be submitted to JCOMM-5:

1) CMOC-International Comprehensive Ocean-Atmosphere Data Set (ICOADS)
2) CMOC-World Ocean Database (WOD)

5.3 Global Data Assembly Centres (GDACs)

GDACs in the MCDS

Recalling the proposed GDAC Terms of Reference (ToR) in Annex V, progress was noted in identifying potential GDACs from both IODE and WMO. At the Fifth Session of the Expert Team on Marine Climatology (ETMC-V), new (or existing) GDACs were identified and mapped into the appropriate structure of the MCDS.

Through informal discussions Mr Tim Boyer (USA) and Etienne Charpentier (WMO) approached potential GDACS to gauge their interest in formalizing their roles as GDACs in the new MCDS. Interest was expressed and it was agreed that WMO would draft invitation letters to the proposed GDACs to encourage them to formally register to assume these new roles. Recall that the goal of the MCDS is to harmonize data flows and to have the least amount of disruption to current duties and allow proposed centres to easily fulfill the MCDS role with little to no additional resource needs or substantial changes.

To date, there are a few GDACs that have been identified that could immediately assume the formal roles of GDAC under the MCDS. They are:

1) WMO Global Collecting Centres (UK and Germany) – GDAC for Delayed-Mode VOS data
2) NOAA's National Data Buoy Centre (NDBC) – GDAC for Moored Buoys
3) Coriolis (ARGO) – GDAC for ARGO
4) CLIVAR and Carbon Hydrographic Data Office (CCHDO) – GDAC for CTDs and Hydrographic Data
5) SOC/DB (France) – GDAC for Real-Time Drifting Buoys
6) RNODC/DB (Canada) – GDAC for Delayed-Mode Drifting Buoys

Identified groups are already carrying out GDAC duties and would easily fit into the MCDS structure in order to expedite implementation of the MCDS and show proof of concept on how the system is expected to work.

The next phase of designating new GDACs will be completed on a more long-term basis as gaps in the MCDS structure are identified. GDACs will then be proposed that could help in filling those deficiencies.

In April 2016, an invitation letter was drafted to be presented to ARGO (and possibly other potential GDACs with minimal edits) inviting their application to be a formal GDAC in the MCDS. The document is under final review and will be prepared by the WMO Secretariat.

The formal process to apply for GDAC (and DACs) will be discussed further at the

Sixth Session of the ETMC (ETMC-VI) being held in Southampton UK, 19-20 July 2016.

IODE – JCOMM GDAC Comparisons

Dr Paul Poli (MeteoFrance) did a recent comparison of IODE and JCOMM GDACs of their Terms of Reference (ToR) for similarities and differences. It was noted that the ToRs are very similar and that merging the two ToRs into one GDAC ToR to cover JCOMM, rather than IODE and WMO individually, would be beneficial. This model would help all aspects of the MCDS, DAC to CMOC, and provide a comprehensive and detailed dataflow between all IODE and WMO groups moving to the MCDS. However, through early communication, it was agreed JCOMM and IODE will conduct a parallel designation process to both contribute to MCDS, taking into account of co-ownership of JCOMM GDACs by WMO and IODE/IOC.

Recalling recommendations at DMCG-5, the DMCG also requested ETMC to follow up on Global Digital Sea Ice Data Bank (GDSIDB) of its candidature as GDAC or CMOC as soon as possible.

While differences were noted in Quality Control(QC) requirements between IODE and MCDS GDACs, it wasn't considered a blocking point and is something that could easily be rectified in a unified GDAC ToR and should be considered by the ETMC and TT-MCDS going forward.

5.4 Preparation for Fourth International Workshops on Advances in the Use of Historical Marine Climate Data (MARCDAT-4)

Dr David Berry reported on this item.

The Fourth International Workshop on the Advances in the Use of Historical Marine Climate Data (MARCDAT-4) will be held at the UK National Oceanography Centre, Southampton, UK 18th– 22nd July. Over 60 participants have registered, with 34 oral presentations planned (9 extended), 17 posters and 3 breakout sessions. Topics to be covered in the breakout session include: uncertainties and biases; surface temperatures; other parameters (including fluxes); product intercomparisons; data management and rescue; using ICOADS raw IMMA files; Future priorities and 10 year action plan. A summary timetable is given in Appendix A of the report[15]. The poster and breakout group sessions on Tuesday and Wednesday respectively have been timed to coincide with a meeting of the ETMC. A meeting room has been reserved at NOC for the ETMC.

5.5 Cooperation with WMO Commission for Climatology (CCI)

The Vice-Chair ETMC, Dr Lydia Gates, represented JCOMM at the first meeting of the WMO Commission for Climatology (CCl) Inter-Programme Expert Team on Climate Data Modernization Programme (IPET-CDMP[16]) held in Geneva, 31 August - 2 September 2015. In presentations she introduced the rationale for the modernization of the marine climate data system in MCDS and the associated requirements for high-level quality control.

The focus of the first meeting of IPET-CDMP was to guide the development of a Concept of Operations (CONOPS)[17] for the High Quality Global Data Management

[15] file://internal.wmo.int/UserData/Redirected/cgallage/Downloads/DMCG-6-Doc-5.4-MARCDAT-4.pdf
[16] http://www.wmo.int/pages/prog/wcp/ccl/opace/opace1/IPET-CDMP-1-4.php
[17] http://www.wmo.int/pages/prog/wcp/ccl/opace/opace1/documents/HQ-GDMFC-CONOPS-VER2.5-31Mars2016-1.pdf

Framework for Climate (HQ-GDMFC). A work-plan was set up for two teams to continue the process. A second meeting is planned for September 2016.

The intention was to establish a framework designed to strengthen the management of climate data through the eventual creation of a High Quality Global Data Management Framework for Climate (HQ-GDMFC) and publication of a Manual on Climate Data Management. The overall aim of this initiative is to examine and make recommendations to improve existing practices in managing climate data, as well as making more effective use of a variety of data forms to improve climate services, including remote sensing and climate model data. It will seek to address inconsistencies and gaps in the definitions and procedures relevant to climate data management, and provide a stronger regulatory basis for climate processes. The HQ-GDMFC and Manual will also provide best-practice guidance on methods, procedures, and techniques in climate data management, and support development of tools and infrastructure in relation to climate-focused activities such as data rescue and preservation; archival; procedures for quality control and assurance; calculation of statistics and climate parameters; homogenization and adjustments, among others. This initiative will collaborate closely with a wider cross-programme initiative aimed at modernizing all WMO programmes' data management infrastructure and processes.

Dr Gates presented JCOMM perspectives regarding climate data management. Main points included:

1) The JCOMM Expert Team on Marine Climatology (ETMC) is leading the development of the JCOMM Marine Climate Data System (MCDS), which is a modernization of the Marine Climatological Summaries Scheme (MCSS), and is intended to be JCOMM's contribution to the Global Framework for Climate Services(GFCS), as well as to eventually contribute to the High Quality Global Data Management Framework for Climate lead by the CCl. MCDS will include management of data flows from various sources through Data Acquisition Centres (DACs), Global Data Assembly Centres (GDACs), and a small number of Centres for Marine Meteorological and Oceanographic Climate Data (CMOCs), providing overall data integration at the variable and end user products level.
2) The International Oceanographic Data Exchange (IODE) committee of the Intergovernmental Oceanographic Commission of UNESCO (IOC) and JCOMM have jointly established an Expert Team on Data Management Practices (ETDMP), focusing on modernizing data management operations, best practices and standards.
3) Existing JCOMM datasets (e.g., moored buoy, glider data) were typically non-standard, not necessarily well documented or understood or linked. There was a need to develop standard data management systems that linked all sources. Other sources provide for some level of standardization, and have good recognition and trust in the international user community (e.g. ICOADS, Argo), but lack formal recognition in the WMO.
4) Higher-level Automated Quality Control of the data will be carried out, with more stringent QC carried out at the GDACs
5) CMOCs cover a relatively large scope, may have a regional or programmatic focus, and carry out data and metadata rescue, data integration by variable (DACs and GDACs being the main sources), higher level quality control, including bias correction, and the production and delivery of integrated marine meteorological and oceanographic climate products to end users. There is a current focus on the Asia-Pacific Region with one CMOC established by Cg-17 in Tianjin, China. Plans are to establish a small number of mirrored CMOCs (less than ten).
6) All data and products developed within the MCDS will be discoverable through the WMO Information System (WIS) or IODE Ocean Data Portal (ODP).

The DMCG welcomed ETMC work on the MCDS and appreciated its consideration to have all data and products of MCDS discoverable through WIS, and requested ETMC to coordinate with TT-MOWIS to clarify integration requirements to the WIS (ASAP).

6 CROSS-CUTTING DATA MANAGEMENT AND INTEGRATION ACTIVITIES

6.1 Report of outcome of the First Meeting of the cross cutting Task Team for Integrated Marine Meteorological and Oceanographic Services (TT-MOWIS)

Mr Rabia Merrouchi, co-chair for the TT-MOWIS reported on the outcomes of its first meeting, and the draft work plan of the team.

Mr Merrouchi recalled that the "Principal Objectives for a JCOMM Strategy on Integrated Marine Meteorological and Oceanographic Services within WIS" as defined by the JCOMM-MAN 11, October 2014, Geneva, Switzerland. TT-MOWIS and membership, goals and short term objectives were refined by JCOMM MAN 12, November 2015, Bologna, Italy. The TT-MOWIS first met in 12-16 April 2016, Geneva, Switzerland, to establish an agreed work plan for the mandate period of TT-MOWIS.

TT-MOWIS Goals

The work of TT-MOWIS should focus on the following actions:

1) Get the full picture of the WMO WIS system – structure, strength, weaknesses, opportunities and threats (many TT members are from marine organisations not being familiar with the WMO world),
2) Clarify the approach to be followed by marine datacentres to become a WIS Data collection or Production Centre (DCPC), as well as the approval process through JCOMM,
3) Put the emphasis on the successful story of the Mediterranean DCPC for marine meteorology and oceanography and to summarise the lessons learned,
4) Present the motivations for marine centres to become DCPC's,

JCOMM MAN-12 recommendations for TT-MOWIS

During the 12th session of JCOMM-MAN, TT-MOWIS was called to address the following tasks:

1) The Committee requested TT-MOWIS, the DMPA and OCG coordinators and the WMO Secretariat to propose a possible way forward for the establishment of a GDAC for waves and marine meteorological moorings, focused on data rescue issues and building on existing structures where appropriate.
2) The Committee requested TT-MOWIS, the DMCG, and OCG to develop a common proposal for the future structure of the JCOMM Data Management Programme Area.
3) The Committee asked TT-MOWIS to take on the registered WIS centres under JCOMM and to assist the completion of those centres still under the certification process, as well as to establish a standard process and guidelines, publicly disseminated, on the certification process for marine meteorology and oceanography related centres in the WIS.
4) It asked TT-MOWIS to identify the key marine meteorological and oceanographic centres that should be encouraged to become registered WIS centres.
5) The Committee agreed to participate in the WIS data exchange governance, development of PART C of WIS (the data management component of WIS

approved by Cg-17), and the future evolution of the WIS.

TT-MOWIS high level priority actions

During the first meeting of TT-MOWIS, it was agreed as high level priority action to provide a guidance document that should be taken as reference document describing the process for applying and certifying Oceanographic and Marine Meteorological centres as WIS centres. To this end, a first list of national, regional and global centres will be designated as potential WIS centres and some of them will be chosen to be a part of pilot project aiming to prove the efficiency of the procedure to address both technical and administrative aspects of the certification process.

The DMCG endorsed the TT-MOWIS work plan, and requested TT-MOWIS to keep DMCG and IODE Officers informed of the development of its guidance document, and to seek inputs and comments as appropriate. Recommendations and requests formulated during the meeting will be taken into consideration by TT-MOWIS during the next teleconference that will take place in September 2016.

6.2 JCOMM Observations Coordination Group Perspective on Data Integration

Mr Kevin O'Brien reported on this item. Kevin briefed responsibilities of the JCOMM Observations Coordination Group. These includes activities directly related to observation networks, measuring performance of those networks against scientific requirements, assisting with observing logistics, identifying new observing system requirements, etc.

In addition, the JCOMM OCG is responsible for interfacing with the WMO in terms of supporting WIGOS and recommending or embracing data and data access standards and best practices. A strong aim of the OCG is to improve data integration and interoperability amongst the observing networks. The OCG would prefer to achieve this goal by embracing standards and conventions and leveraging existing, successful tools in an effort to avoid duplicative efforts.

There are several different types of data integration relevant to this particular discussion:

1) Integration within a particular network. For example, all Argo data existing within a central GDAC
2) Integration across networks
3) Integration by parameter, or Essential Ocean Variables(EOV)

Though much work has been done to achieve the integration of data within a particular network, the JCOMM OCG is interested in improving integration across networks and by parameters. This goal would directly benefit those general users who would like access to ocean observations but are not part of, say, the Argo program themselves.

Rather than having to access, download and reformat data from several different platform networks, each with their own delivery mechanisms and data formats, it would be much more efficient if the user were able to access this data as a complete collection and in a known format accessible and useable by familiar software tools.

The goal in the JCOMM OCG is to find broadly applicable solutions to data integration problems for the ocean research and observing communities. OCG focuses on creating interoperable data frameworks, rather than data portals. For true interoperability, machine to machine capabilities for data access, including RESTful capabilities, must be available. With these frameworks in place, building useful data portals will be much easier, as will create synthesis products for specific science

communities.

JCOMM OCG is implanting a prototype of an interoperable framework to support the platforms that are contributing data in the tropical Pacific in support of the Tropical Pacific Observing System 2020(TPOS 2020) effort. The framework is based upon a tool called ERDDAP and the scope for the prototype will be determined from well balanced and forward reaching use cases discussed with the community. They may be confined to a few specific parameters, e.g. surface temperature or salinity, and might include some supporting gridded climatological or model products that could be used as comparisons with the integrated in situ data framework.

The DMCG requested OCG to continue working with the global observing networks to implement data interoperability framework in close consultation with the DMCG. The DMCG welcomed the pilot projects approach to demonstrate integration based on EOVs, such as sea water temperature and oxygen, while requesting the OCG to refine its vision for EOV pilot projects and consult with oberving networks to determine interest. In addition, the DMCG requested the OCG to engage with GOOS Regional Alliances (GRAs) to provide data framework in support of GRA data portals.

7 JCOMM DATA MANAGEMENT STRATEGY AND ITS IMPLEMENTATION PLAN

Ms Sissy Iona reported on this item.

Ms Iona reminded the DMCG that the primary objective of the JCOMM Data Management Programme Area is to implement a fully integrated end to end data management system across the marine meteorological and oceanographic community, in particular to address the requirements of the Observations Programme Area (OPA) and Services and Forecasting Systems Programme Area (SFSPA). Additionally DMPA will offer its expertise to assist other groups (e.g. OOPC/GCOS) to specify and implement their own data management requirements, with the overall goal of integrating their data management into the overall end-to end data management system.

The DMPA is to address the following requirements from the metocean community for observations and services:

1) To ensure timely delivery of integrated data and associated metadata in line with the IODE/IOC standards and the WIGOS Metadata Standards;
2) To develop and maintain monitoring, evaluation and follow up procedures;
3) To develop and comply with common practices including quality control, metadata, analysis, data flow and data exchange standards, formats and procedures;
4) To develop, and/or upgrade data systems and infrastructures, including the NODCs, DCPCs (WIS), Marine Climate Data System (MCDS), etc both within and outside of WMO and IOC/IODE;
5) To identify, rescue, digitize and archive historical data;
6) To develop and/or strengthen national data management capacity, especially in developing countries, such as ERDDAP;
7) Keep abreast of new technologies for data and metadata management, including big data, third party data and social networks.

Ms Iona then presented on the proposal of the JCOMM Data Management Strategy and its Implementation Plan. The proposal based on the interfaces of DMPA from and to the OPA and SFSPA, an overview of JCOMM three Programmes regarding data management issues.

The DMCG appreciated the proposal, and agreed to proceed on the proposed structure for the strategy and its implementation plan (see Annex IV). The DMCG recommended that the strategy and implementation plan should be prepared in a more

concise and actionable way with proper attention to Capacity Development, for Africa in particular. For Capacity development, the DMCG recommended WMO (global campus) and IODE (OTGA) to work more closely, and to have modules on oceanography and marine meteorology in each other's courses.

8 REPORTING TO JCOMM-V

Nadia Pinardi, Co-President of JCOMM reviewed the intersessional work since JCOMM-4 (2012) that could be highlighted as achievements of the Commission at JCOMM-5. Dr Pinardi also reminded the DMCG to take SDGs into account, especially JCOMM should be present at Fiji conference in June 2017.

Regarding reporting to the JCOMM-5, the DMCG agreed that following can be considered for the DMPA:

1) The proposal of revised DMPA strategy
2) Succession planning principles (implemented)
3) Contribution to WIGOS pre-operational phase including the JCOMMOPS contribution to OSCAR, Regulatory materials 558/471 (ETMSS takes lead)
4) Development of the MCDS / including CMOC
5) Substantial update of regulatory materials
6) TT-MOWIS work to link ocean systems with WIS
7) Sea ice standardization with IMO, IHO - partnerships
8) Open access GTS pilot
9) CD strategy and OTGA cooperation
10) Ocean data standards activities

All documents for JCOMM-5 need to be available in mid-2017 (for translation into 6 languages). The JCOMM-5 will be held on 23 – 31 October 2017, in Indonesia (RA5).

9 ANY OTHER BUSINESSES

10 REVIEW OF ACTION ITEMS AND WORK PLAN

11 CLOSURE OF THE SESSION

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ANNEX I

Agenda

1. ORGANIZATION OF THE SESSION

1.1 Opening
1.2 Adoption of the agenda
1.3 Working arrangements

2. REPORT OF DMPA CHAIR

3. GUIDANCE OF WMO/IOC/JCOMM
3.1 Seventeenth Session of WMO Congress
3.2 Twenty-eighth Session of IOC Assembly (incl.IODE restructuring)
3.3 Twelfth Session of JCOMM Management Committee

4. ETDMP
4.1 Report of ETDMP Chairperson
4.2 Outcome of ETDMP-5
4.3 Ocean Data Standards and Practices (incl. IODE Clearing House Service)
4.4 Quality Management
4.5 Ocean Data Portal

5. ETMC
5.1 Development of Marine Climate Data System
5.2 Development of CMOCs network
5.3 Global Data Assembly Centres (GDACs)
5.4 MARCDAT-4 Preparation
5.5 Cooperation with WMO Commission for Climatology (CCI)

6. CROSS-CUTTING DATA MANAGEMENT AND INTEGRATION ACTIVITIES

6.1 Report of outcome of the First Meeting of TT-MOWIS and recommendations
6.2 JCOMM Observations Coordination Group Perspective on Data Integration
6.3 GRA Data Integration
6.4 AtlantOS Data Integration Efforts

7. JCOMM DATA MANAGEMENT STRATEGY AND ITS IMPLEMENTATION PLAN

8. REPORTING TO JCOMM-V

8.1 Review intersessional activities of Data Management Programme Area
8.2 Promote data management outcomes of JCOMM

9. ANY OTHER BUSINESSES

10. REVIEW OF ACTION ITEMS AND WORK PLAN

11. CLOSURE OF THE SESSION

ANNEX II

List of Actions and Recommendation

AGENDA ITEM 2

1) Request RMIC/AP (NCOSM) to consult DMCG and OCG experts when developing workplan and training materials and to feed into OTGA modules.(ETDMP, NCOSM, ongoing) (in response DMCG-5, item 46)

2) Request DBCP to feed training materials into OTGA modules, to be discussed at DBCP-32, October 2016.(DBCP TT-CB, DBCP TC, IODE, WMO)

AGENDA ITEM 3

3) JCOMM should be kept well involved in the ongoing discussion by the IODE intersessional WG on the restructuring of the IODE, which will submit its report for consideration at the forthcoming 24th Session of IODE to be held in March 2017. (Engage Nadia in the next webex, Yutaka)

4) Continue to review and compare metadata standards, netCDF templates, specific vocabularies and code lists used in other projects, programmes and initiatives and recommend them as standards and best practices.

5) Encourage JCOMM members to volunteer to provide an expert review for submitted standards and best practices in respect with their field of expertise.

6) The DMCG urges IODE to urgently replace Don Collins, as member of ETDMP, and also request JCOMM secretariat to fill remaining vacant membership.

AGENDA ITEM 4

The DMCG welcomed the work plan of ETDMP-5[18], in addition, the DMCG to:

7) Request OCG vice chair for Standards and Best Practises to work closely with TT-ODS of ETDMP;

8) Continue to develop standards/best practices for submitted proposals in the marine community through the IODE/JCOMM Standards Process;

9) Encourage, by preparing and distributing an invitation for submissions, experts in respective communities to propose standards and best practices to be submitted to the ODSBP;

10) Invite JCOMM communities to establish a collaboration with IODE Ocean Data Portal by sharing of metadata, data and services.

11) IODE to encourage accreditation applications by more NODCs, using the *IODE* Quality Management Framework for National Oceanographic Data Centres.

12) IODE to continue CD in annual training course on Quality Management System Essentials for NODCs and ADUs.

13) Encourage OCG and ODP to collaborate closely on interoperability issues.

[18] file://internal.wmo.int/UserData/Redirected/cgallage/Downloads/DMCG-6-Doc-4.2-ETDMP-5_outcome_Rev%20(1).pdf

14) Encourage the deployment of more IODE ODP nodes with assistance of the Partnership Centre for IODE ODP by providing a required technical and training support.

15) Request TT-Metadata and TT-ODP to provide support for existing nodes and seek for more contributions in particular from the IODE/ODP ODINAFRICA regional node.

AGEND ITEM 5

16) ETMC to develop updated work plan for the 558/471 marine climatology chapters to make sure it will be submitted to JCOMM-5 for approval, in consultation with ETMSS. (March 2017)

17) ETMC to consult with ICOADS and WOD for their CMOC application. (by Oct 2017)

18) To consult with GDSIDB about its designation as GDAC or CMOC. (ASAP)

19) Coordinate with TT-MOWIS to clarify integration requirements to the WIS. (ASAP)

20) To incorporate MARCDAT-4 recommendations for MCDS as appropriate.

21) Consider nominations for retiring experts (ETMC, ETCCDI, TT-TDC) with relevant communities.

AGENDA ITEM 6

22) Request TT-MOWIS to keep DMCG and IODE officers informed when developing the guidance documentation, to seek their inputs and comments as appropriate.

23) The group recommended ETDMP and its TT-metadata to interact with SOT TT Pub47 regarding the redesign of metadata requirements and corresponding recommendations for SOT-9 and JCOMM-5.

24) The group recommended more general involvement of the OPA and JCOMMOPS in ETDMP and its TT-metadata , and a TT across all PAs should be considered to cover end-to- end metadata requirements.

25) Regarding third party stations and emerging data, the group recommended to distribute through GTS with an indicator (coded in station ID, or additional code in BUFR sequence 003001) that they are from third party platforms.

26) OCG to continue working with global observing networks to implement data interoperability framework, in consultation with DMCG.

27) Pilot project to demonstrate integration based upon EOVs:
   a. Sea_water_temperature (relatively well known)
   b. Oxygen (more difficult)

28) Refine vision for EOV pilot and distribute to networks to determine interest.

29) Engage with GRA's to provide data framework in support of GRA data portals.

AGENDA ITEM 7

30) Develop JCOMM DM Strategy and its Implementation Plan in a more concise and actionable way, with due attention to Climate Data (for Africa in particular). (Sissy with

Secretariat, in consultation with IODE, Sergey, Lydia, Eric, Peter, Nick, David Legler, Kevin)

31) Regarding CD in DM, including collaboration of WMO (Global Campus/ ETR) and IODE (OTGA), the group agreed to have modules on oceanography and marine meteorology in each other's courses.

AGENDA ITEM 8

32) All documents for JCOMM-5 need to be available in January 2017 for MAN-13 to review, and March 2017 for translation of 6 languages. The JCOMM-5 will be held on 23 – 29 October 2017, in Indonesia (RA5):

1) The proposal of revised DMPA strategy
2) Succession planning principles (implemented)
3) Contribution to WIGOS pre-operational phase including the JCOMMOPS contribution to OSCAR, Regulatory materials 558/471 (ETMSS takes lead)
4) Development of the MCDS / including CMOC
5) Substantial update of regulatory materials
6) TT-MOWIS work to link ocean systems with WIS
7) Sea ice standardization with IMO, IHO - partnerships
8) Open access GTS pilot
9) CD strategy and OTGA cooperation
10) Ocean data standards activities

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ANNEX III

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ANNEX IV

A Proposal for JCOMM Data Management Strategy
(see report of Sissy Iona)

1. Mission of JCOMM Data Management Programme Area (DMPA)

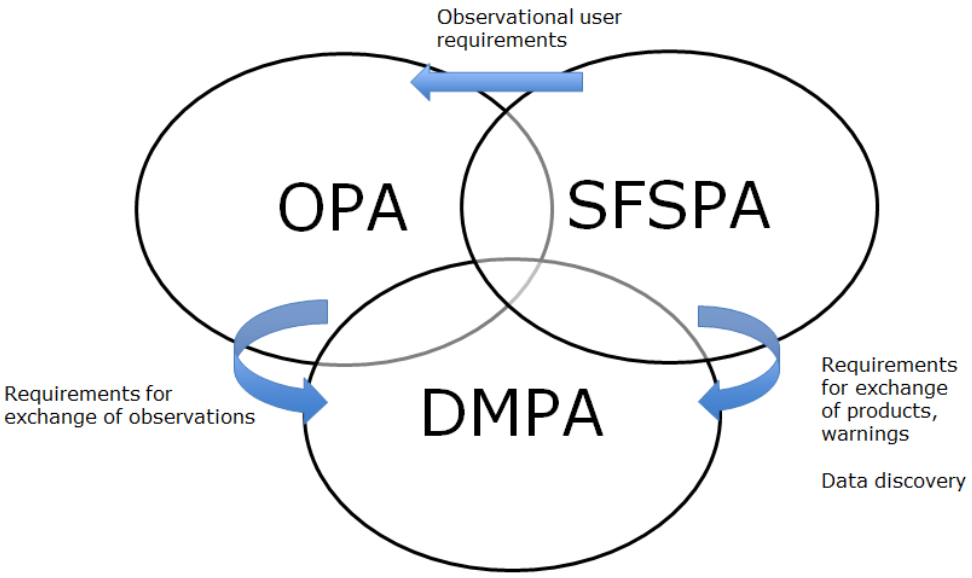
The primary objective of the JCOMM Data Management Programme Area is to implement a fully integrated end to end data management system across the marine meteorological and oceanographic community, in particular to address the requirements of the Observations Programme Area (OPA) and Services and Forecasting Systems Programme Area (SFSPA). Additionally DMPA will offer its expertise to assist other groups (e.g. OOPC/GCOS) to specify and implement their own data management requirements, with the overall goal of integrating their data management into the overall end-to end data management system.

The DMPA is to address the following requirements from the metocean community for observations and services:

8) To ensure timely delivery of integrated data and associated metadata in line with the IODE/IOC standards and the WIGOS Metadata Standards;
9) To develop and maintain monitoring, evaluation and follow up procedures;
10) To develop and comply with common practices including quality control, metadata, analysis, data flow and data exchange standards, formats and procedures;
11) To develop, and/or upgrade data systems and infrastructures, including the NODCs, DCPCs (WIS), Marine Climate Data System (MCDS), etc both within and outside of WMO and IOC/IODE;
12) To identify, rescue, digitize and archive historical data;
13) To develop and/or strengthen national data management capacity, especially in developing countries, such as ERDDAP;
14) Keep abreast of new technologies for data and metadata management, including big data, third party data and social networks.

2. Outline of the DMPA interactions with OPA and SFSPA

JCOMM works as an end to end programme from observations to services and forecasting, through data management. It is essential data management streamlined into the work of programmes of the process, and interact with OPA and SFSPA via two way communication.



2.1 Interface of OPA and DMPA

2.1.1 OPA interface to DMPA

The OPA requires timely and accurate data and metadata delivery in real time or delayed mode for various observing platforms, such as drifting and moored buoys, ice buoys, profiling floats, sub-surface ocean gliders, surface wave gliders, tidal gauges, tsunameters, and voluntary ships, etc. It is also critical to ensure free and unstricted data exchange to address user requirements, particularly for weather-, ocean- and climate- related disaster risk reduction.

2.1.2 DMPA interface to OPA

1) The DMPA collects, processes, analyses, distributes and archives data and metadata with agreed, and/or established formats and protocols, taking into account of the WMO WIGOS metadata standards. DMPA leads the development and transition of TACs to TDCs distributed via Global Telecommunication System(GTS).

2) WMO conducted examination of current quality management practices and procedures being used by WMO observing systems, and has been developing a WIGOS Quality Management guidance, mechanism, practices and procedures, where the WIGOS Data Quality Monitoring System (WDQMS) is an indispensable component.

3) In replacement of the legacy of the Marine Climatological Summaries Scheme (MCSS), JCOMM via its Expert Team on Marine Climatology (ETMC) is developing a new Marine Climate Data System (MCDS). This involves establishment of Global Data Assembly Centres for specialized observing systems (including Argo, drifting and moored buoys, etc) and a network of Centres for Marine Meteorological and Oceanographic Climate Data (CMOCs), as well as development of regulatory materials on marine climatology to be included and updated in the WMO Manual 558 and Guide 471. Data will be discoverable through the WMO Information System (WIS) and the IODE Ocean Data Portal (ODP).

4) Some data centres dealing with delayed mode data such as from data buoys will configure and install a server called, ERDDAP, to provide public access to these data, including rewriting data archives and creating accessible web folders in compliance with

the recommendations of the Earth Science Information Partners (ESIP) Attribute Conventions for Dataset Discovery (ACDD).

2.2 Interface of DMPA and SFSPA

2.2.1 Interface of SFSPA to DMPA

1) Metocean community services user requirements cover a broad range of data spectrum, from traditional marine weather information for safety at sea, to emerging needs of products and warnings for marine environment monitoring and coastal areas management.
2) In order to identify data requirements and gaps in the observing system for mutual benefits of in situ and satellite data community, JCOMM established a Task Team on Satellite Date Requirements to work collaboratively with satellite fora (within WMO, Integrated Observing Systems, IOS and beyond) for improved metocean data, products and services.
3) In recognition of the critical need for improved interoperability of marine meteorological and oceanographic data and metadata standards, ocean analysis and forecast products standards in compliance with WIGOS/WIS requirements, JCOMM in close collaboration with IODE/IOC set up a cross cutting Task Team for Integrated Marine Meteorological and Oceanographic Services within WIS (TT-MOWIS). TT-MOWIS has developed a work plan for integration and interoperability of marine data with WIS, including proposed governance for establishing marine DCPCs.

2.2.2 Interface of DMPA to SFSPA

In general, the DMPA provide quality controlled information and efficient data management system to support and facilitate improved forecasting and warning products and services, and services delivery capacity.

2.3 Interface of OPA and SFSPA

2.3.1 Interface of OPA to SFSPA

The interface of OPA to SFSPA may concerns observational gaps and capacity of observing systems, such as data quality, spatial and temporal resolution for NWP, climate monitoring and projections.

2.3.2 Interface of SFSPA to OPA

Observational requirements are important for the WMO Rolling Review of Requirements, which are expected to be comprehensive, systematic and quantitative to capture requirements of observing systems, and eventually those for ocean forecasting.

The JCOMM Expert Team on Operational Forecasting Systems (ETOOFS) is responsible to maintain, manage, review the requirements and make appropriate update proposals for marine meteorological and oceanographic application of the WMO Statement of Guidance.

3. Proposed Way Forward

1) DMCG to propose bulletin points/elements to be included in the strategy, and agree on who to provide what input by when

2) Develop its implementation plan to consist of existing ETDMP IP, ETMC IP, TT-SAT work plan, TT-MOWIS work plan, etc.
3) Decide on format for the implementation plan (e.g. deliverables, performance targets, performance indicators, deadlines, who is responsible)
4) DMCG-6 to discuss future JCOMM working structure for data management (new ToR of DMPA, DMCG, and what expert teams with their ToRs)
5) Discuss roadmap until March 2017 where all documentation for JCOMM-5 will have to be ready
    a. For reporting of achievement, new strategy, new Implementation Plan, ND new Working Structure
    b. What Recommendation to be submitted to JCOMM-5

ANNEX V

Proposed GDAC Terms of Reference (ToR)
Updates for WMO Pub. No. 471 (Chapter 3, Marine Climatology)

(Access full report from the link: file://internal.wmo.int/UserData/Redirected/cgallage/Downloads/DMCG-6-Doc-5.3-GDACs%20(1).pdf)

3. Global Data Assembly Centres (GDACs)

3.1 A global network of appointed GDACs will assemble and quality control meteorological and/or oceanographic data (real-time or delayed-mode) and metadata received from the appropriate DACs and then forward onto relevant CMOC(s).

3.2 Governance for defining the functions and adoption of GDACs is proposed by JCOMM and endorsed by the WMO Executive Council and UNESCO/IOC Executive Council or Assembly.
3.3 To meet these requirements GDACs must have the following:

Scope:

(a) Each GDAC will define its scope of activities, that is the types of observing platform(s) for which data shall be collected and compiled, and what quality control standard is being applied to the data before submission to a CMOC;

Capabilities:

(a) Each Centre must have, or have access to, the necessary infrastructure, facilities, experience and staff required to fulfill the approved functions;

(b) Each Centre must be able to apply defined WMO and IOC international standards applicable for Data and Quality Management;

(c) The JCOMM Data Management Coordination Group (DMCG) must assess each Centre, at least once every five years, to verify it meets the necessary capabilities and performance indicators as agreed by the Commission; (d) Each Centre must be interoperable with the WMO Information System (WIS) and/or IODE ODP.

Corresponding Functions and Tasks:

(a) Each Centre, within the confines if its agreed scope, must receive and assemble meteorological and/or oceanographic data (real-time or delayed-mode) and metadata from the appropriate DAC;

(b) Each Centre should identify duplicates within the dataset and if possible resolve;

(c) Each Centre should flag/link like-for-like observations and identify differences, where both real-time and delayed-mode data streams exist;

(d) Each Centre must have documented data processing and higher quality control procedures within its scope;

(e) Each Centre must provide feedback to the DACs on data quality issues;

(f) Each Centre must make discovery metadata available to the WIS & IODE ODP;

(g) Each Centre must forward the data and metadata to the appropriate CMOC(s) in agreed format(s) within defined time-scales; DMCG-6 / Doc. -4-

(h) Each Centre, within the confines of its agreed scope, must contribute to WMO and IOC Applications by collecting and processing worldwide marine-meteorological and /or oceanographic data and metadata (and optionally by mutually agreed CMOC-GDAC products) as documented in appropriate WMO and IOC publications (and to the extent that these functions are not already carried out by other existing data centres, but are complimentary to the functions of these centres);

(i) Each Centre must communicate and liaise within the GDAC network and the wider MCDS;

(j) Each Centre should report, on an annual basis, to the JCOMM Management Committee through the DMCG on its status and the activities carried out. JCOMM in turn should keep the Executive Councils of the WMO and the UNESCO/IOC Assembly informed on status and activities of the GDAC network as a whole, and proposed changes, as required.

Data Policy and Software Licensing Usage Rights Requirements

3.4 A GDAC must be committed to make all the data, metadata, and products falling within the scope of the GDAC network available to the international research community in a way consistent with WMO Resolution 40 (Cg-XII) and IOC Resolution IOC-XXII-6. Where applicable software should also be shared.

ANNEX VI

ACRONYMS

ADU	Associate Data Units
ASAP	Automated Shipboard Aerological Programme
CCHDO	CLIVAR and Carbon Hydrographic Data Office
CCI	Commission for Climatology
CDI	Common Data Index
CMOC	Centers for Marine-Meteorological and Oceanographic Climate Data
CONOPS	Concept of Operations
CSR	Cruise Summary Report
DAC	Data Assimilation Centre
DB	Drifting Buoys
DCPC	Data Collection and Production Center
DMCG	Data Management Coordination Group
DMPA	Data Management Programme Area
DOI	Digital Object Identifier
ECMWF	European Centre for Medium-range Weather Forecast
EOV	Essential Ocean Variable
ETDMP	Expert Team on Data management Practices
ETMC	Expert Team on Marine Climatology
ETMSS	Expert Team on Maritime Safety Services
EUDAT	European network of computing infrastructures
GCOS	Global Climate Observing System
GDAC	Global Data Assembly Center
GDSIDB	Global Digital Sea Ice Data Bank
GE-BICH	Group of Experts on Biological and Chemical Data Management and Exchange Practices
GE-MIM	Group of Experts on Marine Information Management
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GFCS	Global Framework for Climate Services
GRA	GOOS Regional Alliances
GTS	Global Telecommunication System
GTSPP	Global Temperature and Salinity Profile Programme
HQ-GDMCF	High Quality Global Data Management Framework for Climate
ICES	International Council for the Exploration of the Sea
ICOADS	International Comprehensive Ocean-Atmosphere Data Set (USA)
ICSU	International Council for Science
IMOS	Integrated Marine Observing System (Australia)
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data Exchange
IPCET-CDMP	Inetr-Programme Expert Team on Climate Data Modernization Program
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM in-situ observations Programme Support center
MARCDAT	International Workshops on Advances in the Use of Historical Marine Climate Data
MCDS	Marine Climate Data System
MCSS	Marine Climatological Summaries Scheme
NCDC	NOAA National Climatic Data Center (USA)
NCEI	NOAA National Center for Environmental Information (USA)
NCEP	NOAA National Center for Environmental Prediction (USA)
NGDC	National Geophysical Data Center
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centres
OBIS	Ocean Bio-geographical Information System
OCG	Observation Coordination Group

ODIN	Ocean Data and Information Network
ODP	Ocean Data Portal
ODSBP	Ocean Data Standards and Best Practices
OOPC	Ocean Observations Panel for Climate (GCOS-GOOS-WCRP)
OPA	Observation Programme Area
OSCAR	Observation Systems Capability Analysis and Review tool
OTGA	OceanTeacher Global Academy
PC	Partnership Centre
QMF	Quality Management Framework
QMS	Quality Management System
RDA	Research Data Allaince
RMIC	Regional Marine Instrument Centre
RNODC	Responsible National Oceanographic Data Centre
RSMC	Regional Specialized Meteorological Centre
RTMC	Real Time Monitoring Centre
SCG	Services Coordination Group
SDN	SeaDataNet
SeaDataNet	Pan-European infrastructure for Ocean and Marine Data Management
SFSPA	Services and Forecasting Systems Programme Area
SG-OBIS	Steering Group on Ocean Bio-geographical Information System
SOC	Specialize Oceanographic Centre
TT-MOWIS	Task Team for integrated Marine Meteorological and Oceanographic Services
VOS	Voluntary Observing Ships
WDQMS	WIGOS Data Quality monitoring System
WDS	World Data System
WESTPAC	IOC Sub-Commission for the Western Pacific
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WOD	World Ocean Database