WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

IODE OCEAN DATA PORTAL AND WIS TECHNOLOGY WORKSHOP

(OBNINSK, RUSSIAN FEDERATION, 18-19 MARCH 2009)

FINAL REPORT

JCOMM Meeting Report No. 67

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NOTES

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Regulation 43

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Chairperson, Publications Board
World Meteorological Organization (WMO)
7 bis, avenue de la Paix
P.O. Box No. 2300
CH-1211 Geneva 2, Switzerland

Tel.: +41 (0)22 730 84 03
Fax: +41 (0)22 730 80 40
E-mail: Publications@wmo.int

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C O N T E N T S

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EXECUTIVE SUMMARY

The IODE Ocean Data Portal and WIS Technology Workshop was held in Obninsk, Russian Federation, from 18 to 19 March 2009. The aim of the meeting was to address Ocean Data Portal (ODP) and the WMO Information System (WIS) technologies and interoperability issues in order to refine ODP version 1 and produce plans for ODP version 2.

The workshop reviewed the progress of the ODP version 1 development, discussed ODP and WIS interoperability issues to support the WIGOS Pilot Project fro JCOMM, and considered the reference model and development plan for ODP version 2.

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANIZATION OF THE SESSION

1.1 Mr Nikolay Mikhailov, Chairperson, JCOMM/IODE Expert Team on Data Management Practices, opened the meeting at 10h00 on 18 March 2009 at the Russian National Oceanographic Data Centre (NODC), All-Russian Research Institute of Hydrometeorological Information – World Data Center (RIHMI-WDC), Obninsk, Russian Federation, and welcomed participants to RIHMI-WDC. In his opening address Mr Mikhailov recalled that the meeting of the Joint Steering Group for the IODE Ocean Data Portal and the WIGOS Pilot Project for JCOMM, which was held in Geneva, Switzerland, from 18 to 19 September 2008, agreed to organize a workshop to address Ocean Data Portal (ODP) and the WMO Information System (WIS) technologies and interoperability issues in order to refine ODP version 1 and produce plans for ODP version 2. The objectives of the meeting were to review the progress of the ODP version 1 distributed data system for the WIGOS Pilot Project, to discuss ODP and WIS interoperability issues to support the WIGOS Pilot Project, and to consider the reference model and development plan for ODP version 2.

2. TECHNICAL OVERVIEW OF THE OCEAN DATA PORTAL

2.1 This Agenda item was introduced by Dr Sergey Belov. In his presentation Dr Belov stated that the architecture of ODP Version 1 is based on E2EDM technology which provides the functionality for building the distributed data system for IODE/JCOMM. ODP uses open standards and open source components and is based on the Service-Oriented Architecture (SOA) model. The ODP delivers a standards-based infrastructure that provides the integration of marine data and information from a network of distributed IODE NODCs as well as the resources from other participating systems as illustrated in Figure 1.

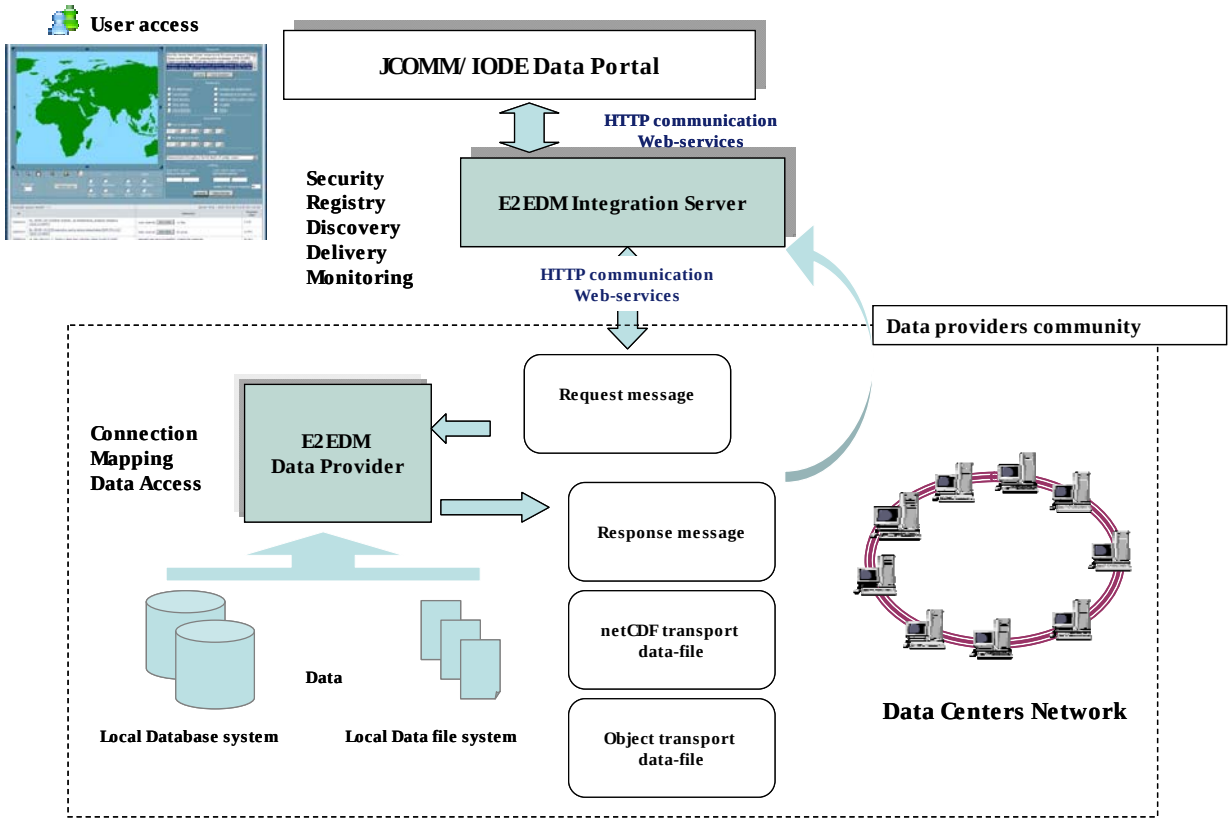

Figure 1: Ocean Data Portal version 1 - Architecture

2.2 The general requirements for ODP call for data providers to nominate and follow the specified technical requirements. The ODP software components can be installed remotely or locally. The IODE/JCOMM Ocean Data Portal web-site provides information on the project (including the documentation currently included in the E2EDM) in addition to assistance to users on how to use ODP and how to become ODP data providers. The ODP web site is at www.oceandataportal.org and the ODP user interface is at

http://www.oceandataportal.net.

2.3 Mr Sergey Sukhonosov then provided detailed information on the new components of ODP. The new version of the Data Provider software (v.1.1.4) provides performance optimization, additional control functions for dataset accessibility and improved web-interfaces for Data Provider Administrator and Operator. The features of the performance optimization include the ability to process information resources with data update frequency for the last day, last week, etc. Data files can be processed as instances (forecast, climate data) represented as data flows from systems.

2.4 New functional components under development are web-service communication and the "light data provider". To facilitate improved web-service communication, the download manager software has been developed and installed in SeaDataNet centres. The E2EDM communication protocol has been upgraded with web-service layer and monitoring information (data provider status checks by Integration Server, data request progress, data delivery) and this component will form part of work on ODP version 2. The "light data provider" is a modification of the data provider software which offers minimum functionality and is easy to install and configure. The "light data provider" concept is based on the data management scheme of the local data system of the participating organization and permits the generation of data files and appropriated discovery metadata files. The "light data provider" software will be placed at the Integration Server side so it is not a requirement to install any software agent at the participating organization. Remote data sources are registered by the "light data provider" and the metadata and data files are acquired from the remote location, using HTTP or FTP, and managed in the local resource catalogue. The integration server manages all data requests and metadata synchronization. This process is illustrated in figure 2.

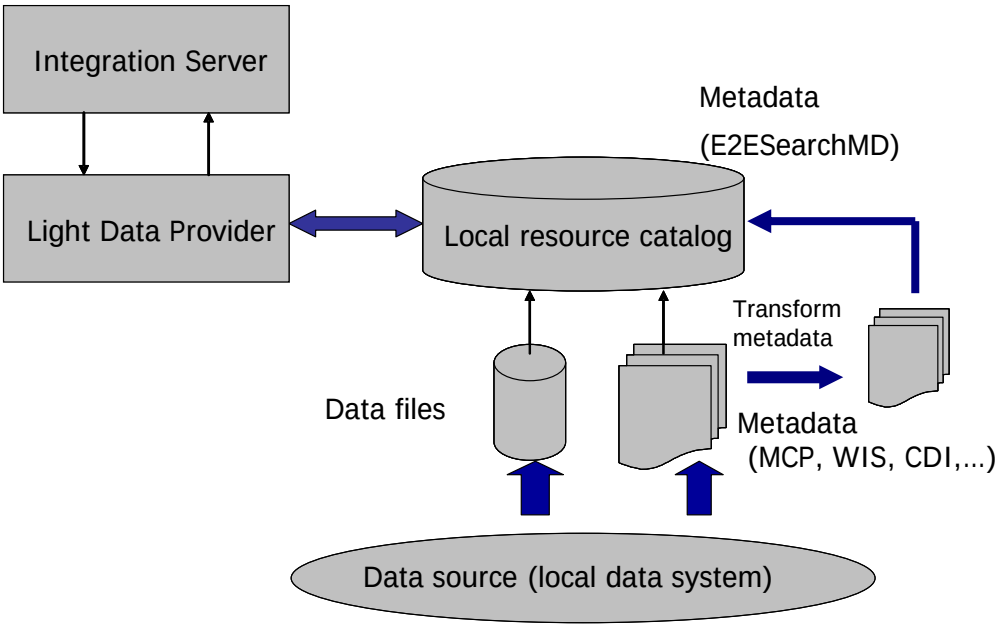

Figure 2: ODP Light Data Provider

2.5 Dr Belov then provided a demonstration of the updated ODP user interface.

2.6 The workshop noted with appreciation the success of the Russian NODC to develop the ODP technology and components. The workshop also noted that the current version of ODP (version 1) is ready for use by the JCOMM Pilot Project for WIGOS and recommended the development of simplified tools to integrate ocean and marine meteo datasets basing on partner local data systems. The Russian NODC agreed to complete the development of the new functionality for the Light Data Provider with linkages to discovery metadata generated by local data system. This will provide access to real-time data that is important for the WIGOS Pilot Project for JCOMM. [**Action: Russian NODC, by August 2009**]. The ODP software will include tools to monitor reports, user account statistics and user data access profiling [**Action: Russian NODC, by May 2009**]. A demonstration of the upgraded version 1 ODP will presented at the IODE-XX session in Beijing, China in May 2009. [**Action: Sergey Belov, by May 2009**].

3. THE ODP DISTRIBUTED MARINE DATA SYSTEM FOR WIGOS

3.1 Mr Greg Reed reviewed the JCOMM Pilot Project for WIGOS. The Pilot Project will be implemented jointly by WMO and IOC through JCOMM and has identified three key deliverables, (i) documenting and integrating instrument best practices and standards; (ii) building marine data systems that are interoperable with the WIS; and (iii) promoting quality management and standards.

3.2 The Pilot Project will make appropriate datasets available in real-time and delayed mode to WMO and IOC applications through interoperability arrangements between the WIS and the ODP. The Pilot Project will also address instrument best practices and traceability to agreed standards through enhanced cooperation with CIMO. Efforts are being made to update the WMO No. 8 Guide and other appropriate WMO and IOC documentation, establishing regional marine instrument centres, and conducting instrument intercomparisons. In terms of quality management, the Pilot Project will assist in the production of the JCOMM Catalogue of Best Practices and Standards for those standards of interest to WIGOS, and is promoting the joint IODE-JCOMM Standards process.

3.3 Mr Reed stated that cooperation with the ocean community is a key to the success of the Pilot Project, and the IODE NODCs will provide access to ocean datasets and this will be facilitated through ODP connectivity to the WIS. Due to the strong potential synergies between the ODP and the Pilot Project, a joint Steering Group has been established with balanced representation from the IOC and WMO communities. A number of organizations and programmes have been identified as potential partners and have been formally approached to confirm their commitment to the Pilot Project. Details of the work expected to be carried out to meet these deliverables and a proposed schedule and actions can be found in the Project Plan and Implementation Plan available at

http://www.wmo.int/pages/prog/www/wigos/marine_pp.html.

3.4 Mr Mikhailov provided a list of datasets that will be contributed to the ODP by partner organizations and programmes as part of the WIGOS Pilot Project for JCOMM. These datasets are:

- US NODC: World Ocean Atlas; World Ocean Database; GTSPP; surface currents from HF radar.
- Russian Federation NODC: data extracted from ESIMO – observation, analysis and forecast data and products (air temperature, wind, wave, sea level, current, water temperature, salinity, oxygen)
- Canada ISDM: upper-ocean T & S gridded in situ fields; and ocean currents derived from surface drifters
- UK BODC: sea level data from PSMSL

- UK Met Office or DWD via Virtual GISC: Marine Climatological Summaries and Global Collecting Centres (GCCs)
- Blended-quality climatology products (e.g., ICOADS); and Global High-Resolution Sea Surface Temperature Pilot Project (GHRSST-PP).

Other potential partners include:

- Profiling floats (Argo);
- Deep ocean time-series reference stations (OceanSITES);
- Tropical moorings (TAO);
- Drifters (DBCP);
- Ship-based observations in the SOT (ASAP, VOS, XBTs);
- Tide gauges (GLOSS);
- Water temperature and salinity profiles (GTSPP);
- Surface underway data (GOSUD); and
- Ocean carbon (IOCCP), etc.

3.5 The workshop strongly endorsed the expansion of data providers for the ODP and recommended that IOC/WMO prepare a follow-up to the letter sent to potential partners in December 2008, requesting confirmation of participation and a description of datasets to be provided. The dataset description should include the information provided in the dataset description template (Annex III) [**Action: Secretariats, by May 2009**].

3.6 Dr Belov provided an overview of common codes and dictionaries. There are 30 E2EDM code lists, 10 dictionaries available as web-services (administrative areas, buoys, cities, countries, districts and regions, oceans and seas, organizations, satellites, ships, stations), and 733 parameters (e.g. P0048_00 – Salinity, P0048_01 – Salinity: min, P0048_02 – Salinity: max, P0048_03 – Salinity: average). There is also the BODC parameter discovery vocabulary (http://seadatanet.maris2.nl/v_bodc_vocab/welcome.aspx) which is used by the SeaDataNet project.

3.7 The workshop agreed that the SeaDataNet (BODC) parameters and other controlled vocabularies should be used by ODP for common system codes and dictionaries. An additional parameter code is required for instrument type “unknown”. Discussions with the SeaDataNet technical team is required to develop codes for parameter statistics (e.g. temperature - minimum, maximum, average) and codes for the metadata elements that are stored together with data (originator, methods, instrument, latitude, longitude, etc.) [**Action: Nikolay Mikhailov, by April 2009**].

3.8 Dr Belov then provided an overview of the features of the integration server installed at the IOC Project Office for IODE in Oostende.

4. WIS DEVELOPMENT PROGRESS

4.1 Mr Eliot Christian provided a detailed overview of the WIS. According to the vision and goals, the WIS will:

- Be used for the collection and sharing of information for all WMO and related international programmes;
- Provide a structure that allows participating centres to enhance capabilities as their responsibilities grow;
- Build on the most successful components of existing WMO information systems in an evolutionary process;
- Pay attention to a smooth and coordinated transition;

- Build on WMO's Global Telecommunication System (GTS) and the Improved Main Telecommunication Network (IMTN);
- Use international industry standards for protocols, hardware and software.

The WIS will provide three types of services:

- Routine collection and dissemination service for time-critical and operation-critical data and products based on real-time "push" using dedicated telecommunication.
- Data discovery, access and retrieval service based on request/reply "pull" via Internet
- Timely delivery service for data and products based on delayed mode "push" using a combination of dedicated and public networks.

WIS defines three functional types of centres forming the core infrastructure of WIS:

- Global Information System Centres (GISCs),
- Data Collection or Production Centres (DCPCs) and
- National Centre (NCs)

4.2 The ODP has been designated as a WIS DCPC and will be a resource that can be discovered through the WIS GISCs (as illustrated in Figure 3).

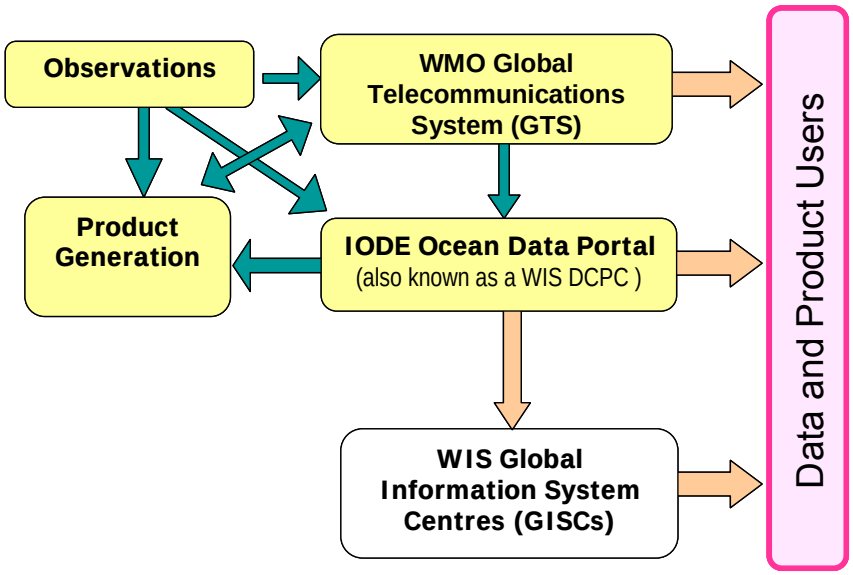

Figure 3: ODP discovery through WIS GISCs

4.3 All WIS reference documents, including WIS Project & Implementation Plan (v1.0), WIS Functional Architecture (v1.0), WIS Compliance Specifications GISC, DCPC, NC (v1.1), and Designation Procedures for GISC and DCPC are available at

http://www.wmo.int/pages/prog/www/WIS-Web/RefDocuments.html

4.4 The workshop noted that the WIS Technical Specifications provide the requirements for all WIS components and metadata/data management and delivery processes.

5. DISCOVERY METADATA COMPARISON

5.1 Mr Greg Reed introduced this agenda item. The International Standard ISO 19115:2003 (Geographic information — Metadata) defines over 400 metadata elements that can be used to comprehensively describe an information resource. The International Standard defines the schema required for describing geographic information and services and provides information about the

identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital geographic data.

5.2 The ISO standard acknowledges that it may not meet the diverse needs of all communities and there is provision to define additional metadata to better serve the special needs of users. One way to extend the standard is to create a profile which provides for a coordinated extension within a community of practice. This extension is known as a c*ommunity profile* and can be used to modify the complex comprehensive metadata standard for use by a specific domain or community.

5.3 The Marine Community Profile (MCP) is a subset of the international standard and includes all ISO 19115 core and mandatory metadata elements. In addition, the MCP has extended the ISO standard to support the specialized needs of the marine community. The MCP has been developed by the Australian Ocean Data Centre Joint Facility (AODCJF) to support the documentation of marine spatial datasets and to facilitate interoperability between the marine agencies across a distributed network of marine data centres. The MCP has changed the obligation and condition of three existing ISO 19115 elements. The MCP also defines four new metadata elements to augment the description of marine resources. The MCP has been implemented using the GeoNetwork metadata catalogue software, a standards based, open source catalogue application to manage spatially referenced resources through the web. GeoNetwork provides powerful metadata editing and search functions as well as an embedded interactive web map viewer. See http://geonetwork-opensource.org/ for more information. An example of the GeoNetwork implementation of MCP can be found at

http://www.metoc.gov.au/geonetwork/

5.4 WMO has recognised the importance of metadata for interoperability, specifically for the operation of the WIS. The WMO Core Metadata Profile, developed within the context of the ISO 19115 geographic information standard, aims (i) to facilitate data discovery, retrieval and reuse in the WMO community, and (ii) to ensure interoperability of information systems between the WMO Programmes. The CBS Inter-programme Expert Team on Metadata Implementation (IPET-MI), which is tasked with the development of the WMO Core profile, submitted version 1.0 of the WMO profile to the CBS Extraordinary session in 2006 (CBS-Ext.06) which was endorsed as the formal draft version 1.0 of the WMO Core Metadata Profile of the ISO Metadata Standard. This version of the profile included extensions to the ISO 19115 standard. The third meeting of IPET-MI (30 June - 2 July 2008) discussed ways to avoid the need for changes to ISO 19115 which were included in version 1.0. The meeting recommended removing the extended elements from the WMO Core and use only ISO 19115 elements. The new version would be known as version 1.1.

5.5 The Common Data Index (CDI) has been developed as part of the SeaDataNet project to provide users with the ability to discover marine data across the different SeaDataNet partners. To ensure interoperability with other systems and for international data exchange, CDI has adopted the ISO 19115 metadata standard and has defined a profile which is a subset of ISO 19115 standard. The CDI profile comprises about 150 elements from the ISO 19115 standard. CDI has also change the obligation of some ISO elements.

5.6 The workshop noted that the MCP and CDI are profiles of ISO 19115 while the WMO Core version 1.1 uses the full ISO standard. It was recommended that the WMO Core (version 1.1) be used for the development of ODP version 2. Further investigation is necessary to determine the requirements to develop a mechanism for the construction of templates (or profiles) of ISO 19115 based on specific semantic and spatial properties of the data [**Action: Russian NODC, by August 2010]**.

6. ODP AND WIS INTEROPERABILITY ISSUES

6.1 This was introduced by Dr Belov who discussed the interoperability issues in connection with ODP operations as a WIS DCPC for the WIGOS Pilot Project for JCOMM. Dr. Belov also used the example of design decisions for the Russian segment of WIS. The key features of ODP relating to the WIS Technical Specification are:

a) Catalogue synchronization. The DCPC-ODP will have one or several data sources based on Data Provider use and the metadata catalogue is synchronized by means of the Integration Server services.
b) Metadata uploading. The Data Provider (light version and full version) contains services for datasets registration, connection with the data and metadata catalogue update by creating ISO 19115 metadata records in the local catalogue. The Data Provider collects metadata from the contributing partners and updates the metadata catalogue. The Integration Server connects to the contributing partners and harvests metadata at specified times and provides archiving routines for collected metadata.
c) Data discovery and download ("pull"). Information is discovered manually by browsing the metadata catalogue of the ODP or by accessing the metadata catalogue of the GISC through the Integration Server.
d) Subscription ("push"). The Integration Server supports the subscription mechanism and the user can define one or more datasets, using appropriate metadata to specify the delivery point and time. Every time new data is available it will be pushed up to the specified location.
e) Access layer. The user, the roles and the rights are managed by ODP service using the administrator web-based interface. A role refers to GISC/DCPC user profile. For each dataset managed by DCPC-ODP, the user policies are defined by specifying which couple role / group can download the data.
f) Data restriction. Restricted resources access authorization is done by ODP Access Layer service, as well as user authentication. Each restricted catalogue entry has appropriate policies defined inside the XML file.
g) Product delivery. This can be data in original or derived formats, maps, tables and graphs.

6.2 The workshop noted that the current version of ODP is compliant with most of the WIS technical specifications for GISC/DCPC and the new components of ODP (see 2.4) will provide full compliance. Full ODP-WIS interoperability will be provided by reformatting the internal ODP metadata format into the WMO Core profile. The workshop discussed the need for interaction between contributing GISCs and the ODP. The name of a contact person and technical details of the contributing GISCs are required to allow the continued development of the ODP-WIS interoperability component and requested WMO WIS Project Office to provide details to the ODP developers at the Russian NODC [**Action: Eliot Christian, by April 2009]**.

7. ODP VERSION 2 REFERENCE MODEL AND DEVELOPMENT

7.1 Ms Kristina Belova outlined the proposal to develop version 2 of ODP. The new version will shift from standalone web-services, and will implement standardized methods of interface interaction to allow unified access to services from the ODP organizations and systems based on international standards, such as OGC and W3C.

7.2 The work plan for the development of version 2 will include technical specifications implementation, web-services implementation, web-services chains implementation, and service bus implementation. The reference model to be used for the ODP version 2 development will include:

- Enterprise viewpoint – the high-level vision of ODP focusing on goals, scope and policies.

- Information viewpoint – focusing on semantic modelling of data and metadata which the ODP should integrate and distribute.
- Computational viewpoint - the functional decomposition of the ODP into services that will interact with interfaces.
- Engineering Viewpoint - identification of ODP component types and preliminary technical requirements to support distributed interaction between the components.
- Technical viewpoint – deciding on the choice of technology elements in ODP.

7.3 A set of technical specifications will be prepared to detail the service implementation, the service bus interaction and the web-services implementation. The technical specifications will provide the interaction protocol requirements, input/output messages requirements, data format requirements, service register interaction requirements, cross platform compatibility requirements, and data type requirements. International standards to be considered in the development of ODP version 2 will include web-services standards (such as WSDL, UDDI, SOAP, XML, BPEL, WS-I Basic Profile 1.1), OGC standards (such as GML, WMS, WFS, WCS) and applied technologies (such as Java).

7.4 The workshop discussed the potential difficulties when combining both W3C and OGC standards. The development team will continue to prepare the technical specifications and submit these to the ETDMP for consideration and adoption. Mr Mikhailov recommended a meeting of ETDMP be held to discuss the ODP version 2 specifications. However the full membership of ETDMP will not be endorsed until JCOMM-III in November so the earliest possible time for a meeting would be December 2009 or early 2010. Mr Mikhailov will prepare a draft agenda for the ETDMP meeting and distribute to the IODE co-chairs before IODE-XX [**Action: Nikolay Mikhailov, by May 2009]**.

8. SUMMARY AND CLOSURE OF THE SESSION

8.1 The Meeting reviewed and agreed on the actions arising from the meeting. These are summarized in Annex V.

8.2 The meeting closed at 13h00 on 19 March 2009.

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ANNEX I

AGENDA

1. Organization of the workshop
2. Technical overview of the Ocean Data Portal
3. The ODP distributed marine data system for WIGOS
4. WIS development progress
5. Discovery metadata comparison
6. ODP and WIS interoperability issues
7. ODP version 2 reference model and development
8. Any other business
9. Workshop outputs and closure

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ANNEX II

PARTICIPANT LIST

Dr Sergey BELOV Scientific Officer	Russian National Oceanographic Data Centre (NODC) All-Russian Research Institute of Hydrometeorological Information – World Data Center (RIHMI-WDC) 6, Koroleva Street, Kaluga District OBNINSK 249035 Russian Federation E-mail: belov@meteo.ru
Ms Kristina BELOVA Software Engineer	Russian National Oceanographic Data Centre (NODC) All-Russian Research Institute of Hydrometeorological Information – World Data Center (RIHMI-WDC) 6, Koroleva Street, Kaluga District OBNINSK 249035 Russian Federation E-mail: christy@meteo.ru
Mr Leonid BEZRUK Head, Main Radio-Meteorological Centre	Main Radio-Meteorological Centre of the Rosgidromet 12, Novovagankovsky pereulok, MOSCOW 123242 Russian Federation E-mail: bezruk@mcc.mecom.ru
Mr Eliot CHRISTIAN Senior Scientific Officer	WMO Information System Observing and Information Systems Department, WMO 7 bis, avenue de la Paix CH-1211 GENEVA 2 Switzerland E-mail: EChristian@wmo.int
Mr Nikolay MIKHAILOV Head of Russian NODC Chairperson, JCOMM / IODE Expert Team on Data Management Practices	Russian National Oceanographic Data Centre (NODC) All-Russian Research Institute of Hydrometeorological Information – World Data Center (RIHMI-WDC) 6, Koroleva Street, Kaluga District OBNINSK 249035 Russian Federation E-mail: nodc@meteo.ru
Mr Greg REED Executive Officer, Australian Ocean Data Centre Joint Facility Co-chairperson, ODP-WIGOS Steering Group IODE Co-chairperson	Australian Ocean Data Centre Joint Facility Level 2, Building 89, Garden Island POTTS POINT NSW 2011 Australia E-mail: greg@metoc.gov.au
Mr Sergey SUKHONOSOV Software Engineer	Russian National Oceanographic Data Centre (NODC) All-Russian Research Institute of Hydrometeorological Information – World Data Center (RIHMI-WDC) 6, Koroleva Street, Kaluga District OBNINSK 249035 Russian Federation E-mail: serg@meteo.ru
Mr Mark VAN CROMBRUGGE IT Specialist	IOC/UNESCO Project Office for IODE Wandelaarkaai 7 8400 OOSTENDE Belgium E-mail: Mark.Vancrombrugge@iode.org

ANNEX III

DATA SET DESCRIPTION (TEMPLATE)

DATASET NAME	The name of data set used in the organization-data provider
CENTRE NAME	Full official name and abbreviation of the organization data provider. The abbreviation of the organization will be used for the unique identification of data submitted into distributed system
TIME PERIOD (*DD-MM-YYYY*)	The earliest and the latest dates of data to be presented to the system. If data are operatively updated – the start date is underlined and it is marked by plain text, that data are updated operatively.
GEOGRAPHIC COVERAGE	The name of the geographic area covered by the dataset.
PROJECT	The title of the project (or programme) which the data are collected. The URL of Web-site the project (or programme) should also be given.
PARAMETERS	The list of parameters and units of measurements f to the dataset.
INSTRUMENTS	The name of the observation instrument (or model of calculations) used for the data acquisition.
SUMMARY	The general characteristic of dataset (content, data sources, frequency of updating, etc.).
CODING SYSTEM	The list of dictionaries or codes used in dataset with a note "national/international" is given. Also the name of coding system and URL address of codes tables should also be given.
DATA WEBSITE	The URL address for on-line data access.
DATA STRUCTURE EXAMPLE	The URL address for the description of the data format and an example of the data file.
STORAGE MEDIUM	The system of a data storage, e.g. DBMS, the structured data files (format), object data files (images, GIS-shapes, etc.).
AVAILABILITY	Any restrictions placed on data access by the data provider.
CONTACT INFORMATION	The name and contact of data originator, data provider and person who made the dataset description.
DESCRIPTION DATE	Metadata description date (DD-MM-YYYY)

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ANNEX IV

DATA SET DESCRIPTION (EXAMPLE)

DATASET NAME: Black Sea Oceanographic Data Base

CENTRE NAME: Department of Marine Information Systems & Technologies of the Marine Hydrophysical Institute of the Ukrainian National Academy of

TIME PERIOD: 1890 - 2009

GEOGRAPHIC COVERAGE Black Sea, Sea of Azov,

PROJECT: Black Sea Oceanographic Data Base

PARAMETERS: Physical Oceanography:
Water bottle stations(T,S), CTD stations(T,S),Bathythermograph(T),
Currents, Waves, Sea level, Transparency.
Ocean Composition:
Oxygen ,Phosphate, Total-P, Nitrate, Nitrite, Silicate, Total-N,
Carbon dioxide, Hydrogen Sulphide, Chlorophyll-a content, pH,
Radioactivity, Isotopes.

INSTRUMENTS: Water-bottle, CTD

SUMMARY: All data of the cruises of MHI research vessels which were obtained in digital form or those which were digitized; Black Sea database, which is compiled from different national and international sources and which is the most complete database for this region. Copy of the oceanographic data set of the Soviet (Russian) NODC as for 1981. Full set of the databases of the CoMSBlack and NATO TU Black Sea Program international surveys in the Black Sea (1991-1995).

CODING SYSTEM: MHI local code system (reference on files with code tables)

DATA-WEBSITE: www.mhi.iuf.net

DATA STRUCTURE EXAMPLE: www.mhi.iuf.net/someplace/datafilesample.txt

STORAGE-MEDIUM: Data files in local ASCII format, 900 megabytes (reference on data file as example).

AVAILABILITY: Free

CONTACT: MIST, 2, Kapitanskaya str., Sevastopol, Ukraine, 99011,
Khaliulin Alexey, hhaliulin@alpha.mhi.iuf.net

DESCRIPTION DATE: 14.04.2009

ANNEX V

ACTION ITEMS ARISING FROM THE WORKSHOP

No	Action item	Ref	By	Deadline
1	To complete the development of the new functionality for the Light Data Provider.	2.6	Russian NODC	August 2009
2	To include tools for ODP to monitor reports, user account statistics and user data access profiling	2.6	Russian NODC	May 2009
3	To demonstrate the upgraded version 1 ODP at the IODE-XX session in Beijing, China	2.6	S. Belov	May 2009
4	To prepare a follow-up to the letter sent to potential partners in December 2008, requesting confirmation of participation and a description of datasets to be provided	3.5	Secretariat	May 2009
5	To discuss with the SeaDataNet technical team the requirements to develop codes for parameter statistics	3.7	N. Mikhailov	April 2009
6	To determine the requirements to develop a mechanism for the construction of templates (or profiles) of ISO 19115 based on specific semantic and spatial properties of the data	5.6	Russian NODC	August 2010
7	To provide contact and technical details of the GISCs contributing to ODP	6.2	E. Christian	April 2009
8	To prepare a draft agenda for the ETDMP meeting and distribute to the IODE co-chairs before IODE-XX	7.5	N. Mikhailov	May 2009

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ANNEX VI

ACRONYM LIST

AODCJF	Australian Ocean Data Centre Joint Facility
ASAP	Automated Shipboard Aerological Programme
BODC	British Oceanographic Data Centre
BPEL	Business Process Execution Language
CBS	WMO Commission for Basic Systems
CDI	SeaDataNET Common Data Index
CIMO	WMO Commission on Instruments and Methods of Observation
CTD	Conductivity-Temperature-Depth probe
DCPC	Data Collection and Production Centre (of WIS)
DBCP	Data Buoy Co-operation Panel
DWD	Deutscher WetterDienst
E2E	End-to-End Data Management
E2EDM	End-to-End Data Management Pilot Project
ESIMO	Archive and on-line oceanology data project (Russian Federation)
ETDMP	JCOMM/IODE Expert Team on Data Management Practices
FTP	File Transfer Protocol
GCC	Global Collecting Centre
GISC	Global Information System Centres (of WIS)
GHRSST	GODAE High Resolution SST Pilot Project
GLOSS	JCOMM Global Sea-level Observing System
GML	Geography Markup Language
GOSUD	Global Ocean Surface Underway Data Pilot Project
GTS	Global Telecommunication System
GTSPP	Global Temperature and Salinity Profile Programme
PP	Pilot Project
HTTP	Hypertext Transfer Protocol
ICOADS	International Comprehensive Ocean-Atmosphere Data Set
IMTN	Improved Main Telecommunication Network
IOC	Intergovernmental Oceanographic Commission
IOCCP	IOC International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange
IPET-MI	CBS Inter-programme Expert Team on Metadata Implementation
ISO	International Organization for Standardization
ISDM	Integrated Science Data Management (Canada)
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
MCP	Marine Community Profile
NC	National Centre
NODC	National Oceanographic Data Centre
OceanSITES	OCEAN Sustained Interdisciplinary Timeseries Environment observation System
ODP	IODE Ocean Data Portal
OGC	Open Geospatial Consortium, Inc.®
PSMSL	Permanent Service for Mean Sea Level
RIHMI-WDC	All-Russian Research Institute of Hydrometeorological Information – World Data Center
SeaDataNet	Pan-European infrastructure for Ocean and Marine Data Management
SOA	Service-Oriented Architecture
SOAP	Simple Object Access Protocol
SOT	JCOMM Ship Observations Team
TAO	Tropical Atmosphere Ocean network of tropical moorings
UDDI	Universal Description Discovery and Integration
VOS	Voluntary Observing Ship
W3C	World Wide Web Consortium

WCS	OpenGIS® Web Coverage Service Interface Standard
WDC	ICSU World Data Centre
WFS	Web Feature Service Interface Standard
WIS	WMO Information System
WIGOS	WMO Integrated Global Observing Systems
WMO	World Meteorological Organization
WMS	Web Map Service
WS-I	Web Services Interoperability Organization
WSDL	Web Service Definition Language
XBT	Expendable Bathythermograph
XML	Extensible Markup Language

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