Oceanography Committee **ICES CM 2003/C:13**

Report of the

Working Group on Marine Data Management

Gothenburg, Sweden
28–30 May 2003

International Council for the Exploration of the Sea

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1 EXECUTIVE SUMMARY

The Working Group on Marine Data Management [WGMDM] (Co-Chairs: R. Gelfeld, USA and L. Rickards, UK) met in Gothenburg, Sweden from 28–30 May 2003. The main outcomes for each of the terms of reference are described below.

Evaluate the use of the MDM guidelines for data management and exchange in response promotional activities

Much effort was put into promoting the WGMDM Data Type Guidelines over the year in other ICES Working Groups, WGMDM member's organizations and contacts, relevant EU projects, IOC/IODE meetings and by a poster at the 'Colour of Ocean Data' Symposium. These were assessed to have been beneficial and productive, but need to be continued to ensure the widest possible use of the guidelines. Links from WG member web-sites to the guidelines, and compilation of a list (with web links) to similar guidelines need to be completed.

Evaluate the results from SGXML regarding the cross parameter dictionary comparison and make recommendations regarding adoption in the oceanographic community/Evaluate and develop future directions for oceanographic data management based on the results from SGXML

The SGXML meeting and outcomes were briefly reviewed. This covers three main areas of work: parameter dictionaries, point data and metadata. Results from the parameter dictionary mappings were not available in time for WGMDM to evaluate these, but the SGXML decision to work towards one unified dictionary is welcomed. However, WGMDM will continue to work closely with SGXML and will contribute in the coming year by examining the compiled parameter dictionary lists to fill/identify gaps, by mapping time series data (e.g., current meter) into the point structure and ensuring collaboration and coordination with the EU SeaSearch II project.

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

WGMDM noted that ICES have endorsed the use of the ITIS, but concerns have been raised about this. Janet Gomon (Deputy Director, ITIS) appreciates these concerns, but stressed that ITIS is an evolving partnership and system, and continues to be open to new collaborators and uses, whilst maintaining the highest quality of data and necessary management structures. WGMDM agreed that it needs to keep encouraging other groups to use ITIS. There are likely to be some interim problems, with a need to build separate short-term databases, but this should all feed back into ITIS, so that the grand vision will eventually be realised.

Identify problems in terms of both submission amount and quality of oceanographic data submitted to the ICES data centre and suggest solutions to member countries or international programs as required

A brief report was submitted by the ICES Oceanographer. This noted that the backlog of work was quite large and due to this the usual data scouting activities have not been undertaken. The WGMDM expressed its concern at this backlog and the problems encountered which have led to data being resubmitted several times. Simultaneously more demands are being placed on the oceanographic databank as users request products that require a high quality and up-to-date database. WGMDM members and other data suppliers are encouraged to submit their data in a timely manner and in a consistent format.

Comment on the report of the Study Group on the Management of Integrated Data

WGMDM commented on the terms of reference for SGMID, a summary of the main points is given below:

- Establish what is meant by integrated – (a) an integrated database (i.e., all data stored in one database) or (b) separate databases (as at present) and integration takes place via software delivering data or products.
- A superficial examination of the data status pages for the ICES Environmental Data Centre indicates that much data are missing. A similar assessment can also be made for the Oceanographic Data Centre – the review carried out by WGMDM can be updated if required – but this will only give an indication, as the submission of Cruise Summary Report forms is far from comprehensive. It is necessary to determine overlaps between the databases. An independent consultant could do this.
- Data assembly, to produce high quality databases, is time consuming. Quality control of data is essential, and must be adequately funded. The underlying databases need to be of high quality and as complete as possible, otherwise the product(s) quality will suffer. Scientific expertise is required to interpret results and/or products.

- It is necessary to know what the user needs are – and who the users are. Can their needs be met by a web-based system (either intranet or internet) or do they want interpretation of data and products by experts? Are regularly updated, routine products required (e.g., for operational oceanography)?
- WGMDM can provide further details of a variety of integrated systems or contact names if required.
- Technology needs to be assessed, and a prototype system developed. WGMDM members can provide some assessments of their own organizations systems, and comment on their advantages and disadvantages.

In addition, the WGMDM reviewed related meetings and projects to ensure proper collaboration and cooperation and avoid duplication of effort. Finally, WGMDM considered future directions and reviewed its role in relation to ICES to ensure that it is properly aligned with the ICES Action Plan.

2 OPENING OF THE MEETING

The meeting was opened by R. Gelfeld and L. Rickards, Co-Chairs, at 9:00 am on 28 May 2003, hosted by the Swedish Meteorological and Hydrological Institute (SMHI), Gothenburg, Sweden. Participants were welcomed to the meeting by Associate Professor Bertil Håkansson, Head of Oceanographic Services. L. Fyrberg also welcomed participants and explained the local arrangements.

Members of the Working Group present were: P. Alenius (Finland), S. Almeida (Portugal), T. de Bruin (The Netherlands), G. Dawson (UK), M. Fichaut (France), L. Fyrberg (Sweden), J. Gagnon (Canada), M-J. García (Spain), R. Gelfeld (Co-Chair, USA), S. Jans (Belgium), K. Larsen (Faroes), F. Nast (Germany), R. Olsonen (Finland), L. Rickards (Co-Chair, UK), S. Sagan (Poland), H. Sagen (Norway), G. Slesser (UK), J. Szaron (Sweden) and M. Wichorowski (Poland). Three observers from the ICES-IOC SGXML, A. Isenor (Canada), R. Schwabe (Germany) and E. Vanden Berghe, (Belgium) also attended. Apologies were received from S. Feistel (Germany), K. Medler (UK). T. O'Brien (USA) and H. Dooley (ICES Science Coordinator/Oceanographer). A complete list of names, addresses and contact points of participants can be found in Annex 1.

3 ADOPTION OF THE AGENDA AND REVIEW OF 2002 ACTION LIST

The agenda (see Annex 2 for current Terms of Reference and last years Action Items) for the WGMDM (see Annex 3 for acronyms) meeting was adopted as a resolution of the 90th ICES Statutory Meeting in Copenhagen, Denmark (C.Res. 2002/2C14).

The Action Items from the 2002 meeting were reviewed. The status of these is given in Annex 2. They are discussed under the relevant agenda items.

4 OCEANOGRAPHY COMMITTEE REVIEW

R. Gelfeld informed the WGMDM that he had presented the Report of the Working Group on Marine Data Management to the Oceanography Committee at the Statutory Meeting in Copenhagen, Denmark. The report was well received by the Committee.

R. Gelfeld reported on the discussions relating to the WGMDM at the Oceanography Committee, but not many know of what we are doing. There is a lack of communication and MDM needs to do better in dissemination of information about its activities; a theme session is one possibility for this. A challenge to the group is that of how to change the thinking of the ICES community in the matter of data management?

There has been some reorganisation within the ICES Secretariat. There is now a central pool of technical staff, which is shared amongst the professional secretaries, and this has led to the quality of work suffering in some cases. The emphasis has also changed to an ecosystem based approach, and data managers are changing to information managers. Operational oceanography is also becoming increasingly important, especially with the setting up of the IOC-WMO Joint Technical Commission on Oceanography and Marine Meteorology (JCOMM).

Some discussion followed, noting that data management was often near the bottom of the list of activities. Several members noted the shift from discipline-based to ecosystem-based activities and fisheries in their own organisations as well as in ICES. This forces the data management activity to be cross-cutting. But the requirement for data management is still there. Standards, guidelines, data quality, communications and data stewardship are still key issues – moving towards information and knowledge managers. Technology has also changed; the future is perhaps no longer centralised data centres, but the direction to take is towards the development of virtual and distributed centres. It was also noted that data centres and data managers are often only noticed when things go wrong and, for example, data are not available or have not been compiled into high quality data sets. There is also competition for funding.

R. Gelfeld also noted that the IOC International Oceanographic Data and Information Exchange (IODE) committee had met earlier in the year, where a new Chair and vice-Chair were elected. Changes are taking place within IOC/IODE. In the past IODE dealt primarily with delayed-mode data; now there is a move to real-time. JCOMM is taking the lead in this, and has set up a data management programme area. One result of this is the merging of the IODE Group of Experts on the Technical Aspects of Data Exchange (GE-TADE) with the newly formed JCOMM Expert Team on Data Management Practices (ETDMP) in an effort to improve efficiency and avoid duplication of effort. This has the overall aim of better utilisation of resources in ocean community. ICES, through its Oceanographer, has played a major part in GE-TADE in the past and there needs to be a link to the new group.

5 PRESENTATIONS

Meeting participants described activities at their own data centre/laboratory over the past year and looked to developments in the future. Presentations were on the themes of operational oceanography, quality control and products and services. Executive summaries of the presentations can be found in Annex 4.

6 EVALUATE THE USE OF THE MDM GUIDELINES FOR DATA MANAGEMENT AND EXCHANGE IN RESPONSE 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. At present there are 12 guidelines covering the following data types: moored current meter, shipboard ADCP, moored ADCP, CTD, XBT, surface underway, SeaSoar/batfish, water level, discrete water sample, biological plankton, drifting buoy and profiling float. The guidelines are on the ICES web-site at: www.ices.dk/committe/occ/mdm/guidelines.

Much effort has been put into promoting the WGMDM Data Type Guidelines over the year in other ICES WGs, WGMDM member's organizations and contacts, relevant EU projects (e.g., ESEAS, SeaSearch), IOC/IODE (e.g., GOSUD) meetings and by a poster at the Colour of Ocean Data Symposium.

The promotional activities were assessed to have been beneficial and productive, but these need to be continued to ensure the widest possible use of the guidelines. Work still needing completion included: linking from WG member web-sites to the guidelines, and compilation of a list (with web links) to similar guidelines. E. Vanden Berghe, T. de Bruin and F. Nast agreed to coordinate this latter item. A comprehensive list of guidelines will also indicate gaps, where future guidelines could be developed. At present the majority of the WGMDM guidelines deal with physical parameters, but before developing new ones, an assessment of other available guidelines is required. In addition, it is important to ensure that the present guidelines can be easily found by search engines, such as Google. To facilitate this, it is necessary to ensure that the appropriate keywords are included in the web page metadata tags.

Other opportunities for advertising the guidelines include: ensuring their promotion within IOC/IODE, and in particular in the capacity building programmes (e.g., ODINAFRICA, ODINCARSA), and also through their OceanTeacher web-site; promoting their use in SeaSearch partner organizations, especially those whose data management capabilities are in the early stages of development; making sure that they are in use in our own organizations; continuing to promote them to others in the ICES community; and taking advantage of opportunities at meetings, workshops and conferences to advertise them.

One action left uncompleted from last year was the compilation of information about how the different organizations merge their CTD data with bottle data. This was seen as a follow-up to the guideline developments. After some discussion, it was felt that this was still an important issue and this will be carried forward. G. Slesser, who has already provided information from his organization (see Annex 5), and T. de Bruin agreed to coordinate collation of this information from other MDM members and report back to next year's meeting.

Action 1: *Improve keywords in metadata tags on web pages to improve visibility for search engines like Google (H. Sagen)*
Action 2: *Ensure all MDM members have links from their web sites to guidelines*
Action 3: *Continue promotion of guidelines at for example: IODE/JCOMM ETDMP (L. Rickards), within EU SeaSearch project (M. Fichaut, and others), etc.*
Action 4: *Co-Chairs to request ICES oceanographer to get links to the guidelines on other ICES web pages (i.e., environment and fisheries)*
Action 5: *F. Nast, T. de Bruin and E. Vanden Berghe to coordinate compilation of a list of other available guidelines (with web links)*
Action 6: *Co-Chairs to instigate collaboration with IODE and in particular OceanTeacher*
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)*

7 EVALUATE THE RESULTS FROM SGXML REGARDING THE CROSS PARAMETER DICTIONARY COMPARISON AND MAKE RECOMMENDATIONS REGARDING ADOPTION IN THE OCEANOGRAPHIC COMMUNITY

The results from the SGXML mapping parameter dictionaries into a common XML structure were not available until immediately prior to the SGXML and WGMDM meetings, so it was not possible for WGMDM members to evaluate

the results. It was reported at the SGXML that five dictionaries had been mapped to the agreed structure. However the next step to be undertaken by the SGXML to produce an inter-comparison between dictionaries was welcomed. In addition, the SGXML decision to work towards one unified dictionary, testing out whether the BODC dictionary could be used as a standard, was welcomed. Further details are given below in Section 9.

8 FURTHER INVESTIGATE DETAILS OF THE INTEGRATED TAXONOMIC INFORMATION SYSTEM (ITIS) AND ACTIVELY PROMOTE ITIS WITHIN THE ICES AND IOC COMMUNITY (IN PARTNERSHIP WITH THE IOC/IODE GETADE)

R. Gelfeld introduced this agenda item on behalf of T. O'Brien. He noted that ICES have endorsed the use of the Integrated Taxonomic Information System (ITIS), but some are not happy with this (e.g., WGZE, WGHABD). T. O'Brien has had an exchange of e-mails with Janet Gomon (Deputy Director, ITIS) regarding comments from the ICES WGHABD regarding the potential of ITIS to be a common taxonomic system for ICES. She agreed that their analysis and concerns were fairly stated and that ITIS has not focused on phytoplankton, and geographical coverage is largely North American and surrounding waters except for some taxonomic groups. However, ITIS partners and available resources and external funding drive the priorities. As a member of external organizations such as the GBIF, the ITIS partnership does agree to adhere to evolving community standards. But, ITIS is an evolving partnership and system, and has always been open to new collaborators and uses. As example, the evolution of ITIS in North America began at NODC, then evolved to be used by U.S. Federal Agencies; then ITIS Canada was established, and also ITIS Mexico at Conabio. Management structures will also evolve. The challenge is to both welcome and encourage the evolution, while maintaining the highest quality of data and necessary management structures to ensure that. Finally she noted that ITIS would welcome the WGHABD's expertise and collaboration.

E. Vanden Berghe commented that groups should feed their information into ITIS, as this was one way in which it could be improved. He said that the ICES decision to use it is to be applauded; it is the best route forward, although it is not always easy.

R. Gelfeld noted that we need to keep encouraging other groups to use ITIS. There are likely to be some interim problems, with a need to build separate databases for the time being, but this should all feed back into ITIS, so that the grand vision will eventually be realised.

S. Sagan noted that his colleagues were initially reluctant to use ITIS, but have now changed their minds. As others are increasingly using the system, they now can see a benefit in them also using it. In this way a critical mass will be obtained. There is a general problem noted by several MDM members, that at first it may seem too much trouble to use ITIS, but in the longer term it will be the most appropriate way forward.

E. Vanden Berghe noted that VLIZ could make a mirror site of ITIS in Europe, which would improve visibility and assist in the resolution of European problems. It is important that all are working to a common end. R. Gelfeld further noted that it is important to show to ITIS, that Europe is interested, as this will improve the situation.

There was some discussion on the use of ITIS codes or names, E. Vanden Berghe felt that people should be able to use which ever they found was most convenient. M-J. García noted that the taxonomic names have variants in spelling, and it can be difficult matching names with codes. The issue of spelling is very complicated, and ITIS does nothing to help with this. E. Vanden Berghe commented that the differences in spelling are not mistakes, but arise from variations in the literature. He recommended consulting the VLIZ web-site (www.vliz.be) to see a solution to this problem.

L. Rickards noted that work has been progressing very slowly on matching entries in BODC's parameter dictionary with ITIS over the last year. However, new funding has been received at BODC to expand the parameter dictionary and this task would be completed as part of this.

E. Vanden Berghe reported that he had tried to test the update speed of ITIS, but had been rather ambitious in his tests. He agreed to continue testing, but with simpler tests. He further noted that there had been an action item from the last meeting to work out an annual production of ITIS CD-ROMs with T. O'Brien. He was unsure of the requirement but will discuss it with T. O'Brien, and progress from there.

Action 8: E. Vanden Berghe to clarify with Todd O'Brien the requirement for an annual production of ITIS CD-ROMs.
Action 9: E. Vanden Berghe will continue to test the update speed of ITIS.
Action 10: ICES WGMDM Co-Chairs to encourage the completion of the matching of BODC's parameter dictionary to ITIS.

9 IDENTIFY PROBLEMS IN TERMS OF BOTH SUBMISSION AMOUNT AND QUALITY OF OCEANOGRAPHIC DATA SUBMITTED TO THE ICES DATA CENTRE AND SUGGEST SOLUTIONS TO MEMBER COUNTRIES OR INTERNATIONAL PROGRAMS AS REQUIRED

A short report was submitted by the ICES Oceanographer. This noted that the backlog of work was now quite large, thus any summary of the status of the database would not be helpful. Furthermore, because of this backlog, the usual data scouting activities have not been undertaken. In this way the list of outstanding jobs is being kept as short as possible. A date-ordered list of all outstanding data accessions and requests was provided. Most of the items on the list refer to accessions (i.e., incoming data not yet reformatted, quality controlled and added to the oceanographic database) as they are still fairly efficient in responding to requests. Included in the list are some outstanding very extensive jobs, such as the merging of the former HELCOM database into the ICES holdings. This one job alone would take several months of single-minded endeavour. There are many data products available from the Service Hydrographique (e.g., oceanography) web site, but the usage of this web site is not currently being monitored.

The WGMDM expressed its concern at the backlog of work and also at the problems that had been encountered which required data to be resubmitted several times. The Oceanography section of the ICES web site indeed includes data and products for download, but there is a concern that the overall quality of the oceanographic data bank is decreasing, due to lack of resources to effectively quality control and chase up data. At the same time more demands are being placed on the databank as users request products that require a high quality and up-to-date database. WGMDM members are encouraged to submit their data in a timely manner and in a consistent format.

10 EVALUATE AND DEVELOP FUTURE DIRECTIONS FOR OCEANOGRAPHIC DATA MANAGEMENT BASED ON THE RESULTS FROM SGXML

A. Isenor, Co-Chair of the SGXML provided a review of the meeting which took place just prior to the MDM meeting. He noted that the SG had considered three main areas of work: parameter dictionaries, point data and metadata.

During the previous year the following had been achieved for each of these:

1) Parameter dictionaries: A structure for parameter dictionaries with definitions had been defined, and a DTD and schema developed. Six parameter dictionaries were mapped into XML using these.
2) Point data: “Keeley” bricks (i.e., data objects) have been developed for profile data; taxonomy is included in the bricks. This work has been applied in three Canadian laboratories; reports and software are available on line. Links are provided at the marineXML web site (www.marinexml.net).
3) Metadata: Little progress had been made

Over the next year the tasks for the SGXML are:

1) Parameter dictionaries – code comparison will be carried out between 10 parameter dictionaries; BODC will provide a web interface to the BODC dictionary, and will reconcile the DTD and schema (XSD) which have been developed.
2) Metadata – standards (e.g., ISO19115, CSR, EDMED…) will be evaluated, and comparisons made leading to the production of an initial optimal metadata tag list.
3) Point data – building on the work of the Canadians, accepted standards (e.g., GML) will be incorporated. The point data structure will also be applied to time series (e.g., current meter data, water level data). The applicability to 3-D data (e.g., net tow) will also be investigated, as the structure should hold any data that includes x, y, z or t.

Discussion followed as to what the main interest of WGMDM was and what contribution they could make to this. G. Slesser and S. Almeida agreed to map their moored current meter data to the point structure and report back. They will also be included on the marineXML mailing list. All information relating to the SGXML and to the EU-funded MarineXML project can be found on the website: www.marinexml.net.

The parameter dictionary mapping is a major project and is of interest to WGMDM as this was identified as a task urgently needing to be done, but resources have been lacking in the past. It will be helpful to look on the compiled dictionary lists to fill or identify gaps. WGMDM will work closely with SGXML to carry out this task. In particular, F. Nast and L. Rickards noted that these discussions, together with those of the SGXML, are relevant to some of the work to be undertaken by the EU SeaSearch II project (of which they are partners). They agreed to ensure that any work carried out through SeaSearch relating to parameter dictionaries and keywords, in particular linked with to EDMED and ROSCOP, would be fed back to both WGMDM and SGXML, to ensure coordination of these activities.

The WGMDM noted that the next SGXML meeting is planned for the 6–7 May 2004, in Oostende, Belgium.

There was some discussion relating to whether the work on the guidelines was relevant to XML. J. Gagnon noted that he wished to know that the information included in the WGMDM data type guidelines has a place in the marineXML structure (content). It was agreed that the guideline coordinators would address this and provide feedback to the SGXML.

E. Vanden Berghe requested assistance from WGMDM to check that all standards have been taken into account when setting up marineXML. He agreed to make available a list of those standards which SGXML are evaluating (e.g., GML) to ensure no important ones are omitted.

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

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

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

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

11 COMMENT ON THE REPORT OF THE STUDY GROUP ON THE MANAGEMENT OF INTEGRATED DATA

L. Rickards introduced this agenda item. The Study Group on the Management of Integrated Data (SGMID) was established in 2002, but had not yet had a meeting (either in 2002 or 2003), so there was no report to discuss. They may hold a meeting during the ICES ASC. The Group was set up to act as a Users Group, rather than a technical group. L. Rickards had contacted the Co-Chairs of SGMID to inform them that, in the absence of a report, WGMDM would discuss the SGMID terms of reference and feed back the outcome. The SGMID terms of reference can be found in Annex 6. The main issues to be addressed include how can (ICES) data be accessed in a more integrated way and how can product production be made more operational? WGMDM reviewed the terms of reference prior to discussing them and felt that they were very wide ranging and not always well defined. However this is important to the future of ICES, with the emphasis on ecosystem-based work and also their involvement in GOOS (e.g., through the ICES-IOC Steering Group on GOOS (SGGOOS) and the ICES-EuroGOOS Planning Group on the North Sea Pilot Project, NORSEPP (PGNSP)). The WGMDM further noted that the Study Group was set up by ACE, but the outcomes are relevant to most ICES committees including ACFM and ACME, as shown in the terms of reference. The WGMDM discussions took the form of a brainstorming session, with the aim of providing some input and guidance to SGMID. A summary of the resulting discussion points is given below against the SGMID terms of reference.

a) review the development within ICES towards integrated databases of oceanographic, environmental, and fisheries data;

WGMDM notes that in the Scientific Justification for the SGMID, it states that "The Secretariat will present its draft plan for such an integration and would like to discuss this in a wider forum before the final decision on how the integration should be implemented is taken." As WGMDM has not seen this plan, it is difficult to know what is required and to review the development towards integrated databases. But, WGMDM understands that currently there are separate databases for oceanographic, environmental and fisheries data, and there may be a number of fisheries databases.

However, before any integration is carried out, an assessment of the data held by ICES is needed. A survey of data held at ICES should be carried out and a data inventory produced. It is also necessary to define what is meant by integrated – is the aim an integrated database (i.e., all data stored in one database) or separate databases (as at present) where integration takes place via software delivering data or data products?

A problem of possible duplication of data was identified between the Oceanography and Environmental databases. Germany, for example, sends copies of some data, in particular nutrients to both databases, whereas Sweden, for example, supplies the data to just one of the databases. Data submission should be kept as simple as possible, and not cause the supplier extra work. Guidelines should be made available to encourage submission of the information required to accompany data, as even now, this does not always occur. Data provided to the databases needs to be quality controlled; this must be properly resourced. There is also a difference in the obligations of suppliers to provide data to the three areas (e.g., fisheries, environment, oceanography). Submission of data to the fisheries database, and for some of the environmental data, is obligatory for data collectors, whereas for others data submission is voluntary.

b) identify data sources relevant to a), above, not yet integrated into the ICES databases;

Internal audit of data: As noted above, if there has not already been an internal audit of the data available at ICES, we recommend this be done – without this an accurate assessment of data outside of ICES is difficult. This could be carried out by ICES staff or by an independent external consultant (provided by the ICES community). An inventory of the data held can then be made available. Some comments on data coverage are given below.

Oceanography Data Centre – data availability can be checked from the web site, and many data sets are available for downloading. Completeness can be checked to some extent via the Cruise Summary Report (previously ROSCOP) database, although this is incomplete. This indicates that much data is missing, although the proportion varies from country to country. Traditionally station or profile data (originally water bottle, now more usually CTD, but with supplementary data from bottles) were handled, but now thermosalinograph data are also stored. Other data have been received for specific projects (e.g., PEX, VEINS, ESOP, etc.), where the Oceanographic Data Centre has carried out the data management for the project.

Environmental Data Centre – various tables on the web site indicate who has supplied what data; this can be used to provide an estimate of what is available and what is missing.

Fisheries Statistics Data Centre – status not known by WGMDM, but a data set containing fisheries statistics for the period 1973 to 2000, together with some software, can be downloaded from the fisheries section of the web-site. This data set is also available on CD-ROM.

Data are held by national oceanographic data centres and a variety of research institutes, which have not been supplied to ICES. Some years ago the WGMDM carried out an assessment of the oceanographic data (CTD/bottle) held at ICES in comparison with an estimate of what data had been collected. Despite the fact that the information on what data have been collected was incomplete, the review indicated that there was a lot of oceanographic data which had not been supplied to ICES.

c) review existing integrated data systems for fisheries/environmental data and review data integration work in existing projects inside and outside of ICES;

It was not clear from the terms of reference exactly what was meant by data integration – whether the aim was to have one integrated database within ICES containing all of the data, or whether the aim was to provide the user with integrated data sets and/or products, where the integration is carried out by software.

Before proceeding, it was also felt necessary to define who the users are for the proposed integrated data system: for example, are they ICES Working Group/Study Group members, individual research scientists, operational agencies, organisations for whom ICES carries out a service (e.g., HELCOM, OSPAR, EEA) – who may require a service including interpretation of data, or others (e.g., general public)? And related to this, what are their needs? A scientist may be quite happy retrieving data and data products from a web site, whereas an organisation like OSPAR or the EEA might require a custom-produced report based on some scientific interpretation carried out by ICES. Or are we looking to the future with GOOS, and describing standard 'operational' products? Thus, there are many different levels of users, all with differing requirements.

A round table discussion revealed that there is much expertise within data centres relating to integration (e.g., BODC, UK; SISMER, France), and also within some institutions (e.g., IEO, Spain, MUMM, Belgium and IMR, Norway). The level of integration varied between organisations, but included fully integrated databases containing all parameters and covering a variety of disciplines, as well as a number of distinct databases, where integration was achieved through a software layer (either on the intranet or internet). In particular, the (integrated) IEO database includes fisheries data, and M-J García (WGMDM member from IEO) will work with the fisheries people for a further development of this database (SIRENO). However, the data are available on intranet only; data do not go to the Spanish Oceanographic Data Centre. There is also a GIS system under development. The present system allows, for example, the study of the influence of temperature on fish. Similarly, in France, SISMER is responsible for the data management for fisheries data, but the data are confidential and kept on the intranet. The FRS Marine Laboratory has spent 2 years developing an integrated database. The Instituto Hidrografico, Portugal uses a GIS (ArcGIS) to link to different databases; different teams then use this to integrate data. Others had a number of distinct databases, but integration was achieved via a software layer (again on the intranet or internet). SISMER is currently developing such a system, and BODC has a system for searching through some of its databases.

Which ever solution ICES adopts, it was felt to be important to take note of what already existed, and not reinvent the wheel or duplicate what has already been done.

Samples of existing systems which may be worth further consideration, and are available on the web include:

MUMM, Belgium: Integrated and Dynamical Oceanographic Data (IDOD) Management.
Web-site: www.mumm.ac.be/datacentre/

RIKZ, Netherlands: DONAR database, with geographical search interface.
Web-site: www.waterbase.nl (only in Dutch)

Russian NODC: ESIMO "Unified system of information for World Ocean" Links together a number of Russian Institutes.
Web site: www.oceaninfo.ru (only in Russian)

US National Coastal Data Development Center, Charleston, USA:
Web-site: www.ncddc.gov/pilots

Ocean Biogeographic Information System (OBIS):
Web-site: www.iobis.org

Gulf of Maine Biogeographic Information System (GMBIS) with EASy GIS, which has software which will extract data from different sources:
Web-site: netviewer.usc.edu/web or gmbis.marinebiodiversity.ca

[Note there is also an EASy GIS version for the Barents Sea under development for IMR, Norway. This can be viewed from the first web-site above. EASy (Environmental Analysis System) GIS has been developed by the Kiefer Laboratory at the University of Southern California, Los Angeles, USA. EASy GIS is a 4-dimensional GIS designed for analysing and displaying the complex horizontal and vertical relationships present in the aquatic and marine environments. At its core, the software has the ability to handle time and depth as well as latitude and longitude.]

DFO, Canada: SeaMAP (Seabed resource mapping)
Web-site: seamap.bio.ns.ca

d) propose strategies and technical solutions for integrating available data including the possibility that data are not physically located in one site;

The examples above give an idea of what is possible, depending on the level of integration required. Most systems use relational databases in conjunction with a GIS. And as noted above the degree of integration varies. WGMDM would suggest first agreeing on the level of integration required at ICES, and then examining those already existing systems which address this requirement. Before adopting a strategy, it would also be beneficial to examine the resource needed to setting up such systems, as this might affect the decision of which solution to adopt.

The Russian National Oceanographic Data Centre is in the process of setting up a virtual data centre between a number of organisations in Russia. This involves the development of a web portal and the development of web sites in regional organisations to provide access to real time data, forecasts and climate data.
The EU COASTBASE Project was a proof of concept technical study to illustrate how a virtual data warehouse might operate.

One other system currently under development as part of the EU funded SeaSearch II project, will link together a number of oceanographic data centres, and search through the data holdings available at these. It may be worth ICES considering this and developing closer links with this project.

One point which needs careful consideration is the value of quality controlled data in a database. For example, the data in the Oceanography database contains data from many sources all of which have been subjected to a consistent level of quality control. This adds value to the data set, and users can have confidence in the data. Could one have the same confidence if the data were scattered through a number of disparate databases?

e) evaluate and recommend the level of integration and aggregation of data in connection with management issues from an ecosystem perspective including the use of GIS systems;

The WGMDM noted that the Colour of Ocean Data (COD) Symposium, held in Brussels in November 2002, brought together biologists and data management experts, together with IT experts. Many new products were described – the presentations are all available on the COD website (www.vliz.be/En/Activ/Events/Cod/cod.htm) – which integrated data and made use of GIS. Perhaps one of the best examples of this was the EASy GIS developed for the Gulf of Maine Biogeographic Information System (GMBIS), and it may be worth considering this in the ICES context. Other groups

have also developed GIS applications, but GIS is a delivery mechanism, which needs to be underpinned by high quality, comprehensive databases. The work in compiling these, in particular carrying out quality control, requires scientists who understand the data, and can identify problems, and provide interpretations, as well as IT specialists. However the drive should not come from the IT side.

It should also be noted that GIS systems can be cumbersome to use, although they can be a helpful way to view data and can provide a starting point to organise the data (as they enforce a structure). However, GIS systems are good for spatial data, but do not embrace the temporal element (although some work is in progress on this). Clarification is needed as to whether ICES (and their users and customers) require data/data product delivery *via* a web based GIS, or whether an in-house GIS is required.

GIS needs a user-friendly interface to allow users to make selections on geographical area, date/time range, parameters, etc., and then search. Then visualisation and integration of the data is required, along with analysis tools. But scientific expertise is required to interpret the results.

f) evaluate problems associated with the accessibility of data.

There are two issues with data accessibility. The first relates to restrictions on the data and the second to how easy it is to actually obtain the required data, both within ICES and as an outside user. For an outside user, at present it is possible to download a large volume of oceanographic data, and view maps of where data have been collected. Some plots are available for temperature and salinity data collected during IBTS work. Project data sets are also available for download; there may be some restriction on access to these during the early stages of the project to allow project scientists work on the data. Similarly some of the more recently collected data may be restricted (depending on the supplier), and not available from the web-site. Further products are available on request. As noted above, for the Environmental data, at present an inventory is available for users, who can then put in a request to obtain the data. Fisheries statistics are also available for download together with software. However, in order to thoroughly evaluate the accessibility of data within ICES it is necessary to understand how the data are organised, and what access (and software tools) is available.

The WGMDM discussions only scratched the surface of the work to be done, and some of the terms of reference need to be addressed before others can be considered in full. However WGMDM is very willing to assist SGMID where ever it can. A summary of the main points to emerge from the discussion is given below:

- Establish what is meant by integrated – (a) an integrated database (i.e., all data stored in one database) or (b) separate databases (as at present) and integration takes place via software delivering data or products. Option (a) will take some time to realize and will need development of protocols, etc., to accommodate differences in the way information is currently stored. Option (b) appears simpler to implement, but an assessment of data overlap in the present databases is required and a solution needs to be formulated.
- A superficial examination of the data status pages for the ICES Environmental Data Centre indicates that much data are missing. An assessment can also be made for the Oceanographic Data Centre – the review carried out by WGMDM can be updated if required – but this will only give an indication, as the submission of Cruise Summary Report forms (which form the basis of the inventory of data collected) is far from comprehensive. As noted above it is also necessary to determine overlaps between the databases. Perhaps an independent consultant could do this.
- Data assembly, to produce high quality databases, is time consuming. Quality control of data is essential, and must be adequately funded. The underlying database needs to be high quality and as complete as possible, otherwise the product(s) will not be of good quality. This also means that scientific expertise is required in order to interpret the results/products.
- It is necessary to know what the user needs are – and who the users are. Can their needs be met by a web-based system (either intranet or internet) or do they want interpretation of data and products by experts? Are regularly updated, routine products required (e.g., for operational oceanography)?
- Various integrated systems have been noted in the discussion above – WGMDM can provide further details of these if required or contact names can be provided.
- Technology needs to be assessed, and a prototype system developed. But caution is required – there are many protocol issues. WGMDM members can provide some assessments of the systems in operation in their own organizations, and comment on their advantages and disadvantages.

Action 15: L. Rickards to provide feedback to SGMID, and continue a dialogue with them.

12 REPORTS FROM OTHER MEETINGS

This item is to inform the Group of other related meetings and to investigate how links can be established or maintained between WGMDM and these other groups.

12.1 Report on the activities of the ICES Benthos Ecology Working Group

The Benthos Ecology Working Group (BEWG) reports to the Advisory Committee on the Marine Environment (ACME) through the Marine Habitat Committee (MHC). Its focus was initially mainly on the North Sea Benthos Survey (NSBS). Recurring topics discussed during the meetings, apart from NSBS and its successor, the North Sea Benthos Project 2000, are standardisation of sampling procedures, quality assurance, ecological quality objectives, major monitoring programmes, mapping of the benthic communities, and habitat classification.

Two meetings have been held since the WGMDM last met. The first of these was in Tromsø, Norway, from 24 to 27 April 2002, with as Chair Dr Karel Essink (Rijksinstituut voor Kust en Zee, Haren, The Netherlands). The second was in Fort Pierce, US, from 28 April to 1 May 2003; Chair was Heye Rumohr (Institut für Meereskunde, Kiel, Germany).

During the last meeting, extensive discussions were held on possible effects of wind-energy farms. Mainly the introduction of hard substrate in areas of soft sediments was mentioned as having a major impact, not necessarily for the worst (increased complexity will bring increased diversity; wind farms will act as fisheries sanctuaries). Another topic of discussion was the Prestige oil spill, and the factors leading up to the disaster.

12.2 IOC International Oceanographic Data and Information Exchange (IODE) committee

The seventeenth meeting of the IOC International Oceanographic Data and Information Exchange (IODE) committee took place in March at UNESCO Headquarters, Paris. IODE-17 was attended by 72 delegates from Member States, 16 representatives of organizations, programmes and projects, and five observers. The IODE network of data centres has 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 and operational programmes and to raise awareness of IODE capabilities. A new Chair (Lesley Rickards, UK) and Vice-Chair (Ricardo Rojas, Chile) were elected during the session. H. Dooley provided the WGMDM with a brief report on proceedings (see Annex 7).

12.3 'Colour of Ocean Data' symposium

The 'Colour of Ocean Data' symposium was organised from 25 to 27 November 2002, in the Palais des Congres in the centre of Brussels, by the Flanders Marine Institute, IOC, the Office of Scientific, Technical and Cultural Affairs of the Belgian Government, and the Census of Marine Life. Nearly 200 participants were registered; there were 44 oral presentations, 40 poster presentations and eight demonstrations.

The objective of the 'Colour of Ocean' symposium was to bring together different communities with an interest in marine sciences and information management. In a series of five sessions, various aspects of data management were discussed. The final part of the symposium was a panel discussion. One of the main conclusions from the panel discussion was that symposiums like this one were needed to strengthen the communication between different communities involved with marine/oceanographic data management. A brief summary of proceedings is provided in Annex 8. More information can be found at: www.vliz.be/cod

12.4 Report on IODE Group of Experts – Biological and Chemical Data Management and Exchange Practices

Two important events had a direct influence on the establishment of the Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BCDMEP). The first was the International Workshop on Oceanographic Biological and Chemical Data Management held in Hamburg, Germany in May 1996. The overall goal of the workshop was to improve the quantity and quality of chemical and biological data available to the scientific community; some thirty papers were presented on issues of biological and chemical data management. The second event was the Sixteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE) held in Lisbon, Portugal, 31 October – 8 November 2000, where the Committee adopted Recommendation IODE-XVI.4 establishing a Group of Experts on Biological and Chemical Data Management and Exchange Practices to develop standards for biological and chemical oceanographic data.

The first meeting was organized in the National Oceanographic Data Center, Silver Spring, Maryland, from 25 to 27 June 2002. The terms of reference for the group, as amended in the first meeting are as follows:

- documenting the systems and taxonomic databases and inventories currently in use in various data centres;
- documenting the advantages and disadvantages of different methods and practices of compiling, managing and archiving biological and chemical data;
- developing standards and recommended practices for the management and exchange of biological and chemical data, including practices for operational biological data;
- encouraging data centres to compile inventories of past and present biological and chemical data holdings;
- encouraging data holders to contribute data to data centres for the creation of regional and global integrated oceanographic profile and plankton databases and other biological databases.

During the first meeting, it was decided that biological data would be the initial focus of the group, because of the expertise present in the group, and the urgency with which some data management problems should be resolved. The plan of action for the group is, ao:

- Organise a follow-up meeting to the one held in Hamburg, Germany, in May 1996. This meeting will again be held in Hamburg, in the spring of 2004.
- Document information systems currently in use to handle biological databases.

12.5 EU SEASEARCH II

This new SeaSearch project began in November 2002 and has 33 partners. The new partners will be compiling metadata for the EDMED, Cruise Summary Report and EDMERP databases. The pre-existing partners, in addition to updating their metadata, will endeavour to provide more coordinated access to their data holdings. To further this, a technical task group meeting was held to design the 'Common Data Index', which will provide access to data at SeaSearch partner's sites. The design has been agreed and common platform, instrument and parameters codes are also under discussion. Initially the system will be set up for task team members, and then extended to other SeaSearch partners. Each member will automatically provide their data index file on an ftp site; these will be collected by the coordinating partner and made available as a unified inventory on the SeaSearch web pages, pointing to on-line data where this is available.

12.6 EU European Sea Level Service (ESEAS)

An ESEAS Work Package 1 workshop was held at BODC/POL in March to discuss quality control of sea level data and agree on standard procedures to be adopted across the partners. A draft document has been produced describing these. In addition, an ESEAS sea level data web site is under development, which in the future will provide sea level data in a consistent format for ESEAS partner's data. A catalogue of paper based records is under development to assess the need for data archaeology for tide gauge records in Europe.

12.7 EU European Directory of the Initial Observing System (EDIOS)

The EU EDIOS project aims to develop an information system for marine observing stations (including moored buoys, coastal installations, seabed stations, drifting buoys, repeated sections and sampling stations, airborne repeated tracks, etc.) where there are routine, repeated, and consistent long-term observations of the marine environmental conditions, and where the data are made available for use in real-time, or near real-time. The project held several meetings during 2002/03, and information from regional coordinators is being entered into the database. A web-based graphical user interface is being developed for searching the information included in the database.

12.8 IOC/IODE Steering Group for the Global Ocean Surface Underway Data (GOSUD) Pilot Project

There was a meeting of the GOSUD Steering Group in September 2002. GOSUD is a project 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. For the purposes of this Project, the data concerned are those collected as a platform is underway, from the ocean surface down to about 15 m depth (www.ifremer.fr/sismer/program/gosud).

At the Steering Group meeting components of the draft plan were reviewed and the preparation of the first project plan formulated. This document sets out the goals of the project and the range of activities required of participants in order to

achieve the goals. The participants of the preliminary meetings have expressed interest in meeting certain of the objectives and these are recorded in this plan. Other participants will be needed in order to meet the goals of the project.

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.

13 FUTURE PRIORITIES FOR WGMDM

L. Rickards introduced this agenda item (see Annex 9 for the PowerPoint slides). She suggested that WGMDM needs to consider its role in relation to ICES and other (international) organisations, projects and programmes, and to ensure that it is properly aligned with the ICES Action Plan. Links to a variety of other groups were considered, together with other ways of working (e.g., workshops, theme sessions, joint conferences) and raising the visibility of the WG's activities. She asked what the priorities over the next 3–5 years should be and suggested the following were important areas to be considered:

- Data quality control (e.g., standards, procedures, guidelines, metadata, real-time/operational)
- Operational oceanography (e.g., through projects such as Argo, EuroGOOS, MAMA, PAPA, EDIOS; developments for quality control and data stewardship)
- Data access (e.g., Internet access to data, SeaSearch project Common Data Index, data availability)
- Data flow (e.g., new data products, web vs. CD-ROMs/DVDs for data dissemination)

The WG split into 3 break-out groups to discuss this and each reported back their conclusions. These are summarized in the table below.

GROUP 1	**Guidelines**
	• Increase usage by making them known and by maintaining them
	• Maintenance
	• Improve the "search hit"
	
	Structuring WGMDM
	• Assign roles to improve the functionality of the group (by topic)
	  • Co-Chairs
	  • Secretary
	  • Subgroup-Chairs (planning and chasing up work intersessionally)
	
	Theme sessions
	• ASC 2004/2005
	  • Improving access to data and data products
	  • Data products (atlases, GIS, regional products)
	  • Data access (emphasis not only on physical data) (downloading)
	  • Integrated data management
	  • Data search tools (web portal)
	
	• Demonstration sessions, (technical interchange)
	
	Public relations
	• Advertising, dissemination, (mouse mat, mugs, pen)
	• Library analogue – stress service provided to scientists to access data (but collaborating with, not duplicating, the efforts of SeaSearch and IODE OceanPortal)
	
	Relations between ICES and IOC/IODE
	• WGMDM – meeting with others with same problems – aimed at finding solutions
	• Wear the WGMDM hat at other meetings
	• Forum for discussions

	• Clarify what – how data are sent to ICES (produce guideline) • Operational oceanography • Operational data also needs to be available in the future, not just now – role for data centres
GROUP 2	• Absence of ICES representation a problem • How should WGMDM be organised? • Split responsibilities (planning meeting, report, etc.) • Role of WGMDM – cover wider remit and terms of reference should reflect this • Other projects – ICES decision – but WGMDM could provide expertise • Workshops are a good way to increase the profile, but are hard work! • Theme sessions – at ASC and in France 2005 'theme session' • ICES represented as widely as possible at other things – e.g., Argo – to spread load • Operational oceanography – short time scales for operational oceanography – if ICES is interested then WGMDM should look into this • Data access – too many organisations putting data on the web – focal points for data are needed • Data should be submitted to ICES

GROUP 3	• Databases cross cutting (a resource to all three areas – oceanography, environment and fisheries) => data management should cover a wider remit, but with additional expertise
	• Ecological = integrated
	• Qualification of group members to be involved in more than one area (restrict memberships) guidelines should be developed for all themes
	
	• Visibility
	  • Theme session for 2005 [or 2004]
	  • Integrated data management
	  • Spain, Gijon [ICES ASC 2004]
	
	• Co-organise Hamburg 2004 meeting (ICES was co-organiser in 1996) [WGMDM on organising committee]
	
	• Poster of guidelines to be presented at science meetings
	
	• Web-site – review pages on the ICES web site
	
	• Continue links with SGXML
	• WGMDM part of organising committee for joint quality control conference
	• Pass guidelines to Ocean Information Technology (OIT) project
	
	• Move into operational data
	• Inventorise – complement EDIOS with west-Atlantic
	• Keep delayed-mode in mind => climatologies
	• Create 2 way referral system for operational oceanography
	• Investigate possibilities to complement EDIOS with information on operational oceanography in the west Atlantic
	
	• Collaboration with IODE?
	• Absorbed into JCOMM/IODE => lost contact between members
	• WGMDM represented on (new) ETDMP?
	• Need link with ETDMP and GEBCDMEP

	• Specificity => North Atlantic • Contribution to integrated database • Quality control procedures (audit/certificates of quality) • Prepare products, analysis (climatologies) • Gap analysis – which products are missing? • Improve ICES web site by better links – especially WGMDM part

The main themes to emerge from the discussions suggested the following priorities should be included in the WGMDM's terms of reference:

- Continue to develop, maintain and promote guidelines
- Develop a referral portal for guidelines and data quality control information (e.g., to include links to standards, procedures, guidelines, metadata, real-time/operational)
- Review the data management developments and implications for operational oceanography (metadata directories, developments for quality control, referral mechanisms, products (climatologies), data stewardship, etc.)
- Critically assess 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 IODE's OceanPortal and SeaSearch initiatives

In addition, the following activities should also form a part of the WGMDM's remit:

- Organise (or co-organise) a theme session in 2004 or 2005 on data products and data access (e.g., atlases, GIS, regional products, operational products, web portals)
- Continue to develop working relationships with other similar groups (e.g., IODE/JCOMM GE's, OIT, etc.) – to prevent duplication of effort and reinventing the wheel; maintain strong links with SGXML.
- Workshops are beneficial – perhaps attach a relevant one to a larger meeting (Hamburg 2004, France 2005, Data Quality Control conference)
- Continue to encourage data submission to ICES, ensuring that information/guidelines on data submission are available

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

Action 18: Co-Chairs to assign responsibilities to WG members (existing and new Co-Chairs)

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

14 TERMS OF REFERENCE FOR 2003/04

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.

15 ANY OTHER BUSINESS

Several new data products have been issued on CD-ROM and DVD during the year. Copies of these were distributed to WGMDM members or are available on request. These included the Centenary Edition of the GEBCO Digital Atlas (available from BODC), MEDATLAS 2002 (SISMER), JGOFS International Collection, Volume 1: Discrete Data Sets (1989–2000) (US NODC) and WOCE Global Data Version 3.0 (US NODC).

M. Fichaut asked if the international current meter inventory was still maintained by BODC and whether WGMDM members found it useful. Some discussion followed as to its benefit; in general it was felt to be a useful resource to refer

enquirers to when they requested data that were not available at any individual centre. L. Rickards noted that it was some years since it had been updated and agreed to contact WGMDM members for updated information.

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

16 NEW CO-CHAIRS

As the present Co-Chairs had agreed to take on this role as caretakers for one year only, a new Chair or Co-Chairs were needed. The WG proposed M. Fichaut (France) and H. Sagen (Norway) as Co-Chairs for the next three years.

17 DATE AND PLACE OF NEXT MEETING; CONCLUDING REMARKS

On behalf of Belgium, S. Jans volunteered to host the next meeting in either Brussels or Oostende, probably prior to the SGXML meeting (to be hosted by VLIZ in Oostende), i.e., 3–5 May 2004.

The Co-Chairs closed the meeting by thanking the participants for their contributions. On behalf of the WGMDM, the Co-Chairs also thanked the Swedish Meteorological and Hydrological Institute for their hospitality and arrangements and in particular acknowledged the efforts of Lotta Fyrberg and Jan Szaron.

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ANNEX 2: WGMDM TERMS OF REFERENCE 2002 (AND ACTION LIST)

2C14 The **Working Group on Marine Data Management** [WGMDM] (Co-Chairs: R. Gelfeld, USA and L. Rickards, UK) will meet in Gothenburg, Sweden from 28–30 May 2003 to:

a) evaluate the use of the MDM guidelines for data management and exchange in response promotional activities;

b) evaluate the results from SGXML regarding the cross parameter dictionary comparison and make recommendations regarding adoption in the oceanographic community;

c) further investigate details of the Integrated Taxonomic Information System (ITIS) and actively promote ITIS within the ICES and IOC community (In partnership with the IOC/IODE GETADE);

d) identify problems in terms of both submission amount and quality of oceanographic data submitted to the ICES data centre and suggest solutions to member countries or international programs as required;

e) evaluate and develop future directions for oceanographic data management based on the results from SGXML;

f) comment on the report of the Study Group on the Management of Integrated Data.

WGMDM will report by 15 June 2003 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.
Scientific Justification:	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) 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. c) The cooperative environment between GETADE and WGMDM resulted in very constructive discussions and many collaborative action items. Of particular interest to both groups is ITIS and its role in the standardisation of data exchange. The ITIS should be actively promoted with the communities. d) The submission amount and quality of data sent to the ICES databank is an ongoing issue. The MDM needs to actively identify related issues and pass on recommendations to data centres or collectors as necessary. e) 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.
Relation to Strategic Plan: ICES	Scientific objectives of understanding marine ecosystems must be underpinned by good data management procedures
Resource Requirements:	None

WGMDM 2002 meeting action items

No.	Action item	Comment
1	After review by the Oceanography Committee, H. Dooley will ensure the Profiling Floats, Discrete Water Sampling and Net Tow guidelines are added to the Data Type Guidelines web page on the ICES web site.	Completed
2	All MDM members to ensure that the description of their data centres is up-to-date and presented in a structure similar to the Canadian page.	Little progress; see section 8
3	A. Isenor and G. Reed, GETADE Chair, will discuss links between IOC/IODE and ICES WGMDM guidelines.	Completed
4	All members will install links between their data centre web sites and the ICES data guidelines web page.	Some progress; 50% complete
5	A. Isenor will notify JCOMM of the data type guidelines.	Completed
6	L. Rickards will inform the Argo data management team of the data type guidelines for float data.	Completed
7	M. Fichaut will inform the Co-Chairs of the IODE Sea Surface Salinity Data Pilot Project of the data type guidelines for Underway data.	Completed
8	A. Isenor will inform GE-BCDMEP (Group of Experts on Biological and Chemical Data Management and Exchange Practices) of the data type guidelines.	Completed
9	A. Isenor, G. Dawson and E. Vanden Berghe will discuss a possible guideline poster for the up-coming "Colour of Data" meeting to be held in Belgium.	Completed
10	A. Isenor will inform K. Medler that the request for a change in the wording of the current meter guidelines will not take place after discussion amongst the group members.	Completed
11	F. Nast will assemble a list of similar data type guidelines as created by other organisations or projects. Once completed, the list will be forwarded to the Chair.	Not started, but to be progressed
12	Selected members (F. Nast, J. Szaron, A. Isenor, P. Alenius, T. de Bruin, M. García, G. Slesser) will provide to the WGMDM Chair, a summary of the method used in merging the CTD data with the water bottle samples.	In progress
13	L. Rickards will compile a list of questions related to underway data collections. L. Rickards will then contact S. Jans, T. de Bruin, A. Isenor, P. Alenius, J. Szaron, F. Nast and M. Fichaut for answers to these questions, with the aim to creating an inventory of underway datasets at member centres.	In progress
14	A. Isenor will contact and inform the NORSEPP Planning Group of the data type guidelines.	Completed
15	E. Vanden Berghe and T. O'Brien, with help from N. Kaaijk, F. Nast, Marc Costello and David Nicholls, to resolve the ICES MDM position on the use of TSNs by November 2002.	Some progress

16	E. Vanden Berghe to contact Todd O'Brien to work out the annual production of the ITIS CDs. E. Vanden Berghe software may be used.	Not done
17	H. Dooley and T. O'Brien to investigate ICES mirroring of the ITIS site.	No resources at ICES for mirror site; but ftp site set up
18	E. Vanden Berghe will test the update speed of ITIS without use of the quick method via T. O'Brien.	Some tests carried out, but rather ambitious; to be continued
19	Todd O'Brien (with Chair's help) will co-ordinate and produce a brief on ITIS for other ICES Working Groups. This is to be circulated inter-sessionally to MDM for comment.	Completed
20	ICES MDM Chair will ensure that ITIS brief is on the agenda of the WG Chair's meeting.	Completed
21	ICES WGMDM Chair to encourage the completion of the matching of BODC's directory to ITIS.	Work underway but not completed
22	H. Dooley to check the number of ROSCOP submissions provided by Canada as indicated in Annex 7, Table 1.	Completed
23	P. Ennet will investigate and report to the Chair, the situation regarding the lack of Estonian data submissions to ICES.	Completed
24	H. Dooley to draw IODE SSSDPP attention to serious quality control problems with underway data.	Completed
25	J. Gagnon will contact Germany, Russia and Iceland to resolve the inconsistencies in the chemical data in the NW Atlantic as presented by H. Dooley (see Annex 7, Figure 3).	Not done
26	Information from SGXML should be made available on MDM Yahoo website. L. Rickards will evaluate the results of the SGXML mapping exercise and entrain other WGMDM members to help with the evaluation.	Information available on marineXML web site.
27	A. Isenor and H. Dooley will review the list of recommendations from MDM 2001 Action #4 and incorporate into the ICES MDM site as required.	Not done

ANNEX 3: LIST OF ACRONYMS AND TERMS

Acronym or Term	Description
ACE	Advisory Committee on Ecosystems
ACFM	Advisory Committee on Fishery Management
ACME	Advisory Committee on the Marine Environment
ADCP	Acoustic Doppler Current Profiler
Argo	The Array for Real-time Geostrophic Oceanography
ASC	Annual Science Conference
BALTEX	Baltic Sea Experiment
BEWG	Benthic Ecology Working Group
BMDC	Belgian Marine Data Centre
BODC	British Oceanographic Data Centre
BoM	Bureau of Meteorology, Australia
BSH	Bundesamt für Seeschiffahrt und Hydrographie
CD-ROM	Compact Disk – Read Only Memory
CEOP	Co-ordinated Enhanced Observing Period
CLIVAR	Climate Variability and Predictability
COD	Colour of Ocean Data
COHERENS	COupled Hydrodynamical Ecological model for REgioNal Shelf seas
CORIOLIS	A system for operational oceanography is under development in France to monitor and forecast the ocean behaviour
CSR	Cruise Summary Report (formerly known as ROSCOP)
CTD	Conductivity-Temperature-Depth
DFO	Department of Fisheries and Oceans
DOD	Deutsches Ozeanographisches Datenzentrum
DTD	Document Type Definition
DVD	Digital Versatile Disk
EASy GIS	Environmental Analysis System Geographic Information System
EDIOS	European Directory of the Initial Ocean-observing System
EDMED	European Directory of Marine Environmental Data
EDMERP	European Directory of Marine Environmental Research Projects
EEA	European Environment Agency
ESOP	European Sub-Polar Oceans Programme
ESEAS	European Sea Level Service
ETDMP	JCOMM-IODE Expert Team on Data Management Practices
EU	European Union
EuroGOOS	EuroGOOS is an Association of Agencies, founded in 1994, to further the goals of GOOS, and in particular the development of Operational Oceanography in the European Sea areas and adjacent oceans.
FAO	Food and Agriculture Organisation (of the United Nations)
FERRYBOX	A multi-disciplinary research and development project to qualify and foster routine underway measurements from ferry boats to better monitor the environmental conditions of European Seas
FIMR	Finnish Institute of Marine Research
FP5	Framework Programme 5 (EU)
FRS	Fisheries Research Services
GBIF	Global Biodiversity Information Facility
GEBCO	General Bathymetric Chart of the Ocean
GE-BCDMEP	IOC's Group of Experts on Biological and Chemical Data Management and Exchange Practices
GE-TADE	IOC's Group of Experts on the Technical Aspects of Data Exchange
GEWEX	Global Energy and Water Cycle Experiment

Acronym or Term	Description
GIS	Geographic Information System
GMBIS	Gulf of Maine Biogeographic Information System
GMES	Global Monitoring for Environment and Security
GML	Geographical Markup Language
GODAR	Global Oceanographic Data Archaeology and Rescue
GOOS	Global Ocean Observing System
GOSUD	Global Ocean Surface Underway Data
GTSPP	Global Temperature Salinity Profile Project
HELCOM	Helsinki Commission
HIROMB	HIgh Resolution Ocean Model for the Baltic
IBTS	International Bottom Trawl Survey
ICES	International Council for the Exploration of the Sea
IDOD	Integrated and Dynamical Oceanographic Data management
IEO	Instituto Español de Oceanografía
IFREMER	Institut Français pour le Recherche et l'Exploitation de la Mer
IMR	Institute of Marine Research
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
IOPAS	Institute of Oceanology Polish Academy of Sciences
ISO	International Standards Organisation
IT	Information Technology
ITIS	Integrated Taxonomic Information System
JCOMM	IOC-WMO Joint Technical Commission on Oceanography and Marine Meteorology
JGOFS	Joint Global Ocean Flux Study
LV	Light Vessel
MAMA	Mediterranean network to Assess and upgrade Monitoring and forecasting Activity
MEDAR	Mediterranean Data Archaeology Rescue Project
MEDATLAS	Mediterranean Atlas
MEDS	Marine Environmental Data Services - Canada
MFSTEP	Mediterranean Forecasting System Towards Environmental Predictions
MHC	Marine Habitat Committee
MOEN	Meridional Overturning Exchange with the Nordic Seas (EU project)
MUMM	Management Unit of Mathematical Models of the North Sea
NMD	Norwegian Marine Datacentre
NIOO	Netherlands Institute of Ecology
NODC	U.S. National Oceanographic Data Center
NORSEPP	North Sea Pilot Project
NSBS	North Sea Benthic Survey
NSBP	North Sea Benthos Project
OBIS	Ocean Biogeographic Information System
OCL	Ocean Climate Laboratory
ODCB	Oceanographic Data Centre for BALTEX
ODINAFRICA	Ocean Data and Information Network for Africa
ODINCARSA	Ocean Data and Information Network for the Caribbean and South America
OIT	Ocean Information Technology
OMEX	Ocean Margin Exchange
OSD	Ocean Station Data
OSPAR	Oslo-Paris Commission
PAPA	Programme for a Baltic network to assess and upgrade an Operational observing and forecasting System in the region
PEX	Patchiness Experiment

Acronym or Term	Description
PGNSP	ICES-EuroGOOS Planning Group on the North Sea Pilot project NORSEPP
POL	Proudman Oceanographic Laboratory
QC	Quality Control
RIKZ	National Institute for Coastal and Marine Management
ROD	Regional Oceanographic Database
ROSCOP	Report of Observations/Samples Collected by Oceanographic Programmes (now CSR)
SG-GOOS	ICES-IOC Steering Group on GOOS
SGMID	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
SNDI	SeaNet Data Interface
SOLAS	Surface Ocean - Lower Atmosphere Study
SOOP	Ship of Opportunity Programme
SSSDPP	Sea Surface Salinity Data Pilot Project
SQL	Structured Query Language
TSG	Thermosalinograph
UML	Unified Modelling Language
VEINS	Variability of Exchanges in the Northern Seas
VLIZ	Flanders Marine Institute
WCRP	World Climate Research Programme
WDC	World Data Center for Oceanography, Silver Spring
WGHABD	Working Group on Harmful Algal Bloom Dynamics
WGMDM	Working Group on Marine Data Management
WGZE	Working Group on Zooplankton Ecology
WMO	World Meteorological Organisation
WOA	World Ocean Atlas
WOCE	World Ocean Circulation Experiment
WOD	World Ocean Database
XBT	Expendable Bathythermograph
XCTD	Expendable CTD
XML	Extensible Markup Language
XSL	Extensible Stylesheet Language

ANNEX 4: SUMMARIES OF PRESENTATIONS

WORLD OCEAN DATABASE 2001 (WOD01)
Robert Gelfeld, US NODC/WDC Oceanography – Silver Spring

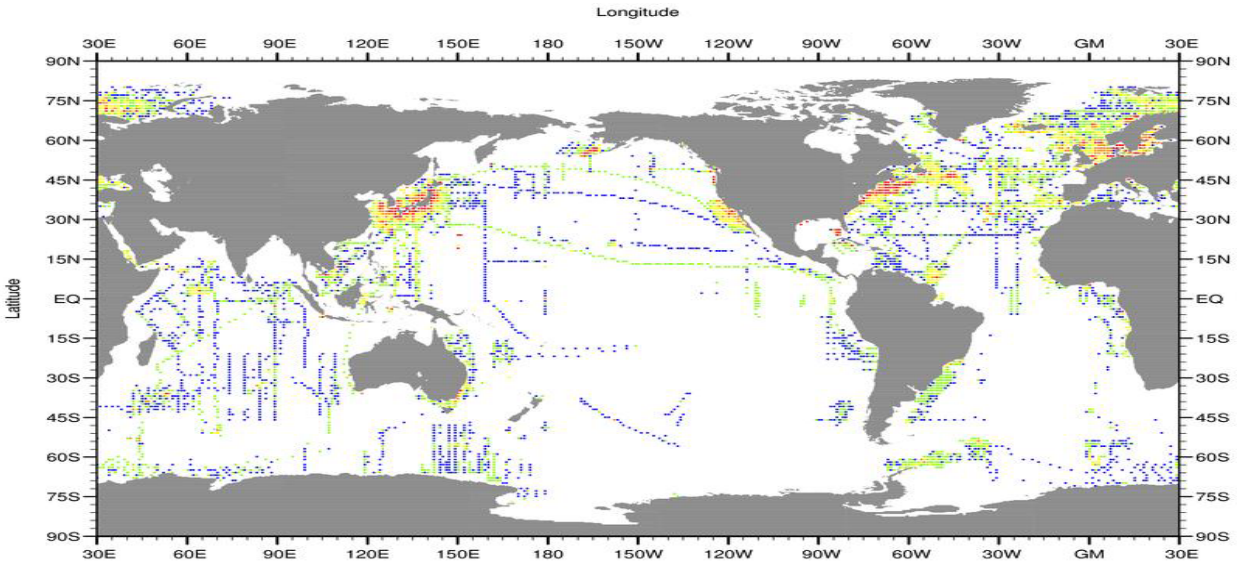
***WORLD OCEAN DATABASE* 2001 (WOD01)**
The *World Ocean Database 2001 (WOD01)* contains observed and standard level profile, plankton and surface data. During the past three years, the number of data sets received at NODC/WDC (National Oceanographic Data Center / World Data Center for Oceanography) has increased from 5 million to 7 million stations as a result of projects such as the Intergovernmental Oceanographic Commission's (IOC) Global Oceanographic Data Archaeology and Rescue project (GODAR), IOC's World Ocean Database (WOD) project, Global Temperature-Salinity Profile Project (GTSPP), World Ocean Circulation Experiment (WOCE), Joint Global Ocean Flux Studies (JGOFS), Ocean Margin Experiment (OMEX), and many others.

***WORLD OCEAN ATLAS 2001* (WOA01)**
The *World Ocean Atlas 2001* (WOA01) contains statistics and objectively analyzed fields for one-degree and five-degree squares generated from *World Ocean Database 2001* standard level, quality controlled data. The ocean variables included in the atlas are: *in situ* temperature, salinity, dissolved oxygen, apparent oxygen utilization, percent oxygen saturation, dissolved inorganic nutrients (phosphate, nitrate and silicate), chlorophyll at standard depth levels, and zooplankton biomass sampled from 0 – 200 meters.

The World Ocean Database retrieval system (WODselect) allows the user to select criteria and search for data in the *World Ocean Database 2001 (WOD01)*. The stations matching the user's search criteria are then extracted and made available (via FTP) in WOD01 native data format.

USER SEARCH CRITERIA:
Geographic Area, Observation Dates, Instrument Type (e.g., OSD, CTD, XBT), Parameters,
Deepest Measurement, Country, Ship/Platform, Project, Institute, Data exclusion using OCL quality control flags

URL: **http://www.nodc.noaa.gov/OC5/SELECT/dbsearch/dbsearch.html**



DATA DISTRIBUTION PLOT FROM WOD01

BALTIC SEA NOW – THE MOST RECENT INFORMATION FROM FIMR CONCERNING THE BALTIC SEA
Riitta Olsonen, Finnish Institute of Marine Research

The Finnish Institute of Marine Research web pages offer many kinds of information based on both newest observations made and models developed in the institute. The most important information is the ice service, the wave and sea level information service and Alg@line.

The ice service works during the ice season, which in the Baltic Sea lasts from October to the end of May. Daily products produced are ice reports in Finnish, Swedish and English, ice charts, ice forecasts and coded ice report. These are based on information collected from satellite images, reconnaissance flights, observations from fixed stations, pilots, coast guards, vessels and icebreakers. Data is exchanged between other ice services, and models are used for interpretation of observations and for forecasts. The most important customers are shipping, fishing and military.

The wave and sea level information service conducts measurements and investigations for port and route planning, mapping and building activity, accident investigation and navigation.

There are thirteen mareographs along the Finnish coast measuring automatically and updated in the institute every hour.

The wave heights are measured using three buoys during the ice-free season. Wave forecasts are made for the whole Baltic Sea, excluding the Gulf of Riga. The forecasts for the significant wave height and direction are given for two days ahead, four times a day.

Observations from mareographs and buoys as well as wave forecasts are available in web pages, or are sent to customers via mail, fax, email or mobile phone. Measurements and other products like investigations, statistical overviews etc. can be ordered from the service.

Alg@line monitors the fluctuations in the Baltic Sea ecosystem in real time by 'ships-of-opportunity' (SOOP) approach: unattended measurements and sampling on ferries and cargo ships. These are combined with studies onboard research vessels, satellite images, sampling in coastal waters and other observations. The main parameters observed and analysed are salinity, temperature, chlorophyll-*a*, nutrients and phytoplankton species composition.

In 2003 there are four merchant ships equipped with unattended flow-through systems in routes Helsinki-Tallinn, Helsinki-Stockholm, Helsinki-Travemünde, Lübeck-Hamina. A fifth ferry is testing between Helsinki-Tallinn (varying also -Riga, – Visby). Two coast guard's offshore patrol vessels participate this activity in Archipelago Sea and in the Gulf of Bothnia.

Alg@line is carried out in cooperation between Finnish Institute of Marine Research, Estonian Marine Institute, four regional environment centres and Helsinki city environment centre. Alg@line is also a part of the Baltic monitoring (HELCOM).

During the growth season, normally from March to September, reports are published in web pages on the algal bloom situation, in Finnish, Estonian, Swedish and English. They include graphs on hydrographical and nutrients situation and relative algal biomass measured along the SOOP routes, plankton species reports from different sea basins and compilation maps of cyanobacterial blooms. Reports are updated weekly or even daily if the situation is changing rapidly.

More information in web sites www.fiMrfi/en/itamerinyt/ and www.itameriportaali.fi

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SERVICES AND PRODUCTS PROVIDED BY THE BELGIAN MARINE DATA CENTRE

Siegrid Jans (1), Karien de Cauwer (1), Mia Devolder (1), Lucien Schwind (1),
Serge Scory (1)

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The **"Integrated and Dynamical Oceanographic Data management" project (IDOD, 1997–2002)** has allowed the development of a marine environmental database with related tools, which is put at the disposal of a wide range of users: scientists, policy makers, sea professionals and others, at national and international levels. BMDC offers a free, online and, as far as permitted, unrestricted access to the data it holds.

The database contains the results of the various scientific projects of the "Sustainable management of the North Sea" Programme, but also data resulting from national and international monitoring programmes and from other scientific projects. The system is continuously fed by data and evolves according to the needs and the progresses of the technology.

The database, implemented in Oracle 8.i, contains so far concentrations of numerous substances in air, water, sediment and biota, sediment granulometry, qualitative observations on biota and abundance of species. The data of first interest are those measured on the Belgian continental shelf and in the Scheldt estuary during the past thirty years.

Several services are available online (http://www.mumm.ac.be/datacentre/) after registration.

- Data selection and downloading through a user-friendly interface developed in Java, after specifying selection criteria. Different output formats (record or tabulars) can be specified.
- **Spatial analysis,** using ArcIMS and scripts, allows the user to explore, visualize and process the resulting data set in an easy way.
- **Statistical analysis,** based on S-Plus**,** allowing statistics such as normality checks, correlation and regression analyses, will be made available online in the near future.
- Several pre-processed maps can be consulted.

A step by step "demo" will show the **database efficiency from data retrieval to analysis.**

NATIONAL OCEANOGRAPHIC DATA COMMITTEE OF THE NETHERLANDS
Taco de Bruin, The Netherlands

The Netherlands National Oceanographic Data Committee is a national platform with 8 participating institutes. This covers 90% of Dutch oceanographic data and provides an infrastructure for the exchange of information, knowledge, expertise and data.

The past 12 months can be characterized by consolidation of activities and developments started in the past, including an increase in monitoring data available on the web, focus on informing policy makers and general public and changes in organization and embedding the National Oceanographic Data Committee. These activities and developments will be covered in the presentation.

DATA MANAGEMENT IN OPERATIONAL OCEANOGRAPHY
María Jesús García
Instituto Español de Oceanografía

Spain is member of the GOOS and EuroGOOS organizations, but the Operational Oceanography is not completely established, only the harbour agency had established a Warning and Observation Network from which the data are on the web. Also there exist a sea level network operated by different agencies that transmit the data in real time and for some stations a sea level prediction service is given. Some other buoys are already installed recently by different agencies. Furthermore in the frame of the European projects drifter profilers have been deployed (GYROSCOPE project) and XBT launch and some sensor are installed for sea surface variable measurement during the path lane of a oceanographic ship (FERRYBOX project). From these two projects the data are transmitted to the corresponding Data Centre in Europe.

Some effort has been made to arrive into an agreement between various agencies in order to establish the operational oceanography. Nowadays we are preparing an I+D project in "Operational Oceanography and Oceanographic Data". The IEODC will be involved in the work package related to the data management; inventories, standards in metadata and procedures for QC, statistics, etc. Also the IEODC will be involved in the work package related to the information services through the web server. The IEODC during this year is working looking at this direction and a web page is under construction for distribution the oceanographic data and information http://www.ieo.es/indamar

Furthermore we are involved in the ESEAS_RI (European Sea Level Service) and one of the work package we are involved is related to the Quality control of the sea level observation.

OPERATIONAL OCEANOGRAPHY AT IH, PORTUGAL
Sara Almeida
IH, Lisbon, Portugal

My presentation will be on Operational Oceanography in which I will try to give an overview of the MOCASSIM Project.

It is an operational forecast system which objective is the implementation of oceanographic models with data assimilation.

The data management, the applications in Naval operations and the control in the Marine pollution accidents (the Prestige case) are other points that I will focus.

HOMOGENEITY TEST FOR CLIMATE TIME SERIES DATA

Jean Gagnon
Marine Environmental Data Services

This presentation describes homogeneity tests carried out on water level time series records. The main conclusions are given below.

- Both homogeneity tests on DIFFERENCES and RATIOS of concurrent Tidal stations have identified a possible DATUM shift of a specific magnitude and on a specific date, despite the known data gaps and obvious spikes in one of the original records.
- The ambiguity as to which station this shift in the mean may apply is unresolved and another nearby station comparison would resolve this ambiguity, however this is not mandatory.
- In practice the test should be used along with the available "history" of the observations in order to investigate breaks in homogeneity. (i.e., Benchmark and station history meta-data records)
- Data gaps do not affect the test results provided the value of Tv is set to near 0.0 for the data gap.

The homogeneity test may be applied to Basin, River, and Tidal water level regimes (and by inference any climate time series of concurrently observed parameters) provided the time series are correlated and the distribution of differences and/or ratios between the two series is Normal.

THE REGIONAL OCEANOGRAPHIC DATABASE (ROD) AT IOPAS

Marcin Wichorowski
Institute of Oceanology PAS, Sopot, Poland

The main goal of presentation is to report present state of the Regional Oceanographic Database (ROD) at IOPAS, with focus on metadata description used in database approach.

The ROD is under development, with support of EU FP5 project. ROD contains data sets of marine physics (optics, acoustics, hydrodynamics), chemistry, biology and marine ecology. Input data has been collected over the years using variety of apparatus, methodologies, formats and undergone different quality assessment. There was no unified format of data set description defined. This fact has significant influence on the difficulties in feeding to ROD older data collections (as measured prior 1990ties). Some data formats (especially hydroacoustics data) use great volumes of storage, so they are only presented as meta-information in database. Due to variety of scientific disciplines (and different kinds of data), the ROD is in fact a set of databases.

The ROD design activities are focused now on establishing the unified format of data set description and interface for data exchange. The latest stage of our work is presented on UML class diagrams and sample XML file, the output from database.

DATA CENTRE REPORT BY GERMANY

Friedrich Nast
Deutsches Ozeanographisches Datenzentrum (DOD)
Bundesamt für Seeschiffahrt und Hydrographie (BSH)

Since last years meeting work was enhanced to access metadata and some data holdings on-line.

Cruise inventory

At our website
http://www.bsh.de/en/Marine%20data/Observations/DOD%20Data%20Centre/index.jsp
Cruise Summary Reports information is published. It is a report from our databank, into which CSRs are entered and used as a data tracking system. The amount, quality and timeliness of our CSR system was improved since last years meeting nationally by solving short-dated staff problems and internationally by the Sea-Search project
http://www.sea-search.net.

In a pilot phase more than 30 CSRs were entered via an online CSR entry system by the Sea-search partners, with CSRs from Baltic, Mediterranean and Black Sea countries (see table below). CSR information is retrievable online (after registration) under
http://csr.bsh.de/cgi-m5310/csr_retrieve/search.html
but this pilot form will only be available till the end of this month, but will be continued in an improved version within short notice this summer.

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.

Visualization

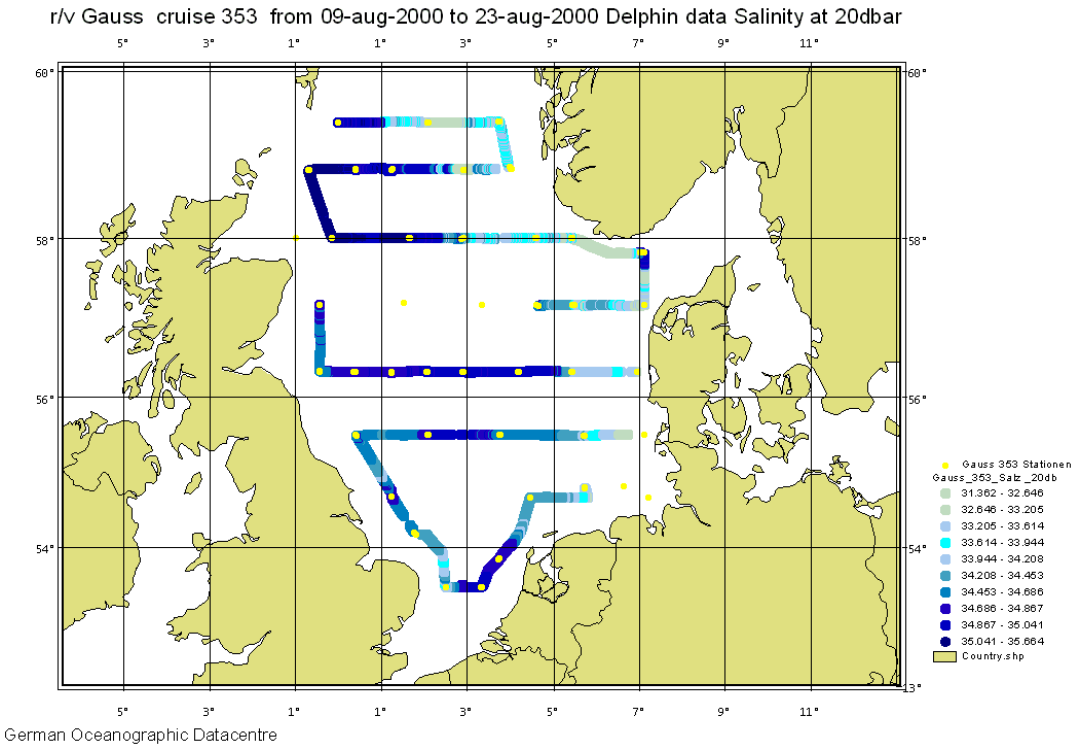
Spatial analysis of data will be improved by using ArcGIS/ArcIMS after finalizing the migration of our Marine data bank from Ingres to Oracle 8.i, scheduled for the last quarter of this year. The development of on-line visualization was given high priority. This vision was echoed by reorganizing DOD, which was linked to the cross section/environmental branch, and is now with a branch called “Data and Interpretation Systems”.

Old Light Vessels Data

Data sets of the old light vessels archived at DOD, were converted from sequential files into the data bank system, and are now in the process of quality control. Besides temperature and salinity values, wind, waves and current data from these time series are increasingly requested due to offshore windpark activities. Some of the 14 light vessels cover more than 50 years of observations, e.g., LV Fehmarnbelt lasted from 1924 – 1984, and is continued by an unmanned system.

New data type

As a new data source, oceanographic data from the towed, undulating CTD-system “Delphin” was taken on, an example from one cruise is given below. Also thermosalinograph data were taken on, of which the first 5 x 10^6 data was loaded into our data bank.



Survey of CSRs entered by CSROnline and loaded into our database

Country	Number	o.k.	dummy
Croatia	2	2	0
Latvia	2	2	0
Cyprus	8	8	0
Finland	2	2	0
Island	2	1	1
Sweden	1	1	0
Poland	1	1	0
Italia	1	1	0
Denmark	1	1	0
Malta	5	5	0
Morocco	2	2	0
Lithuania	2	2	0
Russia	2	1	1
Israel	2	2	0
Germany	1	1	0
Estonia	1	1	0
Belgium	1	0	1
	37	33	4

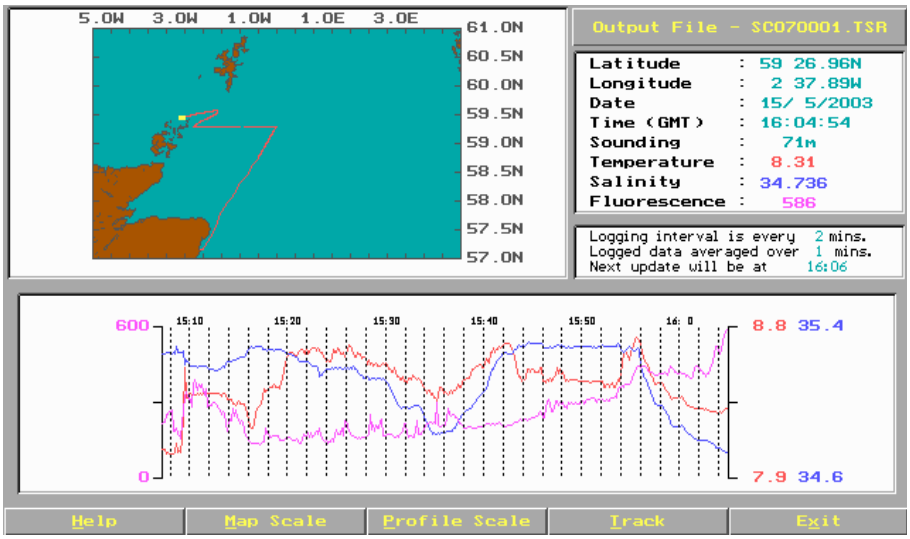
UNDERWAY SEA SURFACE DATA
ICES WGMDM Presentation, Gothenburg, May 2003
G. Slesser, Marine Laboratory, FRS, UK

Since the mid 1980's FRS have been logging underway sea surface thermosalinograph (TSG) data. These data are collected as and when required by FRS scientists working on various projects. Up till 1997, TSG data was in the main collected by the Oceanographic Research and Services Group (ORS). Over the past few years this has changed and now other groups collect approximately half of all TSG data. The majority of the TSG data was collected aboard the research vessels Clupea and Scotia. In more recent years fluorometer data has also been collected.

In 2002 the Steering Group for Underway Sea Surface Salinity Data Archiving Pilot Project (SGUSSSDAPP) was set up. This resulted in a request by Harry Dooley (ICES) for FRS TSG data. This data set was supplied with calibrations for temperature and salinity and a chlorophyll *a* calibration for the fluorometer data.

This exercise has resulted in FRS reviewing the metadata and quality control standards applied to these data. Apart from the calibration data entered at the head of each individual TSG data file no other metadata is logged. Changes are now underway to include as much metadata as possible with the TSG data files. The metadata will include such information as TSG instrument name, manufacturer, sensor serial numbers, latest manufacturer calibration dates, ship and country codes. Over the years quality control procedures have been continually reviewed and this has resulted in taking such measures as replacing salinity sample bottles with the "Hamburg" sample bottle, salinity analysis done in a constant temperature room and increasing the volume of sea water to be filtered (chlorophyll) to one litre. All of these measures brought in to help improve the calibration of the thermosalinograph and fluorometer sensors.

To help provide better quality control of TSG data FRS developed software during the early nineties to log, view and edit the TSG data. An example of the logging and viewing display can be seen below. The edit display is similar in style but allows the user to make edits to the temperature, salinity and fluorometer data.



This software was written for a DOS platform. It is intended that this software will be updated to run on a Windows platform.

PRODUCTS AND SERVICES AND OPERATIONAL OCEANOGRAPHY AT IFREMER/SISMER
Michele Fichaut, SISMER

Overview of SISMER French delayed mode data holdings:
CTD: 26,232 stations
Bottle data: 38,208 stations
Current meters: 1979 time series,
Thermistor chains: 117 time series
and some sediment traps.

This year we are archiving the ship-borne ADCP which is a new activity. We have the data of 32 cruises since the beginning of 2001 and we start to process and check them.

New products and services:
The MEDAR/MEDATLAS 2 European project (MEDiterranean Data Archaeology and Rescue, regional GODAR component) which ended by the end of 2001 has reached its final goal in February 2003. This goal which was to distribute the project results (data set and climatology) to the scientific community, was actually reached by the publication of the final product as a 4 CD-ROMs set. This publication was under the responsibility of IFREMER. The data set content is 35,679 CTD stations, 88,323 Bottle stations, 161,848 bathythermograph profiles and 29 thermistor chains collected over the Mediterranean Sea and the Black Sea.

The following climatologies are available on the CDs:

- Annual, seasonal and monthly for temperature, salinity and dissolved oxygen
- Annual and seasonal for silicate, phosphate and H2S (in the Black sea only)
- Annual for nitrate, nitrite, Ph, ammonium, alkalinity and chlorophyll.

A new WEB product is being developed to provide an online access to the metadata and /or the data available in the SISMER databases. This WEB portal will provide a unique access to all the SISMER databases, and will replace all the WEB accesses available now. This WEB portal uses WEB services and XML integrators (one for each database) which converts the databases contents into metadata XML fluxes compatible with the ISO-19115 standard.

Operational Oceanography:
SISMER has been involved in this activity since the beginning of the CORIOLIS project (2001) which includes the Global ARGO data centre. The CORIOLIS data centre gathers, quality checks and distributes the *in situ* physical oceanographic data collected in the frame of operational networks. The processing of the data is done in real time.

CORIOLIS data centre manages several data types which are collected by:

- Apex and Provor profilers
- XBT, XCTD, CTD
- Thermosalinograph
- Drifting buoys
- Moorings and anchored buoys

This data centre is involved into national (MERCATOR), European (GYROSCOPE, MFSTEP) and international (ARGO, CLIVAR) programs. CORIOLIS data centre also gathers data distributed by other data centres and distributes it through the WEB to a wide community of users.

IFREMER is also involved into the monitoring of French coastal water quality with the MAREL automatic network. The MAREL buoys are equipped with measuring systems for sea analysis. From one buoy, the data are transmitted every 15 minutes through cellular phone to a local laboratory and are then reformatted and loaded into a MYSQL data base. Then the data go through quality control software and can be then distributed through internet.

Up to now the data are managed locally in the different laboratories responsible of the measurements, but a central site is under specification and it is planned to have a national compilation of all the data.

NORTH SEA BENTHOS PROJECT 2000

Edward Vanden Berghe
Data manager NSBP
Manager, Flanders Marine Data and Information Centre
Flanders Marine Institute

The North Sea Benthos Survey (NSBS) was an initiative of the Benthos Ecology Working Group, to map the benthic communities in the North Sea. A series of cruises were undertaken in the spring of 1986, sampling 228 stations on a regularly spaced grid. Sampling methodology was standardised; workshops were held to discuss use of taxonomic names. The results of the NSBS were published as an ICES report (Craeymeersch, J.A. *et al.* (1997). Atlas of North Sea benthic infauna: based on the 1986 North Sea Benthos Survey. ICES Cooperative Research Report, 218), and are available on-line through http://www.vliz.be/vmdcdata/nsbs/index.htm.

Again on the initiative of the BEWG, a start was made to compile all available data that are comparable to the NSBS data, and that were collected in 2000. The North Sea Benthos Project 2000 (NSBP) has in the mean time acquired status as a study group of ICES, reporting to the Marine Habitat Committee (MHC). The project team met once, in Oostende from 28 to 29 January 2002, Chair Karel Essink. Since then, two ad-hoc meetings have been held to discuss specific topics related to the dataset: the first in Bremerhaven from 9 to 11 September 2002, Chair Hubert Rees, to discuss taxonomic problems; the second in Yerseke from 24 to 26 March 2003, to conduct a preliminary analysis of the dataset.

Fourteen institutions have agreed to contribute data; the data are now being integrated in a single database. While the NSBS was based on sampling done specifically for its purpose, this is not true for the NSBP. As a result, the sampling effort is far from evenly distributed over the study area. Also, for some regions sampling was done in slightly different ways (e.g., using different mesh size for the sieves). Last but not least, integrating species lists from different research groups is, like in 1986, a problem.

SEATRACK WEB – A WEB-BASED TOOL FOR OPERATIONAL MODELING OF THE TRAJECTORY AND FATE OF OIL SPILLS

Olof Liungman, SMHI, Sweden

Seatrack Web is an operational oil spill drift model for the Baltic, Kattegatt, Skagerak and eastern parts of the North Sea. It is available to the registered user on a 24/7-basis, via a user-friendly Web interface. The model is based on the operational ocean forecasts produced by HIROMB (HIgh Resolution Ocean Model for the Baltic) and incorporates particle tracking in 3-D, wind drift, interaction with the bottom and coastline as well as oil specific weathering processes.

ODON: OPTIMAL DESIGN OF OPERATIONAL NETWORKS
Philip Axe, SMHI, Sweden

This EU project started in January 2003 and is co-ordinated by Jun She of Danmarks Meteorologiske Institut; BSH, MUMM, POL and SMHI are the other partners. The aim of the project is to use results from a year of very high resolution model runs covering the North and Baltic Seas (~1 km horizontal resolution, ~20 vertical levels) as input to an 'OSSE' - Observing System Simulation Experiment. The data generated in the high-resolution model (the proxy ocean) will be sub-sampled to provide data to operational models. The OSSE will examine the amount of data required from the proxy ocean (in terms of spatial and temporal frequency) to give a suitable level of improvement to the operational models. SMHI's contribution to this project is to set up the initial database for driving the proxy ocean model runs, working with BSH to produce daily, high-resolution SST maps based on satellite, buoy, underway and profile data. Profile data will also be used for validating the proxy ocean data. SMHI's model HIROMB will be used to produce the proxy ocean in the Baltic, while COHERENS, from MUMM, will be used in the North Sea. We are very grateful to have received data and offers of data for the project from almost every country in the project area - as well as from ICES.

OCEANOGRAPHIC DATA CENTRE FOR BALTEX
Philip Axe, SMHI, Sweden

The Oceanographic Data Centre for BALTEX (ODCB) is a Swedish contribution to the international Baltic Sea Experiment 'BALTEX'. BALTEX is one of the continental scale experiments of the Global Energy and Water Cycle Experiment GEWEX and is a part of the World Climate Research Programme WCRP. SMHI hosts the Oceanographic Data Centre for BALTEX with the objectives to collect, store and distribute oceanographic data, and information, from the BALTEX region to the BALTEX scientific community. SMHI also hosts the Hydrological and Radar Data Centres for BALTEX.

The Data Centre continues the function of the meta-data centre established by FIMR In addition, it will collate and archive oceanographic data collected during BALTEX. The first priority for the data bank is to archive data from the BALTEX-BRIDGE period, covering October 1999 to December 2002. This will then be extended to cover 2003 and 2004, to serve the Co-ordinated Enhanced Observing Period (CEOP). Depending upon the success of this work, and the support and interest from the community, the Centre may undertake work to extend the data periods both forwards and backwards in time.

During the Enhanced Observations Periods, the data bank will archive the hydrographic survey data for the whole of the Baltic and Kattegat. The data bank will also archive data from special field activities, such as the high-resolution hydrographic data, current profiler (ADCP) and ice data collected in DIAMIX, PEP and BASIS.

The centre's data exchange policy follows the general BALTEX policy. This requires the registration of data users, the transfer of data between data providers, the centre and data users without charge, and the restriction of data use to the registered user (i.e., not to third parties). Data may be used for purely scientific (non-commercial) studies designed to meet BALTEX objectives. The responsibility for quality control of data lies primarily with the data providers.

UKHO PRODUCTS AND SERVICES
Garry Dawson, MEIC, UK Hydrographic Office

This presentation, which falls broadly into the "Products and Services" category, will consist of two parts:

1. Release of Data

A release, to Oceanographic Data Centres, of Royal Navy XBT data collected between 1990 and 1995 will take place shortly. The presentation will give details of the release of this global dataset and will introduce plans to release similar data at 5 year intervals in the future.

2. A different perspective on data collection

The second part of the presentation deals with a recent initiative to gather coastal water transparency data for a new UKHO Integrated Coastal Hydrography project. This initiative exploits resources not at present employed in collecting oceanographic data.

MOORED ADCP DATA – QUALITY CONTROL
K. M. H. Larsen, Faroe Islands

The Faroese Fisheries Laboratory has since 1994 moored several ADCP's in Faroese waters. The first ADCP moorings started within the Nordic WOCE project, and have continued within various international projects, the latest being the EU-project MOEN. The moorings have also been funded by different oil companies with interest in the Faroese area.

In 1997 a standard data processing and quality control procedure for the ADCP data was established. For each mooring a header file is created, containing standard information for the mooring. The ADCP data are converted from binary to ASCII format, where each of the variables velocity, direction, vertical velocity, intensity, error velocity and sensor data are stored in separate files. Distance to surface is calculated and stored. The data are then quality controlled by a procedure based upon consideration of ADCP performance (error velocity etc.) and data variation with time in relation to neighbouring bins (spikes). The editing is done manually using an interactive graphical software package based upon MATLAB. Generally, the series are edited up to the level where about 50% of the observations are found to be valid. Bins above this level are excluded from the corrected data files. Error codes are inserted for observations that are considered bad. If the Distance to Surface data are good, the depth of the APDC is corrected according this value and subsequently the depth of each bin is corrected.

When the data are corrected some standard statistics are calculated and checked manually. For instance, ADCP's deployed at locations where the current is steady, it is checked if the residual velocity and direction is similar to previous measurements at the same location. Also, tidal constituents are calculated for each mooring, and for moorings at approximately the same location, the individual constituents should be similar.

POSSIBLE FUTURE OF THE NORWEGIAN MARINE DATACENTRE
Helge Sagen, IMR/NMD

IMR is undergoing a process of reorganisation, which includes the marine data centre. The Norwegian Marine Datacentre (NMD) has been an NODC existence since 1971, and has archived oceanographic data and provided a data delivery system, but with no data available online. In recent years the NODC, in addition to the above activities has made data available online from the fixed coastal sites and the underway thermograph data on coastal steamers. In addition, the NODC has been the online node for the SeaNet SNDI.

The future organisation is likely to comprise the following parts:

- Centre of operational services
- Centre of marine data knowledge
- Centre of long term archives

The table below illustrates the components of these three centres:

Centre of operational services	National monitoring service Time-series and experimental datasets Numerical models dataset Project management office Data requests Data products Provide search facilities on marine data
Centre of marine data knowledge	IMR research database Standards and guidelines Data policy Quality control Coordination of marine data Portal on marine data and metadata Participate in international working groups
Centre of long term archives	Data modelling of databases Routines for loading research data into databases Export marine data to National archives/libraries Datacentre

	IMR Third countries (NORAD) Other Norwegian institutions Project data NODC National Oceanographic Data Centre

ANNEX 5: MERGING CTD DATA WITH WATER BOTTLE SAMPLES

(George Slesser, FRS Marine Laboratory Aberdeen)

INSTRUMENTS USED:

Sea-Bird CTD:	SBE19, SBE25, SB911+
Applied Microsystems CTD:	STD12
Nisken Water Sample Bottles	
Knudsen Reversing Bottles	

METHODS:

SBE19, STD12:

In the main when using these CTDs water bottle samples are collected by attaching a reversing water bottle 1m above the CTD and once the CTD is lowered to near the bottom another reversing bottle may be attached to the hydro wire. This is then lowered to 1m below the surface. Therefore, the sample depths are known, bottom sampled CTD depth – 1db and surface depth + 1db. These depth details are logged on a station log sheet with the station details. These station log sheets are typed up into a separate data file. Routines exist at FRS to merge the CTD data file and the station log sheet data file as required. For example, this can be for sending these data to ICES.

SBE25:

When using the SBE25 with a Sea-Bird SBE 32 Carousel Water Sampler the Sea-Bird software TERMAFM is used to set the water bottle firing depths. These bottles are fired on the way down. The CTD is lowered at approximately 30m/min. The firing depths are recorded on a station log sheet with the station details. These station log sheets are typed into a file and processed as above. The Sea-Bird software creates an AFM file that contains five scans before the bottle is fired, therefore, this file can be examined to check that the bottle has fired at the set pressure. If the bottle has not been fired within +/- 1db of the firing depth, the firing depth on the station log sheet will be altered. As above, routines exist to merge the CTD data file and station log sheet file.

SBE 911+

When using the SBE 911+ with a Sea-Bird SBE 32 Carousel Water Sampler the bottles can be either fired manually or automatically. The bottles can be fired manually from the SBE 33 Carousel Deck Unit and can be fired automatically by setting up a preset bottle firing configuration file that will instruct the Sea-Bird software, SEASAVE, to fire the bottles at the assigned depths. The firing depths are recorded on a station log sheet with the station details. These station log sheets are typed into a file and processed as above.

Setting the bottles to fire at 1db before the actual firing depth and lowering at 30m/min will in most cases close the bottles at or close to the firing depth+1db. This can be verified by examining the.BL file created by the Sea-Bird software. This file logs the scan range of a bottle firing. If the bottle has not been fired within +/- 1db of the firing pressure the firing depth on the station log sheet will be altered. As above, routines exist to merge the CTD data file and station log sheet file.

ANNEX 6: TERMS OF REFERENCE FOR THE STUDY GROUP ON MANAGEMENT OF INTEGRATED DATA (SGMID)

2ACE02 A **Study Group on Management of Integrated Data** [SGMID] (Co-Chairs: P. Wiebe, USA and C. Zimmermann, Germany) will be established and will meet in Madrid, Spain from 19–21 February 2003:

a) review the development within ICES towards integrated databases of oceanographic, environmental, and fisheries data;

b) identify data sources relevant to a), above, not yet integrated into the ICES databases;

c) review existing integrated data systems for fisheries/environmental data and review data integration work in existing projects inside and outside of ICES;

d) propose strategies and technical solutions for integrating available data including the possibility that data are not physically located in one site;

e) evaluate and recommend the level of integration and aggregation of data in connection with management issues from an ecosystem perspective including the use of GIS systems;

f) evaluate problems associated with the accessibility of data.

SGMID will report by 15 March 2003 for the attention of ACE, ACME and ACFM.

Supporting Information

Priority:	High
Scientific Justification:	The Bureau has decided to work towards integration of the ICES databases to support work on an ecosystem level. This work has been developing only slowly due to resource problems. However, with additional staff at the Secretariat, it is now hoped that the progress can be more rapid. The Secretariat will present its draft plan for such an integration and would like to discuss this in a wider forum before the final decision on how the integration should be implemented is taken. The key discussion point is, therefore, to understand the use to be made of the integrated data and the possibilities such integration will create.
Relation to Strategic Plan:	Establishing data integration is a step in developing the scientific basis for an ecosystem based approach to management.
Resource Requirements:	
Participants:	The background for this group is the decision to achieve integration of the ICES databases. This integration is to be implemented, at the users level. The members of the group will provide input to the Secretariat's Database Group on how the databases should be developed, on the required data products and on requests for data that shall be served now and in the future. The Working Group is a users' group and will not deal with the technical implementation of the databases, but take part in the verification that the databases meet users' needs. Members should therefore be users and they do not need particular technical knowledge on computer databases. Members should be interested in integrating data from several disciplines of marine science for use in their research.
Secretariat Facilities:	
Financial:	
Linkages to Advisory Committees:	The Group will report to ACE at its 2003 meeting.
Linkages to other Committees or Groups:	RMC, LRC, OCC, MHC, BLTC, ACFM, ACME, ACE, WGMHM
Linkages to other Organisations:	OSPAR, HELCOM, EC

ANNEX 7: REPORT FROM THE INTERNATIONAL OCEANOGRAPHIC DATA AND INFORMATION EXCHANGE (IODE) COMMITTEE MEETING (ICES SCIENCE COORDINATOR/ OCEANOGRAPHER)

17th Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE)

Paris, France
3–7 March 2003

ICES Representative: ICES Science Coordinator/Oceanographer (Dr Harry D Dooley)

1. Several ICES Member Countries participated in the Session. The Session elected a new Chair to replace the former Chair (Ben Searle, Australia) who resigned during the intersessional period. Lesley Rickards was successful in this election, and she took over the conduct of the meeting from the 2nd day. Lesley is deputy director of the British Oceanographic Data Centre and has been very active in the ICES arena for a number of years. She was Chair of the WGMDM in the mid-1990s and is currently a caretaker Co-Chair of this Group.

2. IODE has a broad remit. It supports capacity building activities mainly directed at assisting maritime developing nations to build up their data management infrastructure. Most recently it has embarked on a course to support new operational data management requirements of the programmes being developed in the GOOS framework. As a result of this it is developing a number of joint initiatives in collaboration with GOOS, and the GOOS implementation mechanism (JCOMM – Joint Committee on Oceanography and Marine Meteorology). This means that the Committee's priorities are currently being diverted from its traditional arena in supporting the marine scientific community and oceanographic data centre system in general in favour of promoting the development of operational oceanographic services in support of ocean monitoring.

3. In order to further its ambitions to enhance collaboration with GOOS and JCOMM, the Committee made a number of recommendations and resolutions to support these. In particular, in noting the impact of the emergence of global and regional operational oceanographic capabilities as a result of JCOMM and GOOS initiatives, the Committee has set up a group to examine present and future roles for the World Data Centres, the Responsible National Data Centres and the National Data Centres. This may well lead to a fundamental change to the "bricks" that make up the IODE system. This review will provide fundamental input to the "IODE Review" which was proposed by IODE XV1 and which will now be carried out alongside the development of an IOC Strategic Plan for Oceanographic Data and Information Management. Detailed arrangements for this Review were sketched out at this meeting and it is planned to complete it in time for the 2005 IOC Assembly. This is the first review of this Committee and it is to be conducted in a similar manner to those carried out for other IOC programmes, including GOOS.

4. Also as a result of the strong cooperation between IODE and JCOMM, the Committee decided to recommend the merging of its Group of Experts on the Technical Aspects of Data Exchange (GE-TADE) with JCOMM's Expert Team on Data Management Practices. This will put more emphasis on technical developments in support of operational activities, and will facilitate the development of the GOOS' Ocean Information Technology Pilot Project, which the Committee has recommended to co-sponsor. This initiative was earlier approved by GOOS and was adopted as a JCOMM Data Management Programme Area Pilot Project. One of the important objectives of this Pilot Project is to take the lead in developing an appropriate model and standard for ocean metadata. It will also rely very much on input from SGXML

5. In its consideration of the report of the ICES/IOC Study Group on the Development of Marine Data Exchange Systems using XML (SGXML) the Committee recognised that the development of XML systems was at the forefront of a number of IODE technical initiatives, especially in the framework of the Ocean Information Technology Pilot Project. Thus it was considered important that the meteorological sector be involved as soon as possible. With regard to specific recommendations, the Committee invited specific actions by data centres to map their existing point data into the XML "Brick" structure which was being developed by the Canadian data centre (MEDS). The Committee noted the experience of FAO in developing XML applications in fisheries and invited FAO to participate in the Group. It also noted the involvement of the IODE Secretariat and one member of SGXML in a new EU MarineXML project and asked that close collaboration between these activities be maintained in order to avoid the development of incompatible standards.

6. The Committee was briefed on the developments in its "Ocean Teacher" training activities which is fundamental to much of the capacity building activities of the Committee. This activity has been producing a modular teaching programme built up mainly from software systems made available by the data centre system. In order to ensure the further expansion and maintenance of this system in particular, the Committee supported the suggestion that a

Project Office for IODE be set up in Oostende, Belgium. A formal offer has been made by the Government of the region, and the establishment of the Centre will immediately follow ratification of the proposal at the IOC Assembly later this year.

7. The previous meeting of the Committee laid the foundations for the formal involvement of IODE in the handling of biological oceanographic data. This included the establishment of a Group of Experts on this issue and an international Symposium called the "Colour of Ocean Data" which was designed *inter alia* as a dialogue between marine biologists and data management in order to initiate the design of systems for diverse data sets including marine biological data. The Group of Experts are set to continue their work and IODE also plan a workshop on this issue in Hamburg in 2004.

8. After several years of deliberations, IODE is now finally in a position to recommend that the "IOC Oceanographic Data Exchange Policy" be adopted by the IOC Assembly. The basis of the policy is the "timely, free and unrestricted exchange of oceanographic data" which is to be used for *inter alia* the prediction of weather, the operational forecasting of the marine environment, the preservation of life, the mitigation of human-induced changes, and the advancement of scientific understanding. The policy itself has six clauses which elaborate the above statements, emphasise the non-commercial use of the data, the need to acknowledge the rights of originators, the need to use the IODE system, and the need to ensure that developing countries have the capacity to handle oceanographic data. It was noted that such a policy can only be as effective as its implementation and that remains to be seen.

9. The Session dealt with almost 100 documents and several information documents. Given that the Session time has been reduced by almost half that of previous meetings, it is clear that most of the submitted documents did not receive the attention, or analysis, they deserved. In this report I have tried to focus on those elements that I consider of most interest and relevance to ICES but their weighting may not reflect the overall balance of the meeting. Interested readers may however consult the IODE Website at www.iode.org for much more information.

Harry Dooley
8 March 2003

ANNEX 8: REPORT ON THE SYMPOSIUM 'COLOUR OF OCEAN DATA'

Edward Vanden Berghe
Chair, Organising Committee COD
Manager, Flanders Marine Data and Information Centre
Flanders Marine Institute

The 'Colour of Ocean Data' symposium was organised from 25 to 27 November 2002, in the Palais des Congres in the centre of Brussels, by the Flanders Marine Institute, the Intergovernmental Oceanographic Commission of UNESCO, the Office of Scientific, Technical and Cultural Affairs of the Belgian Government, and the Census of Marine Life. Nearly 200 participants were registered; there were 44 oral presentations, 40 poster presentations and eight demonstrations.

The objective of the 'Colour of Ocean' symposium was to bring together different communities with an interest in marine sciences and information management. Along one divide, participants from the physical oceanographic data management were invited, as were the marine biology data managers. Along a second divide, marine/oceanographic data managers were confronted with the user communities, mainly scientists and policy makers.

In a series of five sessions, various aspects of data management were discussed. The main aim was to allow the different communities to learn about developments on related fields, and to learn from each others' experiences. For each session of oral presentations, there was a corresponding session with poster presentations and demos. The wide variety of topics that were discussed was indicative of the breadth of the field; the ensuing discussions clearly demonstrated the timeliness of the symposium.

The two last hours of the symposium were devoted to a short panel discussion. Two representatives each of international organisations, of the data management community and of the scientific community were given the opportunity to expand on their views on oceanographic data management, their views on the role of data centres, and expectations from user communities. The conclusions from this panel discussion will be included in the proceedings to the symposium.

One of the main conclusions from the panel discussion was that symposiums like this one were needed to strengthen the communication between different communities involved with marine/oceanographic data management. Some very practical suggestions were made. One recommendation was to make data sets citeable, so that scientists' motivation to submit data would be increased. A very strong recommendation was made to investigate how data management can be included in the curricula of universities. Last but not least, there is a need for data centres to be more service-orientated, taking an example from active libraries, rather than being grey and dusty archives, where data enters never to be seen again.

An extensive summary of the discussions during the panel session will be published in the proceedings of the symposium. A preliminary draft is attached to this document.

COD Panel discussion – Organisation and panel members

Objectives: Identify what data centres see as user needs and what users see as user needs.

In the context of ocean data management, scientists, data managers and decision-makers are all very much dependent on each other. Decision-makers will stimulate research topics with policy priority and hence guide researchers. Scientists need to provide data managers with reliable and first quality controlled data in such a way that the latter can translate and make them available for the decision-makers. But do they speak the same 'language'? Are they happy with the access they have to the data? And if not, can they learn from each other's expectations and experience?

There were two panel members from each of the data management and the scientific communities, and from international organisations. The panel discussion was divided into two parts; the first part consisted of short opening statements by the panel members, based on the questions listed below. The second part was dedicated to open debate.

Questions:

<u>Data Centre representatives:</u>

(1) What do you see as the role for data centres in managing data from the global science programs?
(2) What are the challenges you see that data centres need to face individually and collectively?

(3) What added value comes from managing data in data centres, rather than in the originating institutions? What should a data centre have on offer to be more than just a convenient data archive?

Scientists:

(1) What are your expectations from the global network of data management systems?
(2) Can the global network meet your expectations now, with some changes or with radical changes?
(3) What governance structure would ensure effective and efficient management of global data, assuring and documenting data quality, securing data for future generations, and providing easy access to integrated multi-disciplinary data?

International organizations:

(1) What is the role of international organizations to address the data management requirements?
(2) What do you think are the major challenges that the international organizations face in global data management?
(3) What changes should be implemented at the international level to better deliver the global data management mandate?

All

(1) What data management practices can be employed to reduce the impacts of technological differences between developing and developed countries?
(2) What do you see as the main differences in data management practices between biological and physical oceanographers? What can be done to bridge these differences?
(3) If you had three wishes to improve global data management, what will they be?

Panel Members
- Chair: Savi Narayanan, MEDS, Canada
- Representatives from data centres:
  - Lesley Rickards, BODC, UK
  - Catherine Maillard, IFREMER/SISMER, France
- Representatives from the science community:
  - Peter Herman, NIOO/CEME, The Netherlands
  - Neville Smith, BoM, Australia
- Representatives from international organisations:
  - Alan Edwards, EU
  - Peter Pissierssens, IOC/IODE

COD Panel discussion - Main themes

Changing role of data centre
Changes in technology have been leading to changes in the role of data centres. There is a trend to move away from the traditional data centre, with its main task of archiving data sets, to become more service-orientated.

Data centres can look towards libraries for inspiration to redefine their role; libraries provide expertise and guidance in cataloguing. Archives are grey and dusty, libraries are active and open; data centres should strive to resemble the latter rather than the former. Data management needs an equivalent to the 'Web of Science': a mechanism to bring up a list of relevant, available, quality controlled, peer reviewed data sets.

There is a need to create data and information products; not only towards other data managers and scientists, but also to the policy makers and society at large. These products will assist in increasing the visibility of the data centres, and so assisting in attracting both funding for further activities, and data submissions from scientists.

Some traditional roles of data centres remain important: long-term stewardship of data, integrating data sets, documenting and redistributing data sets, development of standards and standard operational procedures…

Bridging the gap between scientists and data managers
Both data centres, and data and information management procedures are very poorly known by marine scientists. In most university programmes, there is no training on data management, no information on data centres, data management procedures… Data management is perceived too much as an IT topic. There is a need to investigate how to put data and information management on the curriculum of academic institutions. This would result in a better knowledge of the data centres, and an increased quantity and quality of data submissions

Data managers should actively seek collaboration with scientists. If data managers have a background in science, it is possible to establish a relationship of trust with the scientists, a smoother collaboration, and a greater input of the data managers in the development of data collection. The involvement of the data managers in the planning of projects from a very early stage makes 'End to end data management' a reality.

EU has the mandate and the funds to support and improve training for scientists in data management, and could be playing a role in this.

Creating incentives for scientists to submit data to data centres
To a large extent, data centres are dependent on scientists to submit data. Especially in view of the extent to which scientists are not aware of the role or even the existence of data centres, this is a potential problem. Several actions can be taken in this respect.

- Creating awareness about importance of data management, by e.g., including data and information management in the curriculum of universities.
- Requirement for data management written into project condition for funding – is already the case for EU proposals, and happens for short-term data management.
- Developing peer review and quality control procedures, to assess usefulness of a dataset, and making a dataset citeable, so that a scientist's contribution of data to a data centre can be measured, and taken into account for career advancement.

Need for long-term activities
Data sets often result from projects, which usually have a limited time-span. Data management on short term, within the time span of the project, is usually no problem: scientists do need data management to produce the deliverables to the project; moreover, making provisions for data management is a prerequisite to have a proposal accepted in the first place. There is an obvious need for activities beyond the duration of the data-generating project, to assure continued availability of the data. This always has been, and probably should remain, one of the tasks of data centres.

Funds for long-term data management should not come from research budgets, but rather from operational networks or other mechanisms. Several initiatives of the EU are relevant in this respect. Within Framework 6, there is a possibility to fund the operations of large 'Networks of Excellence' that will operate on time spans much longer than a typical project. The Global Monitoring for Environment and Security (GMES) initiative is another potential mechanism.

Duplication of efforts
A certain degree of duplication is unavoidable, and is a fundamental aspect of the scientific process. There has to be room for experimentation, different attempts at solving the same problem. After some time, however, experimenting should stop and be replaced with one or a couple of strategies.

Undesirable duplication can partly be stopped during the project proposal review process. One of the objectives of the Networks of Excellence, as proposed by the EU, is to increase communication between partners of the network, raising awareness of each other's activities, and hence decrease the probability of duplication.

Need for peer review of data sets, and for standard practices
There has to be peer-review, as a way to measure and recognise progress, to recognise value and expertise, and as a foundation for standards and accepted procedures. Standards and audit procedures are needed to allow objective peer review. Developing these standards is a task for the data centres.

Peer review is a way to increase the compliance with standards. Countries, or even institutions or scientists, could be tempted to work along principles that were developed locally; obviously, these will fit local needs, and are usually much faster to develop. Doing so, however, can lead to fragmentation, and hamper data exchange.

Difference between biological and physical data management
The problems of biological and physical data management are different: physics data sets are often high volume and low complexity; biology data sets are low volume but high complexity. Taxonomy brings a 5th dimension to ocean data management.

The lower level of standardisation in biology makes importance of proper documentation with the data sets even greater.

Commonalities are more important than differences: both biological and physical data management need for long-term activities; need for quality control and peer review; need to create data products.

Involving the developing countries
Participation of developing countries in global programmes is the best way to transfer expertise. Global programmes can operate at several levels, so that they can serve both global and local needs.

Internet access is a problem in many third-world countries, and assisting with connectivity and basic telecommunications should be made a priority in any capacity-building programme. Where internet is available, the bandwidth is often very limited, making it virtually impossible to download large volumes of data. As long as this problem still remains, data should also be distributed on alternative carriers such as CD ROM or DVD. Data warehousing and brokering can assist in locating and selecting relevant data sets, and thus limiting the volumes of data to be downloaded.

Also funds to purchase hard- and software, and expertise to maintain the systems, is a factor that is more limiting in developing countries. The data management community should provide platform-independent software that is open source and runs on hardware that is compatible with technological expertise available. Reliable and stable standards should ensure that data are available in a form that can be handled by these tools. Capacity building programmes should be organised making use of these tools and standards.

Actions
Investigate how data and information management can be made part of the curriculum of marine sciences in academic institutions.

Develop standard operational procedures and a peer review process to allow an objective assessment the quality of data sets.

Guide the user community directly to relevant, and quality controlled data sets, by setting up portal sites.

Create integrated data products, to increase the visibility of the data centres.

Distribute data not only through the internet, but also on CD or DVD.

Assist third-world countries with basic telecommunications, internet access, and data warehousing.

Create a collection of open source, platform-independent software for the benefit of third-world countries, and organise capacity building programmes around these.

ANNEX 9: FUTURE ROLE OF WGMDM PRESENTATION

• **How should WGMDM be run?**
  ○ Who does what?
  ○ What should the division of responsibilities be?
• **What should the role of WGMDM be?**
  ○ In ICES?
  ○ In relation to EU projects?
  ○ In international projects (e.g., CLIVAR, GOOS, SOLAS)?
  ○ Other projects and programmes? (e.g., JCOMM, non-EU, national)
	• **Should we develop closer links with other groups? For example:**
	• **There are other ICES WG and SG**
	  ○ Especially SGMID
	  ○ Oceanography Committee WG/SG (GOOS related?)
	  ○ Topics relevant to ICES
	• **IODE/JCOMM/GOOS Ocean Information Technology (OIT) Pilot Project**
	• **IODE GE-BCDMEP**
	• **IODE/JCOMM ETDMP (including GETADE)**
	• **IODE SG OceanTeacher (Continuing Professional Development?)**
	• **EU SeaSearch, EU EDIOS, EU ESEAS**
	• **GOOS, GOOS Regional Alliances**

• **We have always worked through the working group and not organised any workshops, conferences or theme sessions at the ASC.**
• **Some other groups have found workshops to be very productive and a valuable way of working. There are some possibilities for this:**
• **The IODE GE-BCDMEP is planning to organise a workshop in Hamburg (2004)**
  ○ Should we suggest ICES co-sponsor?
  ○ And should we hold our MDM meeting alongside?
  ○ And actively participate (e.g., on the organising committee, giving presentations, posters, etc.)?
	• There are also some plans underway for a joint conference on quality control (GODAR and OIT)
	  ○ Should MDM be part of this?
	• The OIT pilot project, co-sponsored by IODE, JCOMM and GOOS is also related to managing marine data.
	  ○ Is there a role for MDM in this project?

• Last year we met alongside GE-TADE
  ○ This group is now combining with the JCOMM Expert Team on Data Management Practices, which will meet in September.
  ○ Is there any role for MDM here?
  ○ Or is it sufficient to be kept informed of their work?
• The SGXML group we obviously have links with already
  ○ How should these develop in the future?
	What should our priorities be over the next 3–5 years? Consider the following:
	• Quality control:
	  ○ Standards, procedures, etc.
	  ○ Guidelines
	  ○ Metadata
	  ○ Real-time, operational
	  ○ Etc.

• Operational oceanography
  ○ Is your organisation involved?
  ○ e.g., GOOS, Argo, EuroGOOS, MAMA, PAPA, EDIOS, MedGOOS, etc.
  ○ If so, what developments are taking place for quality control and stewardship of the data?
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	• Data access: more and more data are being made available over the internet.
	  ○ Does your organisation do this? If so what data sets are available?
	  ○ Is this part of a wider project, or is it restricted to your organisation?
	  ○ Within the EU funded SeaSearch project, we are working towards a Common Data Index

	where partners can show what data they have – either online or available by request. Is there a role for MDM here?

• Data flow:
  ○ Can we provide feedback on the usefulness of new data products that have been issued in the past year?
  ○ Consider on web sites vs. CD-ROM for data dissemination.
  ○ What kind of website/CD-ROM (or DVD) best serves the community?	

ANNEX 10: PROPOSED WGMDM TERMS OF REFERENCE 2003/04

The **Working Group on Marine Data Management** [WGMDM] (Co-Chairs: Michele 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 (metadata directories, developments for quality control, referral mechanisms, products (climatologies), data stewardship, etc.); (Action 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:	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. 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

Relation to Strategic Plan:	Scientific objectives of understanding marine ecosystems must be underpinned by good and up-to-date data management practices and procedures.
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 Science Coordinator/Oceanographer
Financial:	The Science Coordinator/Oceanographer 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)