Hydrography Committee ICES CM1996/C:2

REPORT OF THE WORKING GROUP ON MARINE DATA MANAGEMENT

Copenhagen, Denmark
22-24 April 1996

International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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1. Opening of the meeting

The meeting was opened at 10:00am on 22 April 1996, hosted by the Royal Danish Administration for Navigation and Hydrography (RDANH), Copenhagen. Participants were welcomed by the WG Chairman. P.B. Nielsen also welcomed participants and explained the local arrangements. A joint meeting was held during the afternoon of 24 April with the Oceanic Hydrography Working Group. A report of this meeting can be found in Annex 1.

Members of the Working Group present were: S. Almeida, Portugal, J. Atkinson, UK, B. Cahill, Ireland M. Fichaut, France, R. Gelfeld, USA, H. Loeng, Norway, K. Medler, UK, S. Narayanan, Canada, F. Nast, Germany, P.B. Nielson, Denmark, R. Olsonen, Finland, L. Rickards, UK (Chairman), G. Slesser, UK, J. Szaron, Sweden and H. Valdimarsson, Iceland. ICES was represented by G. Hopwood and, the ICES Oceanography Secretary, H. Dooley, was also present for part of the meeting. Apologies for absence were received from S. Feistel, Germany and N. Kaaijk, the Netherlands. It was noted that for the first time the Working Group has two Members from the CSIRO Division of Fisheries in Australia.

2. Adoption of the Agenda

The agenda for the WG meeting was adopted as a resolution of the Annual Science Meeting in Aalborg (C.Res. 1995/2:20, Annex 2).

3. Data Centre reports

WG participants reviewed activities at their own data centre/laboratory over the past year and looked to developments in the future. A summary of these activities can be found in Annex 3 and the reports were distributed to WG members, together with the report of the ICES Oceanography Secretary.

The WG were pleased to hear that the US NODC had moved to its new accommodation at Silver Spring, with good and modern facilities, and congratulated them on their 35th birthday!

4. Assess the post-1990 oceanographic data sent to ICES by each member country, identify problems and suggest solutions

Data submission to ICES has been reviewed annually over the last few years by the MDM WG to ensure that members of the Group are aware of the data flow and can take steps to improve data submissions where appropriate. In his report, H. Dooley noted that new submissions of profile data are being maintained at a high level and almost all of the new data submissions were for data collected in the past 5 years, 33% for 1994 alone. In the 10 month period from March 1995 to January 1996, more than 17,627 profiles were received which compares favourably with the 16,000 reported in the previous year. All data submitted have been quality checked, and in most cases outstanding questions have been resolved. Much of the additional data submitted have been stimulated by the needs of the Oslo-Paris Commissions. Data collected by ICES member countries on behalf of global projects such as JGOFS and WOCE remain extremely poorly represented. In addition, apart from the OSPARCOM data, many nutrient data that have been collected are not submitted. Many of these data seem to just 'disappear'.

In December 1995, approximately 12,000 Russian CTD data from the late 1980s and early 1990s were received via the US Ocean Climate Laboratory), but due to a number of difficulties with these data, they have not been merged into the database. In February 1996, the approximately 1000 CTD stations collected during 10 of the NATO-SACLANT-GIN-SEAS cruises were received by ICES, following a number of years of 'lobbying'.

A round table discussion on data submission to ICES ensued, from which it emerged that there are a few Laboratories delivering their data on an annual basis, but for most a backlog has built up for various reasons. In general, where a laboratory is handling its own data only, there are fewer problems. However, even in these cases there can be problems. G. Slesser noted that their system was becoming increasingly out-dated and would soon require some changes. They were presently investigating new methods for storing data. H. Loeng reported that they had had some problems with quality control, but things were improving, and he hoped that all of the Norwegian data from IMR would be at ICES by 1998.

There was some discussion about the problems faced in data collection in very rapidly varying marine environmental conditions in reconciling the temperature and salinity collected on the CTD downcast with nutrient samples taken on the upcast. H. Valdimarsson and H. Loeng both mentioned this as a problem. Normally the downcast values would be merged with the nutrients from the upcast, but where the conditions change very quickly, it was felt that perhaps the two should be stored separately. H. Dooley commented that the best solution is to make a separate station for the upcast, with temperature and salinity being recorded when each water sample is taken. In any case, this is a temporary problem as rosette samplers which close during the downcast without the need to change the winch speed are now available. H. Loeng noted that different strategies were needed for different places. There was also some discussion as to whether calibration meant checking the data collected by the CTD against the bottle values, or whether the CTD values were adjusted to the bottle values. Again, this seemed to depend on the region where the work was carried out, and the accuracy of the data required.

R. Gelfeld noted that the US NODC were scanning in documents (for example, cruise reports) to store electronically alongside the data. This was felt to be a good idea, which should be encouraged. H. Loeng added that it was often difficult to track down old information to accompany the data. G. Hopwood stated that the metadata also needs to be quality controlled.

National Data Centres, who are dealing with a range of formats from often a large number of organisations, face far greater problems than the Laboratories handling only their own data. M. Fichaut pointed out that SISMER do not always receive ROSCOP forms from French cruises, which can make chasing up the data difficult. L. Rickards reported that BODC had supplied over 2500 CTD profiles from the Scotland to Rockall section during the year, and hoped to submit more data collected by NERC over the coming year, so that the backlog of data which had built up at BODC would be cleared before too long. Other data due to be submitted to ICES soon included profiles from west Greenland (Denmark), and 1994 data from Finland. Problems faced by ICES included receiving uncalibrated data, and also receiving separate files for nutrients and temperature/salinity. G. Hopwood also commented that it is useful if the data are submitted in the same format from a supplier each year.

The question of confidentiality of data was raised by R. Gelfeld. All data acquired by the GODAR project are made available without restriction, but ICES do not automatically release data that is less than 10 years old. The ICES policy for the Oceanographic Data Bank is that there is no restriction on supply of data as such, but as a matter of courtesy, for any data requested which are less than 10 years old, the data supplier is contacted to check that this is acceptable. This is a benefit to the data suppliers and should encourage the early submission of data. Many of the requests received by ICES are for products rather than data; these are answered without reference to data suppliers. The general feeling of the WG was that scientific data should be made freely available in a timely manner. Scientists should be encouraged to submit their data to data centres and to ICES, and their wishes on restrictions on the data should be respected. In most cases, the period of restriction should be fairly short (e.g. 2 to 3 years). Despite the fact that 10 years was felt to be a long period, it has resulted in scientists sending their data quite quickly to ICES, as they have confidence that the data will remain confidential. The policy in place for the ICES Oceanography Data Bank seemed to work well, and in almost all cases data were released to those requesting them with little delay. The only real problem was in the supply of data to WDC(A) from ICES, data from the last 10 years held at ICES will not normally be passed on unless requested by the data supplier. WG members should encourage data collectors to release their data after reasonable period.

In order that WG members are in no doubt as to the data which should be supplied to ICES, a complete list of the parameters held in the ICES Oceanographic Databank is given below. A description of the ICES format, which is used for the data is available on the World Wide Web or from ICES.

Country/ship and Station No.	Oxygen	Ammonium
Latitude and Longitude	Phosphate	Total Nitrogen
Year/Month/Day and Time	Total Phosphorus	Hydrogen Sulphide
Sounding	Silicate	pH
Observation depth	Nitrate	Alkalinity
Temperature	Nitrite	Chlorophyll-a
Salinity		

Although many scientists know of ICES, it was felt that quite a number of younger scientists were not aware of ICES, the Oceanographic Databank and the expertise available. It was suggested that it would be useful to raise the profile of ICES in member countries *via* a newsletter article. A number of WG members have their own Laboratory/Institute newsletters which could include a short article describing the data held in the ICES Oceanographic Databank, how the ROSCOP forms were used, etc. Although there is a wealth of information available on the World Wide Web, this is still not available to all yet, and an article that would be widely seen could be beneficial, as often the scientist collecting or processing the data does not realise that it can be a valuable addition to global and regional data sets. It was agreed to ask H. Dooley if he could produce a page to distribute to WG members.

5. Review progress in the implementation of IOC's Global Oceanographic Data Archaeology and Rescue (GODAR) Project in each ICES member country

R. Gelfeld provided a review of the status of the GODAR project. The purpose of GODAR is to locate and digitise oceanographic data that exists only in manuscript or analogue form, and ensure that these data and all digital oceanographic data sets, are submitted to one or more international data centres. All data gathered as a result of the GODAR project are being made available internationally without restrictions.

The Fourth Regional IOC/IODE GODAR meeting for Member States of the Mediterranean was held at the University of Malta, Foundation for International Studies, La Valetta, Malta during April 25-28, 1995. Countries represented included: Egypt, France, Israel, Italy, Morocco, Portugal, Russia, Spain, Ukraine and the United States.

Like the previous GODAR Workshops, the purpose was to bring scientists, administrators, and data managers from nations of a specific geographical region to focus on the problems of historical oceanographic data preservation and access. The Workshop helped lay the groundwork for a major upgrading and modernisation of the ocean data management system for the entire region.

As of December 1995, approximately 1.4 million temperature profiles and 400,000 salinity profiles have been archived at WDC-A (Oceanography), as a result of GODAR. The initial oceanographic data rescued as a result of GODAR were made internationally available without restriction on CD-ROMs, as well as other media, as the World Ocean Atlas, 1994. The next release is expected to occur during the fall of 1996. Approximately 500,000 bathythermograph profiles and 50,000 oceanographic station profiles are expected to be made available. In addition for the first time, biological oceanographic data in the form of chlorophyll and plankton observations will also be presented. The format of the new CD-ROM will differ from the previous one, R. Gelfeld distributed copies of a description of the new format.

J. Szaron informed the WG that all Swedish Lightvessel data from 1923 until their withdrawal had been digitised. Data from 1880 to 1923 are still on log sheets and will be digitised when time and personnel resources allow. J. Atkinson mentioned that the UK Hydrographic Office has 40-50,000 temperature and salinity profiles on cards, with worldwide distribution; it seems likely that the US NODC/WDCA will assist with digitising these. G. Slesser said that the Marine Laboratory, Aberdeen held station books going back to 1892. Some data had been extracted and digitised for the Faroe Shetland Channel, but other data was also available in manuscript form. R. Gelfeld informed the WG that the Russians had 600,000 MBTs and 150,000 bottle stations which needed digitising, and some funding was available from NODC/WDCA for digitising manuscript data.

6. Assess the results of the intercomparison of quality assurance methods for station data

Prior to the MDM meeting H. Dooley had provided a summary and some comments on the intercomparison exercise. The idea to establish such an exercise was initiated by a data submission to ICES from PAS (Poland) in November 1993. It was judged to be an appropriate data set for intercomparison due to the large number of problems inherent in it. The data set comprised approximately 800 CTD profiles from cruises between the Faroe-Shetland Channel and Svalbard and in the southern Baltic.

There are several good reasons for such a QC intercomparison, including identification of bottlenecks in data flows, avoiding duplication in data handling (data centres all presumably QC data from other centres because there are no measured 'standards'), encouraging a common level of data documentation generated by originators and data centres, providing a basis for recommended procedures for data handling by data centres and users alike and increasing the possibilities of learning from one another.

MDM was invited to participate in this exercise in early 1994 and the IOC IODE/GETADE group were also invited to participate later that year. H. Dooley noted that the response so far has been disappointing, though perhaps not surprising given that not many data centres have a means of handling 'foreign' data sets. Within the MDM WG work had continued on completing the intercomparison exercise over the year. M. Fichaut had completed quality assurance of the complete data set, L. Rickards had just about finished the work and H. Loeng and B. Cahill had done part of it. J. Atkinson reported that she had not been able to do the work yet.

So far, ICES, WDCA/NODC and SISMER had completed the exercise and provided a report to ICES. The work is underway at MEDS (Canada), who have submitted part of their results. Because of this very low number and that there were still signs that at least one centre was committed to the analysis. H. Dooley thought that it was not appropriate to provide a review of the findings to date. But he informed the WG that, without giving away any secrets, the comparative performance of the four centres involved had been 90% satisfactory.

L. Rickards commented that she felt that the intercomparison had been an excellent idea, and despite the small number of people completing the exercise so far, she hoped that eventually it would result in a set of 'standard' procedures, to which WG members could 'sign up'. This in its turn would hopefully mean that the duplication of effort mentioned by H. Dooley could be avoided. She also thought that it was probably time that this particular exercise was brought to a close as far as MDM was concerned, but that a new exercise should be initiated, including other parameters, in particular oxygen, and this should be promoted as an exercise for 'signing up' to a set of standard QC procedures. Once this was completed the QC list could be reviewed and amended.

It was, therefore, felt useful to discuss the quality control procedures in the various centres to compare similarities, with the object of drawing up a checklist of things to be done. The list below includes those items:

1. Convert data to in-house format
2. Check for duplicates
3. Check header details (station numbers, date/time, latitude/longitude, instrument type, data type/no. of data points)
4. Plot station positions to check not on land
5. Check ship speed between stations to look for incorrect position or date/time
6. Range check for parameters (e.g. for impossible regional values)
7. Check units of parameters supplied
8. Check pressure increasing
9. Check no data points below bottom depth
10. Check depths against echo sounder
11. Plot profiles (individually, in groups, etc)
12. Check for spikes
13. Check for vertical stability/inversions
14. Plot temperature vs salinity
15. Check profiles vs climatology for the region
16. Check calibration information available
17. Report back to PI to resolve problems
18. Document unresolved problems

There was some discussion about what to do when there were problems with the data - should they be flagged, deleted or altered. The situation is not at all clear, with some laboratories not using flags and removing or interpolating bad values, whereas others use a variety of different flagging schemes. However it was felt that it was most important to contact the data originator to solve the problem and only to resort to flagging as a last resort.

The Group agreed that although progress had been slow - it was two years ago that this intercomparison had begun - those taking part had found it most useful. L. Rickards suggested that if the WG agreed, this particular exercise should be brought to a halt, and that all those who had not sent in their results to H. Dooley should do so immediately, and he should be requested to produce a report. The Group felt that a further exercise would be useful and there was some strong feeling that it should comprise a smaller data set, but with perhaps a wider range of parameters - possibly oxygen and nutrients should be included. About ten members of the WG agreed to participate in a future exercise.

7. Report on the development of World Wide Web pages and links between them within ICES Member Countries

R. Gelfeld introduced this item, and brought the Group up to date on developments at the US NODC. More data are now available on-line and security issues have been considered, and a firewall system is in place. NODC are mirroring the IOC pages, for ease of access to those across the Atlantic as trans-Atlantic speed of access is slow. Developments since last year's meeting have included the Irish Marine Data Centre and the SMHI setting up Home Pages and G. Slesser noted that the Marine Laboratory, Aberdeen, had recently got access to the Web (and ftp), and there were plans to set up a Home Page. H. Dooley reported that at the IOC/IODE meeting in Athens there was much discussion about the Web and recommendations relating to further Web developments. G. Hopwood had developed a local set of the Web pages of IODE sites which could be compressed onto two diskettes and distributed to those countries with no access to Internet. It was likely that this type of work would be further developed in the future within IOC/IODE.

H. Dooley suggested that the MDM Group should have a Home Page on the Web which could include the information previously distributed in the ICES Brochure on Data Centres. The Group agreed that this was a good idea, and L. Rickards volunteered to find the most recent Data Centres brochure and request updates for the Web pages. These would obviously link to those pages which centres have already set up.

L. Rickards reported that the WOCE Sea Level Data Assembly Centre (DAC) operated by BODC had made available sea level data via the Web - in common with other WOCE DACs, and this was working well.

Some discussion ensued as to the preferred medium for distribution of information and data - should it be the Web or CD-ROM? The Group felt that there was a need for both, as not all organisations had access to the Web, and for large volumes of data it was more convenient to distribute the data on CD-ROM.

H. Dooley expressed some disappointment that the MDM mailbox was not utilised more often by the WG. L. Rickards said that the mailbox had proved very useful, and encouraged WG members to use it where appropriate. Uses could include any announcements of new data sets available, general enquiries about data availability - one example would be the results of searching for biological data sets.

8. Quantitatively analyse the minimum requirements for quality assurance of oceanographic data

During last year's meeting, H. Loeng had been strongly in favour of producing a series of short documents (no more than 4 sides of A4) for commonly collected data types outlining the minimum requirements for collecting good quality data which can be used in the future, by those other than the collector, with confidence. It was felt important to have something short, as that would increase the chances of it being read, but it could also point to other more detailed manuals and guides. The guidelines should include sections on data acquisition, data processing and quality control, archiving/exchange and references. The guidelines are not aimed at experts, but those people using equipment for the first/second time, or from small laboratories, enabling them to get the best possible results. Over the year K. Medler had produced a summary of the procedures for collecting good quality CTD data and M. Fichaut had produced some guidelines for formatting CTD data for exchange. Both of these documents continue build on the responses to the questionnaire relating to the SCOR WG 51 recommendations for processing CTD data which M. Fichaut reported last year. In addition, H. Loeng reported that in Norway the Guidelines for the Exchange of Moored Current Meter Data produced by the MDM WG some years ago, were being amended and updated.

The WG split in to three sub-groups to consider the minimum requirements for moored current meter data, CTD data and nutrient data. Although there is overlap in the information required for each data type, there are some aspects which vary between data types. The results of the sub-group discussions are given in Annex 4. At present these have different structures, but work will continue on the development of these, to make the structure more consistent. The WG felt that a good start had been made, and that the guidelines, once they had been further refined should be made widely available, both on the Web, and as hard copy. When the work on these is completed, other data types - including shipborne ADCP, SeaSoar/batfish, sea level and XBT - should be considered.

9. Critically review the available bathymetric data sets for the North West European Shelf

In introducing this item, L. Rickards noted that the Working Group had considered a similar topic three years previously, so this year they would consider any new developments, and attempts at producing new products.

J. Atkinson described the bathymetric data sets held by the UK Hydrographic Office. The HO are presently involved in digitising charts for a PC-based system called Admiralty Raster Chart Service (ARCS) to WGS84 - the datum used for GPS positioning. ARCS is the digital reproduction of UK Admiralty Charts for use in wide range of electronic navigation systems both at sea and in shore-based applications. The (encrypted) data are put onto CD-ROMs and can only be used within a software system.

The second database is an intelligent vector database. Initially it will cover the UK shelf. The data are being digitised in bands, all independently, with their own coastline and with no selection made on sounding coverage:

World - charts at 1:3500000
General - at 1:150000, 1:200000, 1:500000, 1:750000 as they move offshore
Coastal - at 1:75000
Approaches, Harbours and berthing - at the best scale possible

This database is for an Electronic Chart Display and Information System (ECDIS) to meet the performance requirements of the International Maritime Organisation. No other work has progressed at present, but there is the potential to strip out layers, interpolate contours, add specialist data, etc., for individual requirements. This type of facility is likely to become available under licence in the future. Resources restrict the expansion of the system or services at present. A prototype system will appear in 1997 and will be available in 1998. This database will also be encrypted and its use limited to navigation.

B. Cahill reported that the Irish Marine Data Centre has also been involved in the production of digital bathymetric data sets on the north west continental shelf. The NE Atlantic data set from the Southampton Oceanography Centre (formerly IOS Deacon Laboratory) has been used to produce various terrain models. The GEBCO Digital Atlas is now used as a matter of routine and is considered excellent. For coastal work, digital, vectorised bathymetry is being produced. 25 UK Admiralty Charts have been digitised, eight by the Navy and seventeen by the Data Centre. Using these, a high resolution gridded bathymetry around the coast of Ireland is being produced. The data are currently being subjected to quality control procedures.

Two major surveys are planned this year off the west coast of Ireland. The first is being carried out by the Irish Petroleum Affairs Division as part of their work in delineating the Continental Shelf. The data from this have been promised to the Irish Marine Data Centre. The second major survey, funded by the Irish Marine Institute, is being carried out by the Geological Survey of Ireland, the Dublin Institute of Technology and the Dublin Institute of Advanced Studies, and consists of a one month GLORIA survey between the Porcupine Bight and the Rockall Trough. The cruise plan has yet to be finalised, but again the bathymetric data have been promised to the Irish Marine Data Centre.

L. Rickards then described a project proposal, led by Peter Hunter at the Southampton Oceanography Centre, which has been produced for discussion with EuroGOOS Members and the MAST Data Committee. The proposal considers the need for a standard bathymetry of the North West European shelf at depths shallower than 200 metres. This bathymetry could be used for the following:

(i) as the boundary and shoreline for numerical fluid dynamical modelling;
(ii) for calculation and prediction of storm surges;
(iii) for computation of wave ray propagation paths;
(iv) as input to sediment transport models, and computation of suspended sediment loads;
(v) for meteorological forecasting.

The geographical extent of the grid would lie between 43°N to 62°N and between 18°E and 12°W. The horizontal resolution would be better than 500 metres and the vertical resolution 2 metres. It is felt that sufficient data are available through the Hydrographic, academic research and commercial communities to achieve this grid resolution. However, different national conventions are used regarding the geoid, tidal corrections, etc. The depth data would be corrected for these variations. The countries involved would include: Germany, France, Ireland, Belgium, Denmark, the Netherlands, the United Kingdom and Norway. Several countries have expressed interest in this project and L. Rickards agreed to keep the WG informed of developments.

10. Critically assess the IOC Cruise Summary Report, identify weaknesses and suggest improvements

At the last meeting of the MDM WG, in Dublin, J. Wallace had volunteered to produce a critical review of the Cruise Summary Report (CSR) as a basis for discussions on improvements to the form. B. Cahill presented this review, which is summarised in the following paragraphs, starting from the questions 'what is the purpose of the CSR?' and 'how is the information used?' Ideally the CSRs should produce an accurate historical summary of oceanographic cruises from which the data collected can potentially be sourced.

Although the CSRs are quick enough to complete, they are often filled out as an afterthought following a cruise. In Ireland, very few scientists complete the forms, as they are not obligatory. She thought that there was a tendency to be more diligent about completing electronic versions of forms, so raising the profile if the electronic version of the CSR should be considered. In Ireland the mechanism for collecting in CSR information needs to be improved and the Data

Centre can take a lead in this. There is the potential to do this using the cruise information database maintained on-board the ship.

There was a curiosity amongst Irish scientists as to the relevance of the information requested for the 'Summary of Measurements and Samples Taken', and a general feeling that it would be better if a summary of the type of measurements was requested as opposed to quantifying the samples. In reality, the number of samples collected is rarely the same as the number analysed. In addition, cruise data reports provide a more accurate quantification of the data. H. Dooley stressed that it is the number of stations (not the number of samples) that should be entered on the CSR.

The parameter list was felt to be inadequate because the division of disciplines removed the relationship between related parameters. For example, contaminant measurements of trace metals in sediments using a grab core is spread between two disciplines. While it is not practical to devise an exhaustive list of oceanographic parameters, it might be worth introducing a quantitative hierarchy system to the system so that the parameters can be given a perspective, i.e. surface, water column, sediments, macrofauna, meiofauna, microfauna, gear types.

The map is too coarse for Irish purposes. Could there be a facility for a finer resolution input to the Marsden Squares?

The WG thanked B. Cahill for her review and some general discussion followed. H. Dooley informed the WG that the 1990 CSR was intended to be simpler than the previous ROSCOP form, but it had been badly designed, and, in particular, the list of parameter codes was included in the cover of a book of blank forms and was thus not distributed with each form. This leads to forms being submitted to ICES with no codes. Some centres, for example SISMER, maintain their own in-house databases and export data from these to submit to ICES. F. Nast commented that all German cruises have to complete forms, especially if the cruise enters foreign waters, and also EU MAST programs require completed CSR forms. He further commented that the track charts are important, and that DOD also requests a copy of the cruise station log. K. Medler noted that at his Laboratory the Scientist in Charge does not fill in the form themselves, this is left for someone else, who has, in all probability, not been on the cruise. This leads to difficulties in sorting out the information provided, which all too often may be incomplete.

Most of the discussion related to the parameter codes which are currently a mixture of data and instrument type. The WG agreed that a small group to include M. Fichaut, F. Nast, B. Cahill, H. Dooley and L. Rickards, would examine the parameter list and suggest an extended and improved parameter list - bearing in mind that there should be compatibility with the present list. This group will report back to next year's meeting.

H. Dooley informed the WG that the ICES ROSCOP (CSR) database had been expanded to include input from Australia, New Zealand, Japan and India, and requested that WG members make every effort to ensure that completed CSRs are submitted to ICES. Within ICES the CSRs are used as part of the data tracking system and any comments on the data forwarded to ICES are also added in. He also drew the attention of the WG to the Windows version of the data entry program (ROSWIN) is now available from ICES. L. Rickards said that she had tried out the new software and thought that it was much easier to use than the previous version and encouraged other WG members to use it.

11. Consider the need for a data archaeology project for an expanded range of data types, in particular the biological oceanographic data types discussed at the 1995 Aarhus Symposium

L. Rickards introduced this agenda item by saying that the Hydrography Committee had added it to the agenda as a result of the ICES Symposium on 'Changes in the North Sea Ecosystem and Their Causes: Aarhus 1975 Revisited'. In particular, she drew the WG's attention to the relevant paragraph in the summary of the Workshop, viz.

'Some of the most important papers presented were those which had re-examined old data sets. It is clear that modern computing capabilities allow us to re-interpret these data sets in ways that was previously not possible. ICES should consider establishing study groups charged to dig out, archive, and interpret old data sets in particular fields.'

R. Gelfeld then described the biological data which will be on the next GODAR CD-ROMs; this will include plankton and chlorophyll-a data. See Annex 5.1 and 5.2 for distribution maps. The new US NODC data format includes biological parameters.

J. Atkinson informed the WG of the work taking place in the UK Hydrographic Office with regard to biological data. At present the databank is to be expanded to accommodate extra parameters, including biological data, and a new post has been created to co-ordinate this work. The Marine Biological Database will contain historical observational data and will include all world oceans. At present effort is being focused on the Mediterranean, which will be used as a pilot study area. The data to be stored are in two categories:

1. Quantitative data: measured parameters at discrete positions and depth, the key parameters include chlorophyll-a, hydrocarbons, bioluminescence, suspended sediment, zooplankton biomass density;

2. Qualitative data: information on distribution patterns and descriptions of related attributes. The key parameters include biological hazards (dangerous species), sonic species, false targets (large mammals), reverberators (deep scattering layer, fish populations, benthos), commercial fishing operations and bioluminescence.

At present bioluminescence observations for the Mediterranean are being collated, a whale observation database has been established, and users of fluorometric sensors have been contacted with a view of establishing rigorous quality assurance protocols.

H. Loeng noted the link between physical and biological data, particularly with regard to the cod and climate studies presently being undertaken. He further noted that information about fish stocks is stored in a variety of places. The database developed over the last few years at IMR, Bergen, links the various different types of data in an integrated manner; so for example temperature profiles and net hauls collected on the same cruise would be linked. IMR plans to put the last 10 years of data into this integrated database. He also felt that it was a good step to include biological data in GODAR.

S. Narayanan commented that in eastern Canada, there is a group looking at historical data, which is proving difficult and time consuming. Often not enough information about the data is available for a proper evaluation of the data quality. In addition, most cruises now have a fluorometer, but it is not always well calibrated. She added that in Canada, the NAFO Committee has well organised databases for fisheries and the CTD data is quite well organised, but nutrients, chemistry, chlorophyll and plankton are not so well catered for. F. Nast added that it was very difficult to collect in biological data, and some data sets are of dubious quality. Some data sets are suitable for a biological data archaeology project but others are not.

R. Gelfeld asked what the situation would be like in 20 years time if nothing was done now, and H. Loeng emphasised this as an important point. F. Nast further pointed out that the biologists would probably expect the data sets to be to hand, and available, but often they are not. L. Rickards suggested that one good starting point would be to look at the EDMED database to see what biological datasets were included (a list of dataset titles for biological data from the North Sea is included as Annex 5.3); another would be for each WG member to compile a list of the data held by their organisation. G. Slesser had produced a list for the Marine Laboratory, Aberdeen, which revealed a wealth of data (see Annex 5.4). This includes data back to the early 1900s, a zoo- and phytoplankton database, many small datasets, benthos data from 1960 onwards and fisheries data from 1961 onwards. The ROSCOP database also contains a wealth of information about biological data. H. Dooley produced a histogram (see Annex 5.5) showing the percentage of ROSCOP forms in the database containing details of biological data, by parameter.

K. Medler noted that the MAFF Fisheries Laboratory has data going back for 90 years, but they are not in an integrated database. Data have been collected by a variety of methods and much work would be involved in putting the databases in order. Recently, however, chlorophyll data have been sent to ICES. H. Valdimarsson added that it was quite difficult to acquire chlorophyll data from the scientists collecting and interpreting the data, although they held data from the past 30 to 40 years. There were also problems of interpretation of the data. It should be noted that ICES already holds some chlorophyll data, and J. Szaron pointed out that there are also quite a lot of biological data reports held by ICES. It should also be remembered that some fisheries data are sensitive, particularly those collected as part of the quota system.

H. Loeng suggested that there might be EU funds available for a biological data archaeology project, particularly if this tied in with other EU funded projects. It was also worth putting the cost of data collection in perspective, compared with a data archaeology project. Overall the WG members felt that this was an issue which should be pursued, although it is recognised that biological data cannot just be put together, experienced people are needed. In addition, it is not a simple matter to acquire the data from individual scientists, particularly those in Universities. As a next step, WG members should check and see what data were available in their organisations, as G. Slesser had done, and make these lists available. This can then be used in conjunction with EDMED to provide an overview of the data which has been collected, and which may be available. The WG will then be in a better position to suggest further actions.

The WG noted with interest that a Marine Biological and Chemical Data Management Workshop was to be held in Hamburg in May 1996, and several WG members would participate. The Workshop is co-sponsored by the US NODC and IOC, and will be hosted by BSH, Hamburg. The overall aim of the workshop is to improve the quantity and quality of the chemical and biological data available to the scientific community. The specific goal is to provide recommendations to guide management of chemical and biological oceanographic data by the IOC/IODE system. Biological and chemical data encompasses many parameters, from bacteria to very large mammals and from tracer gases to complex organic compounds. Case studies covered by the workshop will be limited to parameters routinely sampled. The WG wished to be kept informed of developments, and F. Nast agreed to provide a summary of the Workshop, to be posted to the MDM mailbox, for WG members.

12. Any other business

i) M. Fichaut provided the WG with an update on the progress of the MEDATLAS project, which aims to create a hydrographic (e.g. CTD, Nansen cast, BT) data bank for the Mediterranean Sea. This is a supporting initiative of the EU MAST programme, and has been initiated by a consortium of Mediterranean Data Centres, including the Hellenic Data Centre (Greece), the IEO Data Centre (Spain), the EPSHOM/CMO (French Navy), IFREMER/SISMER (France) and ICES, which acts as an advisor to the project.

The objectives of the project are:

1) to update the available data sets by collecting the dispersed data sets and assembling them into a common exchange format,
2) to perform objective (automatic) and subjective (visual) quality checks, conforming with international standards. As a result, a quality flag is added to each data value,
3) to reappraise the climatological statistics for the Mediterranean Sea with a resolution adapted to the regional space scales,
4) to make the final merged data set easily accessible to all participants by using an electronic data publishing technique (CD-ROM).

The data quality control is carried out using the SISMER SCOOP software. This includes checks for duplicate data sets, location and date/time, ship's velocity, bottom sounding, increasing pressure/depth, no data point below the bottom depth, impossible regional values, constant values in profiles, spikes, density inversions and outliers. Data are compared with pre-existing statistics. Visual checks are carried out on the data to check the validity of the automatic flagging and resolve any outstanding problems.

In addition to the short term objective of the MEDATLAS programme, several long term results are expected including the improvement of safeguarding data and data quality, and the strengthening of the network of Mediterranean Data Centres in the perspective of international operation projects like GOOS.

The WG were pleased to hear of the progress of the MEDATLAS project and were especially interested in the quality control procedures and software. H. Dooley noted that the project was making large steps in revolutionising the way oceanographic data are handled, and is rapidly building up a close knit group of centres and individuals dedicated to the management of Mediterranean data.

ii) H. Loeng raised the topic of GOOS and EuroGOOS, which are becoming of increasing interest and importance. H. Dooley noted that GOOS is on the agenda for the ICES Advisory Committee for the Marine Environment (ACME). In addition, ICES have been invited to take part in a workshop on skill and capabilities, which includes data management strategy. H. Loeng mentioned the much of the data from GOOS would be real-time, but the type of data (e.g. current, temperature, salinity, chlorophyll, contaminants) was that which the WG member were familiar with. H. Dooley commented that some of the GOOS schemes were not relevant to ICES, but the Health of the Oceans was of importance, as, of course, was the GLOBEC project. The WG agreed that it would be useful to consider these projects further at next year's meeting, and review the input from ICES member countries to them.

iii) J. Szaron provided a brief report of the EC/MAST Data Committee meeting which took place in Gothenburg recently. He noted that amongst the topics under discussion were MAST 2 projects and how to deal with MAST 3, where data management would be even more important. The Smith Associates Report, which discussed 'model' data management plans were also discussed. H. Dooley commented that other, more focused proposals were coming along, which the MDM WG could be involved with. B. Cahill mentioned that the Irish Marine Data Centre were involved with an MAST Electronic Data Publishing project, and that for MAST 3 projects the emphasis was changing from just putting the data onto CD-ROM to exploiting the results of the work. H. Dooley expressed some concern over data sets being collected for MAST projects; it is essential that these data sets are not kept in isolation, but, where relevant, are included in the global data sets which are being built up.

13. Date and location of next meeting; topics for discussion

i) Topics for the next meeting

The following items were suggested for inclusion in next year's agenda

a) Assess the post-1990 oceanographic data sent to ICES by each member country, identify problems and suggest solutions;

Although the data received by ICES post-1990 over the last year has been encouraging, there is still a large amount of data outstanding especially nutrient data and data from global projects. This item should act as encouragement to Member States to supply the ICES Oceanographic Data Centre with data in a timely manner;

b) Review progress in the implementation of IOC's Global Oceanographic Data Archaeology and Rescue (GODAR) Project in each ICES member country;

Much data has been recovered by GODAR already, but many valuable data sets still remain outside of established data banks and archives. WG members need to continue searching out old data sets and forwarding them to ICES and WDC(A). ICES has taken a lead role in this project for the ICES region, which provides a focus for member states activities;

c) Further investigate the need for a data archaeology project for biological oceanographic data types;

Initial investigations suggest that much biological data is available within ICES Member Countries. This serves to help quantify the data and associated documentation available, and their status;

d) Critically review the results of the (new) intercomparison of quality assurance methods for station data;

Following on from the previous intercomparison exercise, it was felt useful to continue this work with another data set, with fewer stations but a greater range of parameters. This continues to check that certain minimum standards are being met by the quality assurance procedures currently in place in ICES member countries;

e) Quantitatively analyse the minimum requirements for quality assurance of oceanographic data;

There is a need for simple guidelines for those collecting, processing and quality assuring data. Having reviewed those guidelines and manuals presently available, and produced a draft set of guidelines for moored current meter, CTD and nutrient data, these will be finalised and advertised. Other data types will also be considered (eg ADCP, SeaSoar/batfish, XBT and sea level);

f) Report on the development of World Wide Web pages and links between them within ICES Member Countries;

This is an opportunity to exploit new developments within the Internet and raise the profile of the data centres within in the ICES community. In particular, MDM WG, including a Home Page, pages will be set up;

g) Instigate an analysis of the parameter code list used for the IOC Cruise Summary Report, and produce an improved and updated set of codes;

One of the major shortcomings of the Cruise Summary Report has been identified as the parameter codes. These will be reviewed and an improved set of codes suggested. Other improvements may also be suggested;

h) Review involvement and plans for GOOS, EuroGOOS and GLOBEC in ICES Member Countries;

This will consider the input of ICES member countries to GOOS, EuroGOOS and GLOBEC, and assess how best the ICES MDM WG can be involved;

i) Critically review the new computer technologies available for data management;

Over recent years there has been a revolution in the new technologies available (WWW, CD-ROMs, etc.). This serves to review what is presently available and look towards future advances;

j) Review the status of development of taxonomic coding systems with a view to recommending the adoption of a single coding system for use in ICES;

During discussion at the 1996 WG on Benthos Ecology, and the ad hoc Group of Database Practitioners it became clear that many different taxonomic coding systems are being used by a variety of groups and projects. In addition, the ICES Secretariat databases utilise a number of different coding systems. ACME concurred that a review should be made with a view to identifying a common coding system that may be of use across the various ICES biological oceanography disciplines. Consequently ACME proposes that the Working Groups on Phytoplankton Ecology, Zooplankton Ecology and Benthos Ecology work toward meeting this objective.

ii) Time and place of next meeting

The WG expressed its wish that the next meeting should be held at the U.S. National Oceanographic Data Center, Silver Springs, between 14 and 17 April 1997.

The Chairman closed the meeting by thanking the participants for their hard work, enthusiasm and valuable contributions. On behalf of the WG, she also thanked P.B. Nielsen for a well arranged and enjoyable meeting.

Annex 1

Joint meeting of the Oceanic Hydrography and Marine Data Management Working Groups
24 April 1996, RDANH, Copenhagen

The topics for discussion between the two groups covered various aspects of oceanographic data quality assurance. J. Blindheim began by presenting an overview of the document developed at IMR, Bergen, for the quality assurance of CTD data. The document was structured around a series of procedures, each a succession of actions, with the same structure. The concept behind this was that with a set of procedures in this form, each taking no more than a few pages, it was easy to find the relevant, and was sufficiently brief to ensure that it would be used. Each procedure comprised the following elements: scope, purpose, critical control points and description of methods. The manual developed for the collection of CTD data comprises five procedures.

L. Rickards reviewed the discussions from the MDM WG on quality control procedures/ minimum requirements. The Group was drafting documents for CTD, current meter and water bottle/nutrient data. These included a list of standards that the data should reach and recommendations about the information which should be stored alongside the data. This covered both 'header' information (i.e. position, depth, instrument, etc.), calibration details and supporting information (i.e. instrumentation, collection methods, processing, etc.). She also described an intercomparison of CTD quality control methods which members of the WG were taking part in. This involved each person taking a set of data, converting to their own format, quality controlling the data and producing a brief report, noting any problems. Although this was taking some time to complete, it was found to be a very useful learning experience.

Both WGs welcomed these developments and agreed that it would be most useful to publish the CTD data collection guidelines, possibly under the ICES umbrella. The guidelines produced by the MDM WG were planned to be published on the World Wide Web, but could also be published in hard copy. It was intended that the guidelines for each data type should be short.

Some discussion followed about the information to be stored alongside the data, how to report measurements, and whether data values should be flagged. Various opinions were expressed, including calibration should be supplied alongside the data, flagging as required by WOCE was favoured by some, but not by others, it was possible to state that measurements had been carried out according to procedures laid down in particular manuals. B. Cahill mentioned that it is useful to have a checklist to know what is important to include. G. Hopwood commented that data collected according to a particular manual does not necessarily indicate the quality of the data. J. Meinke noted that each data set should be obtained with the utmost care - not necessarily the most accurate (i.e. not necessarily the third decimal place). One should not be limited to one procedure, but it is necessary to know how the data are collected. It is essential to know the quality of the data. H. Van Aken asked if the Data Centres made provision to store text alongside the data. ICES, BODC and DOD all store information.

Some discussion ensued about how to proceed. J. Blindheim mentioned that it is difficult to meet WOCE standards, even on well staffed cruises. But there are not enough specialists to maintain this level of measurement for all cruises, so it is important that an acceptable level of measurement is attained. It is important to produce a set of unsophisticated guidelines. Secondary users wish to know the quality of data. The level of data acquisition can be raised by simple guidelines. People operating the CTDs may not be well trained, but given basic guidelines, one can aim to acquire the best quality data available. Training is very important, and should be in addition to manuals/guidelines, not an alternative.

The document produced by J. Blindheim has been written to conform to ISO standard - essential items are included on a list, it is simple and easy to use. The document needs to be consistent and hierarchical. It should be stressed that the manual is to be addressed to people using the instruments for the first/second time, to get the best out of them. The 2 WGs agreed that this manual on operation of CTDs should be produced for/by ICES. (and the Hydrography Committee should support this).

R. Dickson was worried about the increasing use of CTDs mounted on batfish, particularly by non-experts. The data collected for example, by biologists only interested in structure rather than absolute values. Calibration was felt to be very important for undulating instruments. It is hard to quality control. CTDs should be taken at the end of each leg. WG members felt that an expert, for example R. Pollard from the Southampton Oceanography Centre in the UK, should write up his methods and these could be taken as the standard procedure, and adapted where necessary.

J. Meinke went on to discuss other types of data which might require similar guidelines, for example RAFOS drifters and ALACE or PALACE floats. ALACE floats are still being developed, trying to add conductivity sensors. But these instruments will soon be producing data and it is important to know the minimum requirements for these, in the form of short descriptions. G. Hopwood mentioned that ICES is the project data centre for the EU MAST ESOP project, which includes these, and could put together a short manual. T. Rossby, the expert for these instruments, noted that RAFOS floats are calibrated in pressure vessels, and have accuracies for pressure somewhere between XBTs and CTDs, for temperature the accuracy is 0.1°C, about the same as XBTs. ALACE floats will be used in the future.

R. Dickson thought that it would be useful to have a couple of pages describing the methods for collecting good quality batfish/SeaSoar data. T. Rossby thought that it would be advantageous to get the technical people together from various institutes periodically, as happens in the USA. Intercalibrations were also valuable, and often took place as part of large programmes. ICES should (and does) encourage the exchange of technicians and intercalibrations.

There was some feeling that the present discussions and guidelines should be restricted to CTD data collection and processing and leave the other data types at present, due to the difficulties they pose. However, J. Meinke pointed out that we are in the run up to GOOS, into which existing programmes will link, and we should sort out procedures now. There is a gap in the temperature and salinity data sets from the 1970s, when CTDs came into use, this should not be allowed to happen again with new instrumentation. New and established instruments should be used in parallel to prevent this, until well developed and reliable procedures are in place for new instruments and the data produced are of good quality. It is also essential that the manuals which do exist are advertised so that people are aware of their existence.

L. Rickards raised the problem how to reconcile temperature and salinity data collected with a CTD on the downcast with nutrient samples taken on the upcast in waters with very rapidly varying conditions. S-A. Malmberg agreed that this has been a particular problem with data collected by him and his colleagues, and has been difficult to solve. It is not so much a data collection problem, as a problem of the best way of handling the data subsequently. On the whole it was thought best to treat the up and downcasts as separate stations. The discussion widened to consider new CTDs which will be able to take the bottle samples on the downcast without upsetting the CTD data collection, and also to consider the problems of knowing which bottle had fired when, as there had been some problems with this which could be time consuming to resolve. H. Van Aken also mentioned that for WOCE many calibration samples were required to obtain high quality data, and he had been surprised at how accurate the calibrations were.

R. Dickson then reported on the work of a small group who, over the year, had discussed the production of a status report for the standard sections which are reported by the OH WG each year, and appended to the WG report. It was intended to produce something which would be more readily available, together with a preamble on the general status of the North Atlantic, and a comment as to the data quality (e.g. these data have been collected and processed according to QUASIMEME). Every 10 years a decadal version of the publication should be produced and presented at the decadal symposium. In between the time series would be kept electronically at ICES, and possibly made available graphically on the World Wide Web. S-A. Malmberg noted that some people in Iceland do not wish to continue monitoring work, but he felt that it was valuable. ICES, in particular was valuable for long time series data to assess climate variability. The data must be taken care of and made accessible. Time series are expensive to collect, but essential. It is important to observe and then explain what is happening. F. Nast commented that the title environmental status might be interpreted incorrectly and it was agreed that a better name would be 'Status of the Physical Environment'.

Annex 2

Agenda

C.Res. 1995/2:20

The Working Group on Marine Data Management (Chairman: Dr. L.J. Rickards, UK) will meet in Copenhagen, Denmark, from 22-24 April 1996 to:

a) Assess the post-1990 oceanographic data sent to ICES by each member country, identify problems and suggest solutions;

b) Review progress in the implementation of IOC's Global Oceanographic Data Archaeology and Rescue (GODAR) Project in each ICES member country;

c) Assess the results of the intercomparison of quality assurance methods for station data;

d) Report on the development of World Wide Web pages and links between them within ICES member countries;

e) Quantitatively analyse the minimum requirements for quality assurance of oceanographic data;

f) Critically review the available bathymetric data sets for the North West European Shelf;

g) Critically assess the IOC Cruise Summary Report, identify weaknesses and suggest improvements;

h) Consider the need for a data archaeology project for an expanded range of data types, in particular the biological oceanographic data types discussed at the 1995 Aarhus Symposium

Annex 3

Highlights from the reports of the Data Centres

ICES: New submissions of profile data are being maintained at a high level. Almost all of the new data submissions were for data collected within the past 5 years. All data have been quality checked and in most cases outstanding questions have been resolved. Work is continuing on evaluating and quality controlling the ICES historical data holdings and the review is complete for most countries. During the year assistance has been given to the EC-MAST MEDATLAS project, which is making large steps in revolutionising the way oceanographic data are handled, and is rapidly building up a close knit group of Centres and individuals dedicated to the management of Mediterranean data. ROSCOP submissions are continuing at a healthy rate.

The Secretariat is involved with 2 MAST/AIR projects - the European Sub-Polar Programme Phase 2: The thermohaline circulation in the Greenland Sea (ESOP-2) and the Trans-Atlantic Studies on *Calanus finmarchichus* (TASC). For ESOP, ICES will handle the marine component of the data, in particular, the CTD and supporting data, self-profiling CTD data, tracer and chemistry data, float data, biological data and current meter data. As part of the contract, ICES will also assemble the data collected during ESOP-1. Most of these data were collected in 1993, but as yet none are at ICES.

Development of the ICES World Wide Web pages has continued, but with no major enhancements since last year. However, as a result of the pages, there has been a significant increase in the number of requests for data and products.

ICES has continued to develop a firm role in GLOBEC, and has received funding from the USA and Norway to establish a North Atlantic Regional Office of GLOBEC. The office will be open later on this year; oversight and direction will be provided by a newly-established ICES/GLOBEC North Atlantic Regional Co-ordination Group. In 1995, ICES/GLOBEC meeting activities were focused on Cod and Climate Issues, and included two substantive workshops.

Canada: Marine Environmental Data Services (MEDS) continues to be the main archival and data management centre for oceanographic data in Canada. All CTD data collected by the regional laboratories are sent to MEDS in near-real time as IGOSS messages. Quality controlled profiles are also submitted to MEDS within one or two years. CTD data from the NW Atlantic are subjected to extra quality control procedures at Bedford Institute of Oceanography and maintained in a separate database. Data from moored instruments are archived regionally. A recent addition to the data archive is the ADCP archive being developed by the Physical Oceanography Group at Northwest Fisheries Centre in St. John's, Newfoundland, based on the University of Hawaii's CODAS software. Preliminary examination of 5 years of ADCP data from the east coast of Canada shows considerable potential for this technology.

Denmark: The RDANH has continued the operation of 13 sea level stations in Denmark and 6 in Greenland. In the autumn 1995, 2 oceanographic stations were equipped with ADCPs, the stations are located close to Drogen Lighthouse in the Sound and at the E28 Lighthouse near the planned bridge across the Great Belt. Data from Drogen have been collected since June 1995; the data period for E28 is August - October 1995 and January 1996 onwards. IN January 1996, Hatter Rev became operative. Two other stations are planned, or have been in operation for short periods of time (Vestbroen and W26). A thermistor chain is already in operation at Drogen; in the near future thermistor chains will be added to some of the other oceanographic stations.

Other activities include the setting up of a telephone service for information on real-time oceanographic parameters; this will be in operation in June 1996. A newly established co-operation with the Bundesamt für Seeschiffarht und Hydrographie (BSH), Hamburg, will result in the inclusion of short-time predictions in the data service to the navigation in Danish waters. The predictions are based on a numerical model developed and operated at BSH.

Profile data from west Greenland (covering the years 1989-1995) are ready for export to ICES after approval of the data format (first version of a new conversion program).

Finland: During the year, the Laboratory's procedures have been accredited. There is now a responsible scientist for each cruise; data are slower arriving, but of better quality when they do arrive. ROSCOP forms remain a problem. Quality control checks are being completed for historical data with ICES. A system has been developed to handle CTD data. In addition, data collected along ship routes are being stored, in a separate database. Biological data are being rechecked, prior to being added to the database. Coastal and sediment data will be added at a later date.

France: Since last year the SISMER quality control software, SCOOP, has been tested and it has been operational since

September 1995. It has also been improved with a second version. A large part of the activity of physical oceanographic data banking has been to quality control all the new hydrographic data, and part of the historical database. 60% of the CTD database has been quality controlled (6400 CTD casts). There are still the bottle data to be quality controlled (~30000 stations).

All of the SISMER data catalogues are on the Web, with different access to the information on the data are available, including access by cruises (with indexes by year, ship, chief scientist, cruise name, co-ordinating body, ocean or sea), and access by type of data (CTD, bottle, current meters).

Exchange with international Data Centres: SISMER has sent all its new CTD datasets to ICES and NODC/WDCA; this includes 927 CTD stations (from 1981 to 1992). There are 675 CTD stations (from 1990 to 1995) to transmit, this will be done when they are in the public domain. All the bottle database has been sent to NODC for a complete check before the new edition of the CD-ROM. The 1994 ROSCOPs have recently been sent to ICES.

Germany: DOD has a new INGRES system on UNIX; it is now much easier to retrieve data by date/time, geographic co-ordinates or by cruise. Classical hydrographic data from 1871 and environmental data from the 1960s are held by DOD. Cruise Summary Reports (ROSCOPs) are produced. Benthos data are not yet in the new database system. The is much metadata to quality control. Old data are being digitised and same Navy data have been declassified (CTD, XBT and water bottle data). There are several thousand profiles going back to 1960 and these will go to ICES in the future.

Iceland: Data from standard sections are collected every year, but few people are working on the data. The Institute is still behind on submitting data to ICES. 1993 and 1994 data have been sent to ICES, and Greenland Sea data have been sent. Data from 1995 have been sent to WOCE. Some WOCE current meters are still out, also 40 drifters are out for work in collaboration with NOAA. ROSCOP form completion continues.

Ireland: The main event over the year was the parent body of the Irish Marine Data Centre, the Irish Marine Institute, grew from 3 staff, plus 6 at the Data Centre, to over 70, as a result of the establishment of the Marine Institute's core staff and the integration of the Fisheries Research Centre. The Data Centre has also acquired 4 extra members of staff. The Data Centre is now focusing on implementing a strategic development plan for the next 5 years with an emphasis on systematic data management.

A Home Page is now online (http://www.marine.ie/datacentre) and this year inventories will be put online.

Continuous surface measurements of temperature, salinity, bathymetry, turbidity and fluorometry are being sampled at a frequency of 10s by the national research vessel on research cruises and on passage. These data are managed by the Data Centre and the temperature is being added to the temperature data set being complied by the Data Centre, while the bathymetry is being tidally reduced and integrated into the digital bathymetric data set.

No CTD data has yet been submitted to ICES; the 1994 data has turned out to be unreliable. The instrument had not been calibrated properly for 2 years and anomalies between the data acquisition system's record of the speed of the ship and station positions could not be rectified. As a result of this, a formal calibration and maintenance procedure has been implemented.

Work has continued on the extended EDMED for Ireland. The database was passed on to BODC for inclusion in the final version of EDMED, and useful discussions on improving the Irish extended EDMED followed. New entries are being added to the database as a result of an additional survey carried last summer. Work on electronically publishing data continues with EDAP, this project is due for completion in November 1996. A guideline document will be produced on electronic data publication at the end of the year.

Norway: The main effort in 1995 has been put into quality control of CTD data. Starting to work backward, CTD data from 1994 and 1993 have been quality controlled and have been entered into the IMR database. These have also been sent to ICES. It is planned to go back to 1987/88 before the end of this year, but two more years will be needed before all of the old CTD data have been quality controlled. Quality controlled water bottle data back to 1900 have been received from ICES, and will be added to the database once they have undergone extra quality control. Nutrients are a little behind.

Procedures are being developed so that new data can be quickly incorporated into the database, but there are still some problems to be overcome. ROSCOP submissions are working well.

Norwegian Standards (NS) are being developed together with other Norwegian universities and research institutes for moored current meter measurements and also for temperature and salinity. This is co-ordinated by the Norwegian General Standardising Body.

Also during 1995, some of IMR's MBT data have been copied and sent to World Data Centre A to be digitised.

Portugal: An exhaustive survey of the data in existence at the Hydrographic Institute took place and an oceanographic catalogue was produced. This catalogue covers cruises with Nansen bottles, CTDs, BTs, currents, meteorology, waves and tides, and has geographic, time and spatial references.

The Physical Oceanography Group database was re-structured, and after a period of validation, it was fed with meteorological and thermistor chain data.

SEFOS participation continued and two oceanographic cruises took place: in March 1995 on the Nazare's Canyon with 20 stations and in October 1995 with 111 stations throughout the standard SEFOS sections. XBT were used on both cruises and, in October, two current meters were moored. Current meters deployed in December 1994 were recovered. ROSCOP forms and data from these cruises were sent to ICES.

The Institute has participated in the comparative study of algorithms to process CTD data, as part of the SEFOS project.

Sweden: The main activities over the year included submission of water bottle, CTD and biological data from Swedish research vessels, coastguard vessels and icebreakers to the Helsinki Commission and to ICES. ROSCOP forms have also been submitted to ICES. SMHI has maintained a programme of cruises involving visits to the main stations in the Skagerrak, Kattegat, the Sound and Baltic proper almost monthly, and also maintains monthly investigations and data sampling in the near coastal zone to the west, south and south east of Sweden.

The Laboratory continues to improve its quality assurance and quality control procedures; software to support this is being continuously developed. A user-friendly search and extraction software package has been developed by the Laboratory using Visual Basic. This provides a graphic interface to SQL and SMHI's marine relational database, SHARK.

A year ago SMHI was appointed 'data host' on Sweden for physical and chemical oceanographic data. This has so far been positive. The quality of data have improved due to education, feedback and personal contacts. A Home Page has been set up by SMHI (http://www.smhi.se), although this is still in its infancy.

UK (BODC): BODC is the project data centre for the CEC/MAST Ocean-Margin Exchange (OMEX) programme, and has responsibility for assembling the data from 40 research cruises undertaken by 12 ships operating on the European Continental Shelf Break between Portugal and Norway from May 1993 to October 1995. In addition, BODC acts as the project data centre and provides data management support for UK WOCE and the NERC LanD Ocean Interaction Study (LOIS).

Work is almost completed on a Windows version of the software for the UK Digital Marine Atlas. It is currently undergoing pre-beta testing. New data sets have been received for inclusion in the new version. The finished product, which will be on CD-ROM, will be available later this year.

A new version of the GLOSS Station Handbook is in production. This will include location maps of GLOSS tide gauge sites. In addition, introductory material relating to GLOSS, two sea level measuring manuals, the Permanent Service for Mean Sea Level data set and supplementary files will be included in the product, which will be Windows based. The intention is to produce a CD-ROM in time for the UN Climate Change conference in July.

The UK Inter-Agency Committee on Marine Science and Technology (IACMST) Working Group on Marine Environmental Data (MED) reported in late 1994. Amongst its recommendations was that the IACMST should establish a MED co-ordinator and advisory group to facilitate communication on a regular basis among MED data managers and sources. NERC offered to host and support the MED co-ordinator post at BODC, which became operative on 1 January 1996. Advisory group members are drawn from Departments and Research Councils which have an interest in MED.

UK (HO): The UK Hydrographic Office, Taunton, has continued to expand its database of oceanographic observations with data from the Royal Navy, Ships of Opportunity and data received by exchange. All data collected by the Ships of Opportunity will be passed to the scientific community via ICES and the US NODC.

Over the year the UKHO has continued the expansion of the database of physical properties of temperature, salinity and sound velocity. Current development work is extending the database to include sea surface properties, biology and optical properties as indicators of ocean features.

The UKHO is currently redesigning the database to make use of relational database management technology by using the INGRES relational database management system. The migration to SOLARIS 2 with a client-server interface with inclusion of data on the new database should be complete by the end of the summer.

Recent connection to the Internet will facilitate communication with others in the worldwide oceanographic community and in particular, should speed up the exchange of data sets via ftp facilities. The UKHO e-mail addresses are of the form anyname@ocean.hydro.gov.uk.

UK (MAFF): The main area of work of the Laboratory are concerned with fisheries stock management, fisheries biology, marine pollution and the monitoring of radioactive substances in the marine environment. Most of the research cruises are for fisheries and biological studies, but physical oceanographic data are often collected, because of their influence on marine organisms. CTDs are used extensively, but often mounted in a towed body; very little of these data go to ICES or BODC. However bottle and reversing thermometer data are also collected and this, together with other physical and nutrient data are forwarded to the data centres. ROSCOP forms for MAFF cruises have been completed and sent to ICES and BODC. Data submissions are up to date, with much of the 1995 data sent to ICES.

Oceanographic cruises during 1995 have been to the Irish Sea where current meters, satellite tracked buoys and a Scanfish mounted CTD were used. This work is continuing. A study on nutrients in the Thames Estuary and Irish Sea begins during 1996. Two moorings were recovered from the Denmark Strait and redeployed for recovery during 1996.

A compilation of flow statistics from long term current meter series that was published during 1990 as a WOCE contribution is now available on the Web at http://www.soc.soton.ac.uk/OTHERS/woceipo. An update to this is in preparation and contributions are welcome.

UK (SOAEFD): All current meter data and water level recorder data has been sent to BODC. The only outstanding current meter records are those deployed in 1994 when investigating a suitable dump site for the Brent SPAR platform. They will be submitted to BODC by SHELL, who jointly own the data. All CTD data from 1995 has been sent to BODC (329 stations). All water bottle and CTD data from 1995 has been sent to ICES (532 stations). The IYF Survey data for 1996 has also been submitted to ICES. ROSCOPs for April 1995 to March 1996 will be sent in May.

The main work at present is for the SEFOS project. At present a series of 64 CTD sections have been collected. These are being verified as far as possible. Work is also being carried out in the Minches, west coast of Scotland, in conjunction with University College, North Wales. This as been useful as the Marine Laboratory intend to carry out an intensive study of the Minches for a Quality Survey Report to be completed by 2000. This will involve collecting hydrographic and biological data.

Next year should see the delivery of a new research vessel, which will have a CTD permanently onboard. Hopefully more CTD data will be collected. It is intended to produce user-friendly software to assist with the data processing, some of which will be carried out at sea.

USA: The highlight of the year was the move to the NOAA Silver Spring Campus in January 1996. The NODC/WDCA operates 6 servers, 30 UNIX workstations, and 90 486/Pentium PCs on a fibre optic network. A 10mb line is the gateway to the NODC's network. The NODC/WDCA continues to enhance its World Wide Web Homepage - which has been awarded the Magellan 4 star site award. A firewall system , which allows outside users to access online data and inventories without jeopardising security, has been implemented. A new online data ordering form is available for standard products. NODC/WDCA data management has evolved over the past year to reflect modern, state-of-the-art technology. Today 90% of the data received is acquired by ftp. In turn 99% of the data serviced is via ftp (10%) or CD-ROM (90%). NODC/WDCA has begun an effort to scan metadata information and digitally tie this information with the data archive.

The Global Temperature and Salinity Pilot Project (GTSPP) is no longer a pilot project. The system is now permanent with real-time data coming in off the GTS to be captured by MEDS of Canada and quality controlled; the data are then transferred to NODC to be placed in the continuously managed database (CMD) and is then sent out to the service centres for further analysis; the data are finally archived by IFREMER, Brest.

Annex 4.1

DRAFT Guidelines for the treatment of moored current meter data

1. DATA STANDARD

1.1 Raw and quality controlled data should, whenever possible, be stored at the original sampling frequency.

1.2 All relevant corrections have been applied to the data including instrumental calibrations. Instrument calibration data should be included in the data file. The data should be fully checked for quality and pre-edited for erroneous values such as spikes, constant values, values obtained during instrument deployment, etc. An explicit statement should be made of the corrections, checks and editing applied to the data.

1.3 Sufficient self-explanatory series header information and documentation should accompany the data so that they are adequately qualified and can be used **with confidence** by scientists/engineers other than those responsible for its original collection, processing and quality control.

1.4 a) All data values should be expressed in oceanographic terms, in SI units, which should be clearly stated.
b) Depending on the method of measurement, current velocity may be expressed in terms of speed and direction and/or in terms of east and north components.
c) A clear statement should be made on whether or not the data have been corrected for magnetic variation - if the correction has been made then the magnetic variation that was assumed should be stored alongside the data.
d) The time zone in use should be clearly stated and each data cycle should include date/time of observation (without loss of precision). It is recommended that UTC is used.
e) Other parameters measured as part of the series, e.g. temperature, pressure, conductivity, should be included with the data.

1.5 Quality control should be carried out as recommended in 4.

2. FORMAT

Data should be submitted in a well documented ASCII format (e.g. each individual field, together with its units, should be clearly defined - stating whether current direction has been corrected for magnetic variation i.e. expressed relative to True North and whether times are in UTC.)

3. SERIES HEADER INFORMATION

Each current meter series should include the following:

3.1 Name of the country and organisation responsible for the collection and processing of the data. The name of the Principal Scientist can also be included.

3.2 Platform/mooring type and identifier.

3.3 Dates and times of instrument deployment and recovery.

3.4 Dates and times of start and end of usable data.

3.5 Precise time interval between successive data cycles in the series.

3.6 Original sampling interval - for cases where the processed observation is derived/extracted from higher resolution data (optional).

3.7 Originator's reference numbers/identifiers for mooring and series.

3.8 Latitude and longitude, navigation system, and sea floor depth.

3.9 Instrument depth (or height, specify which).

3.10 Calibration data

4. **DATA QUALITY CONTROL** should be carried out and include the following:

a) Checks on timing channel, correct number of scans between start and end times, etc.
b) Visual inspection of data via various plots (e.g. time series, current vector scatter plot, progressive vector diagram, etc.).
c) Harmonic analysis
d) Check for fouling problems
e) Check against other data collected on the same mooring, nearby moorings and climatology
f) Check latitude/longitude not on land

5. DATA DOCUMENTATION

Sufficient plain language documentation should accompany each data series so as to ensure that the data are adequately qualified and may therefore be used with confidence by a secondary user. Such documentation should be stored alongside the data (preferably in machine readable form), and where applicable, should cover:

5.1 Instrument

a) Instrument description - manufacturer, model, principle of measurement (each sensor) - refer to publication
b) Instrument modifications and their effect on the data
c) Accuracy, resolution and response range of individual sensors
d) Standard of calibration, e.g. method, quality, dates, calibration coefficients

5.2 Mooring

a) Brief description of mooring structure
b) performance of mooring including condition on recovery, whether dragged or damaged and any event that might have affected the data e.g. wave action, knockdown, etc.

5.3 **Data sampling/processing** - description of original sampling scheme and its relation to the final processed data, for each parameter, including, as appropriate:

a) Type of sampling (e.g. instantaneous, averaged, burst recording).
b) Sensing interval of meter (raw data).
c) Duration of individual sample (raw data).
d) Number of raw data samples used in processed value.
e) Nominal interval of processed data.
f) Methods of averaging, filtering or compression.

5.4 Report on data quality

5.5 Any additional item or event that may have affected the data or have a bearing on the subsequent use of the data, e.g. effects of near surface buoyancy, sea state, fouling, etc.

6. REFERENCES

Annex 4.2

DRAFT Guidelines for the treatment of CTD Data

1. DATA COLLECTION

A. Training

CTD instruments are capable of measuring conductivity, temperature and pressure to a high accuracy, provided they are used correctly. This requires all staff collecting CTD data to receive basic training in how the instrument works and what its capabilities are, how to deploy the instrument at sea and successfully log the measurements, and if necessary, how to subsequently process the profile. In order to achieve accurate measurements considerable care has to be taken, especially in the derivation and application of sensor calibrations, and users should be made aware of potential problems.

Guidelines may be useful, but an understanding of the instrument and procedures to be adopted is better than following instructions but not appreciating the reasoning behind them.

B. Use carefully drafted logsheets

Logsheets are an important requirement when CTD data are being collected and the need for correctly completed logsheets should be emphasised when training those new to collecting CTD data. They go further than recording the station position, time, etc and if carefully drafted they will prompt users to record much of the relevant information that is needed. This includes for example, the serial number of the instrument, the identity of reversing thermometers used to compare with the CTD temperature sensor, and the identity of the persons who worked the station, read the thermometers and collected the water samples for salinity analysis. Users should be encouraged to record as much relevant information as possible, especially any unusual features such as indications of sensor malfunctions and large wire angles.

C. Pre-deployment checks

It is wise to complete an examination of the CTD sensors prior to deployment to check that: no fouling of sensors and any protective coverings have been removed, lenses of optical sensors are clean, thermometers are correctly set (if fitted), Niskin bottles are correctly set and taps closed (if used), any additional battery supplies are switched on and with the instrument switched on observe the values displayed by the sensors to confirm that they are functioning correctly and record the value displayed by the pressure sensor (and the temperature sensor) whilst the CTD is in deck. This can be used to correct the logged pressure.

To avoid confusion, it is helpful if each team adopts an agreed procedure, so that each member will complete the same checks at each station. An itemised check list is useful.

D. Sensor calibration

To obtain the highest quality data corrections need to be applied to the CTD sensors. Calibration procedures will vary from one laboratory to another, but it is generally accepted that whilst the pressure and temperature sensors can be subject to pre- and post-cruise calibrations in the laboratory the conductivity sensor is best calibrated by comparison with samples collected for salinity analysis.

A pressure correction for each station can be determined by noting the pressure when the instrument is on deck, but some pressure sensors are temperature sensitive and a further correction may be necessary. A dead-weight tester is often used to obtain a pressure calibration in the laboratory and the results from this should be in good agreement with the observed 'on deck' value.

The temperature sensor is readily calibrated by comparing its readings with temperatures from a platinum resistance thermometer and this gives a more accurate calibration than can be achieved with reversing thermometers, although electronic digital thermometers offer a more reliable independent estimate than their mercury-in-glass equivalents. However, a thermometer will provide a check on the CTD temperature and may indicate the presence of a temperature 'jump'. Thermometers are also useful to identify rosette misfires.

Care is needed when taking samples for salinity analysis to compare with the CTD conductivity and reversing thermometers to compare with the CTD temperature estimates. Those depths where temperature or salinity gradients are known to exist should be avoided. If samples have to be collected from such depths the logsheet should be clearly marked to this effect and it is probably advisable not to include them in the calibration computation. If it is required to sample in the thermocline or halocline then it would be wiser to add additional sampling depths suitable for calibration.

The operator has to be vigilant when the samples are being collected. If thermometers are being used sufficient time must be allowed for equilibrium (at least four minutes for mercury-in-glass thermometers). Throughout this time the operator should be viewing the values displayed by the CTD and if they are variable this should be clearly recorded on the logsheet and preferably not used to determine the calibration coefficients.

Many CTD users have the instrument mounted in a multisampler rosette which accommodates Niskin bottles, perhaps fitted with reversing thermometers. These bottles are closed at selected depths to collect the sample for salinity analysis which is eventually compared with the derived CTD estimate. Care has to be exercised when using this data to identify rosette misfires (i.e. when a Niskin bottle does not fire at the selected depth). Sometime a bottle does not respond to the triggering signal or two (or more) bottles close simultaneously. Often, if a misfire takes place all subsequent samples collected during the cast will not be from the intended depth. The actual sampling depths need to be established when deriving the calibration coefficients. That a misfire has occurred is not always obvious when the CTD is returned to the surface, but all users should be made aware that this can (and does) happen and that they must look closely at the data to check for this.

E. Sensor response

An important feature of the CTD instrument that causes problems is the mismatch in time response that exists between the temperature and conductivity sensors. This results in salinity 'spikes'. All users should be aware of this problem and if necessary a procedure for removing them needs to be adopted. The report of the SCOR WG 51 discusses this in detail. Software packages are now available, often purchased with the instrument, which purport to remedy this problem. It is recommended that a careful appraisal of such packages is made before deciding whether to use them.

Local conditions can also influence data quality and the response of the conductivity sensor in waters with a large sediment load may be impaired.

F. Post Processing

It is recommended that some processing of the data is completed at sea, preferably soon after the CTD station is complete. This is often the only way of detecting an instrument malfunction (a noisy sensor, perhaps) and a comparison between CTD and thermometer temperatures, CTD and salinometer salinity estimates should be made regularly during the cruise. The data from other sensors being logged should also be examined. This 'first look' offers an opportunity to identify samples unsuitable for use in derivation of the sensor calibration coefficients (e.g. varying estimates).

It is useful to have the pre-cruise calibration data at sea so that checks on performance can be compared with the most recent laboratory calibrations during the cruise.

2. DATA PROCESSING AND QUALITY CONTROL

Information on quality control of the data is in Section 6. This will be adapted to form this section.

3. DATA EXCHANGE

A. General recommendations

(i) The originator of the data has to supply as much information as is available on the data.
(ii) All CTD data should be exchanged as ASCII files
(iii) All stations can be in the same file, one file can be used for each station.
(iv) The CTD files must include information about the station (headers), that are recommended to be in the same file as the data.
(v) The files must be homogeneous. For the headers, that means that each piece of information must always be in the same place in the file. For the data, this means that all of the files (for one cruise) must have the same parameters in the same order. Even if one parameter is not measured at one particular station, it can be replaced by its default value, in order to have a fixed number of columns for files of the same cruise.

B. Recommendations for header information

Mandatory information:

Station number The original station number is useful and must be a unique identifier for a single cruise, so that the cruise number combined with the station number is a unique identifier.

Position Latitude and longitude must be specified. there must be no ambiguity in the format of the position. Either degrees and minutes or decimal degrees can be used. It is recommended that N, S, E and W labels are used instead of plus and minus signs.

Date/time The date and time at the beginning of the station is necessary. 'DDMMYYYY' format is convenient, but the format should always be described. The time must be given in UT (GMT), with hours (00 to 23) and minutes. If local time is used, then the time difference from UT must be given.

Units of the data The units used for the measured parameters should be clearly described.

Instrument/Sensors information about the instruments (CTD manufacturer, calibration, recording rate) and sensors (conductivity cell, etc.) should be included in the header when possible.

Not mandatory but useful:

Sounding The sounding is useful to check the station position, and to compare with the deepest measurement on station. the sounding must be given in metres as a positive number.

C. Recommendations for the data.

i) Only the down casts of the station should be provided except if only the upcast is available.

ii) The file needs to contain the measured parameters, in situ temperature (not potential temperature), pressure (not depth), etc.

iii) Other parameters resulting from a calculation such as density or potential temperature will not be archived.

iv) The recommended pressure interval is 1 decibar.

v) If a value is missing, a null value, which must not be confused with valid data is needed. This null value must be described in the header of the file.

Annex 4.3

DRAFT Minimum Requirements for Quality Assurance of Chlorophyll and Nutrient Data

Data Acquisition by Data Centre

1. The data should be in a media compatibility format (preferably ASCII)

2. The data format documentation should contain:
   All available metadata - which includes:
   a) techniques used to sample the data (including number of replicates)
   b) instrumentation used to collect the data - including manufacturer and detection limits
   c) standards and protocols which apply to the data

3. The primary keys of the cruise and station should be supplied including: time, date, position, ship, originators station number

4. The units for the parameters of the data taken should be supplied

5. The data supplied should also include all physical parameter (i.e. temperature and salinity) and all other parameters measured including data calibration information

6. There should be a description on how the biological or chemical data were stored

Data Formatting

1. The data should include all depth levels and all measurements in all cases

2. The precision that the data were measure at should be supplied

3. Any meteorological information should be available

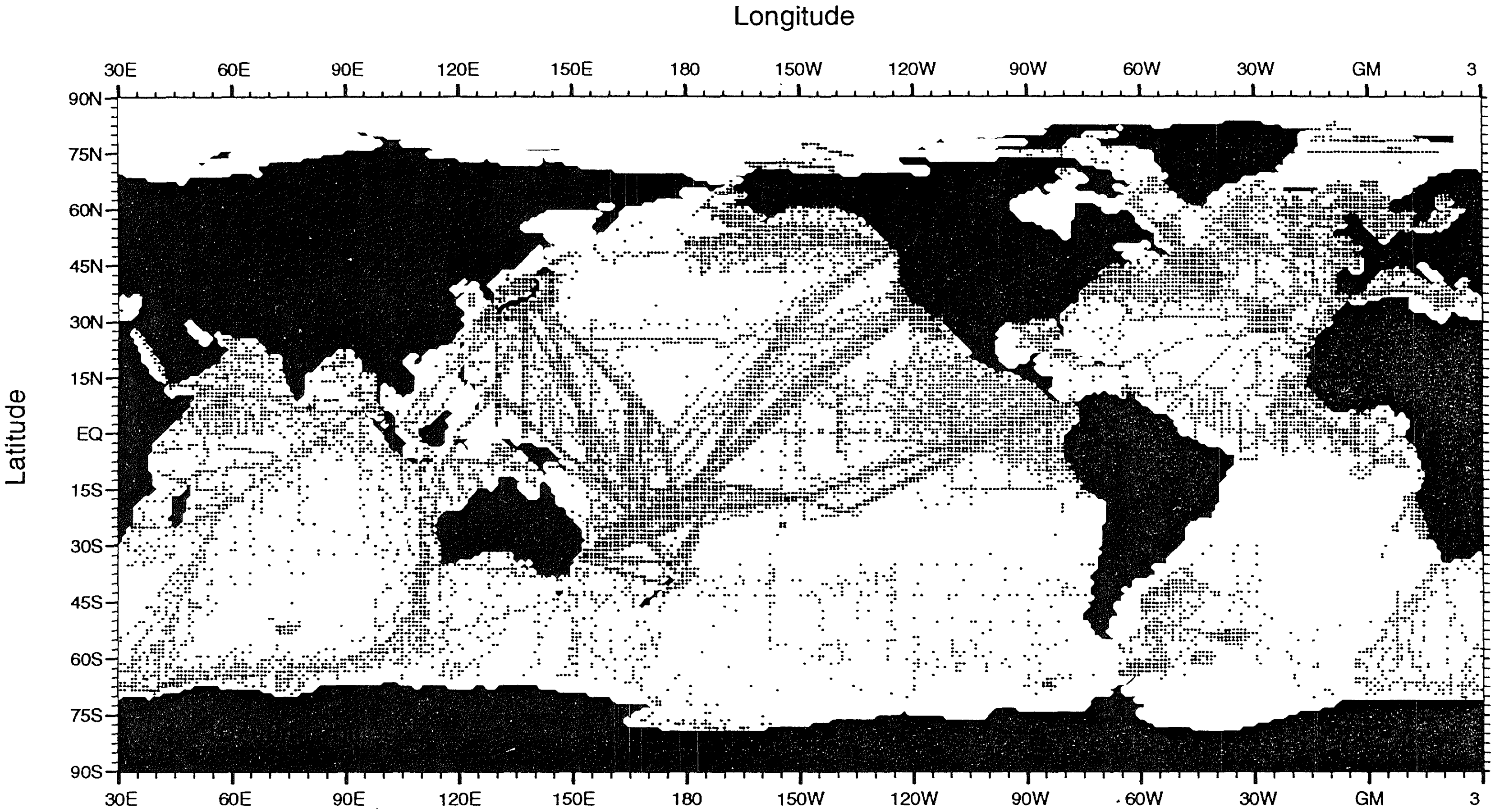
4. The source of the data (i.e. in situ or remote) should be indicated

5. ROSCOP-like information should be supplied (i.e. Principle Investigator, parameters measured, and the estimates of the numbers of parameters)

6. The definition of time should be indicated (start of sampling)

7. There should be a comparison to operational standards such as WOCE, JGOFS, etc

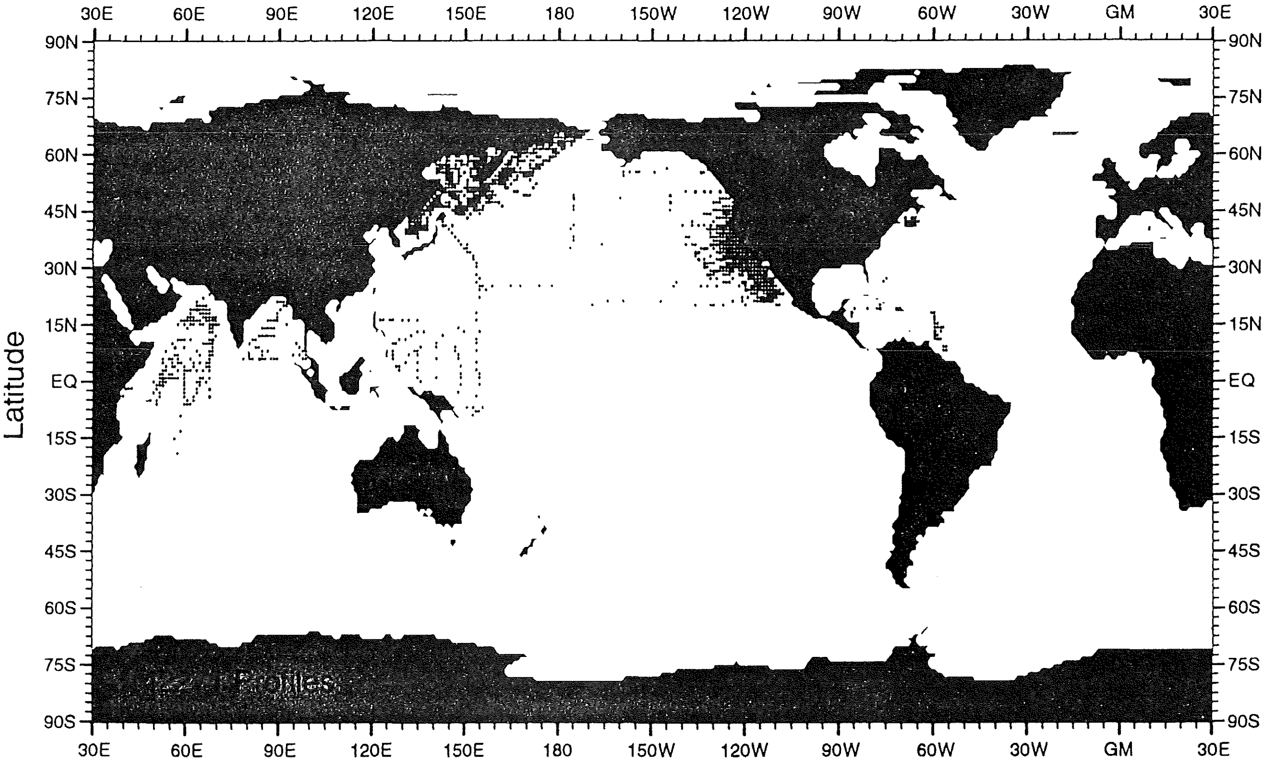
Chlorophyll Data held by the GODAR Project



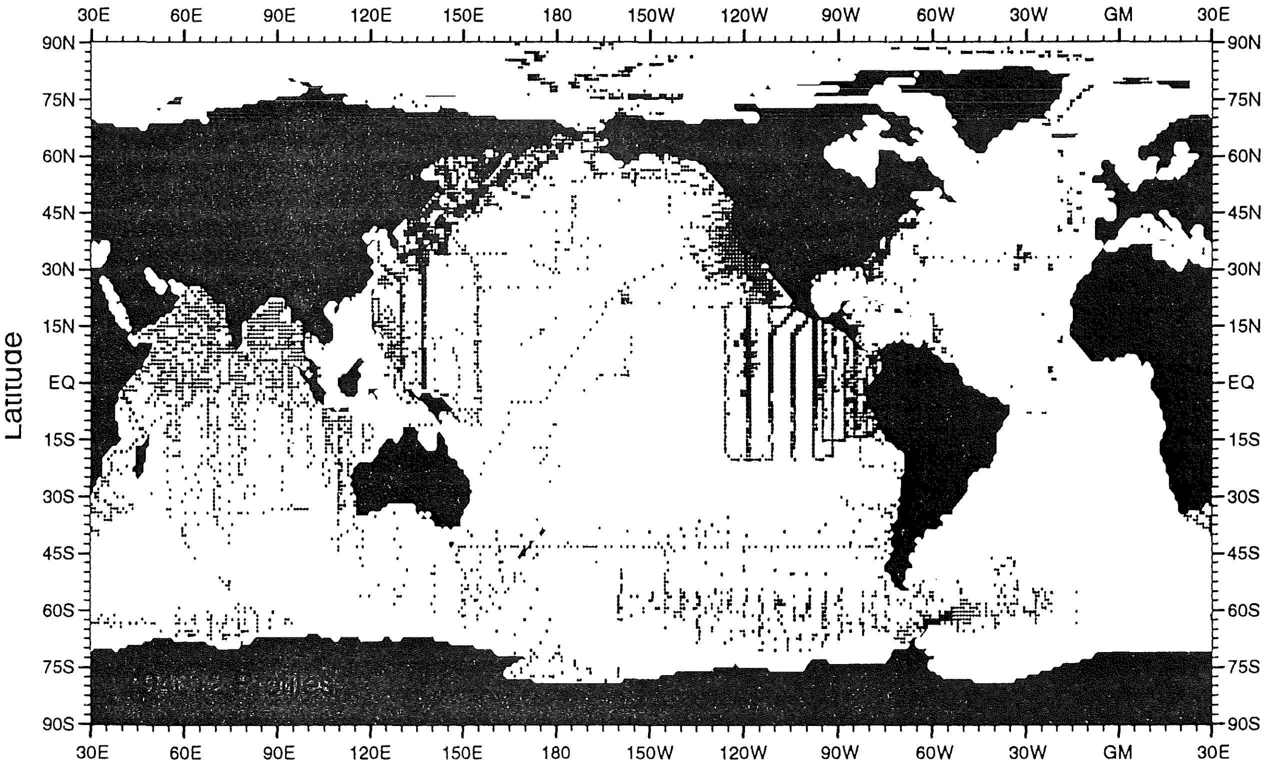
DISTRIBUTION OF CHLOROPHYLL DATA AT THE OCL (04/19/96)

Annex 5.2

Plankton Data held by the GODAR Project



Plankton Data in OCL Global Oceanographic Database, Jan. 1995



Plankton Data in OCL Global Oceanographic Database, Jan. 1996

Annex 5.3

Extract from the European Directory of Marine Environmental Data (EDMED) for biological data sets in the North Sea

EUROPEAN DIRECTORY OF MARINE ENVIRONMENTAL DATA (EDMED)
OUTPUT REPORT PRINTED 23/5/1996

Distribution, habitats, abundance and population structure of cleaner-fish, wrasse (Labridae; Pisces)
Bulletin Hydrographique - Physical, chemical and biological oceanographic data in the North Atlantic, North Sea and Baltic (1902-1956)
Fish of the Western Scheldt estuary (Belgium)
Suspended matter in European waters of the NE Atlantic
Estuarine macrobenthos of the Eastern and Western Scheldt areas (Belgium and Netherlands) - 1979 onwards
Marine and estuarine birds of the Belgian coastal area and Scheldt estuary (1979 onwards)
KL(kustwaterlozingen) - Influence of river and channel inputs to Belgian coastal waters
(CIPS/ICWB) SEA - an extensive multidisciplinary Belgian survey of the eastern half of Southern Bight of North Sea (1971-75)
FLEX76 - Fladen Ground Experiment 1976 in the northern North Sea
ARC - Belgian 'Concerted action research project' - a further multidisciplinary study of Southern Bight of North Sea (1977-81)
LIPID - T,S, chlorophyll, navigation and met. data for RV Belgica cruise 1989/16
CARBON BUDGET - T,S, chlorophyll, navigation and met. data for RV Belgica cruise 1991/22
Marine invertebrates of Belgium and adjacent countries
Belgian bird ringing and recovery data
Inventories and Reports of Belgian Scientific Expeditions (references much early oceanographic data - mainly biological)
Phyto- and zoo-plankton relationships in North Sea and Indian Ocean
Ecology of seabirds and marine mammals in North Sea, NE Atlantic, Arctic polar seas and Antarctica (1970 onwards)
Monitoring Phaeocystis blooms at a fixed station in Belgian coastal waters
Microphytobenthos of Scheldt Estuary (Belgium/Netherlands)
Meiobenthos of the Southern Bight of the North Sea, Western Scheldt and also Greenland, Antarctica and the Kenyan mangroves
Demersal fish and hyperbenthic communities of the Voordelta and Western Scheldt, Belgium
Monitoring data on nutrients, hydrography and primary production in coastal waters of Sonderjylland County, Denmark
Monitoring data on zoobenthos in coastal waters of Sonderjylland County, Denmark
Monitoring data on chemistry of the coastal waters of Ringkobing County, Denmark
Monitoring data on primary production of the coastal waters of Ringkobing County, Denmark
Monitoring data on plankton of the coastal waters of Ringkobing County, Denmark
Benthic macroinvertebrates in the Danish Wadden Sea
Zoobenthos in Danish marine areas
Monitoring of waterfowl at field stations in Denmark
Monitoring data on nutrients, hydrography, plankton, zoobenthos and heavy metals in Ribe County section of the Danish Wadden Sea
Monitoring data on nutrients, hydrography, plankton and zoobenthos in North Sea coastal waters of Ribe County, Denmark
Monitoring data on phytoplankton in Danish Wadden Sea (area 1)
Monitoring data on phytoplankton in Danish Wadden Sea (area 2)
Ecology of the Ythan Estuary, north east Scotland
Northumberland Benthic Time-series (1972-)
Northumberland Zooplankton Time-series (January 1969-)
British Isles Brown Algae (1968-1992)
Seaweeds of the British Isles (1966-)
Benthos populations at and around marine disposal sites off the coast of England and Wales (1986-)
UK coastal sea water quality survey (1980-1982)
Crustacean age pigment measures in UK coastal waters (1983-1988)
Lobster egg and larva lipid content (1989-1990)
Plankton surveys in the North Sea (1962-)
North East Coast of England Plankton Surveys (1976)
Abundance and distribution of Nephrops larvae in the North Sea (1982, 1985) and Irish Sea (1987)
Abundance and distribution of edible crab larvae around the UK (1981, 1989, 1993)
Marine Nature Conservation Review (MNCR) Database (1987-)
JNCC Integrated Coastal Database (1982-)
Marine algae of the Thames estuary (1977-1992)
Marine macrobenthos of chalk shores, south and east England (1986-)
Macrobenthos monitoring - north Norfolk, east coast of England (1987-)
Biology and ecology of the edible crab in north Norfolk, east coast of England (1988)
NHM foraminifera collection from the oceans and seas adjoining Europe (1850-)

TBT Imposex Data around Grampian, east coast of Scotland (1990-1992)
ICES Benthos Working Group North Sea Survey (1980-1986)
MLA Zooplankton Data (1986-)
Intertidal survey for fauna around the Barnhill sewage outfall, Tay estuary, east coast of Scotland (1992)
Fauna and sediment chemistry in the Tay estuary, east coast of Scotland (1991-1992)
Biological Surveys of the inner Eden estuary, near St. Andrews, east coast of Scotland (1982 and 1992)
Dundee foreshore inter-tidal surveys for fauna and sediment analysis, Tay estuary (1989 and 1991)
NERC North Sea Project Data Set (1988-1990)
NERC Land Ocean Interaction Study (LOIS) data off east coast of England (1992-)
UK Digital Marine Atlas (Second Edition)
NE England and NW Scotland Rocky Shores Species Population Dynamics (1967-)
Intertidal Survey Unit Database (1975-1980)
Sulphide and methane-based ecosystems in the North Sea and Skagerrak (1991)
North Sea Nutrients (1986-1992)
River Eden estuary, east coast of Scotland, nitrogen cycling (1976-1979)
Marine mammal movements and behaviour (c.1985-)
Common seal distribution and numbers in August (1988-1992)
The North Atlantic Continuous Plankton Recorder Survey Data Set (1931-)
ZISCH-G4: Zooplankton data from the German ZISCH ('STAR') project in North Sea (1986,87)
ZISCH-G5: Phytoplankton data from the German ZISCH ('STAR') project in North Sea (1986,87)
ZISCH-G7: Benthos data from the German ZISCH ('STAR') project in North Sea (1986,87)
Monitoring hydrography, nutrients and biology in tidal gullies of northern Wadden Sea of Sylt (Germany)
WATIS Information System for Wadden Sea area of Schleswig Holstein (Germany)
Monitoring macrozoobenthos and sediment chemistry of intertidal area of Wadden Sea of Norderney (Germany)
Monitoring phytoplankton and water chemistry off Norderney Island (Germany)
Monitoring phytoplankton and water chemistry along coast of Lower Saxony (German coast from rivers Ems to Elbe)
Occurrence, development and dynamics of algal blooms in Dutch coastal waters
Dutch monitoring programme on TiO2 acid waste discharges (1980-)
Distribution of benthic communities in the Dutch part of the North Sea (1987-)
WORSRO - Chemical and biological monitoring on the Dutch Continental Shelf (1975-)
Macrozoobenthos species density and biomass in the Wadden Sea, Eems-Dollard and the Zeeland Delta (1977-)
Vegetation succession along the borders of the major estuaries of the Zeeland Delta (1973-)
Birds and mammals in the Dutch sector of the North Sea (1979-)
Bird populations on the tidal flats on the Eastern and Western Scheldt (1971-)
Biomonitoring programme of the Eastern Scheldt estuary (1987-)
Transport and exchange of nutrients in the Eastern Scheldt estuary and the North Sea (1980-1987)
Monitoring the wader population of 'Mokbaai' on the island of Texel, Wadden Sea (1983-)
Distribution and development of mussel beds, Wadden Sea (1984-)
Population dynamics of seals in the Wadden Sea (1965-)
Monitoring intertidal vegetation in development of the Groningen and Friesland provinces, Wadden Sea (1982-)
Wading bird migration counts (Siberia - Netherlands - Mauritania) (1960-)
Biological and ecological information of selected sentinel species in the North Sea, Wadden Sea and Norwegian Sea (1930-)
Epibenthic fauna of the North Sea (1972-1981)
Bottom and water column ecosystems north west of the Frisian Islands and north of Dogger Bank (1981-1990)
Occurrence of migratory fish in the Wadden Sea (1959-)
Distribution of sea birds across the North Sea (1987-1991)
Eider duck population on the Frisian Islands (1963-)
Annual cycle of phytoplankton community in the Wadden Sea (1974-)
Dynamics of the macrozoobenthos community at Balgzand, Wadden Sea (1964-)
Herring larvae surveys in the North Sea (1960-)
Vegetation mapping in the Wadden Sea, Oosterkwelder and Schiermonnikoog (1971-)
Beached bird survey along the Dutch coast (1915-)
Ecosystem monitoring in Lake Grevelingen, Province of Zeeland, The Netherlands (1971-)
Water quality monitoring in the Western Scheldt, southern North Sea (1982-)
Ecosystem monitoring of the Eastern Scheldt, southern North Sea (1983-)
Ecological monitoring of the Roggeplaat and Hoge Kraayer tidal flats of the Eastern Scheldt, southern North Sea (1982-1990)
Population dynamics of oyster catchers in the Eastern Scheldt, southern North Sea (1984-)
North Sea benthos survey (1986)
Flora and fauna inventory of the South West Netherlands Delta area (1958-1975)
Saltmarsh vegetation records from the Delta area of the Province of Zeeland (1958-)
Macrobenthos communities in coastal Zeeland Province (1984-1990)
Influence of pollutants on Mytilus edulus and Macoma baltica in the Zeeland Delta (1987-)
JEEP-92 database on the ecology of European Tidal Estuaries (1991-1992)
Saltmarsh soil salinity in the inner Eastern Scheldt, southern North Sea (1965-1969)

Annex 5.4

Biological Data Sets/Bases held by the SOAEFD Marine Laboratory, Aberdeen

Plankton

Data Set/ Base Name	*Description*	*Platform*
PLA	Zooplankton and phytoplankton data base (1986-). Contents: Numbered species list Averaged sizes, Weights, Dry Weights, No. of animals	VAX mainframe In-house software 5 Mbytes. (EDMED).
Loch Linnhe Project	Phytoplankton (1991). Contents: Haul No., Species name No. of animals/unit volume Weights, Dry weights Salinity, temperature, nutrients + see below *	QPRO (Spreadsheets). 1 Mbyte.
Ballast Water Project	Phytoplankton and phytoplankton data base (1994 - 1997). Contents: Species, salinity, temperature, nutrients, heavy metals, ballast water origin	PARADOX (tables). Dedicated relational data base. (External Software house). 5 Mbytes.
Algal toxins	Phytoplankton monitoring programme related to algal toxin sampling in Shellfish (1995-).	PARADOX (as above).
Scotia	Phytoplankton (1986). Contents: see below *	QPRO (Spreadsheets). Paper copies of Analysis sheets. 0.25 Mbytes.
Estella	Phytoplankton (1988). Contents: see below *	QPRO (Spreadsheets). Paper copies of Analysis sheets. 0.5 Mbytes.
Dinoflagellate Cyst Mapping	Identifying cysts in sediment samples. (1991-).	QPRO (Spreadsheets). Paper copies of Analysis sheets. 1 Mbyte.
Loch Ewe Bag	Food chain studies - Phytoplankton and Zooplankton (herring larvae). (1975 - 1985). Contents: Particle counts, species analysis, abundance estimates	Note books. A filing cabinet full!
"Others"	Numerous small data sets. Historical data from research cruises. (1900s - 1970s). Contents: Species counts, names, abundance estimates (e.g. few, many).	Note books. A lot. The intention is to transfer these to a PARADOX data base.

* Data has been worked up to cell volumes, carbon cell and carbon per functional group of organism (e.g. diatoms, heterotrophic dinos and flagellates, autotrophic dinos and flagellates, microzooplankton etc.).

Benthos

Data Set/ Base Name	*Description*	*Platform*
Numerous small data sets from research projects.	(from late 1980s-).	PARADOX tables. QPRO.
ICES Benthos Working Group North Sea Survey	(1980 - 1986).	Netherlands Inst. of Ecology. (EDMED).
Numerous small data sets from research projects.	(Pre late 1980s-).	Notebooks. No work has been done on archiving these.

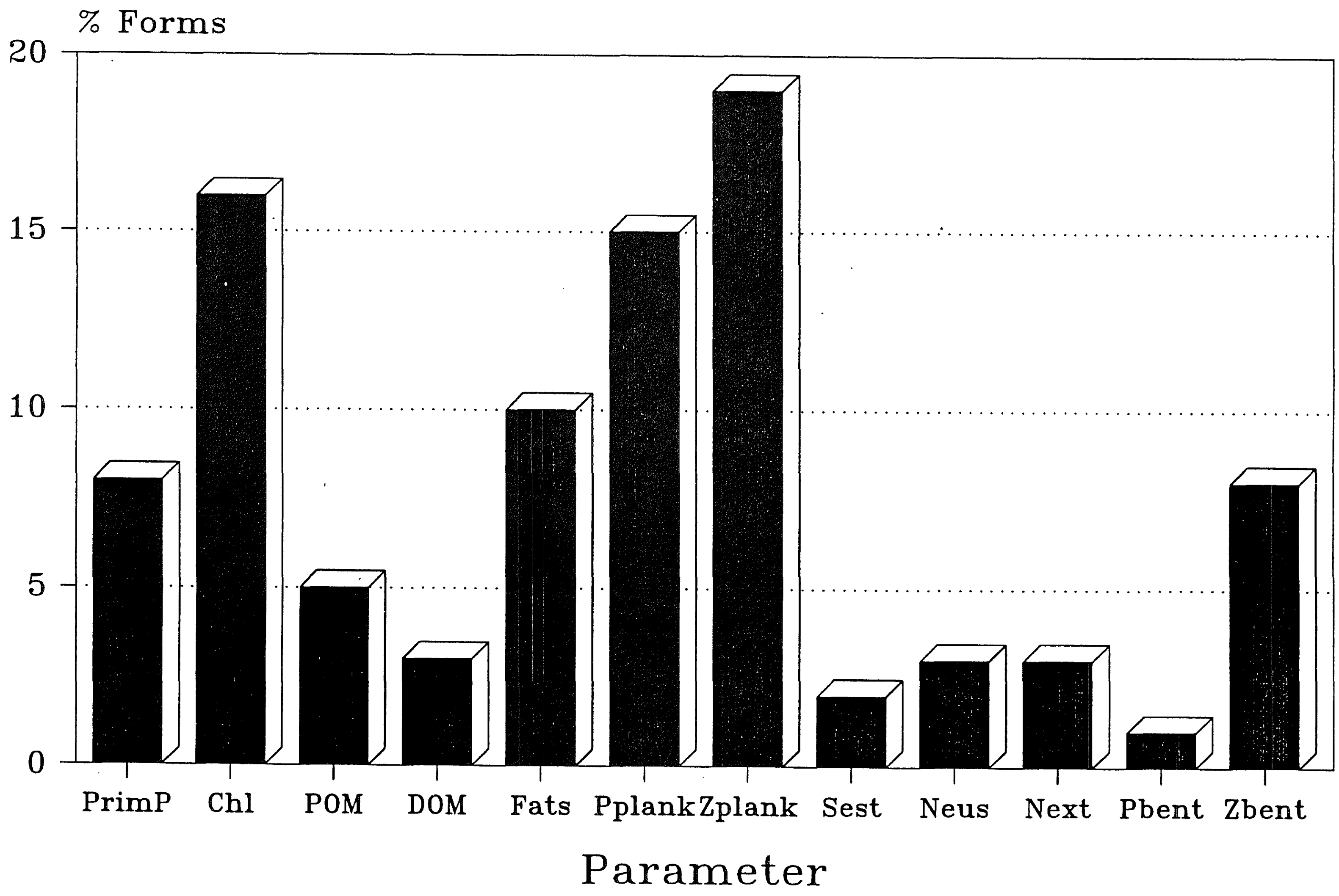
Fisheries Data Bases

Data Set/ Base Name	*Description*	*Platform*
Fisheries Resources Statistics (FRS)	Landings and effort data of fish and shellfish species landed in Scotland by UK registered vessels. Aggregated by ICES statistical rectangle and each method of capture on a monthly basis. (1961-).	VAX mainframe. Accessed via in-house software.
Fisheries Resources Values (FRV)	Monetary value of first sale of fish...(above). (1981-).	As above.
Market Sampling Data	Length freq. distributions and age compositions from fish and shellfish collected at Scottish Fish markets. These data, plus data from FRS and FRV, are the basic information used to determine stock assessments. (Main demersal species from 1960 other species added through the years).	As above.
Discard Sampling Data	Sample information of fish and shellfish discarded at sea (1975-). Contents: Numbers, weights and length frequency distributions.	As above.
Research Vessel Records	Catches made by research vessels (1949-). Contents: time, haul position, fishing gear and length frequency distribution of all species.	As above.

Other Fisheries Data Bases

Fish and shellfish farms.
Fish tagging (1950-).
Herring larval surveys (1970-). Marine Laboratory is the co-ordinating centre.
Mackerel egg surveys (every 3rd year). Marine Laboratory has been the co-ordinating centre since 1992.
International young fish surveys (1965-).
Salmon National Statistics (1952-).
Smolt tagging on the River North Esk (1970-).

ROSCOP - Biological Oceanography
% of Reports



Total Cruises : 23497 (1960–1995)

Annex 6

Recommendations

Proposed Agenda for next year's meeting

The Working Group on Marine Data Management (Chairman: Dr. L.J. Rickards, UK) will meet in Silver Spring, USA, from 14-17 April 1997 to:

a) Assess the post-1990 oceanographic data sent to ICES by each member country, identify problems and suggest solutions;

b) Review progress in the implementation of IOC's Global Oceanographic Data Archaeology and Rescue (GODAR) Project in each ICES member country;

c) Further investigate the need for a data archaeology project for biological oceanographic data types.

d) Critically review the results of the (new) intercomparison of quality assurance methods for station data;

e) Quantitatively analyse the minimum requirements for quality assurance of oceanographic data;

f) Report on the development of World Wide Web pages and links between them within ICES Member Countries;

g) Instigate an analysis of the parameter code list used for the IOC Cruise Summary Report, and produce an improved and updated set of codes;

h) Review involvement and plans for GOOS, EuroGOOS and GLOBEC in ICES Member Countries

i) Critically review the new computer technologies available for data management

j) Review the status of development of taxonomic coding systems with a view to recommending the adoption of a single coding system for use in ICES.