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Report of the Working Group on Marine Data Management (WGMDM)

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International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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Executive summary

The Working Group on Marine Data Management [WGMDM] (Co-Chairs: Michele Fichaut, France, and Helge Sagen, Norway) met in Brussels, Belgium from 3–5 May 2004. The main focus of WGMDM has been on the development of guidelines for managing and exchanging data and reviewing quality control standards (in the wider context of IOC/IODE), testing out the XML data structure for data exchange proposed by SGXML, continued collaboration with ITIS to promote its use and to widen its focus from North America non-marine taxa, and to consider the implications of operational oceanography for data management. The key outcomes from the terms of reference are described below.

Continue to develop, maintain and promote the WGMDM guidelines for data management and exchange, and assess the results of promotional activities
The Guidelines were developed to provide consistent advice for managing and exchanging data, including provision of services to users. The present guidelines are complete and consistent and have been promoted to other groups, including IOC/IODE. The next stage is to compile other guidelines as appropriate, in particular working together with GE-BICH on biological matters, and to collaborate with the IODE quality control project.

Develop a referral portal for guidelines and quality control (e.g., to include links to standards, procedures, guidelines, metadata, real-time/operational)
WGMDM agreed that information on quality control and guidelines should be channelled through the IODE websites (e.g., OceanPortal, OceanTeacher) rather than developing a new portal, whilst maintaining a WGMDM presence on the ICES website.

Further investigate details of the Integrated Taxonomic Information System (ITIS) and actively promote ITIS within the ICES and IOC community
ITIS is the largest, most well organised list of Taxonomic codes and thus has become a de-facto standard, a contributor to the Global Biodiversity Information Facility (GBIF) and recommended by ICES, IOC/IODE and GE-BICH. One of the main advantages of using ITIS was to have a standard list of well-researched names, but it has a North American, non-marine taxa focus. ITIS should consider a decentralised approach to data entry and more specifically, investigate how taxonomic communities working in particular seas can directly contribute records to the ITIS database.

Critically assess the data management developments and implications for operational oceanography
As operational oceanography becomes increasingly important, WGMDM recommends that well known and recommended data management procedures are implemented. WGMDM will examine currently available procedures and recommend best practice for operational oceanography in the coastal ocean. In addition, WGMDM will provide links to relevant data and products produced by their centres.

Appraise the best mechanism/most effective way to provide (coordination) focal points for data access to new data products (CD-ROM/DVD and web-based), online databases, etc. – in collaboration with the IODE Ocean Portal and the EU Sea-Search initiatives
MDM reviewed the capabilities of the IODE's OceanPortal and EU Sea-Search portal to assess their usefulness in providing a route to data products such as CD-ROMs. Google proved more successful as it gave more up to date results. Existing tools need to be improved, adding publication dates and to increase frequency of updates. Semi-distributive systems, such as the proposed SeaDataNet, may help but they need to be kept synchronised and updated. WGMDM will endeavour to provide up to date information on data products to the existing system.

Evaluate and develop future directions for oceanographic data management based on the results from SGXML and make recommendations regarding adoption in the oceanographic community
WGMDM members have tested out two aspects of the SGXML work. The first was to map moored current meter data to the data structure suggested ("Keeley bricks"), generate an XML file and use web tools to validate the XML schema. The results indicated that some new attributes and "bricks" are required to fully describe these data. A further recommendation was that standards such as GML be considered by SGXML. The second task was to check that there was provision in the data structure to include the metadata recommended in the

WGMDM Guidelines. This showed some inconsistencies with respect to the Guidelines, and SGXML are requested to review the results of this intercomparison.

Provide input to the Study Group on the Management of Integrated Data, and comment on their report
Input was provided to the SGMID prior to their first meeting, and the recommendations from their draft report were discussed; feedback will be provided. WGMDM discussed the relative roles of the two groups and will continue the dialogue with SGMID, and provide further input. WGMDM will jointly convene a Theme Session at the 2005 Annual Science Conference on Integrated Data Systems, with SGMID.

1 Opening of the meeting

The meeting was opened by H. Sagen and M. Fichaut, co-Chairs, at 9:00 am on 3 May 2004, hosted by the Management Unit of the Mathematical Models of the North Sea (MUMM), Belgium. Participants were welcomed to the meeting by G. Pichot, Head of the department "Management of marine ecosystems" (MUMM), Royal Belgian Institute of Natural Sciences. S. Scory (Head of Belgium Marine Data Centre) also welcomed participants and explained the local arrangements.

Members of the Working Group present were: P. Alenius (Finland), T. de Bruin (The Netherlands), G. Dawson (UK), G. Evans (UK), M. Fichaut (Co-Chair, France), L. Fyrberg (Sweden), M-J. García (Spain), R. Gelfeld (USA), S. Jans (Belgium), F. Nast (Germany), H. Parner (Denmark), L. Rickards (UK), S. Sagan (Poland), H. Sagen (Co-Chair, Norway), G. Slesser (UK), J. Szaron (Sweden) and M. Wichorowski (Poland).

Six observers from Belgium also attended: J. Backers (MUMM), E. Vanden Berghe (VLIZ), K. de Cauwer (MUMM), M. Devolder (MUMM), A. Meerhaeghe (MUMM), S. Scory (MUMM).

Apologies were received from S. Almeida (Portugal), M. Danielsen (Iceland), L. Fernand (UK), S. Feistel (Germany), J. Gagnon (Canada), K. Larsen (Faroes), M. Lilover (Estonia), G. Moiseenko (Russia), T. O'Brien (USA), R. Olsonen (Finland), S. Wilhelms (Germany), and H. Dooley (ICES Science Coordinator and Oceanographer).

A complete list of names, addresses, and contact points of participants can be found in Annex 1.

2 Adoption of the agenda and review of 2003 action list

The agenda (see Annex 2 for the agenda, Annex 3 for current Terms of Reference and last years Action Items) for the WGMDM (see Annex 4 for acronyms) meeting was adopted as a resolution of the 91st ICES Statutory Meeting in Copenhagen, Denmark (C.Res. 2003/2C11).

M. Fichaut reviewed the Action Items from the 2003 meeting. The status of these is given in Annex 3.

There were twenty action items to be fulfilled: seven of which concerned guidelines made by WGMDM, three concerned ITIS, three had links to XML, three were linked to other ICES working groups or to European projects, one was about the Hamburg meeting on biological data management, one was to assign responsibilities to WG members, one dealt with EDIOS of western Atlantic and one was about the updating of the international current meter inventory. Only two actions were not started, other were either completed or in progress.

The actions have been discussed under the relevant Agenda Items.

3 Reports of WGMDM members - presentations

Meeting participants described some specific activities at their own centre over the past year. Executive summaries of the presentations can be found in Annex 5.

4 Continue to develop, maintain and promote the WGMDM guidelines for data management and exchange, and assess the results of promotional activities

The WGMDM guidelines have been developed over a number of years to provide consistent advice on how to provide data and accompanying information to data centres, to provide an overview of the quality control undertaken by data centres and to indicate the services data centres can provide to users. The guidelines are on the ICES web-site at: www.ices.dk/committe/occ/mdm/guidelines.

To introduce this term of reference, H. Sagen presented how Internet Search Engines work and how they give priorities to Web pages. He underlined that to be found by search engines like "google" or "alltheweb", a page needs to fulfil three criteria: key-words, links and updates. He stressed the need to use the right key-words in the guidelines page, to have links from all data centres to the guidelines and that the guidelines web page should be frequently updated to guarantee that users can find the pages with search engines.

During the discussion a great concern emerged on the subject of who will maintain the guidelines web pages on the ICES web pages in the coming changes in ICES secretariat when oceanographer Harry DOOLEY will leave the secretariat. The WGMDM considers it important that ICES secretariat is represented in WGMDM meetings.

Report on 2003/2004 actions

Action 1: Improve keywords in metadata tags on web pages to improve visibility for search engines like Google (H. Sagen)

Completed as previously described.

Action 2: Ensure all MDM members have links from their web sites to the guidelines

Not all members have links from their data centres web pages to the MDM guidelines web page, this action point should be maintained for next year.

Action 3: Continue promotion of guidelines at for example: IODE/JCOMM ETDMP (L. Rickards), within EU SeaSearch project (M. Fichaut, and others), etc.

It was noted that several members have promoted MDM guidelines in many meetings or when they received visitors in their institutes.

Action 4: Co-Chairs to request ICES oceanographer to get links to the guidelines on other ICES web pages (i.e., Environment and fisheries)

The ICES oceanographer has been contacted by L. Rickards, new links are not in place. It is suggested that this can be requested again via the new ICES database manager.

Action 5: F. Nast, T. de Bruin and E. Vanden Berghe to coordinate compilation of a list of other available guidelines (with web links)

T. de BRUIN gave a report on guidelines for many different data types found on the Internet (guidelines on XBT, Oxygen, Nutrients, Chlorophyll, Chemical oceanography, Geological oceanography, Biological measurements, Sea birds, Marine mammals..). A preliminary list of the available guidelines is given in Annex 6.

The WG noted that the advantage of the WGMDM guidelines is their standardised structures and their clear structure. The WG suggests similar approach to IODE.

The need for comprehensive list of existing guidelines was noted as well as a need for evaluating their quality. Such a large task would be possible but needs a lot of working hours, it should be divided between several persons. Also the priorities should be given to data types. It was also stressed that the possible lacks in guidelines should be analysed. One suggestion was to circulate the list compiled by T. de BRUIN among members to check and make additions. The need to contact other ICES Working Groups, especially WG on Oceanic Hydrography, was noted. The finalised list will also be sent to IODE to be included in the Ocean Portal website.

Action 6: Co-Chairs to instigate collaboration with IODE and in particular OceanTeacher

The roles of IODE and OceanTeacher in promoting the guidelines were noted. The guidelines are now included in OceanTeacher. In addition, IODE has promoted them to IODE national contact points and they will probably be endorsed at IODE-18 in 2005. WGMDM will follow up this by co-operation with the IODE quality control project.

E. Vanden Berghe informed that the content of OceanTeacher is under revision and that comments and suggestions for new inclusions as well as writers for the chapters are welcome. He will ask the person in charge to inform WGMDM on the list of contents.

It was also noted that the consistent format of the WGMDM guidelines could serve as an example to other ICES Working Groups in the area of for instance biology.

Action 7: T. de Bruin and G. Slesser to collate information about merging CTD and water sample data (from G. Dawson, R. Olsonen, G. Slesser, T. De Bruin, H. Sagen, K. Larsen, E. Vanden Berghe, S. Jans, F. Nast, S. Almeida, M-J. García, S. Sagan, J. Szaron)

T. de Bruin introduced action point 7 "Merging CTD and water sampler data". He made a survey on existing practices among the institutions of some members of the Working Group (see Annex 7 for the questionnaire). The survey showed that the practices are mainly rather similar in different institutes. It was however noted that the sample of this survey was limited. It might be feasible to increase the survey to cover more institutions in ICES countries. It remained unclear whether there are real problems in merging CTD and water sampler data. One specific problem might be merging the near bottom sample to CTD data in shallow highly stratified areas like the Baltic Sea. It was discussed whether there is a need for guidelines for best practise in using CTD.

It was decided to focus the questionnaire and send it to the rest of the WGMDM members and to other ICES Working Groups (Oceanic Hydrography). It was decided to keep this action point with minor modifications.

New actions for 2004/2005:

Action 1: Ensure all MDM members have links to the MDM guidelines (all)
Action 2: Continue the promotion of the guidelines (all)
Action 3: Request ICES to get links to the guidelines on other ICES web pages (i.e., Environment and fisheries) (Chairs)
Action 4: Review the list of other guidelines sent by Taco de Bruin (Taco de Bruin as coordinator and all); send the list to Ocean Portal (Taco de Bruin)
Action 5: Send the questionnaire about merging CTD and water samples to all MDM members (Taco de Bruin), MDM members have to fill it in and send it back to Taco de Bruin (all)
Action 6: Produce a summary of the results of the questionnaire (Taco de Bruin)
Action 7: Request comments from the Oceanic Hydrography WG on the summary of merging CTD and water sample (Chairs)
Action 8: Request the ICES secretariat to provide an update on their future data management strategy and plans (Chairs)
Action 9: Request the ICES secretariat sends a representative (e.g., Data Centre Manager) to the next MDM meeting (Chairs)
Action 10: Request IODE project officer to attend the next MDM meeting (Lesley Rickards)

In summary, the present guidelines are complete and consistent. The next stage is to compile other guidelines as appropriate, in particular to work together with GE-BICH on biological matters, and to continue to promote the guidelines. In addition, WGMDM will collaborate with the IODE quality control project.

5 Develop a referral portal for guidelines and quality control (e.g., to include links to standards, procedures, guidelines, metadata, real-time/operational)

M.J. Garcia introduced the topic. Again a concern of the maintenance of the portal on the ICES pages emerged. Reviewing the information on the ICES portal it was noted that the design of the ICES ROSCOP web page shows a complete search criteria and links to the inventories of each data centre. The existence of IOC Ocean

Portal was recognized and caution not to do duplicate work was noted. The presence of WGMDM in the Internet was considered to be important and it was also noted that the Working Group should be active in updating its pages on the ICES web pages. The information concerning WGMDM on the ICES web pages needs revision and updating. It was noted that the links to ICES member country data centres should be updated. It was suggested that a small group within WGMDM should go through WGMDM related pages on the ICES web pages and make suggestions for updates. WGMDM agreed that information on quality control and guidelines should be channelled through the IODE web-sites (e.g., OceanPortal, OceanTeacher), whilst maintaining an MDM presence on the ICES web site.

New action for 2004/2005:

Action 11: Send information to the ICES Secretariat of what MDM would like to see on the MDM web pages (Hjalte Parner, Robert Gelfeld, Gaynor Evans)

6 Further investigate details of the Integrated Taxonomic Information System (ITIS) and actively promote ITIS within the ICES and IOC community

To introduce a discussion on the promotion of Integrated Taxonomic Information System (ITIS) within ICES and the IOC Community E. Vanden Berghe described the evolution of the system over the past few years. From its origins at the NODC, when one man maintained it, it has developed to a position today where it is run by a consortium at the Smithsonian Institute and contains 322,000 records. The structure is now much richer as it contains sources of information, vernacular names and intelligent codes. With formal QC procedures it is well organised and searchable on line. On the downside there are problems as it is not specific to marine taxa, it still has a North American focus and data entry is done by non-experts albeit biologists.

Do we need ITIS? E. Vanden Berghe believed that we do need ITIS for several reasons. It is the largest, most well organised list of Taxonomic codes and thus has become a de-facto standard being already well used, a contributor to GBIF and recommended by ICES, IODE and GE-BICH. E Vanden Berghe commented that the main advantage of using ITIS was to have a standard list of well-researched names; he added that the use of Taxonomic Serial numbers was superfluous and could lead to imply precision and/or certainty that was not there in the original name. Also, several groups, including some ICES working groups have expressed concerns at the level of quality and completeness of the ITIS list. Data entry is slow, and it takes ITIS too long to incorporate new data submissions. Extra support for ITIS activities, as suggested also during the GE-BICH meeting, might alleviate these problems. The availability of mirror sites and remote data entry would add to ITIS's usefulness.

In summary ICES needs ITIS but must continue to comment critically. ITIS had recently agreed to investigate the possibility of remote data entry after training of the personnel concerned in data entry procedures and quality control as practiced at ITIS.

J. Szaron commented that ICES required ITIS to be used, but it does not include Baltic species.

R. Gelfeld felt that the ICES community need to be educated on ITIS – what it is and what it does. A paper is needed at the next Science Conference, as ITIS will not be used if scientists have not heard of it. MDM agreed to request (and forward to ITIS) comments from other working groups under the Oceanography Committee.

S. Sagan understood that provision had been made under EU Framework 6 for a network of excellence on Marine Taxonomy.

E. Vanden Berghe commented that areas which were currently not represented in ITIS should be able to do their own data input work. ITIS is a good, well-developed system but has too much focus on North America.

Reports on 2003/2004 actions:

Action 8: E. Vanden Berghe to clarify with Todd O'Brien the requirement for an annual production of ITIS CD-ROMs

E. Vanden Berghe had consulted with T. O'Brien and it was concluded that an ITIS CD was not required as remote sites, without Internet access, were unlikely to be locations with species represented in ITIS. For example, African species are not represented in ITIS.

Action 9: E. Vanden Berghe will continue to test the update speed of ITIS

Experiences with the responsiveness of ITIS varied widely. BODC and BIO had had good, quick responses. E. Vanden Berghe had asked for large medium and small numbers of records and received no reply at all. The software was not adequate and crashed when faced with a large request. It appears that the systems work well with small requests and personal contact but not otherwise.

Action 10: ICES WGMDM Co-Chairs to encourage the completion of the matching of BODC's parameter dictionary to ITIS

Two people are now working on the matching of BODC's parameter dictionary to ITIS. 163 corrections had been submitted and a further 81 identified. Some improvements to the web browser were with T O'Brien waiting for ITIS to implement.

New actions for 2004/2005:

Action 12: Compare records in ITIS with UNESCO Register of Marine Organisms; European register of Marine Species; Marine Species Database of Eastern Africa; other relevant databases; with a view to assess the number of records that would be available from other databases (Edward Vanden Berghe, Todd O'Brien, Slawomir Sagan, Jan, Szaron)

Action 13: Monitor the completion of the matching of BODC's parameter dictionary to ITIS (Edward Vanden Berghe, Gaynor Evans)

Recommendations:

- Request the ICES secretariat to inform the ICES community on the benefits/rationale of ITIS as the chosen taxonomic coding system.
- Request ICES secretariat to invite a representative from ITIS to present ITIS activities during the next ICES Annual Science Conference. This could be included as part of the suggested joint theme session on Management of Integrated Data.
- Request the Oceanography Committee to compile a consolidated critical assessment by all relevant working groups on the use of ITIS.
- Request the ICES secretariat to contact ITIS to consider a decentralised approach to data entry. More specifically, investigate how taxonomic communities working in particular seas can directly contribute records to the ITIS database.
- Request the ICES secretariat to discuss with IOC/IODE the investigation of the possibility of the IODE project office hosting a mirror site of the ITIS website.

7 Critically assess the data management developments and implications for operational oceanography

J. Szaron outlined recent data management development issues and their implications for Operational Oceanography (OO). The accepted definition of OO, which comes from EuroGOOS, concerns the rapid processing and dissemination of data and covers forecasts, nowcasts and hindcasts. These activities take place in real-time and near-real time and should also cover data archiving. Examination of the ICES website reveals a variety of different references to OO. J Szaron also pointed to the "ICES-IOC Steering Group on GOOS", the "ICES-EuroGOOS Planning Group on the North Sea Pilot Project NORSEPP", the ppt-presentation "Implementing the Coastal Module of GOOS - A Case for ICES' Leadership" (www.ioc.unesco.org/GOOS/Presentations/ICES-talk.ppt) and the planned/future ICES Ocean Observing System (I-OOS). There is also a major initiative in ICES leading to a Theme Session on "integrated assessments" – quite a number of OCC WGs were given this to consider as a ToR.

In addition, under the Projects section of the ICES web-site, there is a section describing interaction with IOC and including details of the three elements of the ICES Implementation Plan for GOOS. These are as follows:

- The Global and Regional Linkage;
- The ICES Ocean Observing System;
- A regional ICES GOOS Programme component for the North Sea.

Consideration of OO in the ICES context raises a number of issues and questions. For example: How should ICES present OO? Where should the results be available? Who is involved in OO? Who has made products? What are the QC procedures? Does ICES need an OO website? What is MDM's task in this area? Many of the WGMDM member organizations are already have some involvement in operational oceanography, for example in projects such as EuroGOOS, Argo, North West Shelf Operational Oceanographic System (NOOS), Baltic Operational Oceanographic System (BOOS), PAPA and EDIOS. Some of these projects are producing operational products often, but not always, published on web-sites. Although the role for MDM is not completely defined yet, effort can be directed at pointing to relevant web sites to help pull together data to make better products, to bring together and examine currently used (real-time) quality control procedures and to recommend which to use (e.g., ICES guidelines, guidelines listed on the IODE OceanPortal site, etc.).

E. Vanden Berghe suggested that we did not want duplication but rather to strengthen what was already happening unless it was proceeding in the wrong direction.

T. de Bruin pointed out that our world was changing to OO and we needed to determine MDM's role in advising how to provide real-time data. J. Szaron noted that we should utilise established guidelines for better OO products.

R. Gelfeld felt that MDM should continue to review OO developments and recommend appropriate data management standards and practices, but that co-ordination should be carried out at the Oceanography Committee level. MDM should offer specific technical advice through its web page. It was agreed that it was necessary to add to existing processes rather than run in parallel.

WGMDM will assist in the development of the ICES Ocean Observing System by providing links to OO data and data products within their own countries; these could be included on the ICES website. It was suggested that all WG Chairs should be requested to provide, to the Oceanography Committee, a summary of what they need to focus on in the field of OO.

L. Rickards felt that open ocean or global OO was quite well taken care of through GOOS projects like Argo and SOOP, which provide standardised procedures and real-time QC, but that coastal OO, which has a much larger range of parameters, is not yet adequately dealt with. MDM does not want to reinvent the wheel, but needs to encourage that real time QC is correctly documented and to ensure long-term data stewardship for coastal OO data. G Dawson considered MDM to be well positioned to give advice on coastal OO from the data management perspective.

New actions for 2004/2005:

Action 14: MDM members will submit links to web sites, where their institute/centre makes OO-data and products available, to Jan Szaron. He will then review the list and forward it to the "MDM web site review group" for inclusion (all)

Action 15: MDM should examine OO in coastal areas (COOP) and ensure/propose that consistent standard sets of QC and processing procedures are used similar to those evolved and established for existing oceanic projects (OOPC) such as ARGO, SOOP etc. (Lesley Rickards)

Action 16: Contribution of the members to GOSUD (Lesley Rickards)

Recommendations:

- The Oceanographic Committee (OCC) is becoming strongly involved in operational oceanographic (OO) data sampling, data pooling and compilation of operational products. MDM therefore recommends that OCC critically reviews established and planned OO-systems to ensure that well known and recommended data management procedures are implemented. MDM also recommends that the guidelines published at the MDM web site be used.

8 Appraise the best mechanism/most effective way to provide (coordination) focal points for data access to new data products (CD-ROM/DVD and web-based), online databases, etc. – in collaboration with the IODE Ocean Portal and the EU Sea-Search initiatives

To appraise the most effective way to provide access to new data products M. Fichaut reported on her use of two search tools (Sea Search and Ocean Portal) to identify two CDs produced by SISMER. The results from using these two search tools were indifferent and depended on how a CD was described. For example, whilst looking for oceanographic data CDs, a search on "CD-ROM" gave much better results than a search on "CD ROM". Use of Google proved more successful as it gave more up to date results. We need to improve existing tools, to add publication dates and to increase frequency of updates. Semi-distributive systems, such as the proposed Sea Data Net, may help but they needed to be kept synchronised and updated. Also duplicates are a problem because unique IDs are difficult to implement.

T. de Bruin said that in his experience with Antarctic data it was easier to find data using Google (with relevant keywords) compared to using established data inventories such as EDMED. Do we need these inventories?

R. Gelfeld wondered in what situation we would need a list of all CDs available.

It was agreed that a list of member organisation's CDs or links to their CDs was needed and that this might be best located at the Ocean Portal web-site, which already includes some information of this type. The list could also include on-line products. It is advisable to agree in common names for same type of products as Climatology, software, etc.

New actions for 2004/2005:

Action 17: Ask the MDM members to give a list of their CD-ROMs and Products, send the complete list to IOC/IODE (Gaynor Evans, Lesley Rickards)

9 Evaluate and develop future directions for oceanographic data management based on the results from SGXML and make recommendations regarding adoption in the oceanographic community

R. Gelfeld described the history and achievements of the ICES/IOC SGXML. The vision of the group was to promote an international standard for seamless exchange of data using well-defined tagged meta-data. This XML data structure was to be platform independent. The group was working to achieve XML standards in parameter dictionaries, point data and with meta-data. The upcoming meeting of the group was to be the third and final. It was hoped that the work would continue under IODE or JCOMM. The large size of XML files would continue to pose problems for data so its applications may initially concentrate on meta-data.

Although the SGXML group did not see the advantage for individual centres in converting their internal format to XML the merits of its adoption for exchange and its self-describing nature, and hence long-term stability, are clear.

Reports on 2003/2004 actions:

Action 11: G. Slesser and S. Almeida to map moored current meter data to point structure

G. Slesser described his work in applying XML (SLIDES in Annex 8), using the Keeley Bricks, to Moored Current Meter data. The data consisted of raw data files and calibration and meta-data files. The work had shown the need for some new attributes and bricks to fully describe the data. Finally he described how he had used web tools to validate his XML schema. The results of this work have been passed on to the SGXML.

E. Vanden Berghe reminded the group that the Keeley Bricks were intended as a proof of concept and he felt that it was now time to move on from them and take into account other standards such as GML.

Action 13: Guideline coordinators to check that everything in the guidelines has a place in the XML structure (Coordinator: J. Gagnon)

J. Gagnon had supplied material in completion of this action that looked at whether the XML work took into account the MDM Guidelines. Comments had also been received from P. Haaring of the SGXML and the EU Marine XML Project. J. Gagnon report on this action is given in Annex 9.

Action 14: E. Vanden Berghe to provide WGMDM with a list of standards taken into account when setting up marineXML to check for omissions

E. Vanden Berghe reported that the list of standards was not yet finalised because he had not received a list of standards used from the EU MarineXML Project. This had been expected in April and should now be available very soon.

The next step for this project was to build three pilot applications of marine XML. These concerned combining different data sources for ships entering harbour, algal blooms and a biology project to produce a standard ontology.

New actions for 2004/2005:

Action 18: Circulate the report of the SGXML to all MDM Members (Robert Gelfeld)

Action 19: Check that everything in the guidelines has a place in XML structure (Serge Scory, Edward Vanden Berghe, Marcin Wichorowski)

10 Provide input to the Study Group on the Management of Integrated Data (SGMID), and comment on their report

This is the report of Action 15.

Lesley Rickards has attended the Study Group on the management of integrated data (SGMID) in March 2004. She also provided feedback to them from the WGMDM discussion on their terms of reference in 2003. 17 attendees (data managers and scientists of different disciplines) from 7 countries were at the meeting.

Lesley Rickards presented a reminder of the SGMID terms of reference for 2004 and a brief overview of the presentations given during the meeting.

The report of SGMID outlines the importance of data integration for the ICES community and SGMID presented a list of recommendations, mainly to ICES:

- ICES to continue work on data integration;
- Urgent need for development of fisheries databases, integration of zooplankton, survey and marine mammal/seabird data as a prerequisite for the development of an integrated advice;
- Make data easily available which is already in the ICES system, but hidden in reports of working groups or elsewhere;
- ICES to retrieve (and quality check) historic data;
- Open access to data wherever possible;
- Data should be directly downloadable to reduce work for secretariat staff;
- ICES to revisit its data policy;
- ICES to take the lead in exchange format definitions (e.g., species lists, nets, fleets….) to ease data integration, make codes available if they are already agreed;
- ICES to use as much as possible existing formats, software… rather than re-inventing/redeveloping database structures or formats;
- ICES to be the focal point for data integration, maintenance of a catalogue;
- Explore possibilities to use distributed database systems (e.g., for survey data). Define minimum standards, facilitate quality control;
- ICES to participate in different ongoing initiatives for data integration in Europe, national institutes to make sure ICES is informed about this initiatives;
- Provide a comprehensive list of data available in the ICES environment (even if currently not handled by the secretariat);

- Encourage national laboratories to contribute to software/database development or to take the lead for development/maintenance of specific distributed databases.

One further recommendation was for SGMID to convene a Theme Session at the 2005 Annual Science Conference on Integrated Data Systems, jointly with WGMDM.

It was decided that SGMID would meet again year in 2005. They are happy to work together with WGMDM, as they do not think that SGMID and WGMDM are competing, but complementary.

The ensuing discussion was about what should be the future actions of WGMDM concerning SGMID. MDM members were concerned about how the two groups could collaborate in the future: should the two groups merge or should the Terms of References of SGMID be transmitted to MDM after the study group completes its work?

Four actions have been decided for next year.

New actions for 2004/2005:

Action 20: Continue dialogue with SGMID especially on future collaboration (Lesley Rickards and Chairs)
Action 21: Provide comments on SGMID report (all)
Action 22: Attend SGMID meeting in 2005 (to be decided)
Action 23: Contribute to a Theme Session on Management of Integrated Data at the Annual Science Conference 2005 (all for posters)

11 Report on other 2003/2004 actions

Action 12: F. Nast and L. Rickards to provide feedback from SeaSearch

Michèle Fichaut provided information about the work done for the normalization of XML to ISO-19115 (standard for geographic information metadata) in the frame of the SEA-SEARCH European project. She mentioned that the XML normalization has been studied for the description of the database relative to oceanographic data (EDMED forms) and to the Cruise Summary Reports (based on the ROSCOP form available on ICES WEB site). This also provides a contribution to the SGXML.

Concerning EDMED, almost all the necessary information have been translated into XML tags in compliance with ISO-19115. An XSL schema, an Excel file describing the mapping between EDMED and ISO-19115 and example of XML file have been made available to the Sea-Search partners.

Concerning the ROSCOP compliance to ISO-19115, the results are that almost 50% of the needed information is not found in ISO-19115. ISO does not contain information about ships, ports of departure and return or moorings.

ISO-19115 does not allow the insertion of geographical element such as the ship route (line), the station of measurements (points) or the area of measurements (polygon). We are currently exploring the use of GML (Geographic Markup Language, standard of OpenGIS) to complete the descriptions of geographic elements.

Action 16: L. Rickards to continue to compile information from WGMDM on their surface underway data holdings, with the aim of creating an inventory of underway datasets at member centres to pass onto GOSUD.

A little progress has been made on this action; some members have prepared data to send to GOSUD. Lesley Rickards will provide a template to submit underway data to GOSUD, to be filled-in by all MDM members.

Action 17: Investigate co-sponsorship of Hamburg 2004 and quality control conferences, and WGMDM participation on organizing committees (L. Rickards, E. Vanden Berghe)

The International Conference on Marine Bio-diversity Data Management will take place in Hamburg, Germany from 29/11/2004 to 1/12/2004. The conference topics will be restricted to marine biological data management - taxon-based, biogeography but also environmental, non-taxon based data management. The website: http://www.vliz.be/oni can be visited to have more information about the conference which is organized by IOC/UNESCO, IODE, Census of Martine Life – Ocean Biogeographic Information system (CoML/OBIS), International Association for Biological Oceanography (IABO), Flanders Marine Institute (VLIZ).

One recommendation of the WGMDM is that ICES supports this activity and promotes the conference (e.g., becomes one of the sponsoring organisations). Following the WG meeting, discussions between IOC/IODE and the ICES Secretariat have resulted in ICES agreeing to be a conference sponsor.

Action 19: Investigate possibilities to complement EDIOS with information on operational oceanography in the West Atlantic (J. Gagnon)

J. Gagnon did not find any web-based input "form" that he could have filled in on the EDIOS web page. Some feedback from the EDIOS project was given to WGMDM: MARIS will set up a Web service for searching data sets on the EDIOS Website, this Web service is under testing but protected by a login and password. The members of WGMDM are welcome to test the search interface of EDIOS.

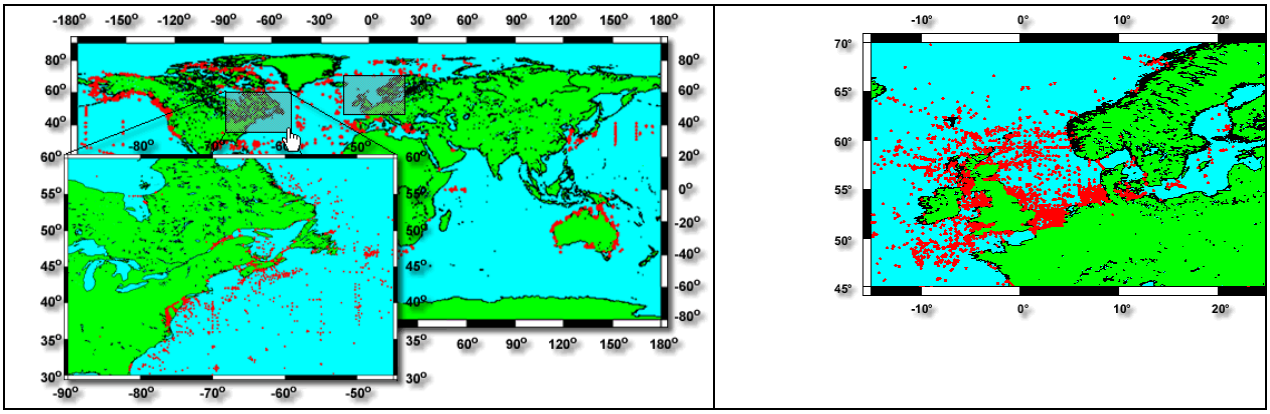
The online access to EDIOS catalogue will be provided by MARIS for 2 years after the end of the project. BODC will be responsible for the maintenance of the data base. IODE data centres and SeaSearch partners will be requested to provide updates on a regular basis.

A new action is proposed for next year, WGMDM will give J. Gagnon the necessary information so that he can progress on the inventory in the North-Western Atlantic area.

Action 20: L. Rickards to contact WGMDM members for updates to international current meter inventory.

BODC maintains an international inventory of the moored current meters. This current meters inventory was first started inside the WGMDM; he was then extended to the country participating to IODE.

The International Inventory of Moored Current Meter Data comprises about 22500 entries relating to current meter data collected by 97 organizations in 15 countries. The locations of the current meter moorings held in the inventory are shown on the map below:



L. Rickards sent an e-mail to the WGMDM members which requested an update of their inventory. Sweden, France, Spain and Canada have provided the inventory of their current meter data.

Norway, Denmark, Germany, Belgium, Netherlands, Finland, USA say they will provide this inventory to BODC in the near future.

Poland will check and contact the potential owners of current meters data.

This action is then renewed to next year.

New actions for 2004/2005:

Action 24: Try to involve ICES into the Hamburg meeting on Biological data management (Edward Vanden Berghe, Lesley Rickards) [Now successfully completed]

Action 25: Provide information to J. Gagnon to see if he can input data from the Western North Atlantic in EDIOS (Lotta Fyrberg)

Action 26: Send current meters inventory to BODC (Helge Sagen, Hjalte Parner, Siegrid Jans, Taco de Bruin, Edward Vanden Berghe, Pekka Alenius, Slavomir Sagan, Robert Gelfeld)

12 Terms of reference for 2004/2005

Terms of reference for the coming year were discussed by the WG, based on the work carried out over the past year and the discussions for future priorities, and by the requirements of the ICES Action Plan. The resulting proposed terms of reference are given in Annex 10.

13 Any other business

G. Dawson requested advice on the ship codification, because in UKHO they still use the "old" ICES codification, which was a four-digit number.

He was advised to use the ICES ship code list available from ICES web page: http://www.ices.dk/ocean/. Codes in this list are 4 characters alphanumeric. And, if the ship is not available in the list, he has to contact susanne@ices.dk to get a new code. This new code is created in collaboration with the World Data Centre for Oceanography (Silver Spring) (USA).

Finally, the WGMDM would like to thank Harry Dooley, the ICES Oceanographer/Science Coordinator, for all of his help and dedication to the activities of the WG over a period of many years.

14 Date and place of next meeting, concluding remarks

On behalf of Poland, S. Sagan volunteered to host the next meeting in Sopot from 9–11May 2005.

The Co-Chairs closed the meeting by thanking the participants for their contributions. On behalf of the WGMDM, the Co-Chairs also thanked the Management Unit of the Mathematical Models of the North Sea for their hospitality and arrangements and in particular acknowledged the efforts of Siegrid Jans and her colleagues from the Belgium Marine Data Centre.

15 Annexes

Annex 1 List of participants

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Annex 2 Detail Meeting Agenda for WGMDM

Monday 3 May – Rapporteur ***Pekka Alenius***

0900-1000 Opening greetings by ***Helge Sagen/Michèle Fichaut***
Welcome by **G. Pichot**, head of department, MUMM
Local arrangements by **Serge Scory**, head of the Belgian NODC
Review meeting schedule and items for discussion ***[Chairs]***
Review action items from last year's meeting ***[Chairs]***

1000-1100 Presentations (1) – *[Lead is **Helge Sagen**]*

1100-1130 Coffee break

1130-1230 Continue to develop, maintain and promote the WGMDM guidelines for data management and exchange, and assess the results of promotional activities. *[Lead is **Helge Sagen**]*
Report on Actions 1 to 7.

1230-1345 Lunch

1345-1500 Presentations (2) – *[Lead is **Michèle Fichaut**]*

1500-1530 Coffee break

1530-1700 Develop a referral portal for guidelines and quality control (e.g., to include links to standards, procedures, guidelines, metadata, real-time/operational). *[Lead is **Maria-Jesus Garcia**]*

Tuesday 4 May – Rapporteur Garry Dawson

0900-1000 Presentations (3) – *[Lead is **Helge Sagen**]*
Further investigate details of the Integrated Taxonomic Information System (ITIS) and actively promote ITIS within the ICES and IOC community. *[Lead is **Edward Vanden Berghe**]*
Report on Actions 8, 9 and10.

1030-1100 Coffee break

1100-1230 Critically assess the data management developments and implications for operational oceanography. *[Lead is **Ian Szaron**]*

1230-1345 Lunch
Appraise the best mechanism/most effective way to provide (coordination) focal points for data access to new data products (CD-ROM/DVD and web-based), online databases, etc. – in collaboration with the IODE Ocean Portal and the EU Sea-Search initiatives.
[Lead is Michèle Fichaut]

1500-1530 Coffee break

1530-1700 Evaluate and develop future directions for oceanographic data management based on the results from SGXML and make recommendations regarding adoption in the oceanographic community.
[Lead is Bob Gelfeld and George Slesser]
Report on Actions 11, 13 and 14.

1700- …. Visit of the Belgian Royal Institute of Natural Sciences (Iguanodon's room), drink in the whale's room and then restaurant. *[Lead is **Siegrid Jans**]*

Wednesday 5 May – Rapporteur *Siegrid Jans*

0900-1000 Presentations (4) – *[Lead is **Michèle Fichaut**]*

1000-1045 Provide input to the Study Group on the Management of Integrated Data, and comment on their report *[Lead is **Lesley Rickards**]*
Report on Action 15.

1045-1115 Coffee break
Report on actions 12 (feedback from SEA-SEARCH), 16 (Surface Underway data holdings), 17(Hamburg meeting), 19 (EDIOS in the West Atlantic) and 20 (Current meters inventory).
[Lead is Lesley Rickards].

1230-1345 Lunch

1345-1530 Other business (codification of ship, *asked by Garry Dawson)*, conclusions *[Lead is **Chairs**]*

Annex 3 WGMDM Terms of Reference 2004 (and Action List)

2C11 The **Working Group on Marine Data Management** [WGMDM] (Co-Chairs: Michèle Fichaut, France and Helge Sagen, Norway) will meet in Brussels, Belgium, from 3–5 May 2004 to:

a) continue to develop, maintain and promote the WGMDM guidelines for data management and exchange, and assess the results of promotional activities (Action Plan 4.12);

b) develop a referral portal for guidelines and data quality control information (e.g., to include links to standards, procedures, guidelines, metadata, real-time/operational) (Action Plan 4.12, 6.1);

c) further investigate details of the Integrated Taxonomic Information System (ITIS) and actively promote ITIS within the ICES and IOC community (Action Plan 6.4);

d) critically assess the data management developments and implications for operational oceanography (Action Plan 5.13.4);

e) appraise the best mechanism/most effective way to provide (coordination) focal points for data access to new data products (CD-ROM/DVD and web-based), online databases, etc. – in collaboration with the IODE OceanPortal and the EU SeaSearch II initiatives (Action Plan 6.1);

f) evaluate and develop future directions for oceanographic data management based on the results from SGXML and make recommendations regarding adoption in the oceanographic community (Action Plan 5.13.4, 6.1);

g) provide input to the Study Group on the Management of Integrated Data, and comment on their report (Action Plan 6.1).

WGMDM will report by 31 May 2004 for the attention of the Oceanography Committee.

Supporting Information

Priority:	This Group flies the flag for ICES in setting standards for global databases. It also provides an important interface for oceanographic and environmental data management in ICES, and promotes good data management practice.
Scientific Justification and relation to Action Plan:	a) Considerable inter-sessional effort will be made on promoting the data type guidelines. This effort will be assessed and feedback from other groups and organisations will be evaluated. Such feedback will help to establish future guideline activity. b) This will encourage standardization of approach in management and quality control across a broad spectrum of data types and to promote best practice in data management. c) The ITIS can play a major role in standardization and improving the ease of data exchange. It is an evolving partnership which requires input from (new) collaborators whilst maintaining community standards. The ITIS should be actively promoted with the communities and groups encouraged feed in their information. d) As GOOS activities develop it is essential that the modern marine data management systems are in place and utilized effectively. This will serve to assess established systems and recommend best practice for data management for operational oceanography. This item will examine various issues including metadata directories, developments for quality control, referral mechanisms, products (climatologies), data stewardship, etc e) This will provide information on data and data products relevant to ICES, but existing outside of the ICES databases. Links can be made and collaborations initiated resulting in the improvement and possible expansion of ICES databases to meet the challenges of the future. f) The data management community must explore the use of new technologies, such as XML, in a broader context. The WGMDM will attempt to integrate the efforts of SGXML into this broader context and develop possible directions for ocean data management in a distributed environment. The efforts of SGXML have potential implications and application to general data exchange procedures. These efforts should be followed within the broader context of general oceanographic data flow. g) Establishing data integration is a step in developing the scientific basis for an ecosystem based approach to management. This is of high priority to ICES. Good data management practice is required to ensure the underpinning databases are as complete and as high quality as possible

WGMDM 2003 meeting Action Items

No.	Action item	Comment
1	Improve keywords in metadata tags on web pages to improve visibility for search engines like Google (H. Sagen)	Completed
2	Ensure all MDM members have links from their web sites to guidelines	Some progress
3	Continue promotion of guidelines at for example: IODE/JCOMM ETDMP (L. Rickards), within EU SeaSearch project (M. Fichaut, and others), etc	Completed
4	Co-Chairs to request ICES oceanographer to get links to the guidelines on other ICES web pages (i.e., environment and fisheries)	No progress
5	F. Nast, T. de Bruin and E. Vanden Berghe to coordinate compilation of a list of other available guidelines (with web links)	Completed
6	Co-Chairs to instigate collaboration with IODE and in particular OceanTeacher	Collaboration in progress
7	T. de Bruin and G. Slesser to collate information about merging CTD and water sample data (from G. Dawson, R. Olsonen, G. Slesser, T. De Bruin, H. Sagen, K. Larsen, E. Vanden Berghe, S. Jans, F. Nast, S. Almeida, M-J. García, S. Sagan, J. Szaron	Completed by some members. To be continued and extended.
8	E. Vanden Berghe to clarify with Todd O'Brien the requirement for an annual production of ITIS CD-ROMs	Completed
9	E. Vanden Berghe will continue to test the update speed of ITIS.	Completed
10	ICES WGMDM Co-Chairs to encourage the completion of the matching of BODC's parameter dictionary to ITIS.	In progress
11	G. Slesser and S. Almeida to map moored current meter data to point structure	Completed
12	F. Nast and L. Rickards to provide feedback from SeaSearch	Completed
13	Guideline coordinators to check that everything in the guidelines has a place in the XML structure (Coordinator: J. Gagnon)	In progress
14	E. Vanden Berghe to provide WGMDM with a list of standards taken into account when setting up marineXML to check for omissions	Completed
15	L. Rickards to provide feedback to SGMID, and continue a dialogue with them	Completed
16	L. Rickards to continue to compile information from WGMDM on their surface underway data holdings, with the aim of creating an inventory of underway datasets at member centres to pass onto GOSUD.	Little progress, to be continued
17	Investigate co-sponsorship of Hamburg 2004 and quality control conferences, and WGMDM participation on organising committees (L. Rickards, E. Vanden Berghe)	Little progress, to be continued
18	Co-Chairs to assign responsibilities to WG members (existing and new Co-Chairs)	Completed
No.	Action item	Comment
19	Investigate possibilities to complement EDIOS with information on operational oceanography in the West Atlantic (J. Gagnon)	Not done
20	L. Rickards to contact WGMDM members for updates to international current meter inventory.	Completed

Annex 4 List of acronyms and terms

Acronym or Term	Description
ADCP	Acoustic Doppler Current Profiler
Argo	The Array for Real-time Geostrophic Oceanography (profiling floats)
BIO	Bedford Institute of Oceanography, Halifax, Canada
BMDC	Belgian Marine Data Centre
BODC	British Oceanographic Data Centre
BOOS	Baltic Operational Oceanographic System
CD-ROM	Compact Disk – Read Only Memory
COOP	Coastal Ocean Observations Panel (GOOS)
CSR	Cruise Summary Report (formerly known as ROSCOP)
CTD	Conductivity-Temperature-Depth
DVD	Digital Versatile Disk
EDIOS	European Directory of the Initial Ocean-observing System
EDMED	European Directory of Marine Environmental Data
ETDMP	JCOMM-IODE Expert Team on Data Management Practices
EU	European Union
FRS	Fisheries Research Services
GBIF	Global Biodiversity Information Facility
GE-BICH	IOC's Group of Experts on Biological and Chemical Data Management and Exchange Practices
GETADE	IOC's Group of Experts on the Technical Aspects of Data Exchange
GIS	Geographic Information System
GML	Geographical Markup Language
GOOS	Global Ocean Observing System
GOSUD	Global Ocean Surface Underway Data
ICES	International Council for the Exploration of the Sea
IEO	Instituto Español de Oceanografía
IMR	Institute of Marine Research
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
ISO	International Standards Organisation
IT	Information Technology
ITIS	Integrated Taxonomic Information System
JCOMM	IOC-WMO Joint Technical Commission on Oceanography and Marine Meteorology
MEDS	Marine Environmental Data Services - Canada
MUMM	Management Unit of Mathematical Modelling for the North Sea
NODC	U.S. National Oceanographic Data Center
NOOS	North West Shelf Operational Oceanographic System
OCC	Oceanographic Committee
OO	Operational Oceanography
OOPC	Ocean Observations Panel for Climate (GOOS)
PAPA	Programme for a bAltic network to assess and upgrade an oPerational observing and forecAsting System in the region - PAPA
QC	Quality Control
ROSCOP	Report of Observations/Samples Collected by Oceanographic Programmes (now CSR)
SGMID	ICES Study Group on the Management of Integrated Data
SGXML	ICES/IOC Study Group on the Development of Marine Data Exchange Systems using XML
SISMER	French National Oceanographic Data Centre
SMHI	Swedish Meteorological and Hydrological Institute
SOOP	Ship of Opportunity Programme

SQL	Structured Query Language
UKHO	UK Hydrographic Office
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VLIZ	Flanders Marine Institute
WGMDM	Working Group on Marine Data Management
WGZE	Working Group on Zooplankton Ecology
WMO	World Meteorological Organisation
WOCE	World Ocean Circulation Experiment
XBT	Expendable Bathythermograph
XML	Extensible Markup Language
XSL	Extensible Stylesheet Language

Annex 5 Summaries of presentations

Last year activities of FIMR

Pekka Alenius -Finnish Institute of Marine Research, Finland

The FIMR has continued monitoring cruises as in previous years. Real-time data is collected from 13 water level stations and two surface wave buoys. Remote sensing is used for ice service. New methods to automatically interpret ice types and ridging from satellite radar images have been developed. The databases are under development. MySQL has been taken into test use as RDBMS and many oceanographic data sets of FIMR including CTD, hydrographic, hydro chemical, biological and water level data have been loaded into the new system. The data model, or structure of the database tables, is under reconstruction. User interface for the new database has been developed for in-house use to make it easier for scientists to extract data from the databases.

Netherlands National Oceanographic Data Committee activities

Taco de Bruin – Royal Netherlands Institute for Sea Research (NIOZ), Netherlands

The Netherlands National Oceanographic Data Committee (NL-NODC) represents eight institutions from the governmental, scientific, and private sectors.

Four of these institutions give access to their data via the Internet and others are planning to do so. However, each institute has chosen a slightly different approach in making data available on their website. The need was felt and an initiative was started to come to a National Infrastructure for Oceanographic and Marine Data and Information.

During the intersessional period a NODC workshop was organised with the following goals:

- To gain insight into current and planned developments, especially on data access via Internet;
- To gain insight on national and international data management and data exchange infrastructure of individual partners;
- To exchange information and expertise amongst NODC participants;
- To supply (background) information for a proposal in the Dutch national funding programme for Geo-information.

One of the first results that came out of this workshop was an overview of the national and international data exchange structure in which Dutch institutes participate.

A new look at duplicates

Garry Dawson - UK Hydrographic Office, United Kingdom

With increasing amounts of oceanographic data available via the web and as more centres exchange data care is needed to avoid duplication. This presentation examines the methods in use in the UKHO's Maritime Environment Data Centre (MEIC) to detect duplicates and considers the shortcomings of its software. It concludes by describing the results from a recently tested new method to identify possible duplicates.

UK historic nutrient datasets: an example of their application

Gaynor Evans – British Oceanographic Data Centre, United Kingdom

Historic marine datasets provide an invaluable resource for identifying decadal scale changes in the marine environment and exploring the causes of such change. This presentation set out to highlight the value and necessity of long-term data sets and outline some of the results from a research project examining long term trends in nutrients and salinity in the Irish Sea.

There are three nutrient and salinity fixed station datasets for UK waters with records dating back prior to 1970. These are Station E1 in the English Channel (UK Marine Biological Association), Cypris Station in the Irish Sea (Port Erin Marine Laboratory, University of Liverpool) and the Menai Strait Database which is a compilation of multiple datasets taken in the Menai Strait also located in the Irish Sea (School of Ocean Sciences, University of Wales - Bangor).

Nutrient and salinity time-series data for the two Irish Sea stations were investigated (a research project funded by the UK Natural Environment Research Council). An outline of results was presented showing the nature of trends in nutrients and salinity in the Irish Sea. Comparison of these datasets lead to the conclusion that natural climatic variations have an effect on nutrient concentrations measured at fixed sampling stations over a decadal time scale. Such natural climatic influences occur alongside changes in marine nutrient concentrations due to anthropogenic nutrient inputs.

Processing and quality checks of shipboard ADCP

Michèle Fichaut – IFREMER/SISMER, France

Since 2003 SISMER has started to process, quality check, archive, and distribute ADCP shipboard data. Three IFREMER ships deliver raw ADCP data from their ADCPs (NB 75 KHz, BB 150 KHz and NB 300 KHz) at the end of the cruises and one Hydrographic Office ship delivers its "pre-processed" ADCP data (NB 38KHz and BB 150Khz) in real time on a daily basis so that if there is an error during the collection of the data it can be directly corrected during at the beginning of the cruise.

The raw data are processed by an in-house Software named CASCADE, running under MATLAB. Raw data are processed into four steps:

- Reformat the Raw data into NetCDF;
- Generation of processed files (attitude and time corrections, calculation of terrestrial coordinates, filtering, means);
- Ground speed calculation;
- Quality checks of the data.

Some examples of the quality checks are given and some results are presented.

Phytoplankton database for the Swedish West coast

Lotta Fyrberg – SMHI, Oceanographic Unit, Sweden

The project is a co-operation between SMHI (EU-project), the County authority in Västra Götaland and the Swedish Environmental Protection Agency. The aim of the project is to create a database populated with all phytoplankton data from the Swedish West and South West Coast, both national and regional (secondarily the database will be populated with national data from the seas surrounding Sweden). There is about 2000 samples + samples from the National Monitoring Program in the database for the moment, starting from 1985. The database will be used amongst other things in The EU Water Framework and can also be used to understand and forecast harmful algal blooms. The database will be connected to the national database for physical and chemical oceanographic data – The Swedish Ocean Archive (SHARK). The phytoplankton database will be accessible on the web in the near future and will hopefully be a complement to the Integrated Taxonomic Information System (ITIS).

Report from Instituto Español de Oceanografía

Maria-Jesús García - Instituto Español de Oceanografía, Spain
National Data Strategy

During 2003, a working group have been establishing to discuss the data policy and the strategy to coordinate the data bases at institution level and at national level. As result of this, one objective of the Strategy Plan (2004–2007) of the IEO is to facility the accessibility of the scientific-technique information not only to the public administration but also to the socioeconomic organization.

At national level, the Secretaría General de Política Científica has committed to the IEO for a study about establish a National System to coordinate the oceanographic data bases and the referential samples material. The study is not finished but progress is expected in relation with the data availability.

Developing Software
A new module, related to the quality control and visualisation of time-series, has been implemented in the QCDAMAR software package, taken into account the MDMWG guidelines. Also the module for visualisation map of the stations has been upgraded following the upgrading the visualisation of time-series. The work plan for this year is develop two applications for:

- *Elaboration products.* In particular, reference values as statistical profiles and spatial distribution of the temperature and salinity.
- *Internet access* to the physical oceanographic data by various selection criteria.

Construction the INDAMAR webpage:
Much more information have been included in Marine Data Information web page http://www.ieo.es/indamar with information and link to the Data Centre and Directories, Metadata from cruises and observation sites, Products, Projects related to the data management and one specific page dedicate to the Tides in which are included information of the stations sites, access to data and reports.

Data Archaeology
In the IEO, we are scanning the historical sea level graphical recorder in order to have all the records in electronic form to avoid the damage or loss of this information and also to facilitate the work of searching specific signals to investigate the high frequencies. A detailed inventory of the graphical recorder is on the web and the user can get the electronic graphical recorder by request.

National Project
Related to Operational Oceanography, a pilot project is being carried out in the frame of the Spanish National Program on Marine Sciences and Technology. The IEODC is participating in this project within the task related to the data inventory, analysis and services. The project have started in December 2003 and in relation with the data inventory, as result of the kick-off meeting, the ROSWIN software for cruises inventory and EDIOS form for the observing sites have been distributed in order to harmonize the Spanish inventory to the ICES and IODE community.

NODC Archive Management System

Bob Gelfeld - NODC/World Data Centre for Oceanography, USA

This system allows interested users outside NODC and WDC to use their browser to search and retrieve metadata and originator data residing at NODC/WDC. The system is comprised of:

- a brief access record describing who, what, when, where, and how the data were collected. The record uses controlled vocabularies to describe elements of this record and is open sourced and platform independent;
- a canonical directory listing the components of the data and the versions available from NODC/WDC;
- a metadata description of the data which allows export to other metadata clearinghouses;
- an archive that allows browser based search and retrieval of the metadata and originator data with direct access to part/all of originator data.

The Archive Management System advantages:

- open source tools;
- rapid inclusion into NODC Archives;
- improved validation of contents during media migration;
- easier, distributed process for creating and managing datasets;
- htpp://www.nodc.noaa.gov/Archive/Search.

Belgium Marine Data Center (BMDC) Report

Serge Scory – Management Unit of the Mathematical Models for the North Sea (MUMM), Belgium

On behalf of Belgium Serge Scory presented the ongoing efforts at the Belgian Marine Data Centre towards operational oceanography. After a brief overview of the history of the BMDC, of the range of data types it handles and of its means and methods, the data that are registered nearly continuously at sea were inventoried. They consist of measures made from the R/V Belgica (operated by MUMM) and at moorings: quality parameters, CTD, ADCP (both hull- and bottom-mounted, etc.). These data are gathered onboard in the ODAS system, which is then mirrored on land, at MUMM. For the moment, more than 500.000.000 values are kept in the system (over more than 20 years). Plans to enlarge the range of sources of information are currently being designed. Firstly the BMDC will incorporate and make available a 'library' of results of operational models run by MUMM. The will provide the users with synoptic values of water

heights, currents and wave spectra. Secondly means to equip future offshore wind farms with various oceanographic and meteorological instruments are being studied. Partnerships with wind farm operators will need to be agreed.

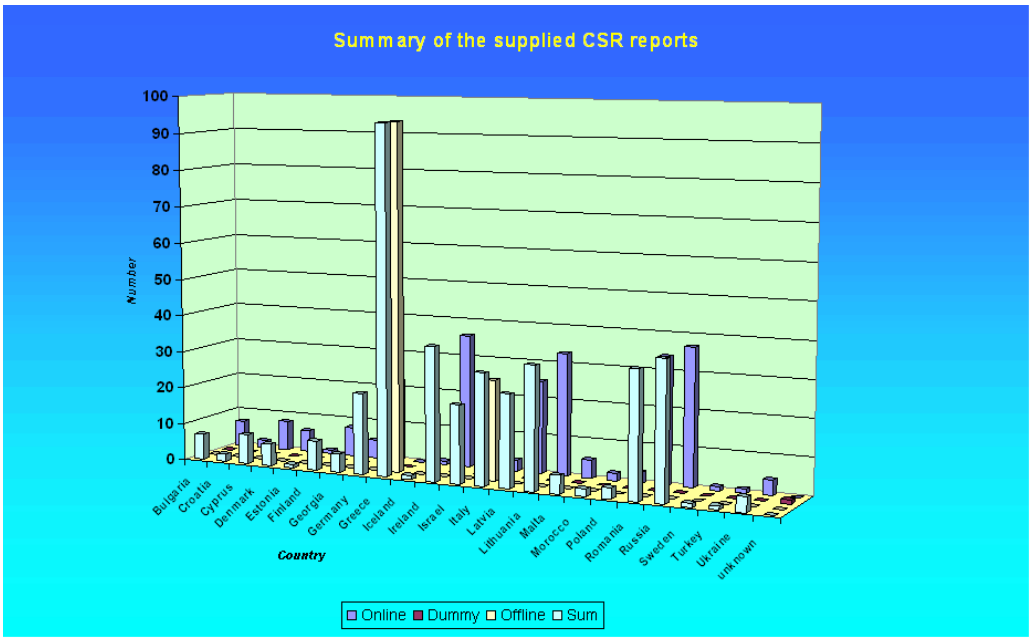
All these data, brought in common, increase the understanding of the marine environment. Very concretely, they are used at MUMM to ensure the sustainable development and management of the marine environment and the marine resources. Two examples were given: the procedure for allowing environmental permissions to wind farms and the agreement and monitoring of sand and gravel extraction.

Data Centre Report by Germany

Friedrich Nast - Deutsches Ozeanographisches Datenzentrum (DOD), Germany

Cruise inventory

In January this year n=576 Cruise Summary Reports (CSRs) were sent to ICES and WDC-A. Within this submission there were 274 CSRs submitted to us within the EU funded Sea-Search project from Sea-Search partners, who mainly used the Sea-search CSROnline entry system. In addition there were cruises from other countries visiting our waters and who submitted CSRs to us. A current summary is online, but it is password protected:



CSRs can be retrieved online via the Sea-Search web site, and you find eg for Israel 21 cruises from 1995 till February 2004, and at the moment Lithuania and Romania submitting CSRs routinely.

The amount, quality and timeliness of our CSR system was further improved since last years meeting nationally , in addition detailed station information is also provided by chief scientists in a standard form.

Country	Online	Dummy	Offline	Sum
Bulgaria	7	0	0	7
Croatia	2	0	0	2
Cyprus	8	0	0	8
Denmark	6	0	0	6
Estonia	1	0	0	1
Finland	8	0	0	8
Georgia	5	0	0	5
Germany	22	0	0	22
Greece	0	0	94	94
Iceland	1	1	0	1
Ireland	36	0	0	36
Israel	21	0	0	21

Country	Online	Dummy	Offline	Sum
Italy	3	0	27	30
Latvia	25	0	0	25
Lithuania	33	0	0	33
Malta	5	0	0	5
Morocco	2	0	0	2
Poland	3	0	0	3
Romania	34	0	0	34
Russia	37	0	0	37
Sweden	1	0	0	1
Turkey	1	0	0	1
Ukraine	4	0	0	4
unknown	0	1	0	0
				386

Online data access

Real data are accessible via our website

http://www.bsh.de/de/Meeresdaten/Beobachtungen/DOD-Datenzentrum/Aktuelle%20Daten/index.jsp

in which recent Data from the Baltic monitoring is presented, at the moment in a joint venture by Germany, Sweden and Finland, with submissions by Poland and Estonia planned.

Visualisation

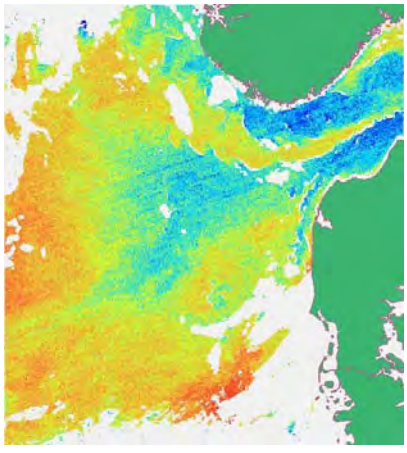
Spatial analysis of data will be improved by using ArcGIS/ArcIMS after finalising the migration of our Marine data bank from Ingres to Oracle 8.i, scheduled for this month.

Archive

In total, 92 data sets were submitted to DOD within the last year. They varied very much, and comprised single cruises or big projects. The biggest set of more than $22x10^6$ data were of WOCE origin covering the years 1990–2002. These data sets were QA-ed and loaded into our data bank. Another well are the offshore wind-energy activities, which both need and produce lots of data.

The use of remote sensing in last minute planning of a cruise

Hjalte Parner - Danish Institute for Fisheries Research (DIFRES), Denmark



The Danish Institute for Fisheries Research has recently started to use remote sensing data in the form of Sea Surface Temperature (SST) maps in the last minute planning of a given cruise.

Sea Surface Temperature Maps are semi automatically generated from NOAA AVHRR Satellite data which are freely available on the internet. The NOAA AVHRR are calibrated and corrected following the NOAA KLM user guide and SST maps are generated using the NOAA operational split window algorithm.

SST maps are supplied to the research vessel daily which gives the cruise leader an opportunity to make last minute decisions on where to place the sampling stations.

This service has proven to be a great success although it presents some problems. The main problem is that SST maps cannot be generated for cloud contaminated areas and therefore the cruise leader cannot rely on getting SST maps at a given time.

Recent developments in International Oceanographic Data and Information Exchange (IODE)
Lesley Rickards – British Oceanographic Data Centre, United Kingdom

The IOC's International Oceanographic Data and Information Exchange (IODE) Committee was established in 1961. The main objectives of IODE are (i) to facilitate and promote the exchange of oceanographic data and information, (ii) to develop standards, formats and methods for the global exchange of oceanographic data and information, (iii) to assist Member States to acquire the necessary capacity to manage oceanographic data and information, and become partners in the IODE network, and, (iv) to support international scientific and operational oceanographic programmes of IOC and WMO and their sponsor organizations with advice and data management services.

Over the last 40 years, IOC Member States have established over 60 National Oceanographic Data Centres (NODCs), and collaborated closely with the ICSU network of World Data Centres. These NODCs have collected, quality controlled and archived millions of ocean observations, supported several international science programs, and assembled and published many project datasets for national and regional projects. The challenge now for IODE is to meet the changing needs of the community arising from changes in technology, user needs and capacity of science programmes, and to raise awareness of IODE activities.

Whereas in the past IODE data centres focused mainly on physical oceanography data, the IODE Programme now gives attention to all ocean related data including physical, chemical and biological oceanography. In recognition of this IODE has set up a Group of Experts on Biological and Chemical Data Management and Exchange Practices. IODE now closely collaborates with, and services the needs of, the other IOC and related programmes such as Ocean Sciences, GOOS and the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM). IODE and JCOMM have a joint Expert Team on Data Management Practices.

Another major and long-term commitment of the IODE Programme is the long-term accessibility and archival of oceanographic data, meta-data and information to safeguard present and future holdings against loss or degradation. This includes sponsorship of a number of international projects data relating to the compilation of global data, the most recent projects of these is Global Ocean Surface Underway Data (GOSUD) Pilot Project It is being designed as an end to end system for data collected by ships as they traverse their ocean tracks. The goal of the GOSUD Project is to develop and implement the data system for ocean surface data, to acquire and manage these data and to provide a mechanism to integrate these data with other types of data collected in the world oceans.

ODIMeX
The Integrated Expert and Training System for Oceanographic Data and Information Management (ODIMeX) will be the successor to OceanTeacher. Whereas OceanTeacher focused on "traditional" oceanographic data and information management, ODIMeX will look at data and information management in a far more open way and will include operational oceanography, remote sensing, etc., thus serving not only the IODE community, but also GOOS and JCOMM. The project to develop ODIMeX began in April 2004 and will last for 4 years. The objective is to provide a single integrated e-learning and expert system providing all the expert and training resources for marine data management and marine information management needed by professional ocean data and information managers and scientists involved in data management, as well as providing ocean researchers and students with the necessary knowledge to interact effectively with their national oceanographic data centres.

Polar Ocean Data and Information Networks (ODINs)
Through collaboration between SCOR, SCAR and IOC, an outline paper is in preparation to apply the ODIN concept to the Polar Regions for presentation to the Planning Group of the International Polar Year (2007). This would be an opportunity to bring together the various nations involved to improve the way they store, retrieve and exchange marine data (including sea ice). In particular, SCAR is keen to see better use made of Southern Ocean data and this proposal also reflects the interests of IODE and JCOMM. This activity would also link into the SCAR Joint Committee on Antarctic Data Management (JCADM) for Antarctic.

Quality control and quality assurance
One of the core objectives and activities of the IODE has always been the "setting of standards" for ocean data and information management. This includes defining and disseminating of procedures for quality control and quality assurance of the data that are managed by the IODE data centres. A project is now underway within IODE to:

i) identify existing quality control and quality assurance procedures at the NODC and project level

ii) compare the procedures identified under (i)

iii) agree on common standards/procedures

iv) properly document and disseminate procedures agreed under (iii)

These procedures will cover physical, chemical and biological data, and will include both delayed-mode and operational data. The intention is to achieve (i) and (ii) by IODE-XVIII (April 2005).

New IODE Project Office
An IODE Project Office will be opened in Oostende, Belgium in April 2005. The Office will establish a creative environment facilitating the further development and maintenance of IODE projects, services and products with emphasis on improving the efficiency and effectiveness of the data and product/service stream between the stage of sampling and the user. It will further assist in strengthening the capacity of Member States to manage oceanographic data and information and to provide ocean data and information products and services required by users.

IODE Review
To further guide IODE towards fully meeting the user needs, a full review of IODE recently began and will be completed for submission to the IOC Assembly in 2005. The review will study the operation and implementation of IODE, with particular attention to its mandate, mission, structure, data centre network(s) and its (their) way(s) of operation, the activities of its subsidiary groups and projects, and the national development of IODE activities. It will further review the extent to which IODE activities, including those specifically targeted at capacity-building in support of IODE, benefit Member States. The results of this review will also be used for the development of an "IOC Data Management Strategy".

For further information visit the IODE website: www.iode.org

IOPAS Marine Databank

Marcin Wichorowski, Slavomir Sagan - Institute of Oceanology Polish Academy of Sciences, Poland

The Institute of Oceanology, PAS, is developing Marine Databank since 2003. Variety of formats and storage techniques has forced users to develop common database, capable to cover all necessary kinds of datasets (physical variables, biological data, publications etc.) collected in IOPAS (and cooperatives of IOPAS) databases.
The Marine Databank is invented as data directory for scientists working either inside or outside the IOPAS. Data model, data quality assessment, data sharing policy and data management are designed to conform guidelines and recommendations provided by WGMDM and other, which are in common use.

The development of tools, which are able to process quality check and data input to the database, must have been done as well. The late stage of the project is design of the output from the database. Data should be exported in formats, which are easy understandable (for example XML) by other database systems.

The present stage of the project is database ready to store the data. Storing, and products (CD's, DVD's and Internet applications) are next, coming steps.

Operational data at IMR

Helge Sagen, Jonas F. Henriksen - Institute of Marine Research, Norway

Handling and presentation of operational data at IMR
Operational ocean-related data arrive at IMR from a variety of sources. This abstract aims to present some of the solutions IMR use to retrieve and handle this data. It will also show some examples of how and why IMR uses SVG-technology to present data to the public.

Regular data transfer between IMR and other institutions via FTP
Examples of this kind of data are satellite images, water level data, wind from satellite, and data from ARGO drifting bouys. The data itself is very diverse, ranging from simple, flat text-files, to binary formats and zipped files. IMR handles this data for various purposes. A Java programme has been developed for intelligent handling of data published on ftp-sites. The main functionality of the programme is to:

- Download data at regular intervals. Regular expressions allow filtering of which directories should be searched for new or updated files, and which files should be downloaded. Downloaded data integrity can be check with a checksum.
- Run your own Java class on the downloaded file, e.g., to extract data, insert it into a database, translate a binary data format to text, etc.
- Run programme in reverse modus to post data to an FTP-site. The reverse modus has similar features as the normal modus.

The programme is currently used at IMR to download water level data every hour, and insert it into a MySQL database, download Argo drifter data daily, extract the data from the NETcdf files they are posted as, and insert into a POSTGRES database, and download gridded wind-data 4 times a day and save as text files.

Transfer of data from research vessels to land
Currently two of IMR's research vessels (G.O. Sars and Johan Hjort), are equipped with direct Internet connection to shore via satellite. This makes it convenient to transfer some of the data back to shore while the ships are still at sea. The system is set up so that some predefined folders on a server on the ship are synched to a server on land every night. For now CTD-data, thermo salinograph data and ship-log data are transferred. An application is being developed to insert the data to a database, and present the data to the public.

Dynamic data visualisation with SVG
IMR is considering the XML-based visualisation graphics tool SVG as a potential tool for visualising operational data on the internet. This standard has many advantages, but also some disadvantages. IMR is currently using SVG technology in at least three projects:

- Displaying data from ships;
- Displaying data from Argo drifters;
- Displaying CTD-, fish-, and zooplankton- data from 0-group cruises.

SVG-technology is ideal for displaying this kind of data, as you can create interactive images with built in zooming and panning possibilities, and the possibility to load more data into a page that is already loaded in the browser. SVG is quite simple, HTML-like, but still very advanced. It is an open standard recommended by the World Wide Web Consortium. A disadvantage with using SVG is that it is still new on the web, and not widely supported.

Report on the Marine Laboratory

G. Slesser - Marine Laboratory, Fisheries Research Services, United Kingdom

Over a six-month period up to the end of June 2004 the Marine Laboratory MicroVax computer system is being closed down. This was first mooted in 1997 when notice was given by the IT Group that the MicroVAXes were coming to the end of their working lives and would not be replaced or up graded by a similar computer system. Notice was given that the computer system to be supported by the IT Group would be a Windows operating system running on servers.

This decision necessitated the rewriting of the software routines presently run on the MicroVax computers. For some groups this involved a large number of programs. For example, the Oceanographic Research and Services (ORS) Group responsible for the processing and management of the physical oceanographic data collected by the Marine Laboratory had a library of 352 programs and subroutines built up over the past 35 years.

Given that some of these routines were possibly redundant or very rarely used a review was undertaken of this program library. Three priority levels were set, high, medium and low. This can be summarised as follows. All programs set at a high priority were those essential for the day to day processing and management of oceanographic data. The programs set at the medium priority level contained routines that immediate use was not identified but would be needed in the future and those set at the low priority level contained routines thought to be unlikely ever to be needed again and would only be rewritten as required.

The programs and subroutines residing on the MicroVAXes were written in VAX Basic and Fortran 77. These were rewritten in Console Compiler Power Basic or Matlab. By the closing down date all high priority ORS programs had been rewritten.
Other groups within the laboratory have either successfully migrated between the two systems or are on course to meet their target dates.

Swedish Underway Data – a contribution to GOSUD

Jan Szaron – SMHI, Oceanographic Unit, Sweden

The Swedish R/V Argos is equipped with a Thermosalinograph (Sea-Bird Electronics SBE 45 MicroTSG). Temperature and salinity (and fluorescence) are registered once every minute around-the-clock during a cruise. Data are corrected once a day against measured CTD-profiles. In-house graphic software is used to manually correct/delete erroneous data and out-layers. Software will be written to facilitate data submissions to GOSUD and also to BOOS.

Recent developments at VLIZ

Edward Vanden Berghe – Flanders Marine Data and Information Centre, Belgium

The Flanders Marine Data and Information Centre (VMDC – Vlaams Marien Data and Information Centre) is a section of the Flanders Marine Institute (VLIZ – Vlaams Instituut voor de Zee), based in Oostende, Belgium. It is the IOC/IODE National Oceanographic Data Centre for Flanders. VMDC is active in several domains of data management. For example, underway data from the Research Vessel 'Zeeleeuw', and operational data from the Monitoring Network Flemish Banks are made available through the web site in near-real time (http://www.vliz.be/cgi-bin/mvb2web.exe?action=list;http://www.vliz.be/vmdcdata/midas/index.php).

Biological data management activities receive special attention. One of the major new developments in VMDC is the data management for the EU Network of Excellence 'Marine Biodiversity and Ecosystem Functioning (MARBEF)', a project with 56 partners. A web site was developed, and hosted from the VLIZ server (http://www.marbef.org). Several data systems will be developed for this project. A register of resources (experts, institutes, metadata, projects, infrastructure, literature) is already functional, based on the 'Integrated Marine Information System (IMIS)' of VLIZ (http://www.vliz.be/vmdcdata/imis2). A register of samples and cruises will be developed. A large proportion of the resources available for MARBEF Data Management will be used to develop two biological databases: one on taxonomy, one on biogeography. The foundation for the taxonomic database is the 'European Register for Marine Species (ERMS)', a dataset resulting from a previous EU project. ERMS data are now available through the VLIZ website (http://www.vliz.be/vmdcdata/erms).

For the biogeographical system, a sub-network for the global 'Ocean Biodiversity Information System (OBIS – http://www.iobis.org) will be created, which will have its own identity and visibility as 'EurOBIS'. Data collected in EurOBIS will be completely compatible, and dynamically exchanged with the International OBIS community, making use of the 'Distributed Generic Information Retrieval (DiGIR)' protocol. VMDC will develop portal software to redistribute EurOBIS data, and make it available in a map-queryable form. For this, use is made of 'Scalable Vector Graphics (SVG)', as a thin-client solution for interactive mapping. Examples of the taxonomic and biogeographical search screens were demonstrated, as they are now used within another application developed by VMDC, 'Macrobenthos of the Belgian Coastal Area (MACROBEL)' (http://www.vliz.be/vmdcdata/macrobel).

Annex 6 Preliminary list of available other guidelines

Seabirds

COWRIE (Collaborative Offshore Wind Research Into Environment)
No URL
Towards standardised seabirds at sea census techniques in connection with environmental impact assessments for offshore wind farms in the U.K. (March 2004)
Camphuysen, Fox, Leopold, Krag Petersen
Shipboard technique: European standard + Canada.
US equivalent technique

ESAS Database group
Aerial technique: Danmark leading

Marine mammals

Line transects
Horvitz-Thomson estimators for double-platform line transect surveys
Borchers, Buckland, Goedhart, Clarke, Hedley – Biometrics 54(4) – 1221-1237, 1998

XBT

Australian Oceanographic Data Center (AODC)
http://www.aodc.gov.au/products/book/QC_Cookbook/cookbook.html
Quality Control Cookbook for XBT Data

JCOMM Observations Programme Area
http://www.marine.csiro.au/~wijffels/iast-4/reports/jcomm_integration/Proposed%20QC%20feedback%20mechanism.htm
Proposed integrated mechanism for relaying quality information on *in situ* marine observing systems (initially buoys, XBTs, and Argo floats) in deferred mode from real time data users back to data producers.

Data Buoy Co-Operation Panel
http://www.dbcp.noaa.gov/dbcp/2qgd.html
Quality Control Guidelines for GTS buoy data

O_2

ICES OCEANOGRAPHY
http://www.ices.dk/ocean/procedures/Oxygen/oxygen.pdf
Dissolved oxygen in sea water: determination and quality assurance

Chl-a

ICES OCEANOGRAPHY
http://www.ices.dk/ocean/procedures/chlorophyll/timeschl.pdf
Standard procedure for the determination of chlorophyll *a* by spectroscopic methods

Nutrients

ICES OCEANOGRAPHY
http://www.ices.dk/ocean/procedures/nutrients/nutrients.pdf
Nutrients: Practical notes on their determination in sea water

JGOFS
http://www.uib.no/jgofs/Publications/Report_Series/JGOFS_19.pdf
Protocols for the Joint Global Ocean Flux studies (JGOFS) core measurements (JGOFS Report Nr. 19)

ICES
ICES Techniques in Marine Environmental Sciences series

Chemical oceanography

ICES ENVIRONMENTAL DATA CENTRE
http://www.ices.dk/env/index.htm

Guidelines:
02-16e_JAMP guidelines contaminants in sediments
99-02e JAMP Guidelines for contaminants in biota
Amendments toTBT effects guidelines approved at ASMO 2003
ASMO2003 ANX13_Guidance on montoring strategies
CEMP requirements
Priority Chemicals
Spawning periods from JAMP 99-02e

HELCOM COMBINE Programme
http://www.helcom.fi/combine_manual/a.html
Part A. General Aspects
http://www.helcom.fi/combine_manual/b.html
Part B. General Guidelines on Quality Assurance for Monitoring in the Baltic Sea
http://www.helcom.fi/combine_manual/c.html
Part C. Programme for Monitoring of Eutrophication and its Effects
http://www.helcom.fi/combine_manual/d.html
Part D. Programme for Monitoring of Contaminants and the effects of Contaminants

US Environmental Protection Agency
http://www.epa.gov/waterscience/cs/collection.html
Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual.

WOCE manuals
http://whpo.uscd.edu/manuals.htm
Manuals on topics ranging from measuring 85Kr to CFCs and Tritium.
And everything in between

Geological oceanography

Ocean Drilling Program
http://www-odp.tamu.edu/publications/pubs_tn.htm
Laboratory Manuals and Reports on Geochemistry, Microbiology, Paleomagnetism, Paleontology, Physical Properties, Sedimentology, etc.

GEBCO
http://www.ngdc.noaa.gov/mgg/gebco/gebcoguide.html
GEBCO Guidelines, PDF Version
(more guidelines to GEBCO organisational structure)

Pore water sampling
On the oxidation and burial of organic carbon in sediments of the Iberian margin and Nazaré Canyon (NE Atlantic)
Epping, vd Zee, Soetaert, Helder – Progress in Oceanography 52, 299-431, 2002.

Biological oceanography

The SEADOC Society
http://mehp.vetmed.ucdavis.edu/pdfs/MPApdfs/Palsson2001.pdf
The Development of Criteria for Establishing and Monitoring No-take Refuges for Rockfishes and Other Rocky Habitat Fishes in Puget Sound

ITIS Taxonomic Metadata Tool
http://www.itis.usda.gov/tax_tool_guidlines.html
ITIS Taxonomic Metadata Tool Use Guidelines

ICES WG on Zooplankton Ecology
Meta data standards for zooplankton data submission

ICES WG on Harmful Algae Bloom Dynamics
Series of technical workshops on phytoplankton
Phytoplankton and flow cytometry
Application of flow cytometry in marine phytoplankton research: current applications and future perspectives
Veldhuis, Kraay – Scientia Marina 64(2),121-134, 2000

General

Australian Oceanographic Data Center (AODC)
http://www.aodc.gov.au/products/book/HI_manual.pdf
Instruction manual for observing and recording seabed samples, secchi disc, bioluminescence and sound velocity measurements
Australian Oceanographic Data Center (AODC)
http://www.aodc.gov.au/products/book/marineqc.pdf
MarineQC
Monterey Bay Aquarium Research Institute
http://www.mbari.org/rd/projects/1999/info_%20management_archiving.html
1999 Projects: Information management and archiving
(Seems to be very interesting information on improved sampling methods)
ANZLIC
http://www.anzlic.org.au/infrastructure_metadata.html#metadata
ANZLIC Metadata Guidelines
ICES
http://www.ices.dk/env/refcodes/guidelines.asp?topic=intro
Guideline for monitoring programmes

Annex 7 Merging CTD data with water bottle samples – questionnaire on ctd operations

Introduction

Action item 7 from the MDM2003 meeting calls for the:

"Collation of information about merging CTD and water sample data (from G. Dawson, R. Olsonen, G. Slesser, T. De Bruin, H. Sagen, K. Larsen, E. Vanden Berghe, S. Jans, F. Nast, S. Almeida, M-J. García, S. Sagan, J. Szaron)."

At first sight this seems to be aimed at producing complete bottle files in which data from the continuous CTD measurements (temperature, salinity and depth) are merged with the data from the water samples. However, it was soon realised that this is not simply about producing bottle files, but about the whole operation of CTDs within an institute or group of institutes. Therefore this questionnaire addresses all aspects of operating a CTD system.

The questionnaire is in Word format, to enable the respondents to edit the questions and answers to their personal preferences and to allow maximum flow of information. Please elaborate as much as you like in describing CTD operations within your institute/country.

Respondent

Name:
Email:
Telephone:
Function:
Institution:
Address:

The information in this questionnaire can be entered describing CTD operations and practices or procedures of individual scientists, departments, disciplines, institutes, and even countries. To clarify this, please answer question 1:

1. Is the described information valid for all CTD operations
   a. Within your country
   b. Onboard (a) research vessel(s) (please list)
   c. Within the following institutions (please list)
   d. Only within your own institution
   e. Within a department or a group of scientists within your institution

2. Manufacturer and type of CTD?

3. Manufacturer and version number of acquisition software?

4. Manufacturer and version number of processing software?

Since the questionnaire's main objective is about merging samples with (continuous) CTD cast values, it is assumed that the CTD is mounted on a frame together with a number of bottles. However, this is not necessarily always true for all CTD operations. One can imagine separate CTD and sample bottle casts.

5a. What is the number of bottles on the frame?
5b. What type of bottles are used?.
5c. What is the volume of these bottles?

6a. Do you take CTD measurements and close sample bottles simultaneously on the same cast or are the CTD and the sample bottles operated on separate casts?
6b. If the latter is true, which one is carried out first and what is the typical time delay between the two casts?

7. Are the bottles closed during the downcast or during the upcast?
8. Do you stop lowering or lifting before you close the bottles?

9a. Do you wait before closing bottles in order to avoid contamination of the water samples by water from different depths being dragged by the frame?
9b. If so, how long do you wait?

10. When on board again, what is the typical time delay between the moment the CTD/bottle frame is on deck again and the moment the sampling of the bottles is started?

11. Are there special precautions taken to shield the samples from outside (weather) influences?

12. What is the order of parameters for which samples are taken from the bottles?

13a. Which parameters are measured directly on board and which parameter are measured later in the laboratory?
13b. If measured later in the laboratory, how are the samples for these parameters stored?

14. How are the parameters measured (procedure, equipment, etc.)?

15a. How many times a year is the CTD system calibrated?
15b. How is this calibration done (manufacturer, in-house calibration facility, etc.)?

16. How are the bottle files created from the CTD measurements (manufacturer software, in-house developed software, other. Please elaborate and explain the procedures used (averaging of data records, de-spiking of data records before averaging, etc.)).
17. How are the measured parameter values merged with the bottle files from the CTD measurements?

18. What metadata do you generate from CTD operations?

19a. Do you keep track of processing procedures (software filters used, order of filters, etc.)?
19b. Do you archive (collecting- and processing-) software versions?

Annex 8 Slides of George Slesser talk on Mapping Current Meter Data to XML

Fisheries Research Services

FRS ➔ XML

(Moored Current Meter & WLR Data)

George Slesser

FRS Marine Laboratory
Aberdeen Scotland

WGMDM

Terms of Reference:

Evaluate and develop future directions for oceanographic data management based on the results from SGXML.

Action:

Map moored current meter data to point data structure: "Keeley" bricks (i.e. data objects).

FRS Current Meter & WLR Formats

Two file types at the core of most FRS current meter and water level recorder processing.

CM*!.HMO - data file
CM*!.CAL - calibration and meta data
CM*!.FRM - calibration and meta data (form)

*** - mooring number**
! - instrument/sensor code

These files are sent to BODC as FRS annual submission of moored instrument data.

FRS CM & WLR File Formats (.CAL)

Current Meter Calibration File

```
Bo'ness SEPA                                   Project Description/Area
56 1.90'N  03 35.10'W                          Position
Aanderaa RCM7                                  Manufacturer / Instrument Type
7596                                           Instrument Serial Number
28                  Readings/Hour              Sounding
20                  Reference Number           Instrument Depth
11/ 8/2003          Reference Check            Deployment Date
26/ 8/2003                                     Recovery Date
None                Speed Cals.  Direction Cals.  Comments
6, 390, 100, 0.2906, 0.0, 1.1, -1.7026, 0.37189, -4.2554e-5, 2.4689e-8, 354.8
2.314046e-2, -2.570405, -2.12185e-6, 2.404163e-9, 15, 40, 33223
                                                          Magnetic Variation
 0.09
 0.78        Temperature Cals.        Start Time & Date
-1.13
-0.41
  .
  .          Compass Cals.
 0.59
 0.62
-0.10
 0.09        Compass Cal. Date
31079
-5.454475e-2, 7.313519e-2
  Conductivity Cals.
```

FRS CM & WLR File Formats (.CAL)

Water Level Recorder Calibration File

```
Guillam Bank                                   Project Description/ Area
57 43.56'N 03 53.1'W                           Position
Aanderaa WLR7                                  Manufacturer/Instrument Type
940                 Readings/Hour              Instrument Serial Number
20                  Reference Number           Sounding
20                  Reference Check            CM Depth
24/ 7/2003                                     Deployment Date
31/ 7/2003                                     Recovery Date
None                Pressure Cals.             Comments
12, 548, 100, -1546.945, 3.355612e-3, -7.156062e-10, -4.914286e-17
0.03557, -3.248, -6.717e-6, 9.753e-9, 15, 35, 33205
     Temperature Cals.        Start Time & Date
```

FRS CM & WLR File Formats (.HMO)

Current Meter Record

East	North	T°C
-13.5197	-19.8992	16.2056
-14.7631	-24.2805	16.2301
-14.3779	-27.8275	16.2791
-15.8498	-28.0223	16.3036
-15.4450	-29.8929	16.2791
-13.3673	-31.5103	16.3527
-13.2203	-30.6249	16.4017
-13.1795	-30.0088	16.4263
-12.6093	-30.2528	16.5245
-11.1510	-29.8914	16.7460
-11.0441	-26.4975	16.6968
-11.2877	-28.5939	16.7214

Salinity record from additional sensor deployed on CM

Salinity
00000.0001 00000.0001 32.8670
00000.0001 00000.0001 32.7824
00000.0001 00000.0001 32.7421
00000.0001 00000.0001 32.7220
00000.0001 00000.0001 32.7421
00000.0001 00000.0001 32.6818
00000.0001 00000.0001 32.5776
00000.0001 00000.0001 32.5575
00000.0001 00000.0001 32.4776
00000.0001 00000.0001 32.2984
00000.0001 00000.0001 32.2746
00000.0001 00000.0001 32.2548

Water Level Recorder Record

Pressure	T°C
00000.0001 28.1504	12.7
00000.0001 28.1784	12.7
00000.0001 28.2065	12.7
00000.0001 28.2416	12.6
00000.0001 28.2697	12.6
00000.0001 28.2995	12.6
00000.0001 28.3328	12.6
00000.0001 28.3714	12.5
00000.0001 28.4083	12.6
00000.0001 28.4469	12.5
00000.0001 28.4819	12.5
00000.0001 28.5188	12.5

FRS CM & WLR File Formats (.HMO)

Current Meter Record

East	North	T°C
-13.5197	-19.8992	16.2056
-14.7631	-24.2805	16.2301
-14.3779	-27.8275	16.2791
-15.8498	-28.0223	16.3036
-15.4450	-29.8929	16.2791
-13.3673	-31.5103	16.3527
-13.2203	-30.6249	16.4017
-13.1795	-30.0088	16.4263
-12.6093	-30.2528	16.5245
-11.1510	-29.8914	16.7460
-11.0441	-26.4975	16.6968
-11.2877	-28.5939	16.7214

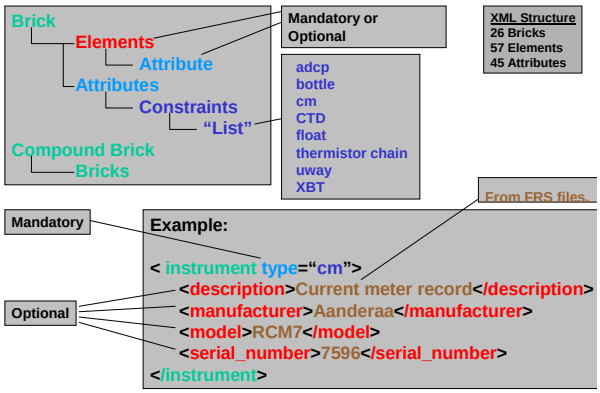
Salinity record from additional sensor deployed on CM

		Salinity
00000.0001	00000.0001	32.8670
00000.0001	00000.0001	32.7824
00000.0001	00000.0001	32.7421
00000.0001	00000.0001	32.7220
00000.0001	00000.0001	32.7421
00000.0001	00000.0001	32.6818
00000.0001	00000.0001	32.5776
00000.0001	00000.0001	32.5575
00000.0001	00000.0001	32.4776
00000.0001	00000.0001	32.2984
00000.0001	00000.0001	32.2746
00000.0001	00000.0001	32.2548

Water Level Recorder Record

		Pressure	T°C
00000.0001	28.1504	12.7
00000.0001	28.1784	12.7
00000.0001	28.2065	12.7
00000.0001	28.2416	12.6
00000.0001	28.2697	12.6
00000.0001	28.2995	12.6
00000.0001	28.3328	12.6
00000.0001	28.3714	12.5
00000.0001	28.4083	12.6
00000.0001	28.4469	12.5
00000.0001	28.4819	12.5
00000.0001	28.5188	12.5

XML Profile Structure

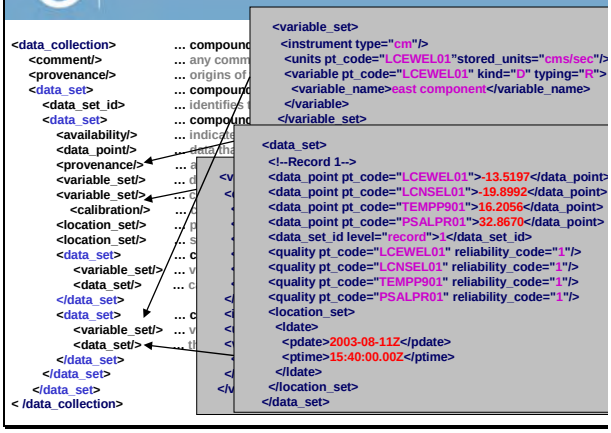


XML Profile Schema - bricks_v2.xsd

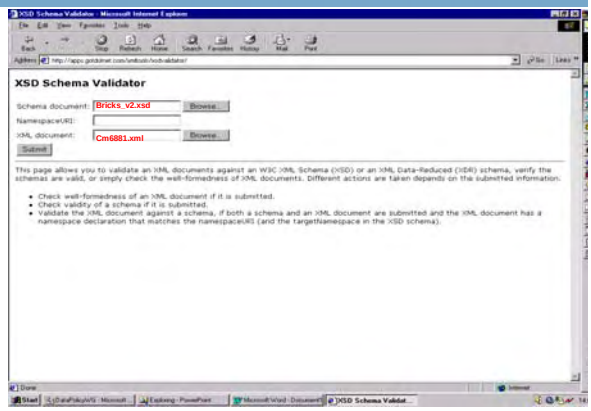
```
<?xml version="1.0"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
.
.
<xsd:complexType name="instrument_brick">
        <xsd:sequence>
            <xsd:element name="description" type="xsd:string" minOccurs="0" maxOccurs="1"/>
            <xsd:element name="manufacturer" type="xsd:string" minOccurs="0" maxOccurs="1"/
            <xsd:element name="model" type="xsd:string" minOccurs="0" maxOccurs="1"/>
            <xsd:element name="serial_number" type="xsd:string" minOccurs="0" maxOccurs="1"
        </xsd:sequence>
       <xsd:attributeGroup ref="type_qualifiers"/>
</xsd:complexType>
.
.
</xsd:schema>
```

```
<instrument type="cm">
    <description>Current meter record</description>
    <manufacturer>Aanderaa</manufacturer>
    <model>RCM7</model>
    <serial_number>7596</serial_number>
</instrument>
```

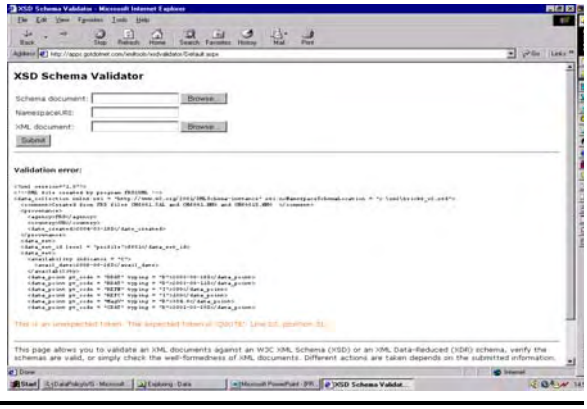
FRS CM and WLR XML Profile Structure



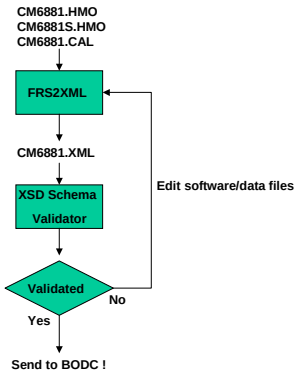
XSD Schema Validator - Tool



XSD Schema Validator - Tool



Process



Summary

CAL File

Bo'ness SEPA
56 1.9'N 03 35.1'W
Aanderaa RCM7
7596
8
6
11/ 8/2003
26/ 8/2003
None
6 , 390 , 100 , .2906 , 0 , 1.1 , -1.7026 , .37189 , -4.2554E-5 , 2.4689E-8 , 354.8
2.3140465E-2 , -2.570405 , -2.12185E-6 , 2.404163E-9 , 15 , 40 , 33223
0.09
0.78
-1.13
.
-0.59
0.62
-0.10
0.09
31079
-5.454475E-2 , 7.313519E-2

Everything in red can be accommodated within the brick structure easily enough.

Everything in purple can be accommodated using the variable and data_point bricks but possibly alteration/addition to bricks and attributes could be made for these parameters.

Deployment date
Recovery date

Magnetic variation

Reference number
Reference number check

HMO File

-13.5197	-19.8992	16.20
-14.7631	-24.2805	16.23
-14.3779	-27.8275	16.27
-15.8498	-28.0223	16.30
-15.4450	-29.8929	16.27
-13.3673	-31.5103	16.35
-13.2203	-30.6249	16.40
-13.1795	-30.0088	16.42
-12.6093	-30.2528	16.52

Possible changes/alterations

Add to
Brick: Instrument

Element	Existing Elements
reference_number	description
reference_check	manufacturer
magnetic_variation	model
	serial_number

Add to
Attribute — Property (Bricks: depth_pressure, latitude, longitude, ldate)

list_values	Existing list_values
deploy, recover	bottom
valid_start, valid_end	creation
	end

Or create a new brick

Brick: Mooring

Element
date_deployed, date_recovered
valid_start, valid_end
instrument_depth
sounding

Note : The instrument depth and sounding can be accommodated using the Brick: depth_pressure within the compound Brick: location_set.

Possible changes/alterations

Add to
Brick:provenance

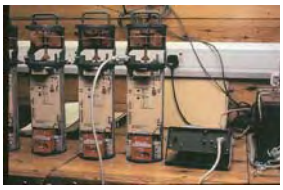
Element
ship — exists under attribute: platform_type

Attribute: platform_type (Brick: provenance)

list_value
moored buoy — break down to u-shaped moored buoy, single string moored buoy

Add to
Brick: sensor

Element
sampling_type — (e.g. instantaneous, averaged, etc)

Annex 9 Report on Action 13 by Jean Gagnon

"Guideline coordinators to check that everything in the guidelines has a place in the XML structure (Coordinator: J. Gagnon)"

As the existing XML structures are still under development and the ICES Guidelines are relatively static, the question was rephrased:

"Can the present XML structures accommodate the exchange of oceanographic information as described in the ICES MDM Guidelines?"

Introduction

The ICES MDM Guidelines were intended as a user's guide for the submission of oceanographic data, independent of specific formats or medium. XML has recently been proposed as formalism for the exchange of oceanographic data, mainly via (but not limited to) the Internet. Although the two are similar in objective, defining a formalism of XML structures (which also includes a common data dictionary) needs to consider the essential contents of the information to be exchanged.

A comparison of the current list of proposed XML elements is made here against the common elements documented in the ICES Guidelines in an effort to help identify the elements that the XML structures which may still require consideration.

Oceanographic XML structures

The most recently proposed set of XML elemental "bricks" that can be combined into a structure is as follows:

Brick	Definition
analysis_method	Information about the analysis employed
archive_information	Information attached by the recipient of the data
availability	A marker to control access to the data
calibration	Information about instrument calibration
comment	General comments on the data
data_dictionary	Used to identify the dictionary in use in the data file
data_point	Contains a single data value and supporting information
history	Processing history of the data
instrument	Information about the instrument used to make the measurements.
location	This used to record the x, y, z, or t values that are fixed for a given set of observations.
provenance	The originator of the data
quality	A marker providing the assessment of data quality
quality_testing	Information about how the data quality assessment was made
record_id	An identifier used to distinguish data
sample_property	Describes properties of sampling for contaminants
sampling	Information about the sampling methods used
sampling_method	Used to store details of the sampling
sensor	Identifies sensor specifics
storage	Storage techniques employed
taxonomy	The full taxonomy of any life form from which a sample was taken
units	The units of measurements
variable	Information about the variables measured.

MDM Data Type Guidelines

Each specific MDM guidelines (per data type) is available from http://www.ices.dk/committe/occ/mdm/guidelines however all these guidelines refer to the "Formatting Guidelines for Oceanographic Data Exchange" available from http://www.ices.dk/ocean/formats/getade_guide.htm as a first common set of building blocks for the exchange of oceanographic information.

Inter-comparison

MDM Block	XML Brick(s)	Missing in XML
Country/Platform • vessel call signs	Provenance	• Codes, if used, need to be standardized and referenced.
Cruise Identifier	record_id	
Data • SI units • precision	data_point, units, variable	• Precision needs to be an explicit element. • Codes, if used, need to be standardized and referenced.
Date	Location (t), location_value	• Date convention needs to be standardized and referenced.
Time	Location, location_value	• Time convention needs to be standardized and referenced.
Instrumentation	instrument	
Missing Values	Variable, null_value	
Operator • contact name and address	provenance	
Position • precision and/or instrument • coordinate conventions	Location (x,y), location_value	• Precision needs to be an explicit element. • Coordinate convention needs to be standardized and referenced.
Data Quality • Originator evaluation • Calibrations • Quality flags • Documented procedures	quality, quality_testing, calibration, history	• Convention for quality flags need to be standardized and referenced.
Record terminator/Field separator	See XML nomenclature	
Sounding • units • convention • history	Location (z), location_value, history	• Precision needs to be an explicit element. • Convention needs to be standardized and referenced.
Station Number • unique identifier	Provenance, originator_identifier,	

Summary

The current state of development of XML structures for the exchange of oceanographic data has some inconsistencies with respect to the MDM guidelines. It is recommended that the SGXML group review the above inter-comparison findings.

Annex 10 Proposed WGMDM Terms of Reference and Action List 2004/2005

The **Working Group on Marine Data Management** [WGMDM] (Co-Chairs: Michele Fichaut, France and Helge Sagen, Norway) will meet in Sopot, Poland from 9–11 May 2005 to:

a) Identify and compare existing quality control and quality assurance procedures for physical, chemical and biological data in use at WGMDM member organizations, and recommend common standards and procedures to ICES and IOC/IODE.

b) Improve usefulness of the Integrated Taxonomic Information System (ITIS) to the marine community and actively promote ITIS within the ICES and IOC community.

c) Critically assess the data management practices in place in WGMDM member organisations in support of Operational Oceanography.

d) Based on the final report and results of the SGXML, make recommendations regarding adoption of the use of XML in the oceanographic community.

e) Comment on the report of the Study Group on the Management of Integrated Data (SGMID), and recommend strategies and solutions for data integration and distributed database systems at the ICES Secretariat.

f) Critically examine the use of GIS in marine data systems in WGMDM member countries, and make recommendations as to the of GIS

Supporting Information

Priority:	This Group flies the flag for ICES in setting standards for global databases. It also provides an important interface for oceanographic and environmental data management in ICES, and promotes good data management practice.
Scientific Justification:	a) Action Plan 4.12, 6.1 b) Action Plan 6.4 c) Action Plan 5.13.4 d) Action Plan 5.13.4, 6.1 e) Action Plan 6.1 f) Action Plan 6.1, 6.2 a) This will encourage standardization of approach in management and quality control across a broad spectrum of data types and to promote best practice in data management. It will include promoting and developing the WGMDM guidelines and also development of recommended practices for merging CTD and water bottle data. b) The ITIS can play a major role in standardization and improving the ease of data exchange. It is an evolving partnership which requires input from (new) collaborators whilst maintaining community standards. In particular, this will seek to improve coverage of non-North American marine species, encourage the development of remote data entry and implementation of a mirror site. The ITIS should be actively promoted with the communities and groups encouraged feed in their information. c) As GOOS activities develop it is essential that the modern marine data management systems are in place and utilized effectively. This will serve to assess established systems and recommend best practice for data management for operational oceanography. This item will examine various issues including metadata directories, developments for quality control, referral mechanisms, products (climatologies), data stewardship, etc. d) The data management community must evaluate the use of new technologies, such as XML, in a broader context. The WGMDM will attempt to integrate the efforts of SGXML into this broader context and develop possible directions for ocean data management in a distributed environment. The efforts of SGXML have potential implications and application to general data exchange procedures. These efforts should be followed within the broader context of general oceanographic data flow. e) Establishing data integration is a step in developing the scientific basis for an ecosystem based approach to management. This is of high priority to ICES. Good data management practice is required to ensure the underpinning databases are as complete and as high quality as possible. Data management expertise from WGMDM will complement user requirements from SGMID. f) The use of GIS is becoming increasingly important for the marine community. The potential benefits (and problems) of this technology will be examined and recommendations made on best practice and use of GIS.

Resource Requirements:	None
Participants:	Core Group of members of national oceanographic data centres ensure well attended meetings.
Secretariat Facilities:	None, apart from preparation of material by the Data Centre Manager or Science Network Coordinator
Financial:	The Data Centre Manager or Science Network Coordinator should attend this meeting
Linkages To Advisory Committees:	Report is seen by ACME
Linkages To other Committees or Groups:	None, but links should be encouraged to broaden the scope of the group to more generic data management issues
Linkages to other Organisations	IOC, especially its Working Committee on International Oceanographic Data and Information Exchange (IODE)

Action list for 2004/2005

No.	Action item	Who
1	Ensure all MDM members have links to the MDM guidelines	All members
2	Continue the promotion of the guidelines	All members
3	Request ICES to get links to the guidelines on other ICES Web pages (i.e. Environment and fisheries) (Chairs)	Chairs
4	Review the list of other guidelines sent by Taco de Bruin (Taco de Bruin as coordinator and all); send the list to Ocean Portal	T. de Bruin
5	Send the questionnaire about merging CTD and water samples to all MDM members (Taco de Bruin), MDM members have to fill it in and send it back to Taco de Bruin (all)	T. de Bruin + all members
6	Produce a summary of the results of the questionnaire	T. de Bruin
7	Request comments from the Oceanic Hydrography WG on the summary of merging CTD and water sample (Chairs)	Chairs
8	Request the ICES secretariat to provide and update on their future data management strategy and plans	Chairs
9	Request the ICES secretariat sends a representative (e.g., Data Centre Manager) to the next MDM meeting	Chairs
10	Request IODE project officer to attend the next MDM meeting	L. Rickards
11	Send information to the ICES Secretariat of what MDM would like to see on the MDM web pages	H. Parner, R. Gelfeld, G. Evans
12	Compare records in ITIS with UNESCO Register of Marine Organisms; European register of Marine Species; Marine Species Database of Eastern Africa; other relevant databases; with a view to assess the number of records that would be available from other databases	E. Vanden Berghe, T. O'Brien, S. Sagan, J. Szaron
13	Monitor the completion of the matching of BODC's parameter dictionary to ITIS	E. Vanden Berghe, G. Evans
14	MDM members will submit links to web sites, where their institute/centre makes OO-data and products available, to Jan Szaron. He will then review the list and forward it to the "MDM web site review group" for inclusion	All members + Jan Szaron
15	MDM should examine OO in coastal areas (COOP) and ensure/propose that consistent standard sets of QC and processing procedures are used similar to those evolved and established for existing oceanic projects (OOPC) such as ARGO, SOOP etc.	L. Rickards
16	Contribution of the members to GOSUD	L. Rickards
17	Ask the MDM members to give a list of their CD-ROMs and Products, send the complete list to IOC/IODE	G. Evans, L. Rickards
18	Circulate the report of the SGXML to all MDM Members	R. Gelfeld
19	Check that everything in the guidelines has a place in XML structure	S. Scory, E. Vanden Berghe, M. Wichorowski
20	Continue dialogue with SGMID especially on future collaboration	L. Rickards, Chairs
21	Provide comments on SGMID report	All members
22	Attend SGMID meeting in 2005	To be decided
23	Contribute to a Theme Session on Management of Integrated Data at the Annual Science Conference 2005	All members for posters
24	Try to involve ICES into the Hamburg meeting on Biological data management	L.Rickards, E. Vanden Berghe
25	Provide information to J. Gagnon to see if he can input data from the Western North Atlantic in EDIOS	L. Fyrberg, P. Alenius, S. Sagan, R. Gelfeld
26	Send current meters inventory to BODC	H. Sagen, H. Parner, S. Jans, T. de Bruin, E. Vanden Berghe