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OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)
EXPERT TEAM ON MARINE CLIMATOLOGY

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FIRST SESSION

ITEM 2.3

GDYNIA, POLAND, 7 TO 10 JULY 2004

Original: ENGLISH

**REPORT ON THE FIRST SESSION OF THE EXPERT TEAM ON DATA MANAGEMENT
PRACTICES**

(Submitted by Ms Elanor Gowland)

Summary and Purpose of Document

This document presents the main areas of discussion at the first session of the Expert Team on Data Management Practices.

ACTION PROPOSED

The Expert Team on Marine Climatology is invited to note the information presented and take it into account when discussing related agenda items.

Appendix: Ad hoc Session of the JCOMM/IODE Expert Team on Data Management Practices (ETDMP)

DISCUSSION

Introduction

1. In this item I will be presenting the main areas of discussion at the first session of the Expert Team on Data Management Practices, held in Belgium, in September 2003. There were 3 working groups set up as a result of the meeting, and Appendix A details their current work status.

First session of the ETDMP

2. The meeting concentrated on the requirements for end-to-end data management, current data management systems, accompanying metadata, cooperation with other programmes and setting up pilot projects.

3. Specifications for E2EDM were given for GCOS, COOP and MMS, along with their requirements for satellite and sea ice data. This information along with the current data management practices for oceanography and marine meteorology were taken on board, and discussed in relation to 2 pilot projects (PP2 – Data assembly, quality control and quality assurance; PP3 – E2EDM prototype). The common themes were: elements and frequency of collection; timeliness, quality and availability of data; storage of data and associated metadata.

4. GRA (GOOS Regional Alliance) requirements are different, as they focus specifically on one country or region, but they should still work in a way that can fit into the global scheme.

5. There currently exists a number of metadata management systems. These different models have a number of cross-walks, but have been developed for particular purposes, so hold varying types of data to differing standards. This discussion formed the basis for one of the pilot projects (PP1 – Metadata management).

6. A review of the current status of these pilot projects is given in Appendix A. This is a report from an interim ETDMP meeting on 8 May 2004, which a small number of participants from the first session attended.

Previous reviews of the first session of the ETDMP

7. There is a comprehensive report from this meeting available through the JCOMM website <http://www.wmo.ch/web/aom/marprog/Wordpdfs/Jcomm-MR/JCOMM%20MR25%20DMP-I/>.

8. Professor Lin Shaohua gave a review of the progress in the Data Management Programme Area to the JCOMM management committee in March 2004. This focussed on the first session of the ETDMP, its activities, achievements and cooperation with other programmes.

ACTION PROPOSED

9. The Expert Team on Marine Climatology is invited to note the information presented and take it into account when discussing related agenda items.

Intergovernmental Oceanographic Commission



Ad hoc Session of the JCOMM/IODE Expert Team on Data Management Practices (ETDMP)

Hosted by Flanders Marine Institute

Oostende, Belgium
8 May 2004

IOC/INF-1199
Paris, 12 May 2004
English only

Abstract

The ad hoc Session of the JCOMM/IODE Expert Team on Data Management Practices (ETDMP) was held in Ostende, Belgium on 8 May 2004 after the 3-d session of the ICES/IOC Study group on marine XML held in Ostende, Belgium, 6-7 May 2004. The ETDMP members discussed the progress of the ETDMP Pilot projects and the ways to speedup their implementation. The group agreed on the necessary urgent actions and made the corrections to the Pilot projects Action Plan.

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- I. Agenda
- II. List of Participants
- III. List of Acronyms

1. ORGANIZATION OF THE SESSION

1.1 OPENING OF THE SESSION

The Ad hoc Session of the JCOMM/IODE Expert Team on Data Management Practices (ETDMP) was opened by the Chair of the team, Nick Mikhailov, on 8 May 2004 at 0930 at the offices of the Flanders Marine Institute (VLIZ), Ostende, Belgium. The Chair welcomed the participants and noted that the session was organized using the opportunity of participation of several group members in the 3-d session of the ICES/IOC Study group on marine XML held in Ostende, Belgium, 6-7 May 2004. The list of Participants is attached to this report as Annex II. The main task of the meeting is to analyse the progress of the ETDMP Pilot projects and speedup their execution. For the Secretariat, Vladimir Vladymyrov welcomed the members. He stated that the team should agree on details of concrete activities and related contracts to finish the pilot projects within one year.

1.2 ADOPTION OF THE AGENDA

The group adopted the agenda for the session as given in Annex I.

2. REVIEW OF ETDMP PILOT PROJECTS ACTIVITIES

The Chair referred to the previous session of ETDMP which was held as well in Ostende, Belgium, on 15-18 September, 2003. He reminded to participants that three Pilot projects were proposed at this meeting, namely:

- Pilot Project 1. Metadata Management
- Pilot Project 2. Data Assembly, Quality Control and Quality Assurance
 - 2a Unique Tags for Original Data
 - 2b Data Quality Assessment and Flagging
- Pilot Project 3. E2EDM Prototype

He also informed the participants that the JCOMM management committee endorsed the ETDMP-I work plan and urged the ETDMP to ensure timely completion of its work plan. Taking into consideration the well-defined work plan of the ETDMP and the scarceness of financial resources, the Committee agreed that Sessions of the DMCG and ETDMP planned for 2004 and 2005 should possibly be postponed and the funds should be used for the implementation of the ETDMP-I work plan. As suggested by the management committee IODE will be able to use the funds, set aside for the ETDMP meeting (approx. US\$ 22,000) to hire contractors to do the practical work. This decision gives the good possibilities to speedup the ETDMP pilot projects execution and to finish them within one year.

2.1 PILOT PROJECT I

Don Collins, the chair of the Pilot project I, informed participants that he had a difficult time getting started with this project, due the problems with e-mail connection with Ricardo Rojas and especially with recruiting experts from other disciplines. The major problems are with the meteorological data. They have totally other metadata aggregation compare to oceanographic data. For example, ODAS has very detailed metadata. Three weeks ago a person was found to work with meteorological metadata issue. The name was provided by Dr. Liz Kent at SOC. After the SGXML meeting held this week, many things are more clear.

Nick Mikhailov informed participants that some work is going on this issue in Russian NODC in parallel with the Pilot project I. It is necessary to find an expert in ODAS. Nick promised to distribute the available documents on ODAS and related Web links to the participants.

Proposals from Don Collins:

This is one area where we think it would be appropriate to hire one-two library graduate student to complete the matching between systems. Working full time, it may be possible to complete the integration of several tables within a month or two. It will cost about \$5,000-6,000.

Remove a task: Investigate possibilities of multilingual keyword management and maintenance, e.g., GCMD valids translated to and maintained in non-English languages. We are not ready to implement it yet.

2.2 PILOT PROJECT II

As the chairs of the Pilot projects II were absent, Nick Mikhailov have read the brief report on these projects development prepared by Bob Keeley. The text of this report is given below:

Unique Tags Project

In November 2003 I sent an email to members of the group describing how the unique tag we are going to use in GTSP is generated. This was deliverable 1.

In January 2004 I followed this up with another document that explored how this might be extended to other kinds of data. This was deliverable 3.

Today we have started the implementation (at long last) of the unique tag scheme in GTSP. We will not have results in time for your meeting, but I do expect to be able to say something in time for an OOPC meeting I have in June. I'll keep you posted on this. This will meet deliverable 2.

I had few in any responses to the discussion of the more generalized tag. I attribute this to people wanting to wait and see now well it works in GTSP before investing too much intellectual energy in it.

Data Quality Assessment and Flagging

In December 2003 I installed a set of web pages (http://www.meds-sdmm.dfo-mpo.gc.ca/meds/prog_int/standards/) That brought together information that a student of mine could find on QC on various topics. These pages have errors and likely omissions as well, but they are what he found. I sent an email about this in January 2004 to members of this Project. (deliverable 1a)

We are continuing to pursue this topic within Canada, as I reported at the ETDMP meeting. It has not progressed as quickly and so the discussion paper I was trying to put together for this month (deliverable 2 of the project) will be late.

In related work, MEDS, IFREMER, GODAE (at the Monterey server) are initiating a project to compare QC procedures and results for profile data. We will be looking at what passes and what fails each of our procedures to see how far apart we are in judging data quality.

On-line Data Dictionary

In another development in Canada, we have been pursuing the development of an on-line data dictionary that all of us can use. The object is first to stop divergence of codes for variables and second to initiate convergence to a common set. This is not a project under ETDMP but it clearly has relevance to OIT goals.

Have a look at http://www.meds-sdmm.dfo-mpo.gc.ca/meds/About_MEDS/standards. There is no reason that groups in other countries could not also participate in this venture. I simply need to get the appropriate code list from them, load them and then provide a username and password so that they can manage their codes, but also see what others are using. All of this is based on the GF3 strategy of a code applying to a variable measured in a unit. If different units are used for the same variable, a new code is required. Behind this implementation is another set of tables where I will separate variables from units and provide conversion formulae as appropriate. We are not there yet in Canada, so this part is not implemented.

If there is interest in other countries wanting to have their code tables included, I would be happy to talk to them about this. I believe that Anthony Isenor will raise this at the SGXML meeting.

Nick Mikhailov mentioned that the Pilot projects II were progressing successfully and they did not ask the additional funding. The results of the Pilot project IIa will be used in the pilot project III in case they are ready for use. He also informed the participants about a message from Catherine Maillard on the Sea DataNet project developments. Text of this message is given below:

“On behalf of our consortium, I have the pleasure to inform you that we (42 partners, IFREMER coordinator) recently submitted a proposal to EU for a new project "Sea DataNet" Design Study, for developing the Pan-European infrastructure for Ocean & Marine Data management and providing on line integrated data access to distributed heterogeneous systems.

The first objective of the programme is to simplify the access to distributed data by making use of the recent development of the communication technology and standards like ISO19115 (however not sufficient to process all the marine data). Another key objective is to develop the existing infrastructures in order they will be able, with minor further development to host, archive for the long term and manage the new observations collected, instead of recreating a new heterogeneous system for each new project. Finally, the distributed system should be able to prepare common products and indicators, based on the highest number of comparable data.

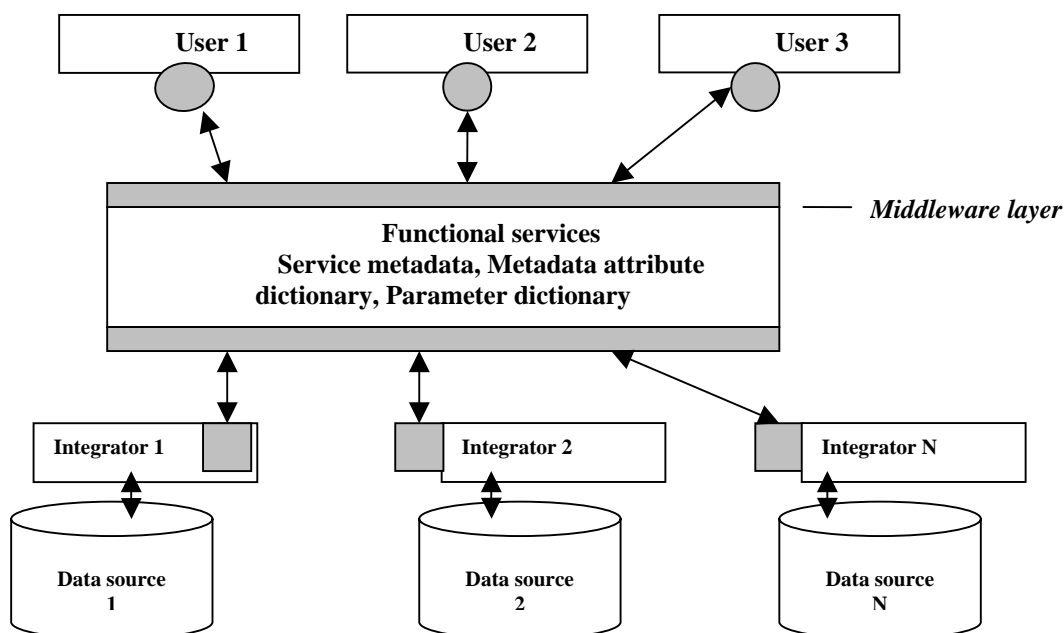
The design study would be the first 3-years phase of SeaDataNet to design and test a prototype and market the community of the different potential actors (data providers, financial supporters and users) in the operational phase. More information on this initiative is available on: www.seadatanet.org

The proposal takes into account the JCOMM requirements for data, and if successful, would at the same time provide a (hopefully) useful contribution to the pilot ETDMP projects and make use of the standards. If this were not the case, we would take into account the reviewers comments and take more time to discuss with all ETDMP WG before resubmitting (that was too short for this proposal, however Nick, Lesley and myself are in both). We expect the results of the reviewing process in July.”

2.3 PILOT PROJECT III

As the Chair of the Pilot project III, Nick Mikhailov described in details the scenario of the E2EDM prototype operation. The scenario determines the composition of parameters to be managed by the system and the composition of data sets/bases and thematic metadata to be considered as local data systems for testing the prototype system. For more efficient and full-fledged implementation of the scenario, it is necessary to coordinate the activities and outcomes of the three Pilot Projects. On February 2004 the E2EDM prototype scenario version was distributed to the ETDMP members to prepare a coordinated action scheme within the Pilot Projects. Unfortunately the agreed upon working version of the scenario was not prepared and some additional efforts are still required.

E2EDM integration technology architecture was presented and described:



1) **Data sources level.** From the technological viewpoint, a data source is a combination of a local data system and an integrator (software operating on the local data system side).

2) **Interaction environment level.** The interaction environment includes two functional layers:

- middleware – application servers, Web servers, transport protocols responsible for the base services such as connection, exchange of messages, security and other;
- information interfaces layer, which in fact is the implementation of the data exchange protocol.

Web server Apache and application server JBoss (Russian NODC uses JBoss Wonderland 3.2.3) are proposed as a middleware software.

Java 2 (Java Servlets, Java Server Pages, Enterprise Java Beans technologies) is proposed for the software support of information and other functional services. On the other hand, the possibility of using the existing software such as OpenDAP and DiGiR is also considered.

3) **Functional services level.** Two categories of services (software applications) are considered at this level: applications performing system functions and client applications of end users.

Specifications of the E2EDM prototype

Identification of parameters and data sets/data flows

It is proposed to concentrate on data and information of the following parameters:

- In-situ data, including marine meteorological – air temperature, sea surface temperature, pressure, wave (height and direction), wind (speed, direction) and ocean – temperature, salinity, oxygen, and some nutrients;
- satellite data – ocean color imagery data.

The following local data systems (data centres – providers) can be recommended to be involved to the E2EDM prototype for the proposed list of parameters:

1) Data

1. Historical (for the last 5-10 years) marine meteorological (air temperature, sea surface temperature, pressure, wave) data from one of the MCSS project data centers. Recommended center-provider: UK MetOffice (Elanor Gowlandt)). Type of the data source - local data files;

2. Historical (for the last 5-10 years) ocean cruise data (temperature, salinity, oxygen and, possibly major nutrients) from at least two of the IODE data centers (to be able to test the occurrence of a user request for ocean data which are placed in a number of local systems):

Recommended centers-providers:

(i) USA NODC(WDC-A) – Ocean Data Base, type of the data source - local data files.

(ii) Russian NODC(WDC-B) – IODE Ocean Data, type of the data source - DBMS.

(iii) VLIZ Ocean Data Base for the North Sea and some other regions, type of the data source - DBMS.

3. Delay-mode GTSP data (temperature, salinity from one of the local data system/data providers). Recommended center-provider: MEDS Canada, type of the data source – local data files;

4. Real-time GTS marine meteorological (SHIP) data (air temperature, sea surface temperature, pressure, wave, wind from one of the local data system/data providers). Recommended centre-provider: Russian NODC, type of the data source - DBMS;

5. Real-time GTS ocean (BATHY and TESAC) data (temperature, salinity data from one of the local data system/data providers). Recommended center-provider: Russian NODC, type of the data source - DBMS;

6. Real-time ocean (TESAC/ARGO) data (temperature, salinity data from one of the local data system/data providers) Recommended center-provider: IFREMER, type of the data source – DBMS (or local data files);

7. Monthly climatic fields (average and deviation, temperature, salinity, standard levels from one of the local data system/data providers). Recommended center-provider: USA NODC (WDC-A), type of the data source – local data files;

8. Analysis/forecast data from GTS (sea surface temperature and wave from one of the local data system/data providers). Recommended center-provider: Russian NODC, type of the data source - DBMS;

9. Ocean SST or/and colour imagery satellite data from one of the local data system/data providers.

2) Metadata

ODAS metadata from one of the local data centre/metadata providers (to be able to test the occurrence of user access to the Argo buoy description when the Argo data are handled);

Cruise (ROSCOP or other), organization, observation program metadata from one of the local data centre/metadata providers (to be able to test the occurrence of user access to the required metadata when data are handled).

3) Geographic area – North Atlantic, including Norwegian, North and Greenland seas.

Requirements to data centers-providers

Data centers that agree to provide particular information resources to the E2EDM prototype should provide:

- i) support for a local data system according to the agreed data list (a working variant of such list is given above);
- ii) functions of the appropriate middleware for communications: Web server and application server;
- iii) registration of sets of information resources and their instances according to the content of the local data system(s) of these centers;
- iv) also, installation of the Integrator software developed under the Pilot Project to provide the connection of the local data system (s) to the distributed data system.

One of the centers should take responsibility for managing the centralized service metadata catalog and Web site (portal) with user-interfaces as a single entry point to the E2EDM prototype. It can be done by the IODE Project Office.

Work to be done

Major tasks that are to be used as a basis for the contract work are formulated below.

- Task 1. Finalization of the Reference data model and development of specifications of E2EDM prototype.
- Task 2. Development of software for the E2EDM prototype data access services.
- Task 3. Development of software for E2EDM prototype Navigation services.
- Task 4. Supporting the data provider functions and centralized service metadata catalog/Web-portal managing during testing and demonstration stages of E2EDM prototype.

Task 1. Finalization of the Reference data model and development of specifications of E2EDM prototype.

Subtask 1.1. Finalization of the Reference distributed data model

Expected results: Working paper with general decisions for structuring information space and interactions of basic information elements.

Subtask 1.2. Development of the specifications of the metadata dictionaries for data unification

Expected results: Working papers with specifications of the metadata attributes and parameters dictionaries including standard specifications (name, codes/tags, descriptions and other) for selected ocean/meteo parameters and metadata required to manage selected data sets/bases. Basis of dictionaries – BODC Dictionary, SeaSearch results (IFREMER).

Participants: Russian NODC , IFREMER, BODC

Subtask 1.3. Development of the specifications of the service metadata

Expected results: Working papers with specifications of the service metadata attributes to provide search, navigation and access to distributed data sources (data source identifier, access address, semantic content attributes and other). It is specifications are developed taking account ESIMO (Russian programme), SeaSearch experience, and WMO standard proposals.

Participants: Russian NODC, IFREMER

Subtask 1.4. Development of the specifications of the Data Exchange Protocol

Expected results: Working papers with specifications of the structures and attributes for information interface layers: request exchange and data exchange between services (soft) and data sources.

Participants: Russian NODC

Subtask 1.5. Development of the specifications of the E2EDM functions

Expected results: Working papers with general (from functional viewpoint) specifications on E2EDM services: Navigation, Access, View.

Participants: Russian NODC

Estimated duration: 6 man/months

TASK 2 DEVELOPMENT OF SOFTWARE FOR THE E2EDM DATA ACCESS SERVICE

This software should provide the transmission of requests, access to the given data sources, conversion of data/products from the local data system structure to the Data Exchange Protocol structures, and combining of request results. The possibility of DiGiR/OpenDAP and other similar software should be considered. Integrator software should be installed in the centers (local data systems) involved.

Subtask 2.1. Development of software for the data access management

Expected results: Service software on the E2EDM prototype side for managing request operations – transmission to data source (s), connecting with data source integrator, aggregation of request results and passing to View service.

Participants: Russian NODC

Subtask 2.2. Development of software for the Integrator service

Expected results: Service software on the data source side for conversion the data from local data system into Data Exchange Protocol (data exchange layer is used).

Participants: Russian NODC, VLIZ (DiGir)

Estimated duration: 8 man/months

Task 3. Development of software for E2EDM prototype Navigation services.

This software should maintain the centralized service metadata catalog to ensure the check of the data source relevance, search and navigation of user requests across various data sources and etc..

Expected results: Navigation software on the E2EDM prototype side.

Participants: Russian NODC

Estimated duration: 4 man/months

Task 4. Development of software for search of and access to user interfaces.

This software should maintain the E2EDM prototype data presentation services supporting user search/access/viewing interfaces via IE browser, and visualization of data/products using an electronic map (GIS).

Expected results: User interfaces and data presentation software to provide View service on the E2EDM prototype side.

Participants: Russian NODC

Estimated duration: 4 man/months

Task 5 Supporting the data provider functions and centralized service metadata catalog/Web-portal managing during testing and demonstration stages of E2EDM prototype.

Expected results: see requirements to data centres for E2EDM data provider functions.

Participants: Russian NODC, USA NODC, IFREMER, UK MetOffice, MEDS, VLIZ

Estimated duration: 1 man/month for each centre

TASK 6. DEVELOPMENT OF E2EDM PROTOTYPE DOCUMENTATION

This documentation should include the descriptions of information (specifications of dictionaries, catalogs, protocol) and software (Access, Integrator, Navigator, View) components as well as user manuals.

Expected results: E2EDM prototype documentation

Participants: Russian NODC, USA NODC, IFREMER, UK MetOffice, MEDS, VLIZ

Estimated duration: 2 man/months

All work should be done within 12 months from the start of contracts. Provisional timetable is given below.

Task	1	2	3	4	5	6	7	8	9	10	11	12
Task 1												
Subtask1.1	X	X	X									
Subtask1.2	X	X	X									
Subtask1.3	X	X	X									
Subtask1.4	X	X	X									
Subtask1.5	X	X	X									
Task 2												X
Subtask1.1			X	X	X	X	X				X	X
Subtask1.2			X	X	X	X	X				X	X
Task 3					X	X	X	X			X	X
Task 4					X	X	X	X			X	X
Task 5								X	X	X	X	X
Task 6											X	X

The following discussion was very intensive. G.Reed underlined that the idea to use in the prototype both historical and real time data is very good and it will definitely show the advantages of the E2EDM system. Problem of the data duplicates was discussed and it was mentioned that at the moment there is no real solution for this problem. It was decided that the Pilot projects progress is at the moment insufficient and Immediate actions were discussed that would lead to the speedup of the Pilot projects execution. All participants strongly supported the statement that the Pilot projects have to be finished by summer 2005.

3. ACTION PLAN FOR 2004-2005

The group agreed on the list of following immediate actions:

- D. Collins will check at the WDC the forms in which the data from World Ocean Database are available (files, DBMS).

- VLIZ data centre will be actively involved in the Pilot project III as the data centre-provider.
- V. Vladymyrov will send a list of information required for the UNESCO contracts to the projects participants by may 17.
- N. Mikhailov and D. Collins will prepare all information for contracts by the end of May.
- All Contracts should be done not later than in June.
- N.Mikhailov with help from IODE will discuss and select several NODC for volunteer participation in the Pilot project III as the data centres-providers.
- The necessary travels and their cost will be estimated for the Russian NODC participants to install and check the developed software at the data centres-providers.

4. CLOSURE OF THE SESSION

The Chair thanked the Flanders Marine Institute for hosting the meeting. The ad hoc session of ETDMP was closed at 1330 on 8 May 2004.

ANNEX I

PROVISIONAL AGENDA

1. OPENING OF THE MEETING (N. MIKHAILOV)
2. PILOT PROJECT 1 – METADATA MANAGEMENT (D.COLINS)
3. PILOT PROJECT 2 – DATA TAGGING, DATA QUALITY ASSESSMENT AND FLAGGING
 - 3.1. DATA TAGGING (B.KEELEY)
 - 3.2. DATA QUALITY ASSESSMENT AND FLAGGING (C. MAILARD AND E. V. BERGE)
4. E2EDMP PROTOTYPE (N.MIKHAILOV)
5. WORKING PLAN FOR FUTURE - DISCUSSIONS

ANNEX II

LIST OF PARTICIPANTS

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ANNEX III

LIST OF ACRONYMS

BODC	British Oceanographic Data Centre
BUFR	Binary Universal Form for Representation of meteorological data
CBS	Commission for Basic Systems (WMO)
CMM	Commission of Marine Meteorology
COOP	Coastal Ocean Observations Panel (GOOS)
CRC	Cyclical Redundancy Check
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
DAC	Data Assembly Centre
DBCP	Data Buoy Cooperation Panel
DIF	Directory Interchange Format
DISS	Data and Information Systems and Services
DMAC	Data Management and Communication
DMCG	Data Management Coordination Group (JCOMM)
DODS	Distributed Oceanographic Data System
DTD	Document Type Definition
EDIOS	European Directory of the Initial Ocean-observing Systems
EDMED	European Directory of Marine Environmental Data
EDMERP	European Directory of Marine Environmental Research Projects
ETDMP	Expert Team on Data Management Practices
ETIDM	Expert Team on Integrated Data Management
ETMC	Expert Team on Marine Climatology
ETODRRGOS	Expert Team on Observational Data Requirements and Redesign of the Global Observing System (CBS)
E2EDM	End-to-End Data Management
FGDC	Federal Geographic Data Committee
FTP	File Transfer Protocol
FWIS	Future WMO Information System
GETADE	Group of Experts on the Technical Aspects of Data Exchange (IODE)
GEBCDMEP	Group of Experts on Biological and Chemical Data Management and Exchange Practices (IODE)
GCC	Global Collecting Centre (VOS)
GCMD	Global Change Master Directory
GCOS	Global Climate Observing System
GLOSS	Global Sea-Level Observing System
GML	Geography Markup Language
GOOS	Global Ocean Observing System
GOSIC	Global Observing Systems Information Centre
GOSUD	Global Ocean Surface Underway Data Pilot Project
GRA	GOOS Regional Alliance
GTS	Global Telecommunication System
GTSP	Global Temperature Salinity Profile Programme
ICES	International Council for the Exploration of the Sea
ICSU	International Council of Scientific Unions
ICOADS	International Comprehensive Ocean Atmosphere Data Set
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
IGOS-P	Integrated Global Observing Strategy Partners
IGOSS	Integrated Global Ocean Services System (IOC-WMO) [<i>superseded by JCOMM</i>]
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IODE	International Oceanographic Data and Information Exchange Programme (IOC)

IOOS	Integrated Ocean Observing System (US)
ISO	International Organization for Standardization
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JMS	Java Message Service
LME	Large Marine Ecosystem
MCSS	Marine Climatological Summaries Scheme
MDM	Marine Data Management working group (ICES)
MEDI	Marine Environmental Data Inventory
MEDS	Marine Environmental Data Service (Canada)
MML	Marine Markup Language
MMS	Marine Meteorological Services
NASA	National Aeronautics and Space Administration
NMDIS	National Marine Data and Information Service, China
NMS	National Meteorological Service
NODC	National Oceanographic Data Centre
NVODS	National Virtual Ocean Data System
NWP	Numerical Weather Prediction
OBIS	Ocean Biogeographic Information System
ODAS	Ocean Data Acquisition System
OIT	Ocean Information Technology Pilot Project
OOSDP	Ocean Observing System Development Panel
OPAG-IOS	Open Programme Area Group on Integrated Observing Systems (CBS)
OPeNDAP	Open-source Project for a Network Data Access Protocol
OWS	Ocean Weather Station
PMO	Port Meteorological Officer
PODAAC	Physical Oceanography Distributed Active Archive Centre
QC	Quality Control
SGXML	ICES-IOC Study Group on the Development of Marine Data Exchange Systems
SOAP	Simple Object Access Protocol
SOT	Ship Observations Team (OPA)
SST	Sea Surface Temperature
SVG	Scalable Vector Graphics
SVP	Surface Velocity Programme (WOCE)
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VLIZ	Vlaams Instituut voor de Zee/Flanders Marine Institute
VOS	Voluntary Observing Ships
VOSclim	VOS Climate (project)
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment
WSDL	Web Services Description Language
WWW	World Weather Watch (WMO)
XML	Extensible Markup Language