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Workshop Report No. 206

IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards

IOC Project Office for IODE, Oostende, Belgium, 21-25 January 2008

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ANNEXES

1. OPENING OF THE WORKSHOP

The workshop was opened on Monday 21 January 2008 by Mr. Robert Keeley, from ISDM-Canada, who co-chaired the workshop with Mr. Greg Reed, Executive Officer of AODCJF, Australia. Mr. Peter Pissierssens, Head of the IOC Project Office for IODE delivered a brief welcome to Oostende and to the IOC Project Office for IODE, the host institution, and described the agenda and documents. Mr. Etienne Charpentier of WMO delivered a brief welcome from the meteorological community, describing the general overall structure of the WMO as is relates to the marine community through the common activities of JCOMM. He continued by inviting the meeting participants to introduce themselves and to describe briefly their roles in marine data management. The list of participants is included as Annex I, and the annotated Agenda is included as Annex II.

2. OVERVIEW OF WORKSHOP OBJECTIVES

Mr. Keeley then gave an overview presentation, in which he stated that this is expected to be the first of a series of meetings that aims at furthering marine data interoperability. In particular the aim is to get broad agreement and commitment to adopt a number of standards related to ocean data management and exchange, thereby assembling not only the agreed conditions by which we operate, but in fact enact these agreements in our respective organizations.

Mr. Keeley proposed that the expected outcomes of this first meeting would be:

- Agreement on standards for selected topics;
- Plan of action to publish the standards through appropriate channels (e.g. ISO, best practices, etc.)
- A set of topics for which agreement can be reached with a little more discussion (either inter-sessionally or during the next meeting).
- Agreement on how to continue the standards setting process (including the selection of other topics, national implementations, wider community involvement, role of a steering committee, etc.).
- Assess the effectiveness of this meeting.
- Agree on procedure for topics on which no agreement was reached;
- Agree on priority items that might be discussed at the next meeting.

Mr. Keeley's presentation is reflected in the material presented in Annex III. His talk was followed by a wide-ranging discussion among all participants of workshop goals and modalities. The basic resource materials used by the workshop participants can be viewed on a special website at http://iodeweb2.vliz.be/omap/Standards/. These materials will be moved in early 2008 to www.oceandatastandards.org.

3. STANDARDS PROCESS

Tasks: The meeting was requested to recommend the process of formal publishing the standards/agreements reached at this meeting. This process should also include exposure to the wider community for comment, the process to solicit comment and reach agreement, and the method of preserving the community agreements that have been reached. In particular the meeting was requested to answer the following questions: (i) Communication of results: How do we expose those agreements to the wider community, get and respond to their

comments, and determine when support is sufficient to "declare" an accepted standard?; (ii) Infrastructure: Where and how do we hold the documentation of the accepted standards?

Agenda items 3.1 and 3.2 were consolidated into a single item. Presentations were made on the processes employed to agree on standards in SeaDataNet, by Dr. Rickards, in IOOS, QARTOD and NASA, by Ms. Bosch, the CF conventions, by Mr. Hankin, by ISO and IHO, by Mr. Keeley. Mr. Charpentier also informed the meeting of the recent agreement between WMO and ISO and the acceptance on WMO procedures by ISO.

The meeting discussed what documentation would be needed to describe a proposed standard and agreed that it should include (as a minimum):

- The scope of the standard,
- Its limitations (suitability of purpose),
- Needed tools or applications for effective support
- Rules for information conversion from existing systems
- Technical issues to be solved (& how to solve them)

The meeting also started to discuss possible mechanisms to install a standards setting process in IODE and JCOMM. At this point it was suggested that the meeting establish two sessional working groups to:

- draft a document template that will be used for the submission of a proposed standard;
- discuss the mechanisms (process) that will be required to “recommend” a standard for IODE/JCOMM use.

Outcome of the group on “Guidelines for completion of a proposal for common standards”

- The group had consolidated the ISO, IHO and DMAC templates;
- The Group recommended that the template should have the following structure:
    - Title
        - Subject of proposed work
    - Scope/Executive Summary
        - Outline of the problem
        - Proposed work
        - Deficiencies
    - Purpose and Justification
    - Relevant documents, citations
        - Technical specification structure (ISO)
    - Cooperation and liaison
        - Who to engage: JCOMM, IODE, WMO, ISO, etc
    - Contacts, acronyms
        - Proponent
    - Actions required
        - Prerequisites (issues to be resolved)
        - Endorse
        - Disagree
        - Comments

Note: Actions required: these will be actions taken by the body that reviews the proposal.

- Explanatory notes and clarifications for each "field" will need to be prepared

Decision:

- It was decided that the structure as proposed by the sessional working group is suitable. Some additional work needs to be done to prepare notes for all fields. Mr. Hankin and Ms. Bosch agreed to provide explanatory notes by end March 2008 of what should be included in each section to assist people using this template to submit a proposal.

Outcome of the group on "Process"

The group used as a starting point the template DMAC Standards Process, presented earlier by Ms. Bosch.

The Group considered which body could take on the task of the "internal review". In this regard the JCOMM/IODE Expert Team on Data Management Practices (ETDMP) was considered. It was noted that this Team had been focusing on its E2EDM pilot project but that the IODE Officers in their November 2007 session, had recommended a revision of the Terms of Reference of the Team as well as a renewal of the membership. In this regard it was noted that membership of JCOMM subsidiary bodies was a formal matter and that the earliest opportunity to revise the Terms of Reference and membership would be JCOMM-III in late 2009. It was noted that this delay was too long. The group further recommended that the IODE Project Office should be used to support internal discussions. Also a voting/polling system should be set up (similar to the system developed for DMAC).

Decision:

- The meeting decided that the IODE/JCOMM Standards process should be structured as displayed in Figure 1. Mr. Keeley, Mr. Mikhailov and Ms. Bosch will prepare the document that describes the process and circulate to meeting participants. This document will be submitted to the DMCG-3 meeting and therefore needs to be completed by mid March 2008.

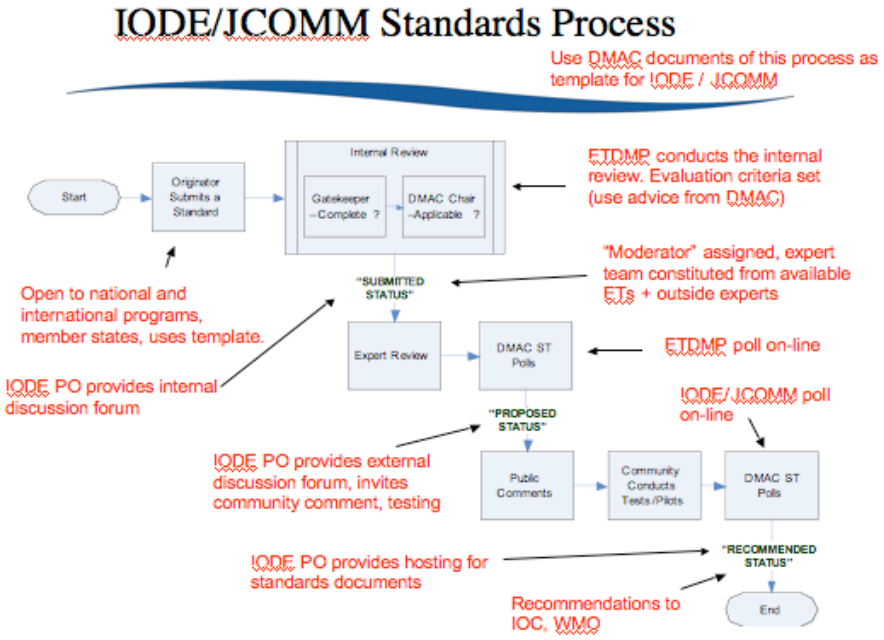

Figure 1

- Bearing in mind the need for adhering to the JCOMM rules regarding the terms of reference and membership of subsidiary bodies, the meeting recommended that a Pilot Project on the IODE/JCOMM Standards Process be established by the JCOMM DMCG during its next Session in March 2008. This Pilot Project should be managed by a Task Team of which the membership will be decided by the DMCG and IODE Officers, taking into consideration the recommendations of the "First Session of the IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards"
- It was further recommended that the process cycle should typically be between 12-24 months with shorter times being preferred.
- The meeting stressed that the standards dealt with by the IODE/JCOMM Standards process should be limited to oceanography and marine meteorology only.
- The meeting considered the question whether proposals could be submitted only by national/international groups or also by projects, individual institutions etc. The meeting decided that this would need further consideration. In addition the meeting recommended that other organizations such as ICES, PICES should be involved.
- The meeting further recommended that IODE/JCOMM should be pro-active in considering the need for certain standards rather than only wait for submissions as this would avoid that projects limited in time would create their own practices rather than submit a proposed standard.
- The meeting recommended that close collaboration should be established with other organizations such as GEOSS to widely advertise and promote the adopted standards.

4. TOPIC DISCUSSIONS

4.1 Metadata

Mr. Greg Reed introduced this item and moderated discussions. Mr. Reed provided background on the international standard for metadata (ISO 19115:2003 Geographic information - Metadata) and discussed two profiles of ISO 19115 that are being implemented in the marine and meteorological communities (the Marine Community Profile and the WMO Core Profile).

Task: the meeting was requested to consider the adoption of a suitable metadata standard.

Mr. Reed explained that a metadata profile is a subset or modification of the published standard. A profile tailors a complex comprehensive metadata standard for application in a specific domain or community. A profile can include extensions to the standard. ISO 19106 describes the procedures for the development of profiles and their registration. He proposed to consider two profiles:

- The Marine Community Profile (MCP): developed by the AODCJF for the Australian marine community. It includes all ISO core metadata components as well as extensions to meet specific community needs;

- WMO Core Metadata profile: a metadata standard to be used in the WMO Information System (WIS). Its aims are (i) to facilitate data discovery, retrieval and reuse in the WMO community and WWW Programme and (ii) to ensure interoperability of information systems between the WMO Programmes. Version 1.0 of the profile was endorsed in 2006. Full documentation is expected to be available in

January/February 2008. Version 2 is expected to include feature type definitions and feature catalogues in order to create the relevant features for WIS.

He concluded that:

- ISO 19115 is becoming widely used in the geospatial community;
- Adopting ISO 19115 (or a profile) by IODE/JCOMM will ensure interoperability with the broader community;
- Both candidate profiles meet the needs of specialised communities

The meeting noted that the SeaDataNet CDI had not been considered.

Decisions:

- The meeting agreed that ISO-19115 or a community profile of ISO-19115 should be used for creating discovery metadata but did not identify a recommended profile;
- It was agreed that Mr. Reed will undertake a comparison between CDI, MCP and WMO core profiles [deadline: end of April 2008];
- It was agreed that Mr. Reed will recommend a metadata profile that will meet the needs of the community and will be interoperable with other community and project profiles [deadline: mid-2008];
- The Canadian NODC will upgrade the metadata creation tool to support the recommended profile and make it available (assuming resources become available). [deadline: end of March 2009];
- In addition to the Canadian metadata tool, consideration should also be given to the "Mikado", Java tool developed by SeaDataNet;
- It was agreed that SeaDataNet will help test compliance to ISO-19115 of the Canadian discovery metadata records; by March 2009.
- It was agreed that functional requirements for discovery and other metadata, based on E2E experience will be prepared by N. Mikhailov [deadline: mid February 2008]

4.2 Ontology Resources

Mr. John Graybeal introduced this item and moderated discussions. He gave a presentation on existing ontologies, ontology tools, ontology services, and ontology processes that could be applicable, with indications as to which are most mature.

Task: The meeting was requested to discuss this information and decide how the tools and solutions offered may advance the setting of standards, and identify the most mature ontology resources.

Mr. Graybeal informed the meeting that Gruber (1993) defines ontology as "an explicit specification of a conceptualization". He identified the following best standards for ontologies:

- OWL (web ontology language)
- OWL-DL (for ontologies with active relationships)
- OWL-Full
- SKOS RDF (for dictionaries, thesauri, mappings)
- RDF

He further recommended Protégé (http://protege.stanford.edu/) and SWOOP (http://code.google.com/p/swoop/), In addition he referred to ontology tools that enable reusing existing data that either convert to ontologies (Voc2owl, Voc2RDF) or that map terms (VINE, Excel). He then noted that OGC SWE and ISO use ontologies. The OBO Foundry

(http://obofoundry.org/) is a collaborative experiment involving developers of science-based ontologies who have established a set of principles for ontology development with the goal of creating a suite of orthogonal interoperable reference ontologies in the biomedical domain. Currently the OBO Foundry ontologies form a part of the wider Open Biomedical Ontologies family, as listed below. In the longer term it is intended that the OBO Foundry will form one collection of ontologies alongside other such collections within the NCBO Bioportal.

Mr. Graybeal presented the following recommendations:

- Allocate resources to keep track of all of this
  - Develop criteria for evaluating resources
  - Develop process by which to apply criteria
- Develop technically credible best practices guide
- Push on resolvable tasks:
  - Decide on URI format to use
    - If URN resolver is needed, build one
  - Develop repository with services for ontologies
- Migrate best vocabulary content into ontologies

Important comments from participants included the observation that there is still work required to develop ontologies and their use as routine tools for the marine community and that until this happens, we should strive to agree on stable, well supported vocabularies.

Decision:

- There was no recommendation on the use of ontologies at this time. More work is required and should be supported by IODE and JCOMM.

4.3 Date and Time

Mr. Greg Reed introduced this item and moderated discussions. He reviewed the various date and time formats available for adoption, and presented a case for one.

Task: The meeting was requested to discuss the merits of choosing a single format or perhaps adopting a limited number of formats. The meeting was requested to provide its advice on the optimum solution for our community (best practice and recommended standard).

Mr. Reed suggested ISO 8601:2004. Data elements and interchange formats — Information interchange — Representation of dates and times. He noted that the standard offers representations for the following:

- Date
- Time of the day
- Coordinated universal time (UTC)
- Local time with offset to UTC
- Date and time
- Time intervals
- Recurring time intervals

The standard can be used in its basic format that has a minimal number of characters (e.g. 20080121) or in its extended format that adds characters to enhance human readability (e.g. 2008-01-21). He further noted that ISO 8601 is widely used in the geospatial and marine communities and it is well documented with sound governance. However he also pointed out that there are issues with:

- Non-Gregorian dates.
- Time references for time series data

Decisions:
- It was recommended to adopt the ISO-8601 standard (using extended format) where appropriate while recognizing some limitations;
- It was agreed that Mr. Reed will write the submission document [deadline: end of 2008, depending on the availability of the template].

4.4 Latitude, Longitude and Altitude

Mr. Greg Reed introduced this item and moderated discussions. He reviewed the various ways latitude, longitude and altitude are represented in standards and so are available for adoption.

Task: The meeting was requested to discuss the merits of choosing a single representation or perhaps adopting a limited number. The meeting was further requested to provide its advice on the optimum solution for our community (best practice and recommended standard).

The meeting was informed that:

- Latitude, longitude and altitude/depth may be presented in different fields in electronic form to simplify machine processing.
- There is a need to include the coordinate reference system (CRS).
- There is a CRS proposed for non-spatial coordinates (such as pressure) as the vertical coordinate

Decisions:
- It was recommended to adopt the ISO-6709 standard;
- It was agreed that Mr. T. de Bruin will write the submission document [deadline: end of 2008, depending on the availability of the template].

4.5 Countries

Mr. Greg Reed introduced this item and moderated discussions. Mr. Reed reviewed the various lists of countries that exist and are available for adoption. He presented a case for selecting one.

Task: The meeting was requested to discuss the merits of choosing a single representation or perhaps adopting a limited number. The meeting was requested to provide its advice on the optimum solution for our community (recommended standard and justification).

The meeting considered the need for country codes and stated that country codes enable to link a unique code with a geopolitical entity regardless of language.

Mr. Reed considered three standards: (i) GCMD Location keywords; (ii) IOC country codes; and (iii) ISO 3166. He summarized the options as follows:

- ISO 3166 - Complete list of current countries; list of former countries; issue with re-use of codes for former countries;

- IOC Country Codes - Widely used in the marine community; governance unclear; is a combination of country and ship codes;
- GCMD Location Keywords - More than countries; some inconsistencies in classification; no coding.

The meeting made the following observations:

- The IOC/ICES standard has been used extensively by IODE NODCs and ICES member countries;
- The IOC/ICES country code system was the responsibility of the RNODC at ICES up to 2003. ICES has continued to maintain the codes for SeaDataNet;
- The ISO country code system is maintained routinely;
- WMO Publication 47 is using the ISO country codes.

The group recognized the importance of regular maintenance but expressed concern that many IODE NODCs and ICES member countries have considerable legacy holdings that use the ICES/IODE country codes.

Decisions:
- It was recommended to adopt the ISO-3166 (3166-1 and 3166-3) standard;
- It was agreed that Mr. Roy Lowry, Mr. H. Parner and US-NODC will map the IOC/ICES country codes to ISO-3166 [deadline: end of June 2008];
- It was agreed that Mr. Lowry will monitor ISO-3166 and keep his list up to date;
- It was agreed that US-NODC will prepare the submission document including text that explains the advantages of converting to this standard. [deadline: March 2008, depending on the availability of the template].

4.6 Platforms

Mr. Hjalte Parner introduced this item and moderated discussions. Mr. Parner reviewed the various lists of platforms that exist and so are available for adoption.

Tasks: The meeting was requested to discuss the merits of choosing a single representation or perhaps adopting a limited number. The meeting provided its advice on the optimum solution for our community (recommended standard and justification).

Decisions: see 4.7

4.7 Platform Types

Mr. Roy Lowry introduced this item and moderated discussions. Mr. Lowry reviewed the various lists of platform types that exist and so are available for adoption.

Tasks: The meeting was requested to discuss the merits of choosing a single representation or perhaps adopting a limited number. The meeting was requested to provide its advice on the optimum solution for our community (recommended standard and justification).

Mr. Lowry defined the term “platform” as “Vehicles, objects, structures or organisms capable of bearing sensors, instruments or tools for the collection of physical, chemical, geological or biological samples”. A “platform instance” is a physical manifestation of a platform. A “platform category” is a term used to label a group of platform instances that possess a common set of attributes.

He stated that legacy data models are too simple:

- Many legacy data models assume a 1-to-1 relationship between data entity and platform type
- Even if multiple platform types are allowed their relationship isn't documented
- This causes problems (e.g. when describing a CTD mounted in a SeaSoar towed by a research vessel)
- Structures from up and coming data models like SensorML and Observations and Measurements need to be introduced into legacy systems

He then considered the platform lists used by GCMD, WMO, MDG77 and GF3. He noted that in GCMD the entity definition includes (but is not confined to) both platform instances and categories. There is some evidence of content governance breakdown (e.g. allowing in an organisation). The WMO platform list is well thought out, but very domain specific. The GF3 coding has no central governance and the many local copies of the base list have evolved.

Mr. Lowry proposed the following way forward:

- Repair L061 (vocabulary of SeaDataNet platform classes);
- Open up L061 content governance using the SeaVOX facilities of SeaDataNet
- Establish mappings to lists in heavy community use (MGD77, WMO, USNODC)
- Establish mappings to platform instance lists (e.g. GCMD) to establish semantic bridge to metadata populated using instances

Decisions:

- The meeting did not identify a recommended standard;
- It was agreed that ICES and US NODCs should continue the maintenance of their current lists;
- It was agreed that Mr. Lowry should repair L061, open content governance using SeaVox, establish mapping to other lists and mappings to instances (such as ICES) [deadline: end of June 2008]

Note on Tasks for topics 4.8-4.12: For all quality control topics the meeting was requested to:

- Identify existing practices for determining data quality;
- Identify where practices (QC tests) are common across standards;
- Provide a recommendation for standard QC tests.

4.8 Quality Control: Temperature and Salinity Profiles

Mr. Loic Petit de la Villeon introduced this item and moderated discussions. He reviewed the various quality control procedures that exist for verifying temperature and salinity profiles.

Mr. Loic Petit de la Villeon stated that the GTSPP realtime QC manual (IOC Manuals and Guides No 22), if revised, should be considered as the reference manual. He noted that the Argo QC manual is too much "instrument dependent". He then addressed a number of specific issues such as QC flags scale, terminology, metadata, data, spikes detection, gradient detection, density inversion, grey list, visual QC.

Decisions:

- The meeting did not identify a recommended standard;

- It was agreed that Mr. R. Keeley and Mr. G. Reed will request GTSPP (through its Chair, Charles Sun), the Argo data management team, the DBCP and SOOPIP to revise IOC Manuals and Guides No. 22; [deadline: to be negotiated with Mr. Sun];
- It was agreed that GTSPP should prepare the submission document [deadline: to be negotiated with Mr. Sun].

4.9 Quality Control: Surface Temperature and Salinity

Mr. Loic Petit de la Villeon introduced this item and moderated discussions. He reviewed the various quality control procedures that exist for verifying surface (and near surface) observations of temperature and salinity.

He considered the following standards for consideration:

- AOML steps to Quality Control TSG data
- Coriolis Data Centre in-situ Data Quality Control (March 2005)
- GOSUD Real-time QC (version 1.0)

Decisions:

- The meeting did not identify a recommended standard;
- It was agreed that Mr. Keeley and Mr. Reed will request GOSUD (through Mr. L. Petit de la Villeon, GOSUD Co-Chair) to revise their QC documentation (reference was made to the GOSUD meeting that will take place in June 2008) [deadline: end of August 2008];
- It was agreed that the revised GOSUD QC documentation should be added to the oceandatastandards reference web site (see Agenda Item 6) [deadline: end of August 2008].

4.10 Quality Control: Sea Level

Dr. Lesley Rickards introduced this item and moderated discussions. She reviewed the various quality control procedures that exist for verifying sea level observations. She identified the following data values of sea level would be considered:

- digitised from paper chart records or obtained electronically at higher frequencies
- from bottom pressure recorder data and water level recorders

Quality Control requirements may be different depending on sampling interval, latency and use to which data are put.

The scope of quality control includes: (i) information (metadata) to accompany the data; (ii) automatic checks (iii) “scientific” quality control; and (iv) quality flags. She noted that the following documentation is available:

- IOC Manuals and Guides No 14, Volumes 1-4
- GLOSS Technical Workshop Reports
- ESEAS QC document
- National authorities (e.g. NOAA/NOS, BoM/NTC, etc.) – not all readily available (and – obviously – not all in English)
- PSMSL/GLOSS Training web-pages
- IOC Manuals and Guide 26
- Software packages plus documentation (UHSLC, POL TASK, TideTasks for Windows, etc.) - Note: there is a difference between QC and software packages.

Decisions:

- The meeting did not identify a recommended standard;
- It was agreed that Dr L. Rickards will lead the revision of the ESEAS QC document in close collaboration with the GE-GLOSS [deadline: April 2009];
- It was agreed that Dr L. Rickards will prepare the submission document [deadline: early 2009];
- It was agreed that Mr. R. Keeley will write QC manual guidance material (i.e. evaluation material for standards review) [deadline: before June 2008 GOSUD meeting].

4.11 Quality Control: Currents

Dr. Lesley Rickards introduced this item and moderated discussions. She reviewed the various quality control procedures that exist for verifying current observations.

Dr. Rickards noted that her discussion was restricted to data from recording current meters and from moored acoustic Doppler current profilers (ADCPs) but not from surface drifters and shipboard ADCPs. The quality control requirements may be different depending on sampling interval, latency and use to which data are put.

The scope of quality control includes: (i) information (metadata) to accompany the data; (ii) automatic checks (iii) "scientific" quality control; and (iv) quality flags.

She noted that the following documentation is available:

- SIMORC Data Quality Control Procedures
- IOC Manuals and Guides 26
- Council Cooperative Research Report: Current Meter Data Quality International Council for the Exploration if the Seas. 1989
- ICES WGMDM Guidelines for Moored Current Meter Data
- ICES WGMDM Guidelines for Moored ADCP Data
- QARTOD Reports and PowerPoints
- National Data Buoy Center Tech Doc 03-02
- TAO Data Quality Control Page
- WOCE Current Meter DAC QC procedures

The meeting was informed that documentation for data management standards for High Frequency radar data is available from the U.S. IOOS programme.

Decisions:

- The meeting did not identify a recommended standard;
- It was agreed that Ms. Z. Willis will provide a document on moored ADCPs and current meters to Dr. L. Rickards who will consolidate these with IOC Manuals and Guides No. 26 and provide the result for inclusion in the oceandatastandards reference web site [deadline: September 2008];
- It was agreed that Ms. J. Bosch will provide HF-radar documentation for inclusion in the oceandatastandards reference web site [deadline: mid-February 2008].

4.12 Quality Control: Surface Waves

Ms. Julie Bosch introduced this item and moderated discussions. She reviewed the various quality control procedures that exist for verifying surface wave observations.

She noted that the following in-situ wave measurement systems are in use today:

- Directional Buoy
- Non-directional Buoy
- Directional Array of Pressure Sensors
- Single Point Pressure Sensor
- Wave Staff
- Acoustic Doppler Current Profiler
- Pressure Orbital Velocity Sensors

She stated that real-time QC is a subset of overall QC. Inspection of the data (automated or manual) must be made in light of where it is collected (e.g. range checks/thresholds must be adjusted to local environments) and visual inspections are still part of these processes.

She mentioned the following candidate standards:

- USACE, CERC-90-1, 1990
    - Actively used
    - Sound methodologies / outdated technologies
    - Geared more toward instrument checks and calibrations
    - More QA than QC

- IODE, Manuals and Guides, No. 26, 1993
    - Actively used
    - Widely used
    - Most comprehensive list of tests
    - Sound methodologies / outdated technologies
    - Includes QA and QC
    - Includes requirement for documentation/tracking (metadata)

- NDBC, Technical Document 03-02, 2003
    - Actively used (NDBC)
    - Sound methodologies
    - Provides descriptive guidance and QC algorithms
    - Provides hard/soft flag guidance
    - Based on methods in IODE, Manual and Guide 26, 1993
    - (Terminology (vocabulary) used in test descriptions = difficulty in directly or quickly relating between standards for this comparison)
        - Geared toward specific user (data management, database, …)

- SIMORC (Draft), 2006
    - Active/Wide use
    - Sound methodologies
    - Based on methods in IODE, Manual and Guide 26, 1993
    - Lists tests / some descriptive guidance
    - Geared toward specific user (data management, tools, codes, file formats…)

Decisions:

- The meeting did not identify a recommended standard;
- It was agreed that US-IOOS and Dr. L. Rickards will lead the update of the IOC Manuals and Guides No. 26 on waves. [deadline: document collation to be completed by April 2008];

- It was agreed that US IOOS will provide the US national waves plan [deadline: May 2008];
- It was agreed that US IOOS will prepare the submission document [deadline: by August 2008].

4.13 Quality Flags

Mr. Robert Gelfeld introduced this item and moderated discussions. Mr. Gelfeld reviewed the various lists and strategies for marking the quality of data (and the test results) that exist. He noted that there are different definitions of "quality flags". Some represent an overall assessment of the quality of the data and some explain the tests conducted on the data.

It was noted by the group that if you attempt to put all these flags together, there is a problem. It is important to keep even the "bad" data in the data files. Descriptions of QC need to be well communicated, and well written. Quality flags should allow the data holder to provide a clean data set and a data set with unclean data and should also allow a way for other users to add their annotations to a data set.

Decisions:

- The meeting did not identify a recommended standard.
- The SeaDataNet flags are a sensible extension to handle situations appropriate for a greater range of variables.

4.14 Projects

Dr Lesley Rickards introduced this item and moderated discussions. She reviewed the various lists of projects that exist and so are available for adoption.

Decisions:

- The meeting noted that many lists exist but that there is no clear candidate for a standard at this time. It was considered that a reference list of projects can be useful to match projects with data as well as with institutions and people. In this regard an ontology approach was mentioned.

4.15 Institutions

Mr. Bob Gelfeld introduced this item and moderated discussions. Mr. Gelfeld reviewed the various lists of institutions that exist.

Decisions:

- The meeting noted that many lists exist but that there is no clear candidate for a standard at this time. Making reference to item 4.14 it was noted that there should be a link between institutions and projects.

4.16 Units

This item was not discussed at the meeting.

4.17 Instruments

Mr. John Graybeal introduced this item and moderated discussions. He reviewed the various lists of institutions that exist. He mentioned that there exist about 14 instrument

vocabularies (GCMD, BODC/SDN, NASA, SSDS) but there exist no mappings between these vocabularies. It was noted that there are multiple organizing principles for instruments.

Decisions:

- The meeting concluded that rather than having multiple lists we should have an instrumentation vocabulary that should be managed by one organization. This organization should be careful about deletion or redefinition of terms (in fact it was recommended not to delete) and new instruments should be added quickly.
- The meeting concluded that the GCMD instrument list is very comprehensive for satellite platform instruments but less so for marine instruments. The BODC list is good for marine instruments but has less granularity than GCMD.
- The meeting therefore recommended using either of these two depending on the domain. The meeting also requested GCMD to consider a mapping between the GCMD and BODC.

4.18 Science Words

Mr. Taco de Bruin introduced this item and moderated discussions. He reviewed the various lists and strategies for managing science words that exist.

Decisions:

- The meeting considered the GCMD keywords and was informed that in GCMD most keywords are found under atmosphere, followed by biosphere and oceans. The meeting welcomed the GCMD keyword list but expressed its concern about deletion of keywords which had already caused serious problems in database systems. As a result BODC had made a copy of the GCMD list at a certain time and now uses that.
- The meeting concluded that the GCMD has an excellent keyword list but it would benefit from a revised management with special attention to the problems caused by deletions.

4.19 Taxa

Mr. Roy Lowry introduced this item. While stating that decisions or recommendations on this item would require additional expertise, he recommended that WoRMS be considered as an early candidate as a global marine taxa standard.

Decisions:

- The meeting recommended that this matter be considered through the agreed upon process and that also the IODE GE-BICH should address this matter during their November 2008 meeting.

4.20 Parameters

Mr. Etienne Charpentier introduced this item and moderated discussions. He reviewed the various lists that exist for identifying parameters. He focused attention on Parameter Usage Vocabularies (PUVs) that label single data values and may also be used for discovery. In this context he addressed the following: BODC, NetCDF CF, NetCDF EPIC and BUFR, but also mentioned MEDATLAS, SEACOOS, JGOFS, GLOBEC, GF3, GTSOPP and GRIB. Mr. Charpentier proposed to focus on specific disciplines first to limit the number of parameters (e.g. Physical oceanography, marine meteorology) and to consider BODC, BUFR, CF and EPIC. They should provide for the following attributes: unique ID, name, definition, collection ID and version ID. He further stressed the need for mapping between the aforementioned.

Decisions:

- The meeting concluded that at this time there is no single vocabulary that can be recommended. However it was suggested that the GCMD vocabulary be used for the time being but that a PUV based on GCMD be developed. GCMD was requested to assist with this.

5. REVIEW OF RESULTS

Decisions and recommendations for agenda items 3 and 4 are summarized under the respective agenda items.

6. WORK PLAN FOR FOLLOW-UP ACTIVITIES

REPORTING

The meeting stressed the need to publish the report of this meeting as soon as possible to maintain the momentum gained**. The meeting requested the Secretariat and the meeting co-chairs to make the report available by 15 February 2008.**

COMMUNICATION

The outcome of the meeting should be communicated as widely as possible through the IODE mailing list **by the IODE Project Office** as well as other relevant mailing lists **[deadline: half February 2008**].

The meeting further emphasized the need to publicize the outcome of the meeting as well as the process that is now being established to adopt standards on core topics related to ocean data management. In this regard the need was recognized for a standard presentation and 1-page information document that can be used at various meetings and other events. **The meeting requested Mr. T. De Bruin, Mr. R. Keeley and Mr. R. Gelfeld to prepare the 1-page information sheet by 12 February 2008**.

The meeting noted the importance of engaging other groups such as GLOSS, Ocean.US, NODCs, IMDIS participants, ICES, IOCCP, SCOR, POGO, IGBP, ICSU (WDCs), etc.

The meeting identified the following events (provisional list) where the standards process could be promoted:

- ICES WG-DIM (Copenhagen, 12-14 February 2008): promotion by T. de Bruin and R. Gelfeld;
- JCOMM DMCG-III (Oostende, 26-28 March 2008): promotion by R. Keeley and G. Reed;
- IMDIS Conference (Athens, Greece, 31 March – 2 April 2008): promotion by R. Keeley;
- OceanSensors08 (Warnemunde, Germany, 31 March – 4 April 2008): to be decided;
- GSSC/ I-GOOS/ PICO-I (Paris, 7-11 April 2008): to be decided;
- EuroGOOS 2008 (Exeter, UK, 20-22 May 2008): to be decided;
- WESTPAC-VII (Malaysia, 26-29 May 2008): to be decided

- 2nd Joint Global Ocean Surface Underway Data (GOSUD) / Shipboard Automated Meteorological and Oceanographic System (SAMOS) Workshop (Seattle, USA, 10-12 June 2008): to be decided;
- SeaDataNet training course (Oostende, 16-20 June 2008): to be decided
- SCOR/IODE workshop on data publishing (Oostende, 17-19 June 2008): to be decided;
- IOC Executive Council (Paris, 24 June – 1 July 2008: to be investigated
- GOOS GRA meeting (Guayaquil, Ecuador, 18-21 November 2008): to be decided.

The meeting **stressed the need for the standards process to have an informative and easy-to-use web presence**. In this regard the meeting made the following decisions:

(i) A new domain name www.oceandatastandards.org will be registered by the IODE Project Office (additional domains .net, .com and .info will also be registered and linked to the .org site) [**deadline: 1 February 2008**].
(ii) A new web site will be established (under the www.oceandatastandards.org domain) with a clear identity related to ocean data standards. This site will include:
(iii) The rich information site prepared for the meeting by Murray Brown will be made available;
(iv) For each topic discussed at the meeting (and for other future topics) the site will contain a page that lists documents and their stage in the process of recommendation (recommended, in review, …);
(v) The site contains general information on the standards site, on the standards process, on the partners, etc.;
(vi) Online tools for submission and processing of candidate standards by made available;
(vii) Promotional materials be available.
(viii) The web site banner should include the IOC, WMO, IODE and JCOMM logos, plus a sub-banner indicating support by IOOS and Flanders.
(ix) A "starter site" with minimum information (information subsite, 1-page info sheet,…) should be established **by 15 February 2008 by the IODE Project Office and will be maintained by the IODE Project Office**.
(x) In view of the close relation of the MMI web site and the oceandatastandards site for a number of topics, collaboration between these sites should be further discussed.

It was further **recommended to create a Wikipedia page on the standards process with a link to the new oceandatastandards.org site.** Mr. Lowry agreed to create this page **[deadline: May 2008]**

MANAGEMENT

In order to effectively manage the implementation of the work plan it was agreed that an *ad hoc* Steering Team will be established, composed of the JCOMM DMCG Chair (Robert Keeley), the IODE Co-Chair (Greg Reed), JCOMM/IODE ETDMP Chair (Nick Mikhailov) and a US IOOS representative. A more formal management structure will be discussed at IODE-XX (2009) and JCOMM-III (2009). The *ad hoc* Steering Team will report to IODE and JCOMM. The Steering Team will work mostly by email but the Team may request a formal meeting if needed (through the JCOMM and IODE Secretariats).

The meeting also identified a need for testing (test-bed) of standards: this will be the task of the ETDMP Task Team for the Standards Pilot Project but it may also involve other partners.

7. CLOSURE

The meeting was closed at 12h30 on Friday 25 January 2008. In his closing words Mr. Keeley noted that this was an unusual meeting to chair because whereas in most circumstances discussions and conclusions can mostly be anticipated before the meeting but that in this case, this was not possible. However, the high quality of thoughtfulness and interjections by participants made the task of chairing a pleasure. He thanked all of the participants for their very hard work and open discussions on the various topics. He also thanked the presenters for undertaking this task and for their concise and clear summaries of the topics. He thanked the IODE Project Office for the excellent facilities provided. He thanked Murray Brown and Bob Gelfeld for their assistance to Peter Pissierssens in acting as rapporteurs and preparing the final report. He expressed thanks to Greg Reed for agreeing to co-chair the meeting. Finally, he thanked the Governments of Flanders and the United States for their financial assistance for the meeting.

ANNEX I
List of Participants

Ms. Julie BOSCH
National Coastal Data Development Center (NCDDC)
Stennis Space Center, MS 39529
United States
Tel: 1 228 688 3841
Email: julie.bosch@noaa.gov

Mr. Taco F. DE BRUIN
Royal Netherlands Institute for Sea Research (NIOZ)
P.O. Box 59
1790 AB Den Burg
Texel
The Netherlands
Tel: +31 (0)222 369479
Fax: +31 (0)222 319674
Email: bruin@nioz.nl

Ms. Karien De Cauwer
MUMM – Belgian Marine Data Centre
Gulledelle 100
1200 Brussels
Belgium
Tel: ++32 (0) 2 773 21 37
Fax: ++32 (0) 2 770 69 72

Mr. John GRAYBEAL
Monterey Bay Aquarium Research Institute (MBARI)
7700 Sandholdt Road
P.O. Box 628
Moss Landing, CA 95039-0628
United States
Tel: +1 831 775 1956
Fax: +1 831 775 1620
Email: graybeal@mbari.org

Dr. Margarita GREGG, Director
National Oceanographic Data Center
1315 East West Highway Silver Spring, MD 20910
United States
Tel: +1 301 713 3270
Fax: +1 301 713 3300
Email: Margarita.Gregg@noaa.gov

Mr. Steve HANKIN
NOAA Pacific Marine Environmental Laboratory (NOAA/PMEL)
7600 Sand Point Way NE
Seattle, WA 98115
United States
Tel: +1 206 526 6080
Fax: +1 206 526 6744
Email: Steven.C.Hankin@noaa.gov

Mr. Francisco HERNANDEZ
Flanders Marine Institute (VLIZ)
Wandelaarkaai 7
B-8400 Oostende
Belgium
Tel: [32](59)34.21.30
Fax: [32](59)34.21.30
Email: francher@vliz.be

Mr. Robert KEELEY
Integrated Science Data Management
Department of Fisheries and Oceans Canada
12W082 - 200 Kent Street
Ottawa K1A 0E6
Ontario
Canada
Tel: +1 613 990 0246
Fax: +1 613 993 4658
Email: Robert.Keeley@dfo-mpo.gc.ca

Dr. Roy LOWRY
British Oceanographic Data Centre
Joseph Proudman Building
6 Brownlow Street
Liverpool
L3 5DA
United Kingdom
Email: rkl@bodc.ac.uk

Dr. Jianping MAO
Global Change Master Directory (GCMD)
National Aeronatics and Space Administration (NASA)
Goddard Space Flight Center, Code 610-2
Greenbelt, MD 20771
United States
Tel: 01 301 614 6079
Email: Jianping.Mao@nasa.gov

Dr. Gilbert MAUDIRE
IFREMER Centre de Brest (IFREMER)
Z.I. Pointe du Diable
B.P. 70 Plouzané 29280
France

Tel: +33 2 98 22 42 16
Email: Gilbert.Maudire@ifremer.fr

Mr. Nikolai MIKHAYLOV
Chairperson, JCOMM Expert Team on Data Management Practices
Russian National Oceanographic Data Centre
Koroleva Street, 6
Obninsk
Russian Federation
249020
Tel: +7 48439 74907
Fax: +7 095 255 22 25
Email: nodc@meteo.ru

Mr. Hjalte PARNER
International Council for the Exploration of the Sea (ICES)
H.C. Andersens Boulevard 44-46
1553 Copenhagen V
Denmark
Tel: +45 33386700
Fax: +45 33934215
Email: hjalte@ices.dk

Mr. Loic PETIT DE LA VILLEON
Chef du SISMER
IFREMER/SISMER
Centre de Brest, BP 70
29280 Plouzane
France
Tel: +33 2 98 22 49 13
Fax: +33 2 98 22 46 44
Email: loic.petit.de.la.villeon@ifremer.fr

Mr. Greg REED
Executive Officer
Australian Ocean Data Centre Joint Facility
Wylde Street
Potts Point NSW 2011
Australia
Tel: +61 2 9359 3141
Fax: +61 2 9359 3120
Email: greg@metoc.gov.au

Dr. Lesley RICKARDS
Permanent Service for Mean Sea Level (PSMSL)
& British Oceanographic Data Centre (BODC)
6 Brownlow Street
Liverpool L3 5DA
United Kingdom
Tel: +44 (0)151 795 48 97
Fax: [44] (0)151 795 4912
Email: ljr@bodc.ac.uk

Mrs. Zdenka WILLIS, Director
NOAA Integrated Ocean Observing System Program Office
U.S. Department of Commerce/NOAA
1100 Wayne Ave., Suite 1225
Silver Spring, MD 20910
United States
Tel: +1 301 427-2420
Fax: +1 301 427-2073
Email: Zdenka.Willis@noaa.gov

Secretariat

Mr. Etienne CHARPENTIER (JCOMM Representative)
Observing and Information Systems Department
Observing Systems Division
World Meteorological Organization
7 bis, Avenue de la Paix
Case Postale No. 2300
CH-1211 Geneve 2
Switzerland
Tel: + 41 22 730 82 23
Fax: + 41 22 730 81 28
Email: echarpentier@wmo.int

Mr. Robert GELFELD (Rapporteur)
National Oceanographic Data Centre (NODC)
1315 East-West Highway SSMC3, Rm4230
Silver Spring, MD 20910
United States
Tel: +1 301 713 3295 Ext. 179
Fax: +1 301 713 3303
Email: Robert.Gelfeld@noaa.gov

Mr. Peter PISSIERSSENS (Rapporteur)
Head, IOC/UNESCO Project Office for IODE
IODE Programme Coordinator
Wandelaarkaai 7
8400 Oostende
Belgium
Tel: +32 59 34 01 58
Fax: + 32 59 34 01 52
email: p.pissierssens@unesco.org

Consultant

Dr. Murray BROWN
1710B Washington St.
New Smyrna Beach, FL 32168
United States
Tel: +1 386 428 6367
Email: murraybr@bellsouth.net

ANNEX II
Agenda

1 OPENING OF THE SESSION

- 1.1 Welcome, introductions
- 1.2 Adoption of the agenda and working documents
- 1.3 Meeting arrangements

2 OVERVIEW OF SESSION OBJECTIVES

3 STANDARDS PROCESS

- 3.1 Overview of ongoing standards activities
- 3.2 ISO

4 TOPIC DISCUSSIONS

- 4.1 Metadata
- 4.2 Ontology Resources
- 4.3 Date and Time
- 4.4 Lat, long and altitude
- 4.5 Countries
- 4.6 Platforms
- 4.7 Platform types
- 4.8 Quality Control: Temperature and Salinity Profiles
- 4.9 Quality Control: Surface T&S
- 4.10 Quality Control: Sea level
- 4.11 Quality Control: Currents
- 4.12 Quality Control: Surface waves
- 4.13 Quality flags
- 4.14 Projects
- 4.15 Institutions
- 4.16 Units
- 4.17 Instruments
- 4.18 Science words
- 4.19 Taxa
- 4.20 Parameters

5 REVIEW OF RESULTS

6 WORK PLAN FOR FOLLOW-UP ACTIVITIES

7 CLOSURE

ANNEX III
Conduct of the Meeting

By Bob Keeley

General Remarks

The First Session of the "IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards" will commence at 0900 on 21 January at the IODE Project Office in Oostende, Belgium. The objective of the Forum is to achieve broad agreement and commitment to adopt a small number of standards related to ocean data management and exchange. The meeting will bring together representatives of organizations who are involved in ocean data management, have strong technical expertise in one or more areas and are able to influence their national organizations to adopt the agreed upon standards.

Factors influencing the organization of the meeting include:

- This is expected to be the starting point for a developing standards setting process. We should not be overly ambitious in objectives for this meeting since it is important to show success.
- The agenda addresses 20 topics for which agreement should be possible but probably not all 20 will be completed during the first meeting;
- Key people from programmes and institutions with technical knowledge of the subject areas have been invited in order to manage the meeting size. The conclusions and recommendations of the meeting(s) will need to be communicated to the wider ocean data management community after the meeting to seek their agreement.

Expected outcomes from the meeting include:

- agreement on standards for selected topics;
- plan of action to publish the standards through appropriate channels (e.g. ISO, best practices,…)
- a set of topics for which agreement can be reached with a little more discussion (either inter-sessionally or during the next meeting).
- agreement on how to continue the standards setting process (including the selection of other topics, national implementations, wider community involvement, role of a steering committee, etc.).
- assess the effectiveness of this meeting.
- agree on procedure for topics on which no agreement was reached;
- agree on priority items that might be discussed at the next meeting;

The participants at the meeting are a selected subset of the wider community. The wider community will need to be included in the standards setting process because adherence to the standards is voluntary and to be effective, we need broad community acceptance. It is for this reason that the meeting will be discussing the mechanisms to engage the wider community as a priority and follow on activities to continue the standards setting process.

The Chair of the meeting, Mr. Bob Keeley (Chair, JCOMM Data Management Coordination Group), will manage the overall conduct of the meeting, assisted by Mr. Greg Reed (IODE Co-Chair) and Mr. Peter Pissierssens (IODE Programme Coordinator). He will assess the progress of discussions and keep them focused on the goal. Where discussions

appear to be progressing to agreement, he will permit them to continue, even at the expense of discussions of later topics. Where discussions appear to be stalemated or wandering, he will intervene.

Standards Process

This is the topic of highest priority for the meeting and will be dealt with first. There are some choices of models for this process and the meeting will be provided with overviews of these. The issues that need resolution are

- How do the meeting results get exposed to the wider community? Results may be proposed standards or topics needing further discussion.
- What is the process for getting and responding to comments from the wider community?
- When is a standard declared as agreed to?
- Where and how will the documentation be housed during the standard setting process and once standards are agreed to?
- How will agreement on standards result in implementation?
- What is the process for selecting new topics?
- What is the process for continuing standards setting (meetings, on-line fora, steering committee) and can we set a timetable?

All of the above issues are important but the meeting may not resolve all of these. At the very least, the last bullet must be answered.

The resulting standards process is one that needs to be agreed to by the wider community. It will be necessary to engage groups that identify weaknesses in existing standards to upgrade the standard rather than invent another solution. This necessarily will increase the consultation time, but in the end will greatly improve the international exchange of data and information.

This meeting is a venue for exposing agreed practices carried out by a limited number of partners, to a wider international audience. It may be that these practices are suitable for broader use, but that knowledge of them was not widespread. Providing a mechanism to allow greater scrutiny will help reduce the production of independent solutions. The guiding principle for this process should be adopt first if possible, adapt an existing process if needed, and only create something new as a last resort.

Topics

The list of topics proposed for discussion at the First Standards Forum is purposely longer than it is likely can be managed. There is no requirement for every topic to be discussed at the meeting. Rather, organizers decided on a two-pronged approach. First, no matter what the list of topics, the agenda would be ordered so that those topics that appeared to be closest to agreement would be discussed first. The discussion would continue until either agreement is reached and a standard can be proposed to the wider community, or it is clear that agreement is not possible.

The meeting may also decide to add other topics to the list, to be discussed at future meetings and also identify suitable experts who could then introduce these topics.

Presenters

The annotated agenda includes remarks about each of the topics. It also provides the name of the presenter. This person is expected to act as a resource for that topic and to lead the discussion. The meeting chair will assist as needed to ensure that discussions progress towards a conclusion.

We are expecting the presenter of a topic to provide an overview of the material that was available to the meeting and was reviewed. They should:

- identify the clear purpose for this standard (the reason why the international community should agree) and therefore provide a clear focus for the discussion;
- provide a summary of the points of agreement and of disagreement as represented in the material reviewed (and available on the web site http://iodeweb2.vliz.be/omap/Standards/;
- help leading the discussion in order to keep it focused on the objective.

Organizers expect the meeting to state its view on the purpose of the standard, to verify acceptance of the points of agreement, and to attempt to resolve those points of disagreement.

Timetable

The agenda is purposely vague on discussion times for each topic. With such a varied agenda, with no precedent for such discussions, and uncertainty about which topics could result in agreement, the best that could be done is to provide a rough breakdown on order of discussion. This order will be discussed as part of adoption of the agenda and may well change. The most important point is that the meeting should discuss first those topics for which it appears that agreement is possible, and that the meeting should not feel compelled to discuss the full agenda.

The full last day has been assigned for review of results and planning of follow-on activities. It is expected that this review will take about one half day. The other half day is held in reserve to allow flexibility in the agenda so that topics can take more time than allocated, provided that progress is being made. No matter the state of discussions, the afternoon of the last day will be used for this review.

What is Agreement?

How will participants know that they have reached an agreement? When the meeting has determined that a single course of action meets with its approval, this course of action will be recommended to the wider community. Depending on the topic under discussion, it may be that one controlled vocabulary is agreed to be the one that everyone should use. Or, it may be that one structure for reporting discovery metadata attains complete agreement at the meeting. In other cases, it may be that a single course of action is unsuitable for all occasions. In this case, the meeting may agree that a limited number of approaches are acceptable. Overall, the meeting will decide by consensus whether or not agreement has been reached.

Some topics, such as QC standards, may require flexibility in the standard. For example, the meeting may not agree on all of the different tests that should be applied, but may agree on a way that the tests that have been applied are recorded with the data. This would leave implementers to devise tests that are particularly suited to their circumstances

and yet still follow a standard on reporting tests. A companion approach may allow for agreement of a “core” set of tests that can be agreed to internationally, with specialized tests being implemented to suit national circumstances.

Possible Follow-On Activities

If agreement is reached, a meeting participant will be invited to prepare a document that can be presented to the wider community to engage them in the discussion and to ensure there is broad support. This document will form the basic description of the standard. The meeting will also need to define the term “wider community” as well as the ways to communicate with that community.

If agreement cannot be reached, the meeting will need to rule on what subsequent steps can be taken. If there are competing opinions, the proponents may be asked to prepare the document that jointly lays out the competing views. This document will also be presented to the wider community to seek broad advice on what to do. If there is not enough knowledge at the meeting to reach a conclusion, it may be that some more knowledgeable person(s) will be approached to lead the standards discussion on that topic. It may also be that another Standards Forum will be required to address remaining and other topics, and to review follow-on activities from this meeting. The meeting may wish to recommend the organization of future sessions and call on the organizers to seek ways and means to do so.

Implementation

It is crucial to remember that adherence to any standard is a voluntary activity. If a proposed or agreed standard does not meet the requirements of the community, the standard will be ignored.

It is also important to remember that the standards proposed by this meeting are for international data exchange. A country can adopt whatever practices they wish for internal use. Of course, the objective of this meeting is to gain acceptance and use of the standard in international activities to promote and achieve interoperability and comparability between data systems.

ANNEX IV
Digest of Decisions

This annex contains a composite of all decisions taken by the Meeting and marked in red in the body of the report. In this annex, names of experts tasked with implementing a decision are marked in red. Deadline dates are marked in blue.

3. STANDARDS PROCESS

(1) It was decided that the structure as proposed by the sessional working group is suitable. Some additional work needs to be done to prepare scope notes for all fields. Mr. Hankin and Ms. Bosch agreed to provide explanatory notes by end March 2008 of what should be included in each section to assist people using this template to submit a proposal.

(2) The meeting decided that the IODE/JCOMM Standards process should be structured as displayed in Figure 1 (below). Mr. Keeley, Mr. Mikhailov and Ms. Bosch will prepare the document that describes the process and circulate to meeting participants. This document will be submitted to the DMCG-3 meeting and therefore needs to be completed by mid March 2008.

(3) Bearing in mind the need for adhering to the JCOMM rules regarding the terms of reference and membership of subsidiary bodies, the meeting recommended that a Pilot Project on the IODE/JCOMM Standards Process be established by the JCOMM DMCG during its next Session in March 2008. This Pilot Project should be managed by a Task Team of which the membership will be decided by the DMCG and IODE Officers, taking into consideration the recommendations of the "First Session of the IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards"

(4) It was further recommended that the process cycle should typically be between 12-24 months.

(5) The meeting stressed that the standards dealt with by the IODE/JCOMM Standards process should be limited to oceanography and marine meteorology only.

(6) The meeting considered the question whether proposals could be submitted only by national/international groups or also by projects, individual institutions etc. The meeting decided that this would need further consideration. In addition the meeting recommended that other organizations such as ICES, PICES should be involved.

(7) The meeting further recommended that IODE/JCOMM should be pro-active in considering the need for certain standards rather than only wait for submissions as this would avoid that projects limited in time would create their own practices rather than submit a proposed standard.

(8) The meeting recommended that close collaboration should be established with other organizations such as GEOSS to widely advertise and promote the adopted standards.

(9) The group further recommended that the IODE Project Office should be used to support internal discussions. Also a voting/polling system should be set up (similar to the system developed for DMAC).

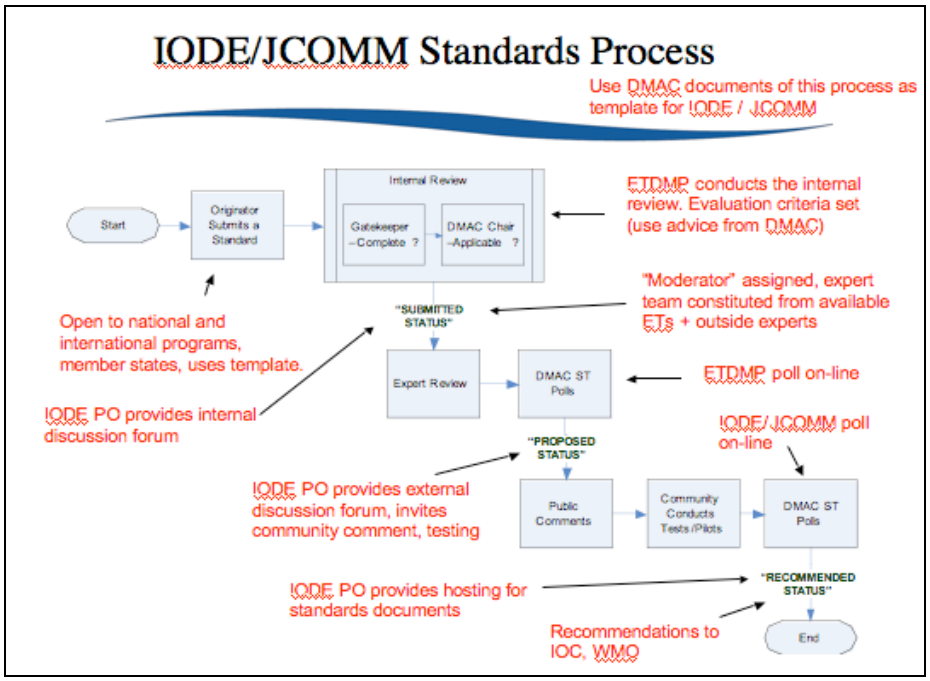

Figure 1

4.1. METADATA

The meeting agreed that ISO-19115 or a community profile of ISO-19115 should be used for creating discovery metadata but did not identify a recommended profile;

(10) It was agreed that Mr. Reed will undertake a comparison between CDI, MCP and WMO profiles [deadline: end of April 2008];

(11) It was agreed that Mr. Reed will recommend a metadata profile that will meet the needs of the community and will be interoperable with other community and project profiles [deadline: mid-2008];

(12) The Canadian NODC will upgrade the metadata creation tool to support the recommended profile and make it available (assuming resources become available). [deadline: end of March 2009];

(13) In addition to the Canadian metadata tool, consideration should also be given to the “Mikado”, Java tool developed by SeaDataNet;

(14) It was agreed that SeaDataNet will help test compliance to ISO-19115 of the Canadian discovery metadata records; by March 2009.

(15) It was agreed that functional requirements for discovery and other metadata, based on E2E experience will be prepared by Mr. N. Mikhailov [deadline: mid February 2008]

4.2. ONTOLOGY RESOURCES

(16) There was no recommendation on the use of ontologies at this time. More work is required and should be supported by IODE and JCOMM

4.3. DATE AND TIME

(17) It was recommended to adopt the ISO-8601 standard (using extended format) where appropriate while recognizing some limitations;

(18) It was agreed that Mr. Reed will write the submission document [deadline: end of 2008, depending on the availability of the template].

4.4. LATITUDE, LONGITUDE & ALTITUDE

(19) It was recommended to adopt the ISO-6709 standard;
(20) It was agreed that Mr. T. de Bruin will write the submission document [deadline: end of 2008, depending on the availability of the template].

4.5. COUNTRIES

(21) It was recommended to adopt the ISO-3166 (3166-1 and 3166-3) standard;
(22) It was agreed that Mr. Roy Lowry, Mr. H. Parner and US-NODC will map the IOC/ICES country codes to ISO-3166 [deadline: end of June 2008];
(23) It was agreed that Mr. Lowry will monitor ISO-3166 and keep our list up to date;
(24) It was agreed that US-NODC will prepare the submission document including text that explains the advantages of converting to this standard. [deadline: March 2008, depending on the availability of the template].

4.6. PLATFORMS

See 4.7

4.7. PLATFORM TYPES

(25) The meeting did not identify a recommended standard;
(26) It was agreed that ICES and US NODCS should continue the maintenance of their current lists;
(27) It was agreed that Mr. Lowry should repair L061, open content governance, SeaVox, establish mapping to other lists and mappings to instances (such as ICES) [deadline: end of June 2008]

4.8. QUALITY CONTROL: TEMPERATURE & SALINITY PROFILES

(28) The meeting did not identify a recommended standard;
(29) It was agreed that Mr. R. Keeley and Mr. G. Reed will request GTSPP (through its Chair, Charles Sun), the Argo data management team, the DBCP and SOOPIP to revise IOC Manuals and Guides No. 22; [deadline: to be negotiated with Mr. Sun];
(30) It was agreed that GTSPP (Mr Sun) should prepare the submission document [deadline: to be negotiated with Mr. Sun].

4.9. QUALITY CONTROL: SURFACE TEMPERATURE & SALINITY

(31) The meeting did not identify a recommended standard;
(32) It was agreed that Mr. Keeley and Mr. Reed will request GOSUD (through Mr. L. Petit de la Villeon, GOSUD Co-Chair) to revise their QC documentation (reference was made to the GOSUD meeting that will take place in June 2008) [deadline: end of August 2008];
(33) It was agreed that the revised GOSUD QC documentation should be added (by the Secretariat) to the oceandatastandards reference web site [deadline: end of August 2008].

4.10. QUALITY CONTROL: SEA LEVEL

(34) The meeting did not identify a recommended standard;

(35) It was agreed that Dr L. Rickards will lead the revision of the ESEAS QC document in close collaboration with the GE-GLOSS [deadline: April 2009];
(36) It was agreed that Dr L. Rickards will prepare the submission document [deadline: early 2009];
(37) It was agreed that Mr. R. Keeley will write QC manual guidance material (i.e. evaluation material for standards review) [deadline: before June 2008 GOSUD meeting].

4.11. QUALITY CONTROL: CURRENTS

(38) The meeting did not identify a recommended standard;
(39) It was agreed that Ms. Z. Willis will provide a document on moored ADCPs and current meters to Dr. L. Rickards who will consolidate these with IOC Manuals and Guides No. 26 and provide the result for inclusion in the oceandatastandards reference web site [deadline: September 2008];
(40) It was agreed that Ms. J. Bosch will provide HF-radar documentation for inclusion in the oceandatastandards reference web site [deadline: mid-February 2008].

4.12. QUALITY CONTROL: SURFACE WAVES

(41) The meeting did not identify a recommended standard;
(42) It was agreed that US-IOOS and Dr. L. Rickards will lead the update of the IOC Manuals and Guides No. 26 on waves. [deadline: document collation to be completed by April 2008];
(43) It was agreed that US IOOS will provide the US national waves plan [deadline: May 2008];
(44) It was agreed that US IOOS will prepare the submission document [deadline: by August 2008].

4.13. QUALITY FLAGS

The meeting did not identify a recommended standard.

4.14. PROJECTS

(45) The meeting noted that many lists exist but that there is no clear candidate for a standard at this time. It was considered that a reference list of projects can be useful to match projects with data as well as with institutions and people. In this regard an ontology approach was mentioned. She will present a case for selecting one.

4.15. INSTITUTIONS

(46) The meeting noted that many lists exist but that there is no clear candidate for a standard at this time. Making reference to item 4.14 it was noted that there should be a link between institutions and projects.

4.16. UNITS

This item was not discussed at the meeting.

4.17. INSTRUMENTS

(47) The meeting concluded that rather than having multiple lists we should have an instrumentation vocabulary that should be managed by one organization. This

organization should be careful about deletion or redefinition of terms (in fact it was recommended not to delete) and new instruments should be added quickly. The meeting concluded that the GCMD instrument list is very comprehensive for satellite platform instruments but less so for marine instruments. The BODC list is good for marine instruments but has less granularity than GCMD. The meeting therefore recommended to use either of these two depending on the domain in which it will be used. The meeting also requested GCMD to consider a mapping between the GCMD and BODC.

4.18. SCIENCE WORDS

(48) The meeting considered the GCMD keywords and was informed that in GCMD most keyword are found under atmosphere, followed by biosphere and oceans. The meeting welcomed the GCMD keyword list but expressed its concern about deletion of keywords which had already caused serious problems in database systems. As a result BODC had made a copy of the GCMD list at a certain time and now uses that. The meeting concluded that the GCMD has an excellent keyword list but it would benefit from a revised management with special attention to the problems caused by deletions.

4.19. TAXA

(49) The meeting recommended that this matter be considered through the agreed upon process and that also the IODE GE-BICH should address this matter during their November 2008 meeting.

4.20. PARAMETERS

(50) The meeting concluded that at this time there is no single vocabulary that can be recommended. However it was suggested that the GCMD vocabulary be used for the time being but that a PUV based on GCMD be developed. GCMD was requested to assist with this.

6. WORK PLAN FOR FOLLOW-UP ACTIONS

REPORTING

(51) The meeting stressed the need to publish the report of this meeting as soon as possible to maintain the momentum gained**.** The meeting requested the Secretariat and the meeting co-chairs to make the report available by 15 February 2008.

COMMUNICATION

(52) The outcome of the meeting should be communicated as widely as possible through the IODE mailing list by the IODE Project Office as well as other relevant mailing lists [deadline: half February 2008].

(53) The meeting further emphasized the need to publicize the outcome of the meeting as well as the process that is now being established to adopt standards on core topics related to ocean data management. In this regard the need was recognized for a standard presentation and 1-page information document that can be used at various meetings and other events. The meeting requested Mr. T. De Bruin, Mr. R. Keeley and Mr. R. Gelfeld to prepare the 1-page information sheet by 12 February 2008.

(54) The meeting noted the importance of engaging other groups such as GLOSS, Ocean.US, NODCs, IMDIS participants, ICES, IOCCP, SCOR, POGO, IGBP, ICSU (WDCs), etc.

(55) The meeting identified the following events (provisional list) where the standards process could be promoted:

- ICES WG-DIM (Copenhagen, 12-14 February 2008): promotion by T. de Bruin and R. Gelfeld;
- JCOMM DMCG-III (Oostende, 26-28 March 2008): promotion by R. Keeley and G. Reed;
- IMDIS Conference (Athens, Greece, 31 March – 2 April 2008): promotion by R. Keeley;
- OceanSensors08 (Warnemunde, Germany, 31 March – 4 April 2008): to be decided;
- GSSC/ I-GOOS/ PICO-I (Paris, 7-11 April 2008): to be decided;
- EuroGOOS 2008 (Exeter, UK, 20-22 May 2008): to be decided;
- WESTPAC-VII (Malaysia, 26-29 May 2008): to be decided
- 2nd Joint Global Ocean Surface Underway Data (GOSUD) / Shipboard Automated Meteorological and Oceanographic System (SAMOS) Workshop (Seattle, USA, 10-12 June 2008): to be decided;
- SeaDataNet training course (Oostende, 16-20 June 2008): to be decided
- SCOR/IODE workshop on data publishing (Oostende, 17-19 June 2008): to be decided;
- IOC Executive Council (Paris, 24 June – 1 July 2008: to be investigated
- GOOS GRA meeting (Guayaquil, Ecuador, 18-21 November 2008): to be decided.

The meeting stressed the need for the standards process to have an informative and easy-to-use web presence. In this regard the meeting made the following decisions:

(56) A new domain name www.oceandatastandards.org will be registered by the IODE Project Office (additional domains .net, .com and .info will also be registered and linked to the .org site) [deadline: 1 February 2008].

(57) A new web site will be established [by the Secretariat] (under the www.oceandatastandards.org domain) with a clear identity related to ocean data standards. This site will include:

(58) ● The rich information site prepared for the meeting by Murray Brown;

(59) ● For each topic discussed at the meeting (and for other future topics, a page that lists documents and their stage in the process of recommendation (recommended, in review, …);

(60) ● General information on the standards site, on the standards process, on the partners, etc.;

(61) ● Online tools for submission and processing of candidate standards;

(62) ● Promotional materials.

(63) ● The web site banner should include the IOC, WMO, IODE and JCOMM logos, plus a sub-banner indicating support by IOOS and Flanders.

(64) A “starter site” with minimum information (information subsite, 1-page info sheet,…) should be established by 15 February 2008 by the IODE Project Office and will be maintained by the IODE Project Office.

(65) In view of the close relation of the MMI web site and the oceandatastandards site for a number of topics, collaboration between these sites should be further discussed.

(66) It was further recommended to create a Wikipedia page on the standards process with a link to the new oceandatastandards.org site. Mr. Lowry agreed to create this page [deadline: May 2008]

MANAGEMENT

(67) In order to effectively manage the implementation of the work plan it was agreed that an *ad hoc* Steering Team will be established, composed of the JCOMM DMCG Chair (Robert Keeley), the IODE Co-Chair (Greg Reed), JCOMM/IODE ETDMP Chair (Nick Mikhailov) and a US IOOS representative.

(68) A more formal management structure will be discussed at IODE-XX (2009) and JCOMM-III (2009). The *ad hoc* Steering Team will report to IODE and JCOMM. The Steering Team will work mostly by email but the Team may request a formal meeting if needed (through the JCOMM and IODE Secretariats).

(69) The meeting also identified a need for testing (test-bed) of standards: this will be the task of the ETDMP Task Team for the Standards Pilot Project but it may also involve other partners.

ANNEX V
LIST OF ACRONYMS

ADCP	Acoustic Doppler Current Profiler
AODCJF	Australian Oceanographic Data Centre Joint Facility
AOML	Atlantic Oceanography and Meteorological Laboratory (of the USA)
BODC/SDN	British Oceanographic Data Centre/SeaDataNet
BoM/NTC	Bureau of Meteorology / National Tidal Centre (of Australia)
BUFR	Binary Universal Form for the Representation of meteorological data (data format from WMO)
CDI	Common Data Index (metadata format)
CERC	Coastal Engineering Research Center (of the USA)
CF	Climate and Forecast Convention (standards for implementation of the NetCDF format)
CRS	Coordinate Reference System
CTD	Conductivity-Temperature-Depth [Sensor] (common oceanographic instrument)
DBCP	Data Buoy Cooperation Panel
DFO	Department of Fisheries and Oceans (of Canada)
DMAC	IOOS Data Management and Communications (plan and activity of the USA IOOS)
DMCG	Data Management Coordination Group (of JCOMM)
E2EDM	End-to-End Data Management
E2E	End-to-End [Data Management]
EPIC	Oceanographic data management system developed by the Pacific Marine Environmental Laboratory (of the USA)
ESEAS	European Sea Level Service
ETDMP	JCOMM/IODE Expert Team on Data Management Practices (of JCOMM)
EU	European Union
EuroGOOS	European Association for the Global Ocean Observing System
GCMD	Global Change Master Directory (of the US NASA)
GE-BICH	IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (of the IODE)
GEOSS	Global Earth Observation System of Systems
GF3	General Format 3 (data format of ICES)
GLOBEC	Global Ocean Ecosystem Dynamics
GLOSS	Global Sea Level Observing System
GOOS GRA	Global Ocean Observing System / GOOS Regional Alliances
GOSUD	Global Ocean Surface Underway Data Pilot Project (of JCOMM)
GRIB	Gridded Binary (data format from WMO)
GSSC	GOOS Scientific Steering Committee
GTOS	Global Terrestrial Observing System
GTSPP	Global Temperature-Salinity Profile Program (of JCOMM)
HF	High Frequency [Radar]
ICES	International Council for the Exploration of the Sea
ICSU	International Council for Science
IGBP	International Geosphere-Biosphere Program (of ICSU)
I-GOOS	Intergovernmental Committee for GOOS
IHO	International Hydrographic Organization
IMDIS	International Conference on Marine Data and Information Systems
IOC	Intergovernmental Oceanographic Commissions (of UNESCO)
IOCCP	International Ocean Carbon Coordination Project (of IOC and SCOR)

IODE	International Oceanographic Data and Information Exchange (of IOC)
IOOS	Integrated Ocean Observation System (of the USA)
ISDM	Integrated Science Data Management (division of Canada's DFO)
ISO	International Standards Organization
JCOMM	Joint WMO-IOC Technical Commission on Oceanography and Marine Meteorology (of IOC, q.v., and of WMO)
JGOFS	Joint Global Ocean Flux Study
MCP	Marine Community Profile (metadata format from AODCJF)
MDG77	Marine Geophysical Data Exchange Format (of the USA)
MEDATLAS	Mediterranean Hydrographic Atlas Project
ML	Markup Language
NASA	National Aeronautics and Space Administration (of the USA)
NDBC	National Data Buoy Center (of the USA)
NetCDF	Network Common Data Form
NetCDF CF	Climate and Forecast Convention for NetCDF usage
NetCDF EPIC	Oceanographic data management system developed by the Pacific Marine Environmental Laboratory of the US NOAA using NetCDF
NOAA	National Oceanic and Atmospheric Administration (of the USA)
NODC	National Oceanographic Data Centre (of IODE)
NOS	National Ocean Service (operational division of the USA NOAA)
NTC	National Tidal Centre (of Australia)
Ocean.US	National Office for Integrated and Sustained Ocean Observations (of the USA)
OGC	Open Geospatial Consortium
OGC SWE	Sensor Web Enablement activity of the OGC
OWL	Web Ontology Language
PICES	North Pacific Marine Science Organization
PICO	Panel for Integrated Coastal Observations (of GOOS and GTOS)
POGO	Partnership for Observation of the Global Oceans
POL TASK	Proudman Oceanography Laboratory – Tidal Analysis Software Kit
PSMLS	Permanent Service for Mean Sea Level (of the UK)
PUV	Parameter Usage Vocabulary
QC	Quality Control
QARTOD	Quality Assurance of Real-Time Oceanographic Data (of the USA)
RDF	Resource Description Framework
RNODC	Responsible National Oceanographic Data Centre (formerly of the IODE)
SAMOS	Shipboard Automated Meteorological and Oceanographic System
SCOR	Scientific Committee on Oceanic Research (of ICSU)
SDN	SeaDataNet
SEACOOS	SouthEast U.S. Atlantic Coastal Ocean Observing System (of the USA)
SIMORC	System of Industry Metocean Data for the Offshore and Research Communities
SKOS RDF	Simple Knowledge Organisation Systems / Resource Description Framework
SOOP	Ship of Opportunity Programme
SOOPIP	Ship of Opportunity Programme Implementation Panel
SSDS	Shore Side Data System (of the Monterey Bay Aquarium Research Institute, USA)
TAO	Tropical Atmosphere Ocean Project
UHSLC	University of Hawaii Sea Level Center
UNESCO	United Nations Educational, Scientific and Cultural Organization
USACE	US Army Corps of Engineers
US-IOOS	See IOOS
USNODC	See NODC
UTC	Coordinated Universal Time
WDC	World Data Center (of ICSU, q.v.)

WESTPAC	IOC Sub-Commission for the Western Pacific
WG-DIM	Working Group on Data and Information Management (of ICES)
WG-MDM	Working Group on Marine Data Management (of ICES)
WIS	WMO Information System (of WMO)
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment
WWW	World Weather Watch (of WMO)

Intergovernmental Oceanographic Commission (IOC)

United Nations Educational, Scientific and Cultural Organization (UNESCO)
1, rue Miollis, 75732 Paris Cedex 15, France
Tel: +33 1 45 68 39 83
Fax: +33 1 45 68 58 12
http://ioc.unesco.org

IOC Project Office for IODE
Wandelaarkaai 7
8400 Oostende, Belgium
Tel: +32 59 34 21 34
Fax: + 32 59 34 01 52
http://www.iode.org