Hydrography Committee

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REPORT OF THE

WORKING GROUP ON MARINE DATA MANAGEMENT

Silver Spring, USA
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International Council for the Exploration of the Sea

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Palægade 2–4 DK–1261 Copenhagen K Denmark

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1. Opening of the meeting

The meeting was opened at 9:30am on 14 April 1997, hosted by the US National Oceanographic Data Centre (US NODC), Silver Spring, USA. Participants were welcomed to the meeting by the WG Chairman. Dr. H. Frey, Director US NODC, welcomed the Working Group to Silver Spring and wished the WG a successful meeting. R. Gelfeld also welcomed participants and explained the local arrangements. He also noted that various members of the US NODC would be sitting in on parts of the meeting and other would be giving presentations for specific items.

Members of the Working Group present were: S. Feistel, Germany, M. Fichaut, France, M. J. Garcia, Spain, R. Gelfeld, USA, G. Glenn, Canada, D. Hartley, UK, H. Loeng, Norway, P. B.. Nielson, Denmark, L. Rickards, UK (Chairman), D. Spiers, Canada and J. Szaron, Sweden. ICES was represented by the Oceanography Secretary, H. Dooley. Apologies for absence were received from S. Almeida, Portugal, B. Cahill, Ireland, K. Medler, UK, F. Nast, Germany, R. Olsonen, Finland, G. Slesser, UK and H. Valdimarsson, Iceland. N. Kaaijk, the Netherlands, was represented by M. Scheffers. R. Feistel from IOW, Germany, also attended some parts of the meeting. A complete list of names and addresses and contact points of participants can be found in Annex 1.

Members of the US NODC staff who attended parts of the meeting included Hank Frey, Syd Levitus, Margarita Conkright, Linda Stathoplos, Ron Moffatt, Godfrey Trammell, Darrell Knoll, Natalie Wong, Tim Boyer, Daphne Johnson and Muriel Cole (NOS).

L. Rickards noted with satisfaction that we now had a representative from IEO, Spain and that two Canadians from MEDS were also attending.

2. Adoption of the Agenda

The agenda for the WG meeting was adopted as a resolution of the Annual Science Meeting in Reykjavik (C.Res. 1996/2:24, 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.

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

The Working Group has reviewed data flow to the ICES Oceanographic Data Bank annually over the last few years with a view to assessing the problems and improving the data submission. H. Dooley gave a brief overview of the current situation (Annex 4), noting that despite the record number of profiles received this year (over 51000), the blackspots are not improving, neither is the submission of nutrient data. The only real improvement is due to the Data Policy which is in place. This serves to reassure scientists that their data are safe with ICES, and will not be given out without their permission. G. Glenn asked for clarification of the data required for the ICES Oceanographic Data Bank - both in terms of aerial coverage and the range of parameters. The standard set of classical parameters held is given below, but H. Dooley noted that total carbon and pCO_2 are now also being collected.

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		

H. Dooley also noted that he has being trying to respond to requests for chlorophyll, which is of great interest, and has been in the format specification for forty years. However, it is usually reported as a biological parameter, and frequently does not get supplied to ICES. If a demand arise for other parameters, then these could be taken on-board. At present, the Oceanic Hydrography Working Group is expanding its intrest to include freons. In terms of aerial coverage ICES' remit is for the North Atlantic and adjoining seas, but data from other areas are accepted, as one learns more about the data suppliers and data quality in this way.

R. Gelfeld pointed out that the work carried out by Syd Levitus at the Ocean Climate Laboratory/WDCA should not be seen as a duplication of effort but as a beneficial collaboration. The work done by ICES over past few years has been of great benefit to the Data Archaeology project.

As noted last year, scientists are still hiding behind large projects, such as WOCE and JGOFS, assuming that the data will get through, but not submitting them directly to ICES. H. Loeng asked if the data flow problem rested with scientist or data centres. In response, H. Dooley commented that one problem was that national data centres often do not have a national remit - for example, the Norwegian Oceanographic Data Centre does not at present handle data from the University of Bergen, but should do so. A further question was asked about the minimum quality of the data expected but ICES - was fully quality controlled data expected? H. Dooley summarised the requirements of the ICES Oceanographic Data Centre as follows: ICES do not wish to receive uncalibrated data, but if the precision of the data is specified, then the data will be accepted, and the fact that the data are of lower quality will be documented. The region in which the data were collected also affects the expected quality/accuracy of the data; for example, temperature and salinity data from the Barents Sea or the Baltic would not be expected to have the same precision as that from the North Atlantic. In addition, there are some special cases, as with Russian data.

Part of the function of the quality control exercise was to test out how we do things - no one gets it right all the time and we can learn from one another and improve our quality control procedures. Sophisticated flagging systems can cause extra work and more automatic processing encourages less scrutiny of the data - leaving unresolved problems in the data. H. Dooley noted that quality control is very important, and as we learn, our methods evolve with time. It is difficult to be objective - for example, instabilities do not necessarily mean that the data are bad. It is vitally important to get back to the data originator when problems are encountered with the data and to provide feedback. It is also important to use the guidelines which are available, for example, the SCOR WG51 report and the JPOTS manual.

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

R. Gelfeld gave an update of the GODAR project, which began in 1990, and was sponsored by IOC in 1992. The World Ocean Atlas 94 (WOA94) series of CD-ROMs was produced in 1994, and a new series WOA97 will be produced later this year. Margarita Conkright is in charge of the project in the Ocean Climate Laboratory (OCL).

R. Gelfeld produced a summary of the data received as part of the GODAR project from ICES member countries (see Annex 5), which he reviewed country by country. He noted that about 50% of the data have been acquired *via* ICES. When data arrive at the OCL they are put through the quality control procedures to check for duplicates, etc. These have been designed by T. Boyer.

A small amount of data have been received from Belgium, these were received directly, not through ICES. Data currently held from Canada are being matched up with the MEDS (Canada) archive. This has been completed for MBTs and for part of the CTD holdings. Nansen data is yet to be dealt with. Data from Denmark were received from ICES and compared with data already held. Data from Finland has been checked up to 1989. M. Fichaut has provided a copy of the French water bottle and CTD database to both the OCL and ICES. Supply of data from Germany has been sporadic, and at present Germany does not wish ICES to pass on data to the OCL. Norway currently has a two year proprietary period attached to their data, and M. Conkright intends to discuss data release with them. Swedish data is mainly historical although some discussions have been held with J. Szaron; some data from Russia have been mixed in with the Swedish data set at NODC. Quite a lot of Russian data has been received, mainly *via* S. Levitus. At OCL, Daphne Johnson is the computer specialist in charge of quality assurance of the Russian data. Data from Latvia and Estonia are included in the Russian data set (i.e. they have been keyed in with the country code for the former Soviet Union), but some new data are now coming in. Some CTD data have been received form the UK, but the supply of data has been slow. The US Navy has declassified some data which, have been supplied to the OCL. These have been useful for filling in data sparse areas. Portugal have been the most restrictive, and have chosen not to have their data included on the CD-ROMs.

H. Dooley noted problems of data having the incorrect country/ship/cruise attached to them. M. Conkright commented that on the forthcoming CD-ROM set a lot of meta-data would be included (e.g. the instrument type would be given in the Nansen file). R. Gelfeld reminded the WG that he could provide inventories of the data held, so that WG members could assess which data are missing from the archive. Over the year work has proceeded with the UK Hydrographic Office and the Marine Laboratory, Aberdeen.

Data location plots showing new data received by the GODAR project for Nansen, XBT, MBT, CTDs and biological data are in Annex 5. Note that these have not all been quality controlled (some positions given are on land!)

S. Levitus, Director of the Ocean Climate Laboratory (OCL), gave an overview of his work with the GODAR project. Recently a substantial amount of data had been received from the UK Hydrographic Office (UKHO Nansen Card and Surface Card file). This included over 100000 Nansen casts, 50000 of which have never been digitised, together with approximately 0.5 million temperature-salinity pairs. Digitisation is being arranged for these. Information from the data cards, about where the data have come from (i.e. country, laboratory), are also being included in the database. This has led to the discovery of data which are not in the database from around Indonesia, collected by the Netherlands. Sources not heard of before are now being entered into the database, and many errors are being corrected. Probably there are more data than that on these cards. Digitisation of these data will start in the summer - they will be digitised both in-house and externally. Included are data from the Southern Ocean, collected by the UK Royal Navy ships in the 1920s and 1930s (temperature and salinity), and a valuable upper ocean salinity data set. D. Hartley commended the efforts made by the OCL, and noted that it was good that they had the resources available for this work.

Later in the year, a new set of CD-ROMs will be produced; this will be the World Ocean Database, this is a follow up to the previous set of CDs, and will contain newer data as well as historical data which have been rescued. A CD-ROM will also be produced with ICES containing surface data. More resources are needed for the data archaeology work, it is hoped that these may be forthcoming from, for example, the World Bank. In late April, there will be a GODAR meeting in Ghana; there are many data sets in west Africa, some of these have been received *via* France. For example, there is 20 year time series off the Ivory Coast. In addition, there is lot of interest in South America. Then in December, there will be a workshop reviewing the GODAR project, and also to plan the future, It is intended that scientists taking part in international projects like WOCE and JGOFS will participate. A report describing the results of the project will also be produced (which will acknowledge all organisations contributing to the GODAR project).

Some discussion followed relating to the quality of older data, for example H. Dooley stated that he had decided not to put any pre-1990 data into GODAR, the salinity data in particular are of unknown quality. S. Levitus noted that they are trying to put back chlorophyll data into data sets (and nutrients to some extent). M. Fichaut informed the group of a Mediterranean data archaeology project which was being developed, and a meeting in Turkey was due to take place soon.

In reply to a question about the situation of data rescue in the USA, R. Gelfeld replied that there is a considerable volume of MBT data at Scripps (25000 profiles from the North Pacific collected during World War II). Much data from this period has been thrown out. Now there is an emphasis on collecting coastal data sets. If the quality is good enough other parameters can also be considered. There are also huge archives of publications with data not yet included in archives. At present there is a significant effort being put into digitising and merging biological data. In addition, before too long, a data archaeology may be needed for recently collected data sets.

R. Gelfeld requested that if any organisations held any data like the UK Hydrographic Office, please get in touch with either H. Dooley or him. He noted that ICES had recently discovered cards in their basement and rescued them. These were matched with the archives and 46000 MBTs were discovered which were not in the digital archives.

He reported that the new set of CD-ROMs would be in a new format. This had been developed because of experiences with the present format, feedback from users, new parameters to be included, and space efficiency. Software will be included to translate, for example, into MATLAB, and a Graphical User Interface (GUI) is being developed. The new format is flexible, but more time consuming to program against. A lot of metadata are also included. H. Dooley asked if the software was for UNIX or DOS, and also noted that there had been a problem with carriage returns (<CR>) in the previous set of CD-ROMs.

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

Last year the WG made a start at searching out what biological data had been collected in their various countries to investigate whether a biological data archaeology project would be worthwhile. This revealed that quite a lot of data have been collected, but it is not a simple matter to put the data together in an archive, especially as a lot of metadata would be required to qualify the data. During the year, a chemical/biological workshop was held in ?? which addresses various data management problems and solutions relating to biological and chemical data. J. Szaron and M. Fichaut, from this WG, had attended the workshop, and F. Nast was also involved.

The WG then reviewed its knowledge of biological data sets. M. Fichaut noted that there was a large database for coastal monitoring which included biological data. She also provided a list of biological data sets held by IFREMER (Annex 6). M-J. Garcia commented that the Spanish had a lot of biological data but they had not been organised into a database, although a database had now been designed. J. Szaron reported that the Swedish biological data collected within the HELCOM-project (1979-) were well documented and archived. A number of smaller known datasets are kept on different PC-systems and in different formats. The newly appointed "national host for marine biological data", the Stockholm Marine Science Centre, has started the work to develop a system to manage marine biological data of national interest. The system will be operational next year. The situation in Canada is that MEDS has a mandate for physical and chemical data, but may also become a biological data centre. All data are held in the regions at present and it is not a simple matter to come up with a list of data, although it is better to work through MEDS for information. S. Feistel reported that her institute had been involved with the Baltic Monitoring Programme, and had chlorophyll and primary productivity data from 1976 onwards, and zoobenthos and plankton data from 1991. In addition data from non-monitoring cruises exist, but these are on tape and their exact contents are not known. Data from her institute are normally sent to DOD/BSH.

R. Gelfeld reported that the major problem for the US was the large volume of data scattered over the country in a large number of different formats. L. Stathoplos noted that there was a good network of people. The impetus behind compiling chlorophyll and primary productivity data was SeaWifs. The US NODC and the OCL are currently concentrating on compiling chlorophyll, primary productivity and plankton data. Plankton data are handled by the National Marine Fisheries Service, who also manage the fisheries data. H. Loeng stated that IMR holds all kinds of biological data, often going back in time a long way. All are stored in the same format. No information is stored from other Norwegian organisations. He volunteered to provide a list of Norwegian biological data. P-B. Nielsen reported that his institute holds no biological data and that there is no exchange of biological data. M. Scheffers noted that there is a Dutch monitoring programme with data from 1975 onwards. From 1990 onwards the data are in the DONAR database. The fisheries institutes and NIOZ also have biological data, perhaps also Universities. D. Hartley described the development of a database for biological data at the UK Hydrographic Office, which will be populated with data soon. L. Rickards noted that BODC has some biological data but these are restricted to data collected for specific projects for which BODC are doing the data management. Other than that the laboratories at Plymouth, Dunstaffnage and Southampton all hold biological data, as do some university departments.

H. Dooley commented that the largest existing biological data set was probably that published in the Bulletin Planktonique between 1908 and 1912, and this should be digitised as a priority. It was expanded in 1912 to deal with extra survey, but further issues were not published, as scientists were not submitting their data. R. Gelfeld agreed to check to see if the Bulletin Planktonique was held at NODC, and whether it was being digitised. H. Dooley commented further that from next year OSPARCOM are monitoring eutrophication and have requested help from ICES in setting up formats for data collection/storage. At present formats are being formulated, data will be from all OSPARCOM countries, and this could be a good data set.

H. Dooley also expressed his concern about biological data collected as part of EU/MAST projects, and the lack of an overall strategy for data management of these data. Some projects have a data management strategy (e.g. the data are sent to a data centre to be compiled into a project data set, but others do not). The WG should investigate the volume and diversity of biological data collected by these projects, and discuss what should happen to these data at the completion of the projects. Some projects, like TASC, have links with other projects (in this case GLOBEC). But overall a future strategy for biological data needs to be developed. The WG will investigate this further in the coming year.

7. Critically review the results of the (new) intercomparison of quality assurance methods for station data

H. Dooley gave a brief outline of the previous exercise which had been undertaken by several WG members. The impetus for the intercomparison had been the receipt of a data set from a Polish laboratory which contained many errors. The data set comprised two sets of cruises, one from the Baltic Sea and the other from the Norwegian Sea. The former contained pressure, temperature and salinity; the latter depth, temperature and salinity. The data were supplied in two different formats. This data set had been distributed to several different organisations to quality control; so far ICES, US NODC, SISMER, BODC and MEDS had completed the exercise and IMR had completed part of it. All had submitted reports to H. Dooley who had coordinated this exercise.

The original data suppliers had been invited to provide details of the problems with the data sets, but instead re-submitted the entire data set, this time in good shape, but this meant that it was not always possible to say exactly what changes have been made to the data.
Unfortunately there has been a large time delay between the first two centres completing the intercomparison and the most recent - and this had led to delays in producing a final report. However the WG felt that it was important to have a report from the exercise both for those who took part and those who were unable to and encouraged H. Dooley to write it up. He noted that most participants captured most of the errors, but he needed to contact the participants to discuss various aspects of the quality control. Any report produced will include information about the different ways in which the quality control is carried out.

In the meantime another intercomparison had been undertaken by ICES, BODC and SISMER. The data were from 3 UK cruises, two carried out by biologists and one by physical oceanographers. Due to the short time available for the exercise, the data had been supplied in a simple ASCII format, rather than in the GF3 format (in which they had originally been received). The data set comprised the following:

Charles Darwin 13/86	60 casts	pressure, temperature, salinity, oxygen, sigma-t
Discovery 132	29 casts	pressure, temperature, salinity, oxygen, sigma-t
Discovery 158	23 casts	pressure, temperature, conductivity, salinity, dissolved oxygen, oxygen saturation, chlorophyll fluorescence, transmittance, downwelling irradiance, sigma-t

M. Fichaut summarised her findings to the WG. She had produced a report, and used some of the diagrams to highlight some of the problems with the data. Overall she noted that the stations often contain both up and downcasts, and pressure is not continuously increasing (or decreasing) along the profile. These profiles were processed to remove the upcasts and suppress the redundancies in pressure values. Dissolved oxygen was provided in micromoles/l, for comparison with Levitus , this was converted to ml/l.

Charles Darwin 13/86: For file 2, only the upcast was supplied, it was kept and the pressure channel reversed.
Files 13 and 14 were duplicates, only 13 was retained
No errors were detected for header quality control, but station 2 looked out of place, longitude was changed from 6degW to 7degW.
Temperature values were ok, but salinities for profiles 7, 8 and 9 were out of range; profiles 10 and 11 had salinities lower than the others, but within the Levitus climatology.
Lots of spikes were noted in the upper part of the downwelling irradiance profiles for profiles 6, 31, 35, 39, 44, 55, 56, 61, 62, 63, 64. Profile 13 was constant (at zero).
Cast 3 has a density inversion at ~47dbar and cast 57 has a density inversion at 22.8dbar.

Discovery 132: Four doubtful ship velocities suggest wrong date/time.
Temperature and salinity ok.
Oxygen data are noisy, spikes on profiles. Profiles 20, 21, 25, 39, 49 and 50 out of range of Levitus, but all except 21 flagged back to good.

Discovery 158: Three stations have the wrong latitude/longitude - they are located in Africa, this gives rise to 5 errors on ship velocity. Latitude/longitude flagged for stations 6560, 6623 and 6635.
Profile 6647 has a negative pressure values (-8.2dbar): this is deleted from the profile.
Temperature ok.
Salinity is no good for profile 6611, profile 6764 has 3 bad values, 6715 has 2 bad values.
Oxygen data are very noisy. 3 major spikes were noted (profiles 6611, 6660, 6752).
Tansmittance and attenuance were supplied - are both needed.
Profile 6623 is constantly zero, 6635 is mostly zero for transmittance.

H. Dooley then reported his findings and summarised his quality control procedures. Firstly the ROSCOP form is pulled out to check what data are expected. In this case, for one cruise, the nutrients, which were not supplied along with the CTD data, would be requested. Any data channels including derived parameters would be discarded and any badly defined parameters are ignored.

He came to the following conclusions:
Charles Darwin 13/86: The data set contained between 7 and 9 parameters per file. Conductivity, Chlorophyll-a, downwelling irradiance, potential temperature, computed potential transmittance and sigma-theta were

ignored. Several conversion programs had to be written to account for the different combinations of parameters. Many density errors were encountered. Suspect no date/time details for stations 15 and 37. Conclusion: All salinity values lie well under and over climatology, as indicated by the maximum value of 52.949 which is not an isolated value. Recommend whole cruise be rejected. ROSCOP indicates that bottle samples were taken, but no temperature and salinity.

Discovery 132: Six parameters were included per file; pressure, temperature, salinity and dissolved oxygen were reformatted to ICES format. Potential temperature and sigma-theta were ignored (derived quantities). Changes were made to the date/time field for stations 15, 19 and 22. One small density error was noted on station 18, and the oxygen on station 2 in the upper 400 dbar was well out of climatology. Should be removed as clear signs of sensor instability.

Discovery 158: 1. Stations 1, 4, and 5 are in Africa, clearly out of position
2. Station number sequence incompatible with time sort. Makes checking for time/position errors difficult
3. There are 141 errors flagged. These include 137 density instabilities, 15 of which are very large. Most errors are from station 3. Salinity of station 3 is beyond climatology (both positive and negative). Station to be removed.
4. Station 1 has a group of oxygen values out of climatology (one >150% saturation). About 10 data points are affected and should be removed.

L. Rickards summarised her findings as follows:

Charles Darwin 13/86: Station numbering ok
Format consistent; dates/times and positions ok
CTD cast 1314 is duplicated; delete one
Most profiles include both up and down casts; data are one second averages (i.e. not one or two decibar values) and pressure does not increase with time in a uniform way.
Water depth for all stations was 1000.0 or 99999.9 (should have been GF3 null value, but incorrect - missing leading minus sign?)
Position for 1302 might be wrong - but matched with cruise report.
Many spikes - most series need flagging.
Individual comments: Station 1302 - upcast only supplied; Station 1307 salinity approx. 37 (conductivity ~4) much too high; Stations 1308 and 1309 - salinity ~51, conductivity ~5 -much too high; Station 1311 - upcast 0.2 PSU lower than downcast (delete upcast); Station 1329 - downwelling irradiance no good.

Discovery 132: Positions and station numbers are ok.
A bug in the processing software of the originating laboratory resulted in the incorrect times being written to the files. There may be a mismatch between the header and data cycle times -the latter are all incorrect to some degree. Dates/times from the cruise report should be used. The dates/times supplied give rise to speed checks between stations 10636/10637, 10639/ 10640 and 10643/10644.
Values are 1 second averages, not 1 or 2 decibar values, up and downcasts were supplied.
Data were good quality on the whole.

Discovery 158: Discovery numbers used - sometimes with 'HDV' at start, sometimes an extra 2 digits appear at the end. No water depths were supplied. Up and downcasts have been supplied. Oxygen upcasts show where bottles were fired - these data have not yet been deleted.
Individual comments: Station 11276 - incorrect position, gives speed error with 11278; Stations 11290 and 11291 are duplicated, in each case one of the two has the wrong position (on land).

The WG agreed that this had been a useful exercise and L. Rickards agreed to produce a report summarising the findings of those taking part and she also would resupply the data sets to the ICES Oceanographic Data Bank.

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

Following on from the two intercomparison exercises, the methods of quality control, in particular for CTD data, were reviewed. R. Gelfeld introduced the discussion by summarising the procedures in use at the US NODC. M. Fichaut also described the system in place at SISMER. On the whole, many of the procedures in place are the same or very similar, but the differences in detail may be important. The list compiled at last year's meeting, which is included in the guidelines for handling CTD data cover most of the main items. However, there are still items which require further discussion or clarification. Duplicate checking emerged as a major task for some WG members, especially those involved in data archaeology work. Also adding in or changing ship or station names causes problems. M. Fichaut noted that there were many duplicates in the World Ocean Atlas data set, R. Gelfeld replied that these had not been duplicate checked, but the next published version of the data set will have been through the duplicate checking software, and should be a much cleaner data set. On the new set of CD-ROMs, each profile will have a unique identifier.

There is also confusion as to whether depth or pressure should be used as the independent parameter. The World Ocean Atlas uses depth, although guidelines (e.g. SCOR WG 51 and JPOTS) recommend pressure. However, much data received by Data Centres include depth not pressure. M. Fichaut also noted that MEDATLAS uses pressure in the data files, and for MBT and XBT data, depth is assimilated to pressure as the differences are not significant in shallow water. In Canada and the UK the parameter supplied is the one retained. H. Dooley reminded the WG that the differences are significant in deep water.

Most WG members have a check for density instabilities, often instabilities of 0.02 or greater are noted, but this does not mean that the data are discarded or flagged. At BODC, the data are visually inspected and a decision is made whether the data value should be kept or not. At ICES, action is usually taken for inversions greater than 0.05. The Canadians use a smoothing function. Also the Levitus climatology is used as a guide. Objective flagging of data which fail checks takes place, but those data flagged are then inspected. Twenty-five checks are in place. Altogether they want to ensure that no data are lost. Errors are often gross ones, which are removed. Approximately 2% of the data handled have errors.

J. Szaron noted that his laboratory use EG&G software, and is happy with this. The raw data are also kept, and can be reprocessed as necessary. M-J. Garcia has also used this software.

There are also problems in dealing with nutrients. In her experience with MEDATLAS, M. Fichaut said they had had difficulty in defining range checks for the Mediterranean as regional variations are important. H. Dooley agreed that nutrients could be problematical, and recommended parameter-parameter plots and use of Redfield ratios. R. Gelfeld noted that a description of the quality control procedures used for the World Ocean Atlas had been published for nutrients and temperature/salinity. S. Feistel reported that at her laboratory the same person always validates all of the data, using the same software, as different people get different results, even though as many objective checks as possible are made. H. Dooley also commented that the person making the measurements can greatly influence the quality of the results. This is not always easy to keep track of, but does emphasise the importance of taking part in intercalibration exercises, or projects like QUASIMEME.

R. Gelfeld requested advice on what to do if both up and downcasts are supplied, and also how to treat Batfish (SeaSoar) data. This widened to a discussion about underway sensors in general, which produce quite long time series of, for example, temperature, salinity, dissolved oxygen, and in some cases nutrients. Procedures for handling shipborne ADCP data were also mentioned. L. Rickards suggested that as the WG had drawn up some guidelines for both Batfish and shipborne ADCP data several years ago, these should be reviewed and updated.

H. Dooley stressed the usefulness of using the ROSCOP information to assist in quality control. He also recommended that the JPOTS manual be used, as it contains advice and recommended procedures for handling temperature and salinity data.

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

Darrell Knoll (the US NODC Webmaster) provided and overview of the Web pages developed by the US NODC. The pages created three and a half years ago look similar today, but Natalie Wong is presently revising and updating them. The first page had been rather long, but is now shorter and it should be easier to navigate around the pages. In an effort to make data more accessible, links are being provided to the catalogue database. Two machines are inside a firewall; there is an interface to a Sybase database. At present, this is used primarily by the Services Unit, but can be used by anyone at NODC. When the firewall was set up one server was inside, and one outside - both are updated together. As a result of many internal e-mails in the past, an intranet was set up - and these messages are now posted there. He provided a demonstration of the NODC Web pages, including online access to data buoy data. Information input, for example at latitude/longitude range, is translated to sql commands, the database is searched, the results translated into html and displayed. Help files are available to which document how to use the facilities. Searches at present are at the data set level (i.e. one can find a cruise, but not an individual CTD profile); a point orientated database is needed to get to a more detailed level. In the future, it is hoped to include other products such as temperature maps, summaries of data, etc. In addition the ocean profile database, including data from the GODAR project, in total 5 million profiles, will made available for searching over the Internet.

Some discussion followed relating to how information is made available; ICES have some project data sets available and BODC have WOCE Sea Level Data on the Web. The US NODC policy has been that if data are available on CD-ROM, then they are not put online.

Jan Szaron pointed out that Dick Schaap (MARIS, Netherlands) had set up a Home Page for the EU MAST Data Committee with links to the relevant Web pages and to EDMED and ROSCOP. Development has now finished on these pages as the contract has been completed.

M. Scheffers described the Dutch Water Pages ('Waterland') which have been set up to find anything relating to water in the Netherlands. Real-time data for sea level are available, and are automatically updated. Data for fluxes, waves, temperature and water quality are also available, as are photographs. This system has developed from an information system for the Scheldt Estuary.

G. Glenn noted that MEDS have Web pages, but now that people were more educated in the use of the Web (i.e. people will click on anything), less explanation is needed. On the whole pages work best if they are simple. Some WG members have started using JAVA for their pages (e.g. US NODC and SISMER)

H. Dooley provided an update on the information available from ICES on the Web. He described three developments. Firstly, he illustrated how ICES are making use of ROSCOPs generated by EU MAST programmes. For example, for the ESOP programme, ROSCOP information is available showing what data have been collected, and whether they are held at ICES. Data sets from some other projects are available, these can be passworded if access to the data is restricted. Secondly on the ROSCOP pages, in addition to downloading the ROSCOP database, there are now links in place to Denmark, France, Poland and Sweden, where these countries have either their own ROSCOP databases available on-line or have cruise reports available. In the case of Sweden these are complete cruise reports, made available for downloading and use with Adobe Acrobat. For Denmark, the information provided is from the monitoring programme in the Baltic and Danish Sounds. Included are track charts and plots of data.

Finally, H. Dooley described the pages developed for the environmental data, where there will be pages with a direct link to the SASS database from where data can be extracted and plotted. Initially this has been developed for the Environment pages, but eventually it will be extended to all the ICES pages. He also noted that the ICES oceanography pages include information about the ICES data policy, and data/data product guidelines. Charging policy is also covered - generally data are provided free of charges for research scientists, but charges may be levied for commercial use of the data.

J. Szaron reported that the SMHI database can be accessed via the Web, searches made, and data ordered - although their pages need to be bilingual, which adds to the work involved.

L. Rickards reported that she had set up some MDM pages (http://www.pol.ac.uk/bodc/mdmwg.html - see Annex 7), and these were reviewed by the WG. These comprise an introductory page, with links to pages containing the terms of reference for the Working Group, information about data centres in the ICES area (and links to the centres themselves), and details of the quality control guidelines for various data types which have been compiled by the WG. Various suggestions were made to improve the pages, including adding a copy of the WG report, advertise through Yahoo (for example), link to the University of Hawaii for further information about shipborne ADCP data, link with IOC/IODE (and GETADE), map showing the location of the data centres, make pages more dynamic, have section on frequently asked questions (FAQ). This could include a whole range of topics from 'What is salinity? to 'What format should be used for....?', information about units for data (i.e. micromoles/m^3, micromoles/l or micromoles/kg, where conversions are not straightforward). Also links can be included to reformatting routines (possibly on-line at the Scripps Institution of Oceanography), and the JPOTS manual (Processing of Oceanographic Station Data) could be included. H. Dooley agreed to check if there was a digital version of this available. This should demonstrate well how the different centres are working together. The WG agreed that a good start had been made to the MDM pages, and L. Rickards agreed to expand these, and will contact other WG members for assistance. The WG was also reminded of the MDM mailbox (mdm@ices.dk) and were encouraged to use it as a bulletin board to communicate with each other.

10. 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. Dooley introduced this item by providing some background to the development of the present Cruise Summary Report (formerly known as ROSCOP) and described its use within ICES. ICES collated microfiche forms from the mid-1960s working closely with WDC-A. In the mid-1980s, these were converted to digital form. In 1990, the form was revised and renamed the Cruise Summary Report (CSR). It had a simplified coding system in comparison to the previous version of the form. The codes relating to types of studies had been removed., as they often had provided ambiguous information or were left blank. This had resulted in a decrease in the number of codes from 170 to 82.

He felt that perhaps a more appropriate name for the form was the Cruise DATA Summary Report, as its aim was to provide information about the data which were collected. Despite the simplified coding, the forms received by ICES often required considerable editing, and caused many problems. He also noted that there is confusion in some quarters between ROSCOP and EDMED.

He then described the software developed at ICES for keying in new forms and for searching the ROSCOP database. This is available via ftp or the Web, together with the database. He gave a demonstration of the software and described how the system is used at ICES. The ASCII files created by ROSWIN (Windows version of input program) are added in to the database, and then can be used by ROSEARCH (DOS based search software). The ROSCOP database is used by ICES as a data tracking system - and when data are received this is noted in the appropriate place, as are any comments on the data quality. In addition, where a cruise report is available online, the URL is added into the ROSCOP. Cruise track plots are often supplied along with the ROSCOP form. These could be scanned and stored electronically, indeed some are now being received as JPEG or GIF files. However, the overall quality of these cruise track plots is not high. As the ROSCOPs form an integral part of the quality control at ICES, if data are received, but no ROSCOP has been submitted then ICES will create one.

ROSEARCH can be used to search on all fields of the form, although the 'observations' field is probably the most important for searching. Each category of measurement has an 'other measurements' field, which should be accompanied by a description of the data collected - but this is often not included. Some data types are not well represented by the forms, contaminants, for example, but, on the other hand, there are not that many cruises collecting these data. Searching can also be carried out by year. Two output files are produced by ROSEARCH, one a summary of the CTD and bottle data showing in tabular form the volume of data collected and whether they are at ICES. The second file contains formatted output of the complete ROSCOP.

H. Dooley noted that there did not seem to be a great deal of enthusiasm for the ROSCOP system, for example, forms from Finland had not been received for some years now, and not many are received from the USA or Canada. Although, on the other hand, Australia, Japan and South Africa had some interest. R. Gelfeld commented that the ROSCOPs were very useful for data archaeology and L. Rickards agreed. In the UK the forms had provided the basis for an inventory of CTD data, and also they had been used recently to assist a scientist at the Southampton Oceanography Centre, who wanted to know who had been collecting seismic data in Europe over the past 20 years. This was the first stage in setting up a project to rescue analogue seismic records.

The WG then went on to discuss problems with the present form. One fairly major problem is the inconsistency in the forms received - and indeed getting hold of the forms. The response is very patchy. Various projects have tried to encourage the use of ROSCOPs or make their submission a mandatory part of the project, this has met with success in some quarters. A further problem, identified by the WG last year, is the parameter codes.

The most pressing problems are the lack of codes for underway data (with the exception of temperature and salinity) and the difficulties posed by codes such as 'cores' which occur in the geology section, although cores are also taken by biologists. In fact this is really a problem of mixing measurements with the gear used. M. Fichaut reported that she had discussed the codes with colleagues and they had suggested some new codes; a copy of their suggestions can be found in Annex 8. The biologists in particular had questioned some of the codes - for example, why are molluscs included not others, why not have zoobenthos instead? They had also reinstated the 'types of study' codes which had been removed when the present form was designed. In addition, they had separated shipborne and fixed ADCP measurements, and geophysical measurements made at the surface and at the sea floor. It is necessary to include the difference between bottle samples taken for measuring dissolved oxygen and CTD oxygen measurements. Moreover, there are now many more chemical parameters being measured (e.g. CFCs,, CCl_4, etc.) which need to be included. A further inconsistency is that at present nutrients are included separately, but freons are grouped together.

H. Dooley suggested that perhaps there should be a radical new design of the codes, and perhaps the ROSCOP codes should be mapped to a more developed or hierarchical set of codes, for example, the IOC parameter codes (which has evolved from the GF3 code tables) or the JGOFS data dictionary. The WG thought that this suggestion was well worth pursuing and an intersessional sub-group comprising M. Fichaut, H. Dooley, G. Glenn, R. Gelfeld and L. Rickards will investigate mapping the JGOFS (and other) data dictionary codes to the ROSCOP codes. The JGOFS data dictionary comprises 4 tables, which can be queried via a relational database (e.g. ACCESS). This could be linked in to ROSWIN to provide access to the codes when completing a form. The JGOFS codes include information about the method of data collection, as well as the parameter itself. It is important though, to ensure that any suggested system will be simple to use.

11. Review involvement and plans for GOOS (including its regional components) and GLOBEC in ICES Member Countries

Muriel Cole from the US GOOS Project Office (based at the National Ocean Service (NOS)) provided an overview of US GOOS. In the US there are 10 agencies with an interest in GOOS, and NOAA is the lead agency. At present, they are moving from the planning stage to implementation via pilot studies. The objective of the US Coastal GOOS programme is to demonstrate and foster operational systems which integrate and facilitate access to in-situ and remotely sensed coastal observations for reliable assessment, prediction and management of coastal areas and resources. Coastal GOOS planning is being carried out around three goals: sustain healthy coasts, mitigate natural hazards and promote safe navigation. A workshop was held in December 1996 to articulate monitoring needs to address the first goal. Participants included representatives from 13 academic institutions, five Federal agencies and two state agencies. Two themes recurred throughout the workshop: (1) the complexity of the coastal area and interdependence among processes and actions, and (2) the importance of involving, at the outset, stakeholders in designing monitoring activities, so that the correct questions will be addressed.

The timetable is: 1990-2000: formulation of policy, development of scientific and technical basis, refinement of plans; 2000-2007: implementation of sub-systems and new elements of GOOS; 2007: onwards full implementation.

For international GOOS, recent activities have included the preparation of an implementation plan, a proposal for a global ocean data assimilation experiment, consideration of the needs of GOOS coastal modelling, implementation of a global coral reef network and the appointment of Dr. Colin Summerhayes as the Director of the International GOOS Project Office in Paris.

G. Glenn asked what was meant by monitoring, as there are already many existing monitoring programmes. It was thought that GOOS was trying to fill in the gaps, for example climate monitoring in the USA. Assistance will also be given to developing countries. GOOS was also trying to define what needs to be monitored. The WG noted that huge efforts were already taking place for regional monitoring. For example the AMAP project which started in 1991, but there are no links to GOOS, but which will produce a report on the different contaminants in the Arctic - terrestrial, marine and atmospheric. The WG also noted that in 1998, the Year of the Ocean, IOC will hold a commitments meeting to bring countries together, this will cover regional groups as well as individual countries.

H. Loeng asked how ICES fitted in with international GOOS. ICES is represented on I-GOOS, and has a watching brief. In addition, the Health of the Oceans module was developed by ICES people. ICES is a forum for scientific discussion and as such can provide input to GOOS. ICES also has observer status on EuroGOOS, although EuroGOOS is a little beyond the ICES remit. There was some discussion about EuroGOOS, which has set up a project office at the Southampton Oceanography Centre, with Dr. Nic Flemming as Director. EuroGOOS has just published a strategy document, which sets out its goals and sub-projects. At this stage, it does not appear that a lot of consideration has been given to data management. The WG were also not clear how involved the regional commissions like HELCOM and OSPARCOM were. It is estimated that EuroGOOS will cost 20 billion dollars/year, but there is no new money for EuroGOOS, so this may well have implications for existing work.

The WG considered data management for GOOS. A Working Group within GOOS has been set up to develop a data management strategy. R. Moffatt noted that GOOS started out trying to set up its own system, and it was quite difficult to convince them that there was already a system (IOC/IODE) in place. At the last IODE meeting, Ben Searle (AODC) and Ron Wilson (MEDS) had presented a paper on how the present system could evolve into the 'end to end' data management needed for GOOS.

L. Rickards informed the Group that within the UK, an inter-agency GOOS Action Group had been set up. This Group has compiled an inventory of monitoring measurements which will be available on the Web later this year.

Mention was also made of the SEANET programme, which is trying to unify existing monitoring networks in and around the North Sea, led by the Netherlands. Some financial support for meetings has been supplied by the EU/MAST programme. SEANET is also being looked at as a preparation for some aspects of GOOS. It has also been recognised by EuroGOOS.

Moving on to consideration of the GLOBEC programme, H. Loeng drew the attention of the WG to the draft data policy that had been developed for the ICES/GLOBEC North Atlantic programme, and distributed copies of this. It noted that the Cod and Climate change programme and other elements of the North Atlantic GLOBEC programme involves the analysis of data from a wide variety of sources and disciplines, including meteorology, physical and chemical oceanography, plankton and fisheries studies. In most cases policies on the access and conditions of use for data sets are dictated by the funding agencies - but the data polices aim to facilitate full and open access to the data, rather than to restrict it.

12. Critically review the new computer technologies available for data management

L. Rickards introduced this item, saying that she felt that it was important for members of the WG to be aware of the different systems in use in each data centres and also to look towards future developments. Most groups were using some sort of relational database, although some were using a mixture of relational databases and files for data storage. Each WG member briefly described the systems currently in place in their own organisations:

UK (HO): D. Hartley noted that the UK Hydrographic Office had been trying to build up an RDBMS over the last 18 months. Progress has been made but the system is not fully operational yet.

Netherlands: M. Scheffers said that RIKZ have a purpose built, operational system (DONAR). More work is being carried out and planning is underway for the development of a distributed system. This would start with the meta-data/information for the National Oceanographic Data Committee.

Denmark: P-B. Nielsen reported that RDANH have an RDBMS for time series data only at present; separate files are maintained for CTD dips, but they are planning to move to Oracle for these in the future, when they have to move to a new system.

ICES: At the ICES Secretariat, the only relational database is the SIR database for the young fish survey data. At present, there is a trial underway in collaboration with the Norwegians and Icelanders to test out the feasibility of using either Oracle or Ingress. This is proceeding slowly. Developing an integrated database within in the Secretariat could be problematical in that there are no new resources available for this, so priorities could change. Environmental data are stored in files in a structured manner; access to the data is straightforward. The fisheries data comprises mainly statistical information which is not in such good order, as data are stored in a variety of ways. The oceanographic data are filed in a file oriented manner, with good efficient retrieval of data. The environmental data are also in quite good order.

USA: R. Gelfeld noted that the US NODC separate their data into profile and non-profile data (e.g. current meter, buoys). The profile data are stored in a Sybase database, which holds 26 parameters. The non-profile data have a Sybase index. They plan to migrate more to Sybase, and combine the data holdings of the OCL with those of NODC and hold them in a common system. However the move to more coastal oriented work may change this.

Germany: S. Feistel said that her Institute uses Ingress, run on a Sun Spark workstation. They are loading historical and new data into this system. The data included are CTD, bottle and currents. The next stage is to improve data access and two students are developing some software tools to aid this. Data are routinely sent to DOD, Hamburg, for archival.

Canada: G. Glenn stated that MEDS has 15 GB of oceanographic data collected by Canadian research institutes, universities and the private sector, as well as through international exchange agreements. Ocean profiles, surface wave, drifting buoy, tides and water level data, etc., have been quality controlled to documented standards and merged in common databases maintained as VAX/VMS indexed-sequential binary files. Data, data products and services are available *via* the Internet (http://www.meds.dfo.ca) or e-mail at services@ottmed.meds.dfo.ca upon request.

Sweden: J. Szaron reported that two systems are used, one PC-based DOS-oriented portable system used in the laboratory and onboard ships (data from 1990-) and a relational database based on the MIMER RDBMS. All data are managed on the PC-system and then transferred, using SQL, to the main MIMER-base. A user friendly interface has been developed for easy access to data and information. It is possible that the MIMER-system will be replaced by another more commonly used RDBMS.

Spain: M-J. Garcia reported that their system had changed this year. They have only physical oceanographic data, which are kept in flat files of the same format. An Oracle database is being developed . Most people have a preference for PCs. The Institutes in Vigo, Coruna and Madrid are linked together and use the same systems. The system used in the Canaries is different and does not use PCs. However, in the future it is likely that the Canaries will also be connected in.

France: M. Fichaut noted that at SISMER use several systems for different data. Oracle is in use, but some data are stored in flat files, with the meta-data only stored in the RDBMS. A user interface has been developed for easy access to the data, which will be put on the Web by the end of the year. All users will be able to interrogate the system to see what data exist, but retrieval of data will be restricted to specified users.

UK (BODC): Data are stored in two systems. Data collected as part of large projects, for example OMEX or LOIS, are primarily stored in the Oracle RDBMS except for large data sets (i.e. surface underway measurements) which are stored as binary files, with extraction software, and moored instrument data. Other data received are stored in BODC's in-house (binary) format, with meta-data in Oracle. Recently software has been developed linking these databases, so that a single query will search all databases, previously searches had to be carried out on each database separately.

Some discussion ensued, during which H. Dooley commented that he has encountered problems when receiving data which have been extracted from RDBMS systems. Problems have related to trailing blanks, and with latitude and longitude degree and degree fractions. Entities need proper labelling (e.g. country, year, ship, station number). J. Szaron commented that there are many variations in the way things are done, but much care is needed to ensure that the station number and name are clear.

13. 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

L. Stathoplos, the US NODC representative on Taxonomic Codes, provided an overview of the taxonomic coding system used and developed by the US NODC. A selection of the overheads she used in her presentation are provided in Annex 9. She explained that taxonomic names have synonyms, commonly used variant spellings, are not unique, and are hierarchically related. In the past, numeric coding systems have been developed as it was harder to manipulate text than numeric values. The present system is being developed in the USA, by the Interagency Taxonomic Information System (ITIS). This is a collaborative effort between the Department of Agriculture, the Department of Commerce, the Department of the Interior, the Environmental Protection Agency and the Smithsonian Institution. In the future, this should be extended to cover all US federal bodies, plus state bodies. International collaboration would also be valuable, but this is currently limited, due to a lack of resources.

Version 7 of the US NODC Taxonomic Coding System comprised 'intelligent' keys, whereby the hierarchy can be determined from the code. However, in time, you run out of codes in the 'right' place and it is not possible to translate from the taxonomic code number to back to the name. In Version 8, a non-intelligent taxonomic serial number is assigned. The advantage of this is that the number translates to a unique name and does not change even of the taxon gets reclassified. This disadvantage is that the hierarchy cannot be seen from the number alone. Version 8 of the US NODC Taxonomic Code System (released May 1996), includes approximately 250000 records, a final list of old NODC codes, hierarchy and synonymy and some common names. Most of this can be viewed on the ITIS Web page (http://www.itis.usda.gov/itis).

Addition of new codes to Version 8 of the taxonomic coding system has been suspended, and the ITIS system is currently undergoing testing. The system is not working correctly yet, but should be operational by May 1997. If it is not, then new codes will be assigned to Version 8. The addition of new codes should be a simple matter if the name to be added is fully documented, but without the documentation it could take weeks to months. As the ITIS system is undergoing this testing phase and is not fully operational, it is a little premature to recommend its usage.

Taxonomic information is not necessarily received in a consistent way; software is available at NODC to take the string and convert it. This can then be edited as necessary, but this does require some expertise. However, only about 5% of the incoming information is lost due to a lack of expertise being available. This is most problematic if the originator is no longer available.

Much work is presently under way with plankton data, at the Ocean Climate Laboratory, as funding was obtained to include this type of data on the forthcoming World Ocean Atlas. G. Glenn commented that this could be useful to JGOFS - and also there has been some interaction with GLOBEC. A valuable exchange of information took place last year at the Biological and Chemical Workshop in Hamburg.

Some discussion followed on other coding systems in use. These include a Dutch system mainly using codes based on an old system from the US NODC - 30000 species have been coded, although there have been some problems with synonyms. In the UK, there is a system in use at the Plymouth Marine Laboratory, developed some time ago for use with Continuous Plankton Recorder data. A further system is in use at the SOAEFD Marine Laboratory, but discussion held recently with the US NODC may result in the Marine Laboratory adopting the US NODC system. The other system discussed, which has been used in the Baltic countries and for HELCOM, is the RUBIN code. This was developed partly because the US NODC taxonomic coding system did not include many Baltic species. This coding system is still in use, but is no longer being maintained. (i.e. no new codes are being added). The Working Group expressed concern about the lack of maintenance of the RUBIN code system.

More discussion followed on the possibility of mapping the RUBIN codes into the US NODC Taxonomic Coding System, together with a translation table. This has not happened yet due to a lack of resources, but the Working Group felt that it would be a very useful development. Considering the changes in computing over the last few years, the use of names is not the problem it once was. The Working Group felt that the best solution would be to use the full Latin name, but that the US NODC should be the authority for the code list. In addition a mapping should be developed for the RUBIN code system and this should be included. In effect, the US NODC Taxonomic Coding System Version 8 is an indexing system rather than a coding system, and from the point of view of a scientist, this type of authoritative list is what is required.

[Note that since the MDM meeting, problems with the ITIS system have been resolved and it is now working.]

14. Any other business

(i) Dr. Hank Frey, Director of the US NODC, gave an overview of the coastal work which is now being undertaken by the US NODC. Until recently there had been an imbalance in the data held by the NODC towards the deep water. But there are many programmes in coastal oceanography, so for NODC to serve NOAA, etc., a better balance needs to be struck. A workshop was held a month ago for the coastal ocean data community (the stakeholders), with NOAA and NODC also attending. Participants were chosen carefully to get the right mix of scientists, data collectors, managers, etc. It is important that coastal data are available for the decision makers. Coastal data is a huge problem, gradients are sharp, mixing is more complicated, and the coastline is long. For example, the Gulf of Mexico coast is estuarine in nature. At present the workshop results are being digested to ascertain priorities. Additional funds may be made available because of the importance of the coastal zone and strong stakeholder support. Quite a lot of coastal data are held, but these have been archived as received and have not been ingested into the database. A new staff member may be recruited for handling coastal data. In response to a question of how the coastal ocean is defined, H. Frey replied that his definition would be inland as far as the head of the tide and offshore to the shelf break, although he felt that it was not that easy to define. He felt there was a need for a coastal GOOS type operation, with improved cooperation within the US research community (i.e. government, military and commercial).

(ii) Following on from the discussion of Web pages, some views on the data services provided by the different centres were examined. This topic was raised by H. Dooley, because of the number of requests for data/advice from scientists to ICES have increased. Most requests come direct from scientists and not via data centres. He thought that this was an area where collaboration could be increased, particularly for North Atlantic data. Also collaboration increases exchange of data. L. Rickards reported that most requests which come to BODC are specifically targeted at data sets held by them, but occasionally a request for a gridded data set was received, this would be directed to ICES. The WG felt it would be useful to publicise requests on the Web pages or via the e-mail box if there was a possibility that other data centres could help, although it must be recognised that the different centres often deal with different sorts of request depending on their function. However it was felt that probably better use could be made of the data which are available, and the WG agreed to review the requests for data received and answered over the coming year and critically analyse the results with a view to improving the service offered.

(iii) MAST Data Committee Meeting. J. Szaron reported on the recent meeting of the EU MAST Data Committee which took place in Norway, organised jointly by OCEANOR and IMR. The Norwegians had given presentations of the MAST Projects with which they are involved and MARIS (Netherlands) also gave a presentation. The MAST Guidelines on data management were discussed as was the forthcoming Framework V programme. The MAST Data Committee will have three more meetings in its current form, then other arrangements will be needed to continue these activities. The Navigation File, produced by MARIS, is a start to improving the communication links between the partners, and there are possibilities of obtaining EU funding for future meetings. BODC and MARIS have been involved in some discussions on how to take this forward.

15. 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 Countries 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, including consideration of biological oceanographic data types;

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

c) 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 set of guidelines for moored current meter, CTD and nutrient data. Other data types will now be considered (e.g. ADCP, SeaSoar/batfish, XBT and sea level) and guidelines developed and updated;

d) 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 pages will be further developed;

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

The results of the intersessional sub-group work on mapping the existing Cruise Summary Report codes to the JGOFS data dictionary codes will be critically reviewed.

f) Investigate the Data Services available from NODCs in ICES Member Countries and suggest a scheme to improve cooperation between countries to provide and improved service to the community;

Collaboration will lead to increased data exchange and efficiency, and better collaboration between the NODCs.

g) Investigate and evaluate the Data Dictionaries available to the marine science community;

A Data Dictionary covering a wide range of parameters has been developed for JGOFS. This and other data dictionaries known to the WG will be examined to determine the most appropriate system to use.

ii) Time and place of next meeting

Following an invitation from M. Fichaut, the WG expressed its wish that the next meeting should be held at the SISMER/IFREMER, France, between 20 and 23 April 1998. The text of the recommendation to the Hydrography Committee concerning this meeting is included in Annex 10.

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 R. Gelfeld and all of his colleagues at the US NODC for a well arranged and enjoyable meeting.

Annex 1

ICES Working Group on Marine Data Management, Silver Spring, USA. 14-17 April 1997 - List of Participants

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Annex 2

Terms of Reference

The Working Group on Marine Data Management (Chairman: Dr. L.J. Rickards, UK) will meeting in Silver Springs, U.S.A. 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 (including its regional components) 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.

Annex 3

Highlights from the reports of the Data Centres

ICES: This was a record year for data receipts, but there were also many re-submissions of data. The submission of nutrient data is falling, and often when received the nutrients are not merged with CTD data. One good trend is that quite a lot of older data (back to 1980) are being submitted. Most data are received by ftp and all outgoing data is by ftp, although there are some poor communication routes (for example between Denmark and Germany). In general, the same sources supply data regularly, although data supply from Spain has improved recently. ICES are looking at who is doing what with the data supplied and also what requests cannot be met.

Submission of ROSCOPs is also patchy and it is getting more difficult to handle with present parameters; in addition, the form is too verbose which slows up inclusion in the database. Good spots include Norway who send in their ROSCOPs within a month and Poland who send by express mail. Iceland and Ireland are disappointing and the supply from Finland has stopped. ICES holds approximately 20,000 forms from 1970 onwards; ~15% have been created by ICES as data have arrived, but no ROSCOP has been forthcoming. Work will continue to try to acquire the forms. They are useful for quality control - especially for nutrients.

At the request of the Shelf Seas WG, ICES has begun compiling an inventory of long-term (>20 years) time series data. A good nucleus of data is represented in the first version of this. It will eventually be put on the Web.

Canada (MEDS): Dr. Savithri (Savi) Narayanan was appointed Director of the Marine Environmental Data Service (MEDS) following Dr. Ron Wilson's retirement. MEDS manages and archives physical and chemical oceanographic data collected in the major ocean areas adjacent to Canada (MEDS' primary area of interest for data is 35 to 90 degrees North latitude and 40 to 180 degrees West longitude) as well as for international programmes such as WOCE SVP buoys and GTSPP, where the area of interest is global. Some of the data such as the Bathy/Tesac profiles, surface waves and water levels are available in near-real time for operational purposes. MEDS has experience in the processing, quality control and database management of physical and chemical variables as well as some experience with biological variables. CD-ROMs of offshore oil environmental data and GTSPP are available with surface wind and wave as well as other CDs presently under development. MEDS is also developing a web site to link biological, chemical, physical and fisheries data for the Science Directorate of the Department.

Denmark: The Oceanographic Department (OD) of the RDANH collects oceanographic data - sea level, currents, winds, sea temperature and salinity - from a number of stations in harbours and on lighthouses. In addition, OD/RDANH is responsible for 6 tide gauges in Greenland and 2 on the Faroes. In 1996, much effort was devoted to the development and tuning of the oceanographic stations at lighthouses, aimed at optimal reliability in data acquisition and quality. Data from 13 tide gauges are provided in real-time. There are 5 oceanographic stations which are equipped with doppler current meters, thermistor chains and wind meters. Data are downloaded t RDANH every half an hour. A number of internal and external users currently receive the data in real-time, often *via* a voice response system. Cooperation with other agencies includes monitoring oceanographic conditions along the west coast of Greenland in summer, delivering sea level data from 4 tide gauges to the Danish Hydraulic Institute for modelling water exchange in the Sound, exchange of sea level data with the Danish coastal authority, maintaining an oceanographic station at the West Bridge in cooperation with the Great Belt Link, working with the North Sea Hydrographic Committee Tidal Working group, and collaboration with SeaNet, EuroGOOS and HELCOM.

France: SISMER has a new technician who is working on the physical oceanographic database and on cruise catalogues. Most work over the year has focused on the MEDTLAS project, which is now in its final stage. A CD-ROM will be produced containing all of the available data from the Mediterranean (50694 CTD/bottle profiles, 147136 XBT/MBT profiles) and climatological statistics. For the CD-ROM, software has been produced to interpolate to standard levels and to perform data extraction. This will be available on the CD-ROM and is compatible with both UNIX and PCs. The primary results are available on the Web at:

http://www.ifermer.fr/sismer/program/medatlas/gb/gb_medat.htm

In addition to the MEDATLAS work, quality control has been performed on all new hydrographic data and some historical data (CTD and bottle). So far, for the bottle casts, only temperature, salinity and oxygen have been quality controlled. Now work is beginning quality controlling the nutrients and the Levitus climatology has been included in the quality control software. SISMER recently sent all of its new CTD data to ICES and WDC-A (44 cruises from 1988 to 1994, 976 stations). 1995 ROSCOPs (99 cruises) have also been sent to ICES.

Germany: IOW was formed in 1992, as a continuation of the IfM of the former East Germany. In 1991, a rescue of historical data was started, and over the last 5 years data have been reprocessed. Data used to be stored on magnetic tape, but are now stored in an INGRES database. Water bottle data are sent to DOD and from there to HELCOM. So far only a small set of CTD data has been sent to DOD, but more are being sent in a step by step fashion. In addition, 800 current meter series have been processed. Biological data have been found to be difficult to process, but there are some good plankton and benthos data. IOW want to make data available to scientists and will probably make catalogues available on line (but not the data). IOW are also involved in the BASYS project - information on this is available on the Web (http://www.io-warnemuende.de).

Ireland: The deep sea data from the BENTHOS project was used to help design a project management and publishing system (known as PIRATE) which can cater for biological data, amongst others. While not the official data managers for the BENTHOS project, the Irish Marine Data Centre (IMDC) did work very closely with and advise the internal project data managers (namely Natural History Museum (NHM), London) in designing data management procedures and also proactively chasing the data. Selected data sets have been processed into this system to demonstrate how the system works, particularly in regard to managing biological data. On the basis of this work, and as result of the International Workshop on Marine Biological and Chemical Data Management, a paper was submitted to the IOC, regarding 'Managing the diversity of marine biological data: perspectives from a European Union Marine Sciences and Technology (MAST) Project' by Gordon L.J. Paterson (NHM), Orla Ni Cheileachair (IMDC) and Yvonne McFadden (IMDC). Dr. Gordon Paterson and Orla Ni Cheileachair are preparing another paper for the next MAST Project Data Management Workshop in Ispra, Italy 11-13 June 1997. This paper is titled: Can we manage biological oceanographic data? Copies of these can be requested from IMDC. The IMDC also acts as data manager for the MAST III BENGAL project.

The IMDC are also currently developing a database to handle marine environmental data for a sister unit (Fisheries Research Centre, Marine Institute). This database will hold a range of environmental parameters - nutrients, organics, residues and metals in sediment, biota and water collected in Irish waters, and will facilitate of reporting of data in ICES format.

Netherlands: In the Netherlands many institutes are collecting environmental data. Some institutes manage their data carefully and have clear procedures and an adequate infrastructure for quality control and storage, while others are less developed in this respect. For this reason, the initiative has been taken to establish a Committee that acts as a platform for data exchange and advice on data management. The major goals of the National Oceanographic Data Management Committee (NODC) are: to promote the exchange of high quality oceanographic information as effective as possible to a broad population of users and to remove or lower barriers for the exchange of oceanographic information between members of the Committee. The programme for the coming two years of the NODC will be: (1) to create a Web site where meta information can be found on planned and carried out research projects, schedules of ship time and data series collected from monitoring activities, projects, remote sensing, etc; (2) to develop a national policy on data management of oceanographic information in the Netherlands; and (3) to be the national and international contact point for data management and data exchange. The institutes participating at this moment are: the National Institute for Coastal and Marine Management (RIKZ), Delft Hydraulics (WL), the Royal Netherlands Meteorological Institute (KNMI), and the Netherlands Institute for Sea Research (NIOZ). It is anticipated that more institutes will participate in the near future.

The DONAR database system is now fully implemented and operational. RIKZ also participates in REMSSBOT, SeaNet and EuroGOOS. In addition, there is involvement with Monitoring Strategy 2000+, a project within RIKZ to improve the relationship between end users of information, providers of information and developers of technology.

Norway: The main effort in 1996 has been put into quality control of CTD data. Data back to 1987 have been controlled and have been entered into IMR database, and most of the data from the period 1990-1996 are sent to ICES. The effort on quality control of historical data will be turned down in 1997, and we will give priority to new data. We have started on the same process for quality control of nutrient data. Parts of the quality process have been improved during the last year. The ROSCOP submission to ICES is still working well.

The work with Norwegian Standards (NS) on moored current meter data and measurements of temperature and salinity have been continued. The coordinator for this work is the Norwegian General standardising Body. There is also a project under the Ministry of Environment on standardisation of Norwegian environmental data, in which IMR is involved.

NOD has taken the responsibility of data management within the MAST-3 project TASC (Transatlantic Study of Calanus). Information on cruises and data are found on the TASC data management Home Page.

Spain: Data mainly from IEO are archived, generally physical data. If data are not at IEO (Madrid), their whereabouts are known. IEO has been working with SISMER, France and Greece on the MEDATLAS project. A lot of sea level data have been processed and IEO is now working with other institutes. IEO has had a tide gauge network since 1944. This is now incorporated into the REMA network. Biologists store their data on their own PC but an ecological database has now been developed. The network of IEO laboratories all have servers and are linked to Madrid. The Laboratory on the Canaries is not yet linked into this, but may be in the future. Updates to the international current meter inventory have been provided to BODC and mean sea level data sent to PSMSL. IEO also has an interest in geology and, together with the Hydrographic Office, is involved in multi-beam data collection, and the production of coastal charts. Bathymetric data are also held north of 43degN. IEO is the coordinator for the MAST CANEGO project and, with ISMARE, are responsible for data management. The data will be freely available after 3 years. IEO are responsible for the data and ISMARE will develop software.

Sweden: The main activities have been: to act as "national data host" for physical and chemical oceanographic data; serve national needs for data and information products; help other marine data collecting institutes in Sweden improve the quality of their data and information management; introduce the Laboratory and Data Centre onto the Internet (for example, cruise reports from RV Argos are published on the Internet within a few days after the cruise); digitise, quality control and archive historical data from coastal area monitoring programmes; compile, quality control and submit Swedish marine biological data to the Stockholm Marine Science Centre; intensify cooperation with the national Board of Fisheries; and, serve the public with data and information products. In addition, SMHI maintained the number of cruises undertaken so that the main stations in the Skagerrak, Kattegat, the Sound and Baltic were visited approximately monthly, together with monthly monitoring in the near Swedish coastal zone. SMHI also delivered the following: Swedish IBTS data (from 1996) to ICES; ROSCOPs from the first half of 1996 to ICES; BMP biological and hydrochemical data to HELCOM; a number of data requests on bilateral agreements with institutes around the Baltic; and a few requests from MAST projects.

UK(BODC): BODC continued data management for WOCE sea level data, UK WOCE data, PRIME, OMEX and LOIS. CD-ROMs containing the project sets for OMEX and LOIS are due for publication in the next year. A new version of the GEBCO digital atlas (GEBCO 97) has just been produced. Daily checks and weekly retrievals are carried out for the 47 tide gauges which comprise the UK National Network. The data are quality controlled weekly, and statistics produced either monthly or annually. Hourly data from the three GLOSS gauges are sent to the 'fast' WOCE Sea Level Centre in Hawaii. A new version of the GLOSS Station Handbook has been produced; this was done at the request of the IOC for the 'Second Conference of Parties of the UN Framework Convention on Climate Change' held in Geneva, 1996. The EDMED directory is now available on the Web. A total of 2003 requests were serviced by BODC over the year. 455 were for products such as the GLOSS of GEBCO CD-ROMs. A further 1028 were in the form of self-service access to BODC's on-line databases, and 520 were ad hoc requests for data and information.

UK(CEFAS): The Laboratory became an executive agency of MAFF at the beginning of April, and it is now known as CEFAS, the Centre for Environment, Fisheries and Aquaculture Science. The UK Government, through MAFF, will continue to be a significant 'customer' of CEFAS. The Laboratory has the use of two research vessels and participates in some ICES coordinated surveys, e.g. the International Bottom Trawl Surveys in the North Sea, the Mackerel Egg Assessment Survey. Physical data are collected during many fisheries cruises, often by a CTD mounted in a towed body.

Oceanographic cruises use CTDs for vertical profiles and when mounted in a SCANFISH undulating vehicle. ARGOS-satellite tracked drifting buoys are deployed and were used extensively during the last three years in the Irish Sea to support a circulation studies program. A similar study in the North Sea commences during 1997. The development of smart biophysical instruments continues with deployments in the western Irish Sea in May and throughout the Summer, together with current meter moorings, including an ADCP. A study of the processes which influence the behaviour of nutrients moves into its second year during 1997 with cruises to the Outer Thames Estuary and the Irish Sea.

UK(HO): The principle database maintained by the Physical Oceanography Branch is the Historical Oceanographic Observations Database (HOOD), which contains temperature, salinity and sound velocity. Data are received from a variety of sources. UK RN vessels routinely take XBT observations whilst on passage; in the year to March ~10000 XBT raw observations were processed, and 75% were accepted for inclusion in the HOOD. Day to day management of the RN's contribution to the UK Ships of Opportunity Programme (SOOP) is undertaken by the Physical Oceanography Branch. In the year to March 1997, this has included liaison with, and the supply of XBTs to, MV Arktis Vision, Plymouth Marine Laboratory (RRS James Clark Ross, HMS Hecla, and RMS St. Helena, Southampton Oceanography Centre, UCES Bangor, British Antarctic Survey, RMAS Newton, Sir Alistair Hardy Foundation for Ocean Science and SOAEFD, Aberdeen. Progress has been made over the year in the design, construction and population of a new marine biological database. Effort has been focused towards development and storage of data in two distinct categories - quantitative and qualitative.

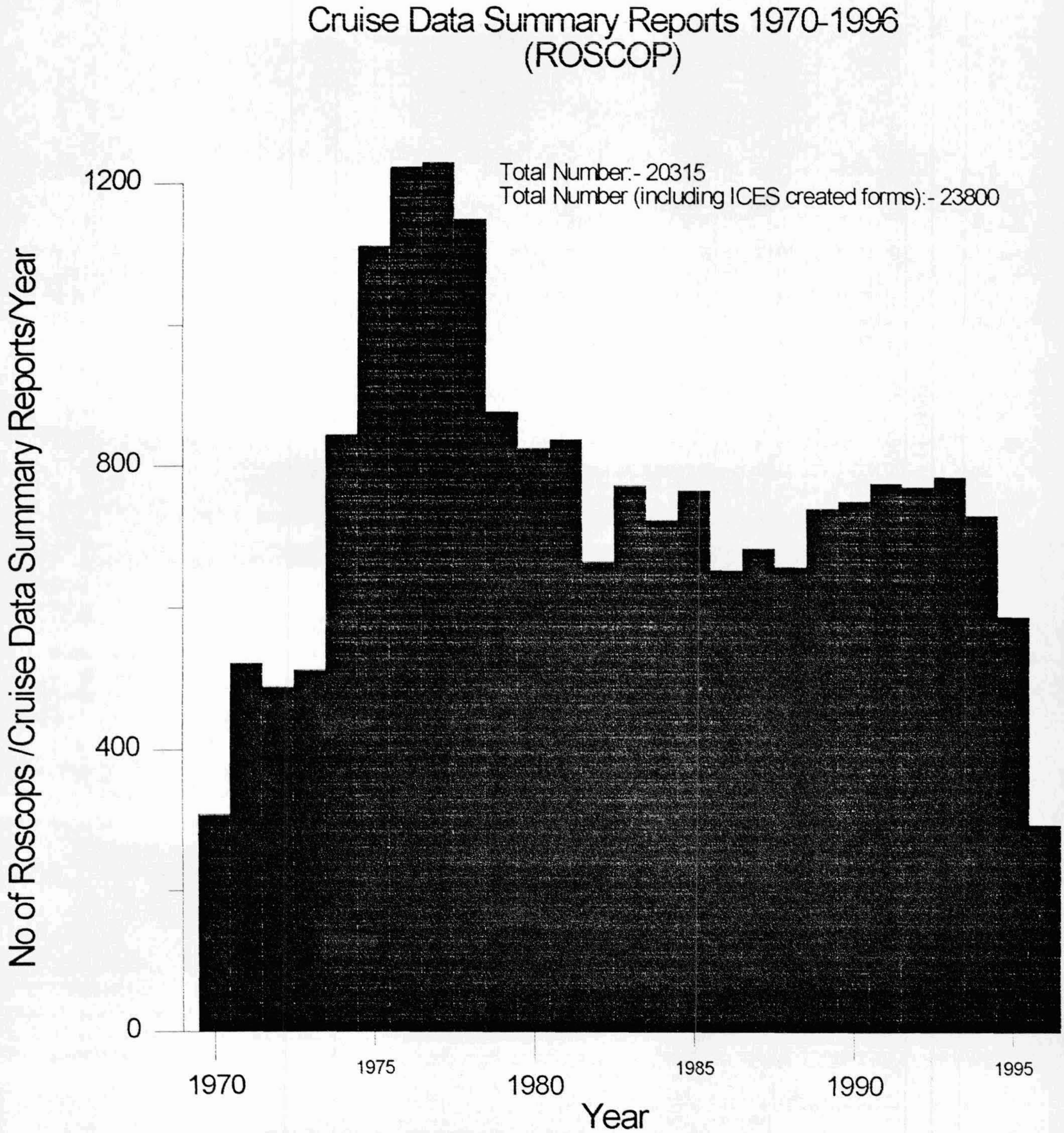
UK(SOAEFD): During 1996, the Marine Laboratory deployed 15 instrument moorings and completed 897 hydrographic stations for fisheries and environmental projects being undertaken by the laboratory. The instruments deployed were 13 current meters, 1 thermistor chain and 1 ADCP. Of the 897 hydrographic stations, 562 of these included CTD profiles. All valid data recovered from the moored instruments deployed have been sent to BODC with the relevant documentation. All the reversing bottle data and 422 CTD data profiles are in the process of being finalised and will be sent on to both BODC and ICES in the forthcoming weeks. The remaining 140 CTD data profiles will hopefully be sent by the summer. The 1996 Cruise Summary Reports are in the process of being compiled and will be sent to both BODC and ICES in the coming weeks. The Marine Laboratory is the CTD data collection point for the Shelf Edge Fisheries Oceanographic Studies (SEFOS) project and a large part of 1996 was spent collating, reformatting and redistributing the CTD data set to participating members. To date 1464 CTD profiles from 125 sections have been submitted for inclusion in the data set. The CTD profiles were in the main collected along 25 standard sections across the shelf edge between Norway and Portugal. These data are being sent to ICES either by the Marine Laboratory, or by the participating members.

A Home Page can now be found on the WWW (http://www.marlab.ac.uk). Attached is a copy of this page. Now that this site is operational it is hoped to develop it over time. A WWW Group has been set up in the laboratory to meet these ends.

U.S.A.: During the year, Hank Frey was appointed Director of the US NODC, and NODC held an Open House in celebration of its 35th Anniversary. The US NODC now has an Intranet which holds many useful announcements, standard operational procedures for NODC, and weekly reports, etc. NOAA held a Coastal Ocean workshop in March, with 100 attendees, to set priorities for NODC to balance its coastal and deep ocean data management activities, and to encourage formulation of additional partnerships and joint ventures. The NOAA Integrated Library system has been implemented with user access through the World Wide Web to 23 NOAA Library catalogues and the NOAA Coastwatch Active Archive Access System has been enhanced to provide online access to AVHRR products.. The NODC catalogue database has been upgraded and the NODC and OCL oceanographic profile databases are being merged into a single system. New CD-ROMs have been produced for the Gulf of Mexico hydrographic and marine mammal data and for the Surface Marine Data Atlas. The NODC also had an exhibit at The Oceanographic Society (TOS) meeting in Amsterdam, 1996. User contacts for the year totalled 149223. The NOAA Virtual Data System, a unified seamless data access and delivery system, which enables the NESDIS data system to work and integrate more effectively.

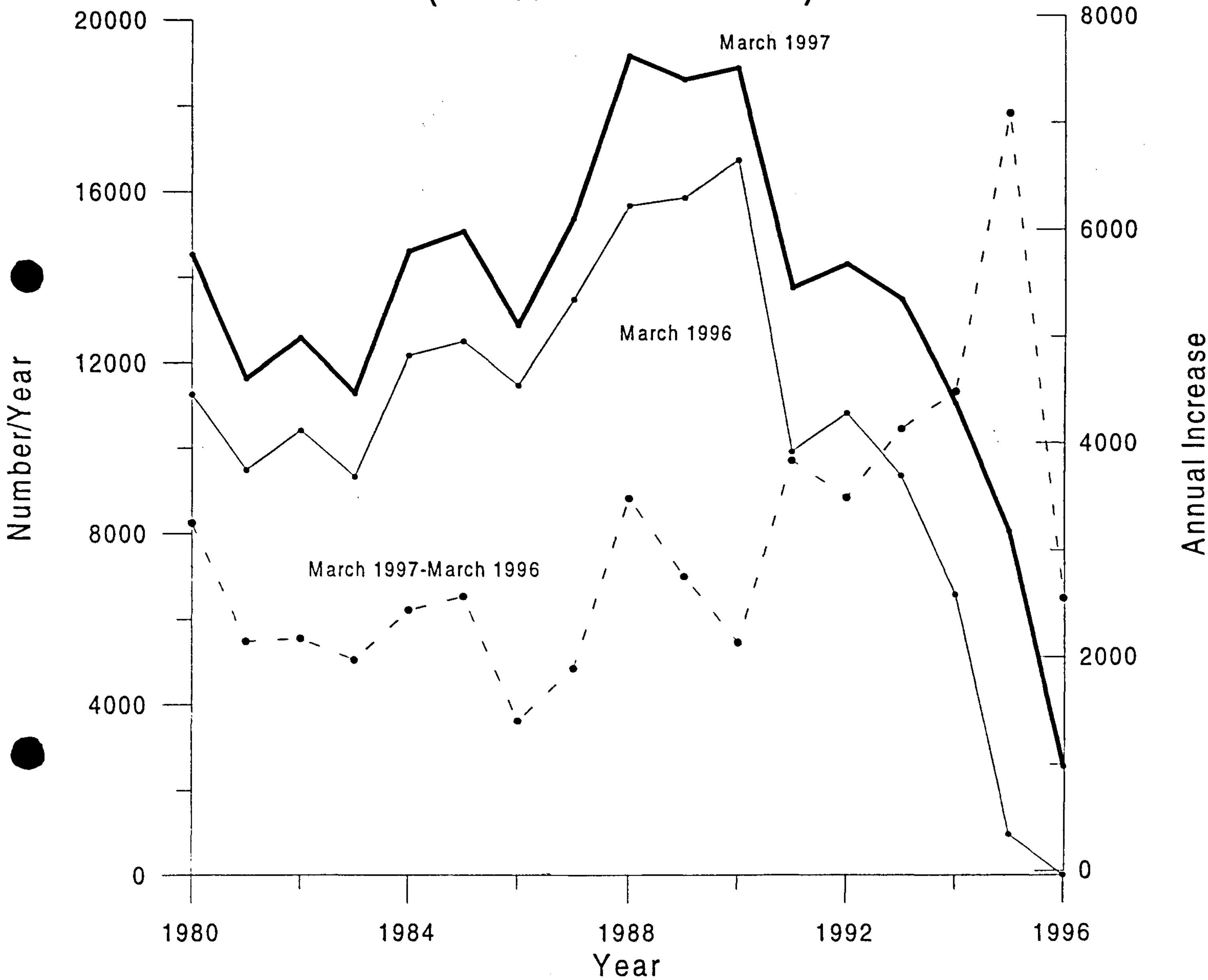
Annex 4

ROSCOP/CSR and data flow into the ICES Oceanographic Data Centre



ICES ROSCOP submissions as of 11/04/97																												
Country/Year	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Total
Belgium	1	6	7	1	1	1	3	1	1	1	1	1	1	1	1	0	0	0	0	21	26	24	25	30	31	26	4	215
Canada	12	5	14	4	1	13	9	17	18	20	14	21	16	13	23	25	9	41	52	13	14	17	27	41	27	1	25	492
Denmark	5	8	16	8	21	24	40	32	16	16	18	9	19	31	31	38	42	39	39	22	19	24	20	20	26	22	20	625
Finland	4	3	6	7	7	8	0	11	13	11	13	11	10	4	13	12	1	0	0	0	0	0	0	0	0	0	0	134
France	38	57	60	52	76	68	55	62	64	76	88	73	68	76	61	52	53	34	54	97	119	96	82	75	128	99	2	1865
FRG	45	94	63	82	47	58	68	64	65	52	70	92	92	96	102	129	131	118	141	167	161	160	139	189	199	184	123	2931
GDR	1	2	7	6	7	9	8	12	10	11	9	13	10	11	13	10	10	8	11	8	15	0	0	0	0	0	0	191
Iceland	11	20	19	9	10	11	10	16	17	16	18	12	12	14	10	12	9	19	8	6	9	11	8	16	16	13	4	336
Ireland	1	1	2	13	1	5	3	5	5	5	0	0	0	0	0	0	0	16	4	0	9	2	10	11	3	2	0	98
Norway	27	31	25	26	26	38	31	28	28	35	35	40	41	48	44	48	38	47	46	49	40	42	71	56	63	72	52	1127
Netherlands	13	23	27	24	38	33	26	28	57	69	70	63	83	74	73	76	74	26	0	83	82	81	13	10	15	20	13	1194
Poland	14	10	32	25	15	9	14	12	11	5	15	11	14	13	16	16	15	11	12	11	14	15	7	4	10	3	11	345
Portugal	0	0	0	1	0	0	1	2	0	1	1	2	1	0	2	1	1	2	2	1	1	0	0	0	3	2	0	24
Spain	5	4	4	5	4	8	4	2	2	5	1	0	0	0	0	2	1	5	4	1	4	25	34	28	27	18	3	196
Sweden	10	12	8	9	9	13	24	19	9	8	9	11	10	14	24	23	23	24	9	3	4	14	0	20	19	19	11	358
UK	105	216	173	178	187	163	183	197	181	164	150	181	155	135	115	114	108	119	114	117	132	135	120	132	81	82	40	3777
USA	6	11	14	63	392	647	730	707	648	375	311	292	127	227	188	192	126	164	148	131	100	143	109	68	0	0	0	5919
USSR	10	18	13	6	5	3	16	15	3	3	1	1	4	7	2	3	3	0	0	0	4	1	0	0	0	0	0	118
Other	1	1	0	0	0	0	0	0	0	4	4	6	3	11	7	15	10	10	13	13	1	9	117	109	109	48	0	491
Total	309	522	490	519	847	1111	1225	1230	1148	877	828	839	666	775	725	768	654	683	657	743	754	799	782	809	757	611	308	20436

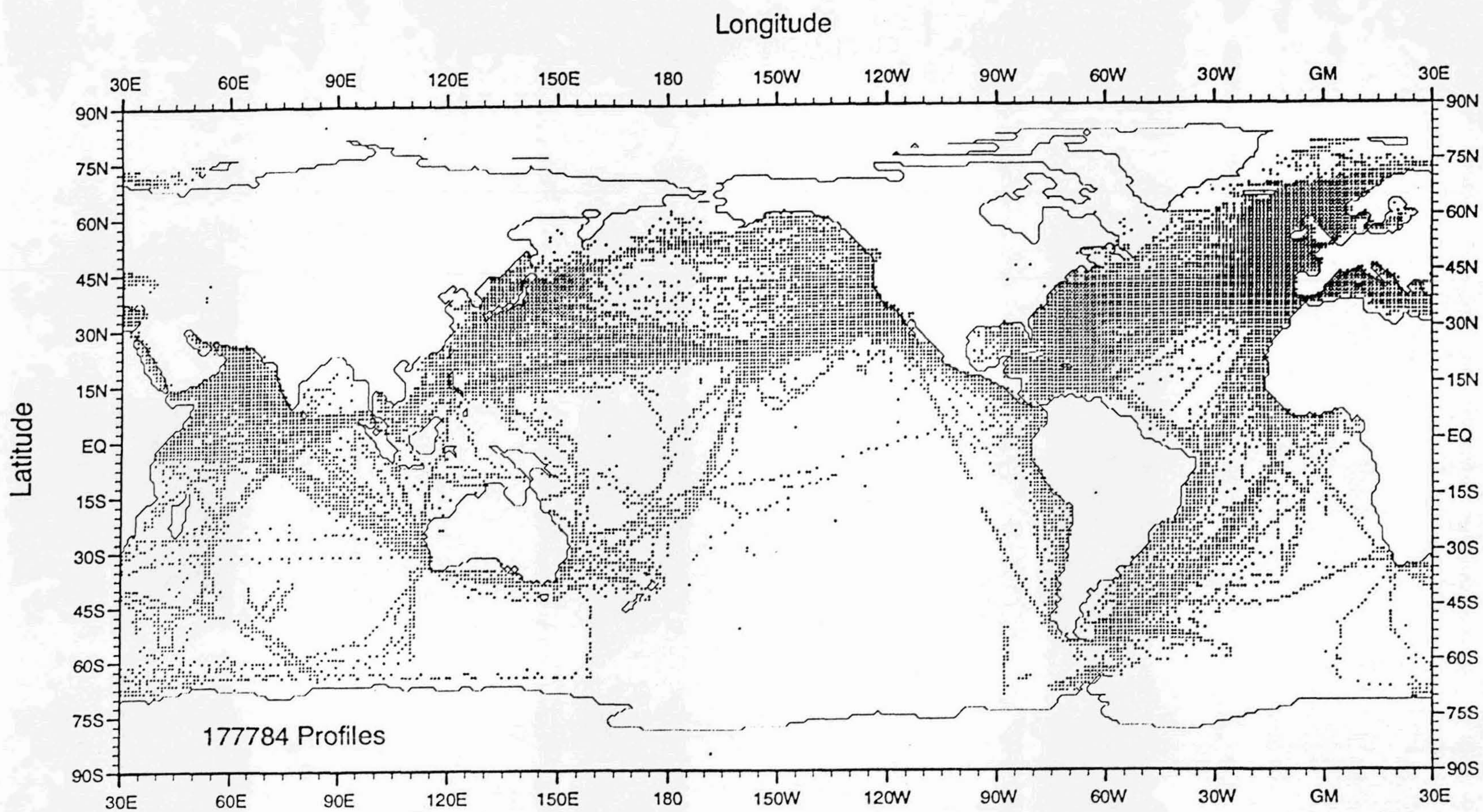
ICES-ODC Profile Data Receipts 1996-1997
(Number received: 51839)



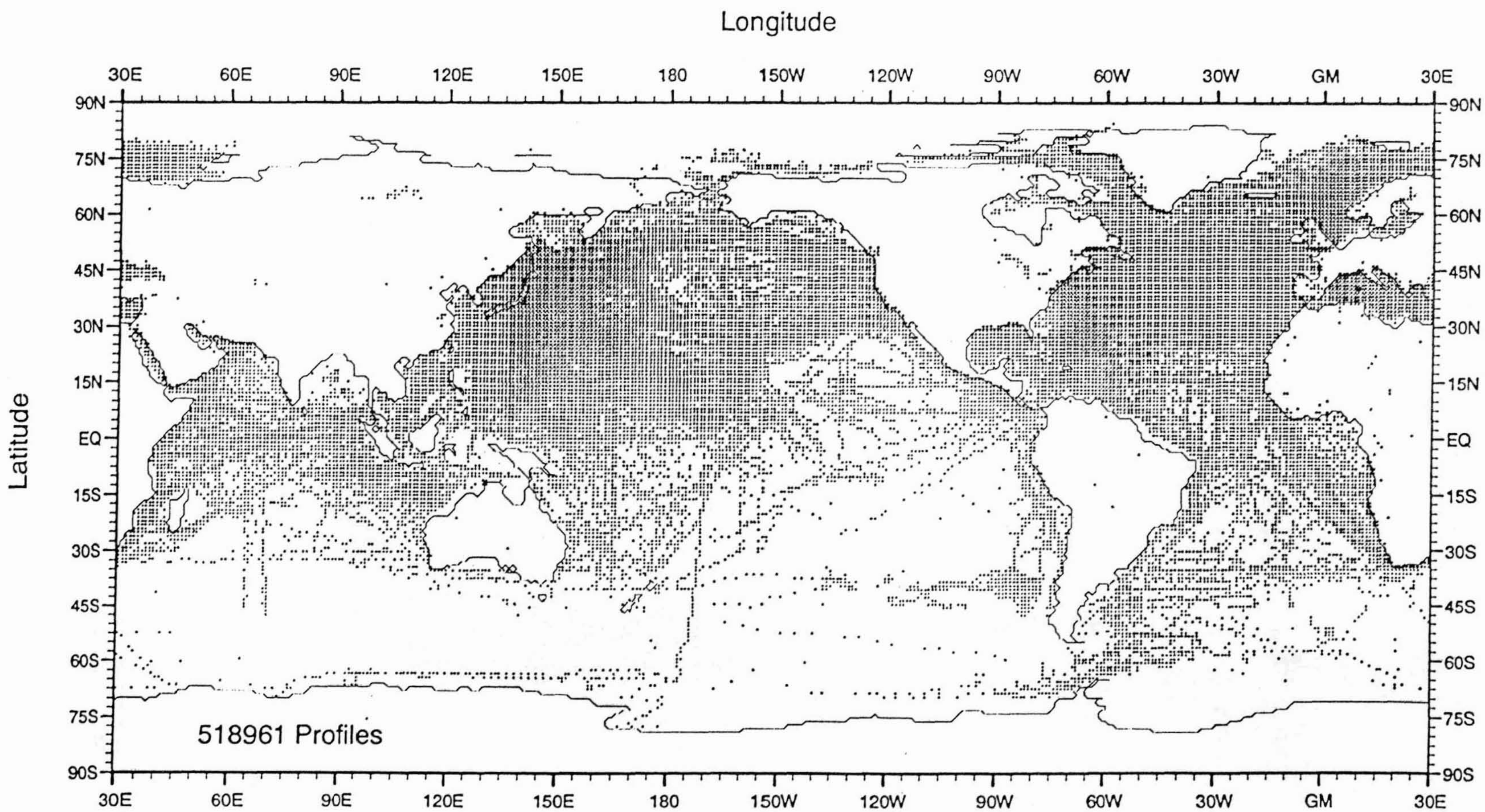
Annex 5

Progress of the GODAR Project

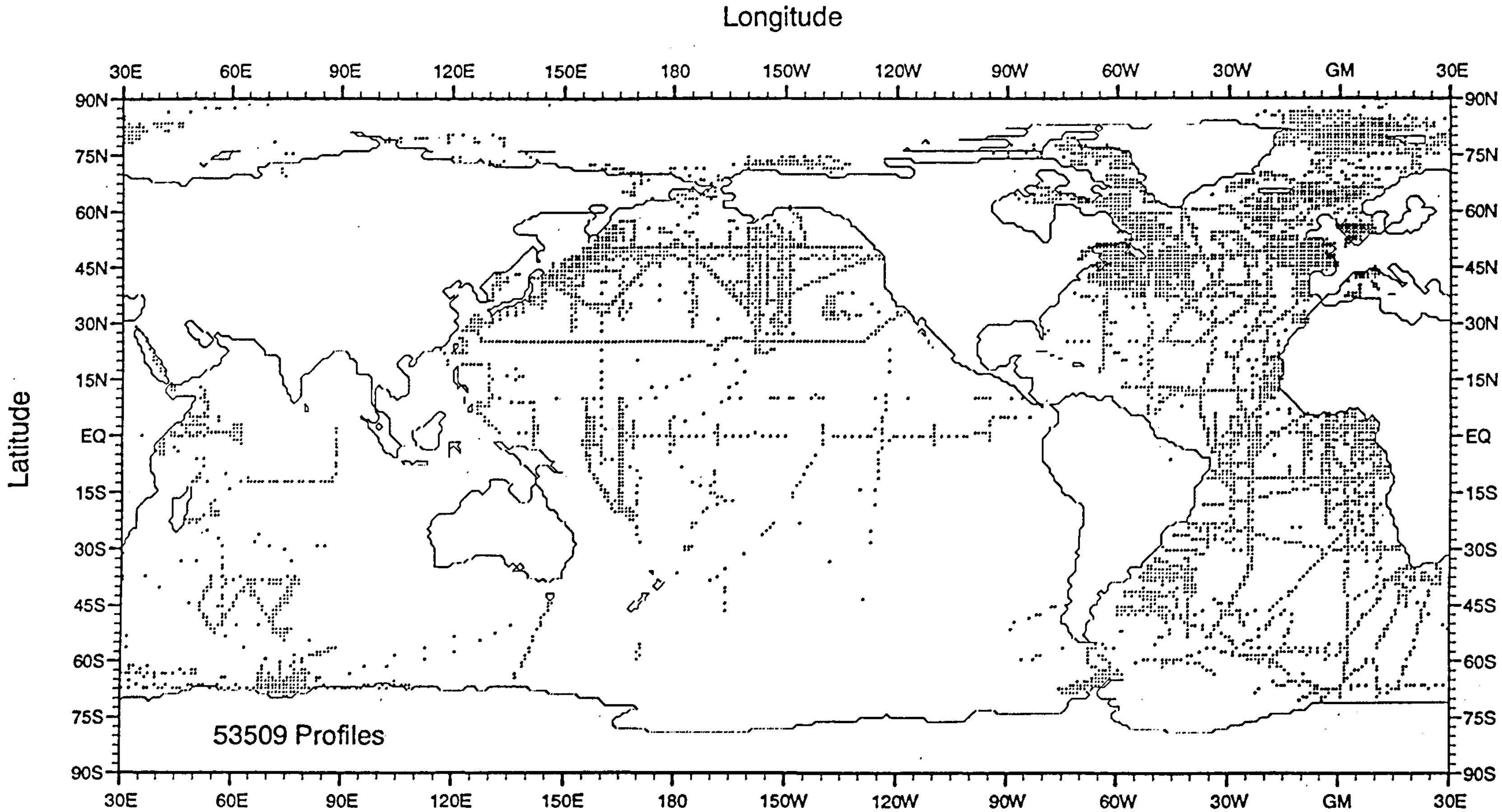
	Progress of GODAR in ICES Member Countries								
Country	GODAR Biology	GODAR CTD	Total CTD	GODAR MBT	Total MBT	GODAR Nansen	Total Nansen	GODAR XBT	Total XBT
Belgium						35	5066		
Canada		23625	24146	161543	299352	5959	87572	58325	121137
Denmark						15934	32168		3138
Estonia									
Finland						350	35773		
France	111	9554	12238	2791	3156	23637	44045	93	24037
Germany	219	399	1872		7507	4482	43564		30607
Iceland						7323	15470		3322
Ireland							2737		
Latvia									
Netherlands		788	820	4	7188	5725	14855		6301
Norway		2726	2726	157	890	48372	85064		1304
Poland	95					328	8044		1194
Portugal					2936		676		676
Russia	44			66490	70822	96931	192081		7165
Spain					196	68	1468		2715
Sweden			165			631	35672		4193
United Kingdom	2471	5345	6989	52147	126938	8148	11885	86986	142266
United States	997	5009	78895	277048	1015987	71977	244920	87903	725174
TOTAL	3,937	47,446	127,851	560,180	1,534,972	289,900	861,060	233,307	1,073,229



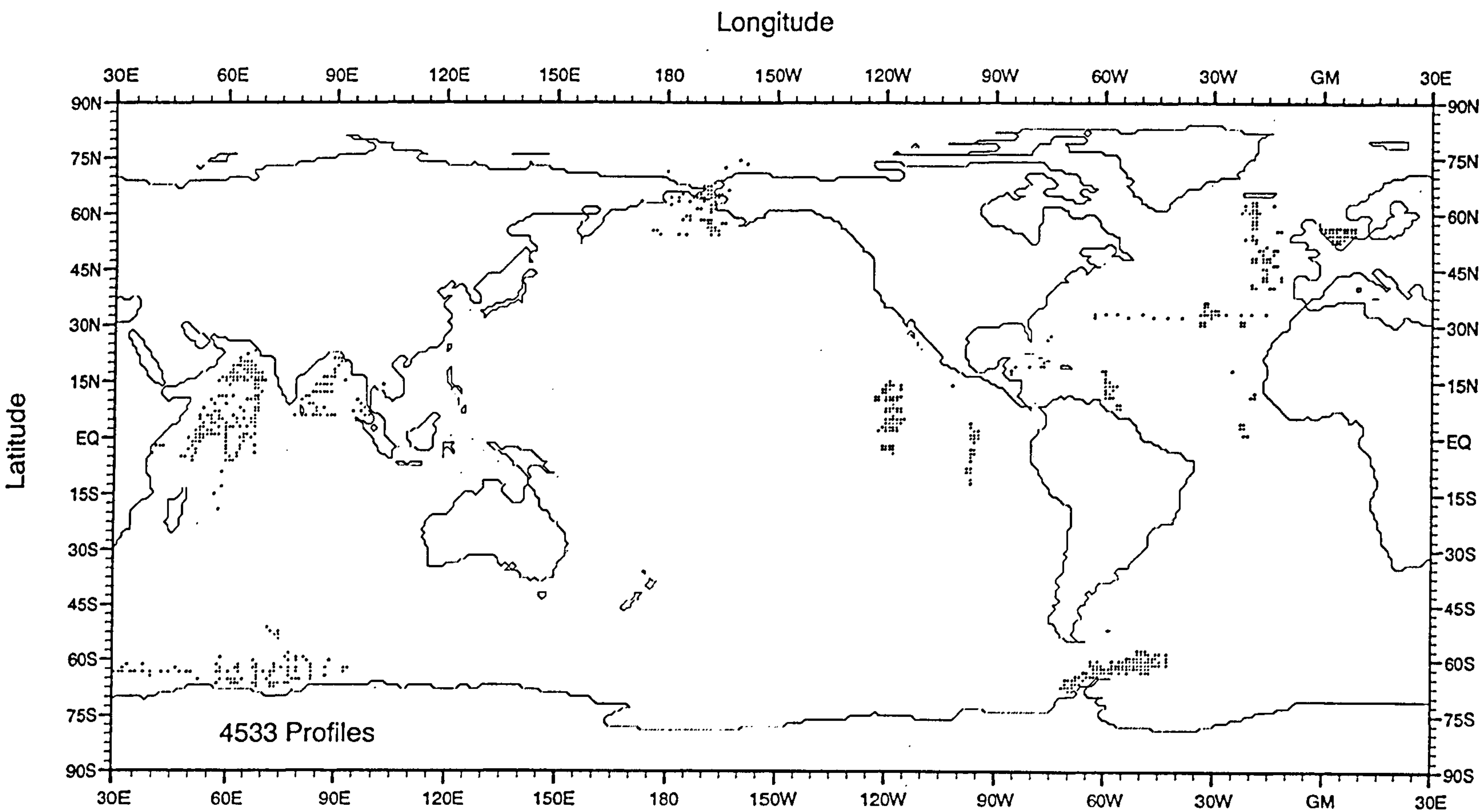
GODAR XBT Data



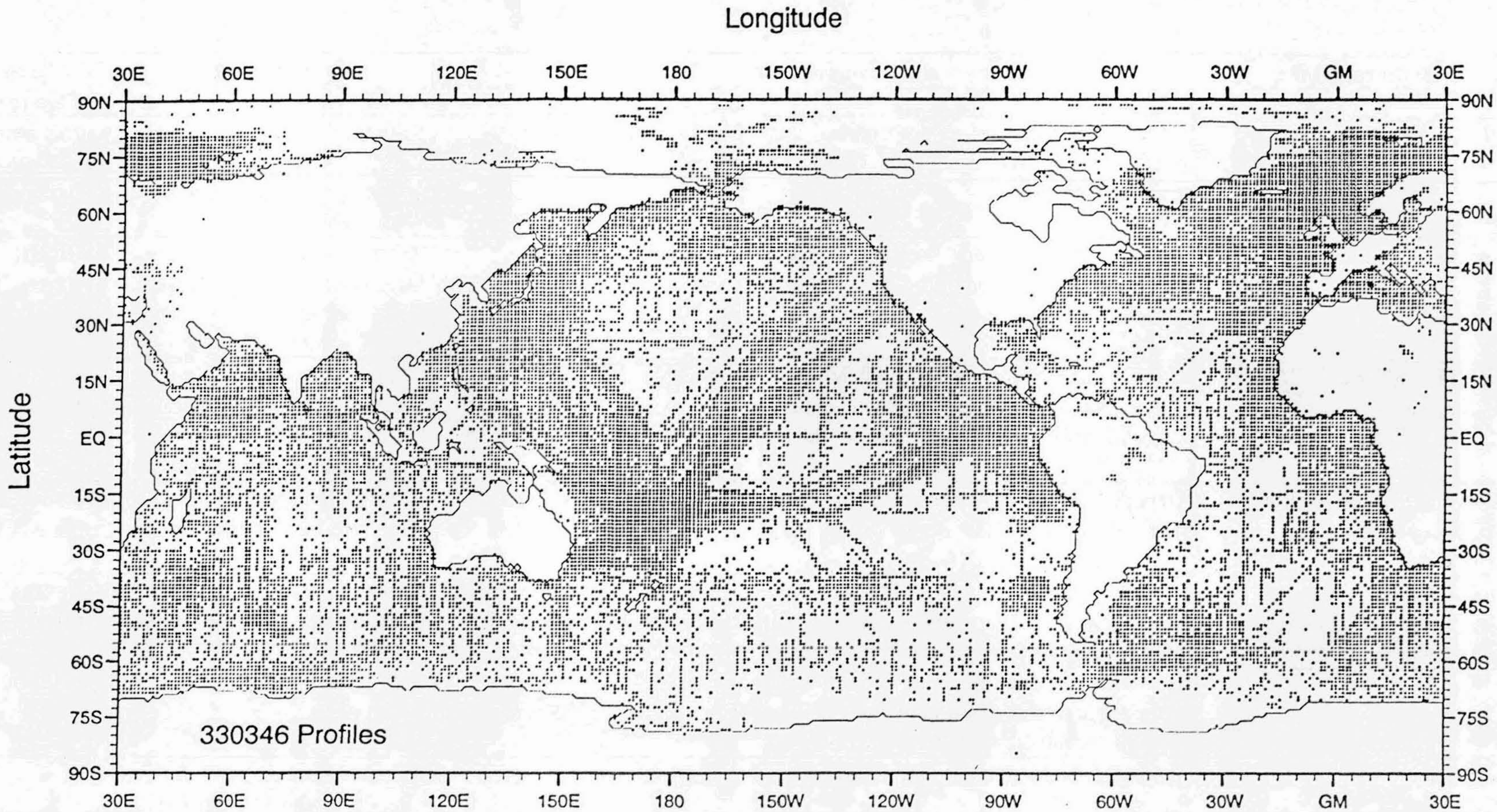
GODAR MBT Data



GODAR CTD Data



GODAR BIO Data



GODAR Nansen Data

Annex 6

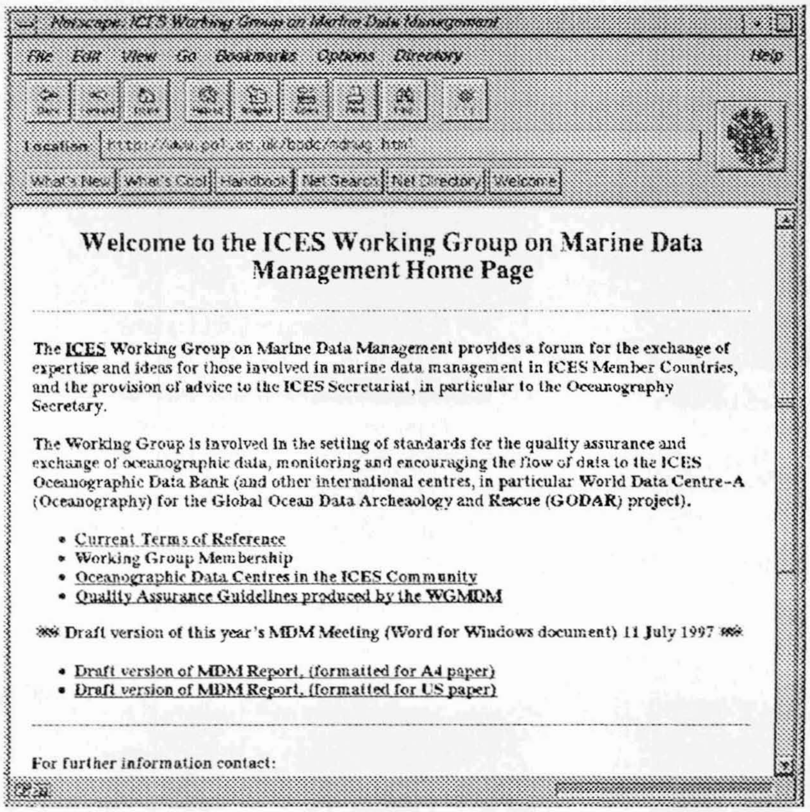
Biological Data Sets/Bases held by SISMER, France

BIOLOGICAL DATA SETS HELD By IFREMER / France

Data set Name	Description	Platform	Taxonomic Code system
BIOCEAN	Data base which handles descriptions, taxonomy and digital images of benthic and hydrothermal ecosystems : 60 cruises, 30 000 samples. Data since 1967.	Rdbms : Oracle User Interface :Ilog Client/Server and WEB Actual volume : 1 Go	Full name of the species No codification
ARPEGE	Data system for fishery resource : Land-based sampling : Evolution of the populations of commercial species (size, age, ...) Data since 1983.	Rdbms : Sybase User Interface : SuperBase Client/Server Actual volume : 565 Mo	RUBIN code from ICES
STATISTIQUES de PECHE (fisheries statistics)	Confidential data set of National fisheries statistics since 1970 : - Real time access to the reference data, exploitation of these data - Consultations and data extraction relative to fish production and effort.	Rdbms : Sybase User Interface : PowerBuilder Client/Server Estimated Volume : 2 Go	RUBIN code from ICES
ECHANTILLONAGE EN MER (sea sampling for fisheries)	Data system on sea sampling for fisheries. This data base in under construction.	Rdbms : Sybase User Interface : PowerBuilder	RUBIN code from ICES
QUADRIGE	Data system on the quality of the coastal environment : contains the data of 4 Networks : National Observation Network (RNO), Microbiological Monitoring Network (REMI), Phytoplankton Monitoring Network (REPHY) and the Impact of Great Developments (IGA). National database updated in real time by 20 laboratories, 2600 sampling stations, 1 500 000 analysis since 1974.	Rdbms : Sybase User Interface : PowerBuilder Client/server Actual Volume : 1 Go	Internal codification close to RUBIN code from ICES
REPAMO	Data base on breeding mollusc pathology.	Rdbms : Access User-Interface : Visual Basic	

Annex 7

Sample of MDM WG World Wide Web pages



Netscape: ICES Working Group on Marine Data Management

File Edit View Go Bookmarks Options Directory Help

Location: http://www.pol.ac.uk/bodc/mdmwg.html

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Welcome to the ICES Working Group on Marine Data Management Home Page

The ICES Working Group on Marine Data Management provides a forum for the exchange of expertise and ideas for those involved in marine data management in ICES Member Countries, and the provision of advice to the ICES Secretariat, in particular to the Oceanography Secretary.

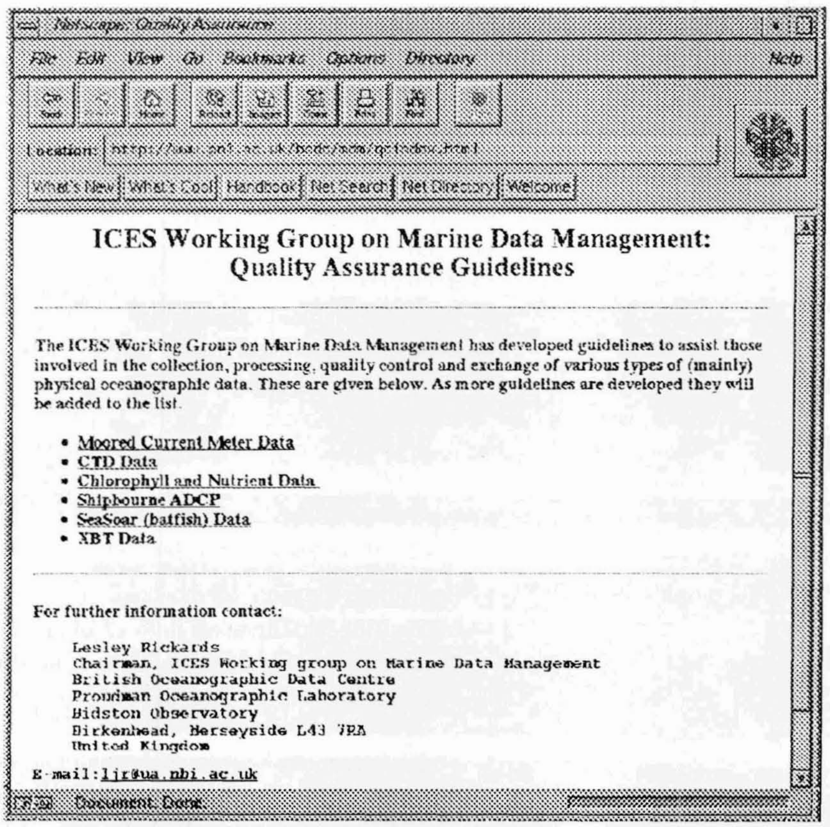
The Working Group is involved in the setting of standards for the quality assurance and exchange of oceanographic data, monitoring and encouraging the flow of data to the ICES Oceanographic Data Bank (and other international centres, in particular World Data Centre-A (Oceanography) for the Global Ocean Data Archeaology and Rescue (GODAR) project).

- Current Terms of Reference
- Working Group Membership
- Oceanographic Data Centres in the ICES Community
- Quality Assurance Guidelines produced by the WGMDM

*** Draft version of this year's MDM Meeting (Word for Windows document) 11 July 1997 ***

- Draft version of MDM Report, (formatted for A4 paper)
- Draft version of MDM Report, (formatted for US paper)

For further information contact:



Netscape: Quality Assurance

File Edit View Go Bookmarks Options Directory Help

Location: http://www.pol.ac.uk/bodc/wgmdm/qa/index.html

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ICES Working Group on Marine Data Management: Quality Assurance Guidelines

The ICES Working Group on Marine Data Management has developed guidelines to assist those involved in the collection, processing, quality control and exchange of various types of (mainly) physical oceanographic data. These are given below. As more guidelines are developed they will be added to the list.

- Moored Current Meter Data
- CTD Data
- Chlorophyll and Nutrient Data
- Shipbourne ADCP
- SeaSoar (batfish) Data
- XBT Data

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Document: Done.

Annex 8

SISMER/IFREMER suggestions for changes to CSR parameter codes

PRESENT ROSCOP CODES		⇨ PROPOSED MODIFICATIONS OR ADDITION
BIOLOGY		
Pelagos		
B06	Dissolved organic matter (inc DOC)	
B01	Primary productivity	⇨ Pelagic Production and Uptake
B02	Phytoplankton pigments (e.g. chloroph	⇨ Pelagos Pigments (chlorophyll, phaeopigments..)
B		⇨ Pelagos Organic matter fluxes
B		⇨ Pelagos Taxonomy and Biodiversity
B		⇨ Pelagos Population Dynamics
B		⇨ Pelagos Community Structure and Composition
B		⇨ Time series of Pelagos Observations
B07	Pelagic bacteria/micro-organisms	⇨ Microzooplankton
B		⇨ Microphytoplankton
B08	Phytoplankton	
B09	Zooplankton	
B13	Eggs & larvae	⇨ Meroplankton (larvae of benthic invertebrates in the pelagos)
B11	Nekton	
B14	Pelagic fish	⇨ OUT the Pelagic Fish (= Nekton)
B26	Mammals & reptiles	⇨ OUT the Mammals & reptiles (= Nekton)
Benthos		
B		⇨ Benthic Production and Uptake
B		⇨ Benthos Pigments (chlorophyll, phaeopigments..)
B16	Benthic bacteria/micro-organisms	⇨ = microbenthos
B17	Phytobenthos	
B18	Zoobenthos	
B19	Demersal fish	
B20	Molluscs	⇨ OUT the molluscs (= zoobenthos)
B21	Crustaceans	⇨ OUT the crustaceans (= zoobenthos)
B22		⇨ OUT the seaweed (= phytobenthos)
B		⇨ Benthos Organic matter fluxes
B		⇨ Benthos Taxonomy and Biodiversity
B		⇨ Benthos Population Dynamics
B		⇨ Benthos Community Structure and Composition
B		⇨ Time series of Benthos Observations
B		⇨ Bioturbation
Particulate Matter		
B03	Seston	⇨ = B71
B71	Particulate Organic Matter	
B72	Biochemical meas. (e.g. lipids, amino	⇨ Particulate Biogenic Elements
B		⇨ Major Biogenic Elements in Sea Column Particles
B		⇨ Trace Biogenic Elements in Sea column Particles
B		⇨ Microbiology in Sea column Particles
B		⇨ Major Biogenic Elements in Settling Particles
B		⇨ Trace Biogenic Elements in Settling Particles
B		⇨ Microbiology in Settling Particles

Sediment

B		⇨ Major Biogenic Elements in sediment
B		⇨ Trace biogenic Elements in sediment
B		⇨ Microbiology in Sediment

Instruments/Methods

B28	Acoustic reflection on marine organ	
B37	Taggings	
B64	Gear research	
B65	Exploratory fishing	⇨ = Fishing technics
B73	Sediment traps	
B		⇨ Plankton Net
B		⇨ Dredge (for biology)
B		⇨ Grab (for biology)
B		⇨ Corer (for Biology)
B		⇨ Benthic Chamber
B		⇨ Manned submersible
B		⇨ Unmanned submersible
B		⇨ Underwater photography/video
B90	Other biological/fisheries meas.	

Special

B10	Neuston	
B25	Birds	

PHYSICS

D01	Current meters	⇨ Fixed Current Meters
D03	Currents measured from ship drift	
D04	GEK	⇨ Underway Current Meters (GEK, ADCP ..)
D05	Surface drifters/drifting buoys	
D06	Neutrally buoyant floats	⇨ Subsurface Floats
D09	Sea level (incl. bottom p. IES)	
D71	Current profiler (e.g. ADCP)	⇨ Fixed current profiler (e.g. ADCP)
D72	Instrumented wave measurements	
D		⇨ Acoustic Tomography
D90	Other physical oceanographic meas.	

GEOLOGY/GEOPHYSICS

G01	Dredge	
G02	Grab	
G03	Core rock	
G04	Core soft bottom	
G		⇨ Geological sampling by submersible
G08	Bottom photography	⇨ Bottom photography *and video*
G24	Long/short range side scan sonar	⇨ Long/short range side scan sonar *including multi-beam data* ⇨ or *Acoustic imagery*
G26	Seismic refraction	
G27	Gravity measurements	
G28	Magnetic measurements	
G71	In-situ sea floor meas./sampling	⇨ In-situ sea floor *physical properties* ?measurements (do not include geological sampling in this code. There are already G01 to G04)
G72	Geophysical meas. made at depth	⇨ must be suppressed . See suggestion below
G73	Single-beam echo-sounding	
G74	Multi-beam echo-sounding	

G75	Single channel seismic reflection	⇨ Single channel seismic reflection / *mud penetrator*
G76	Multi-channel seismic reflection	⇨ Multi-channel seismic reflection /*Expanding Spread Profile*
G		⇨ Ocean Bottom Seismometer (OBS)
G90	Other geological/geophysical measurements	

To have more pertinent criterion to select data sets, a distinction between remote sensing from the surface, remote sensing at depth and in-situ/bottom measurements should be introduced in the code. A possibility is the introduction of an additional character : S as surface, D as « at depth » for deep towed devices, and B as bottom. For example, multi-channel seismic reflection at depth (French cruise PASISAR) would be described by G76D.

CHEMISTRY

H09	Water bottle stations	
H10	CTD stations	
H11	Subsurface meas. underway (T,S)	
H13	Bathythermograph	
H16	Transparency (e.g. transmissometer)	⇨ Transparency/Turbidity
H17	Optics (e.g. underwater light levels)	
H21	Oxygen	⇨ Dissolved Oxygen
H22	Phosphate	⇨ Dissolved Phosphate
H23	Total - P	⇨ Total Dissolved P
H24	Nitrate	⇨ Dissolved Nitrate
H25	Nitrite	⇨ Dissolved Nitrite
H26	Silicate	⇨ Dissolved Silicate
H27	Alkalinity	⇨ Dissolved Alkalinity
H28	pH	⇨ Dissolved pH
H30	Trace elements	⇨ Dissolved Trace Elements
H31	Radioactivity	⇨ Sea Water Radioactivity
H32	Isotopes	⇨ Dissolved Isotopes
H33	Other dissolved gases	⇨ Other Dissolved Gases
H71	Surface measurements underway (T,S)	
H72	Thermistor chain	
H73	Geochemical tracers (e.g. freons)	⇨ Dissolved geochemical Tracers
H74	Carbon dioxide	⇨ Dissolved CO2
H75	Total - N	⇨ Total N Dissolved
H76	Ammonia	⇨ Dissolved Ammonia
H90	Other chemical oceanographic meas	
X		⇨ Major Inorganic Elements in Sea Column Particles
X		⇨ Trace Inorganic Elements in Sea Column Particles
S		⇨ Major Inorganic Elements in Settling Particles
S		⇨ Trace Inorganic Elements in Settling Particles

M01	Upper air observations
M02	Incident radiation
M03	Near surface meteorology
M04	Sea ice
M05	Occasional standard measurements
M06	Routine standard measurements
M71	Atmospheric chemistry
M90	Other meteorological measurements

POLLUTANTS OR PARTICULATE MATTER ?

P01	Suspended matter
P02	Trace metals
P03	Petroleum residues
P04	Chlorinated hydrocarbons

P05	Other dissolved substances (??)
P12	Bottom deposits
P90	Other contaminant measurements

Taxonomic Code Types

	'Intelligent' key (Old NODC Code)	Taxonomic serial number (New NODC TSN)
Advantages	*Can see hierarchy from number itself	*Number translates to unique name *Doesn't change even if taxon gets reclassified
Disadvantages	*Run out of numbers in the 'right place' *Can't translate uniquely from number back to name	*Can't see hierarchy from number only

NODC Taxonomic Code Version 8.0 CD-ROM (May 1996)

- Includes:
  - TSNs for about 250,000 records
  - final list of old NODC codes
  - hierarchy and synonymy
  - some common names
- Most can be viewed on ITIS page:
  - http://www.itis.usda.gov/itis/

What is ITIS?

- Partnership
  - US Federal agencies collaborating with systematists in the Federal, state and private sectors to provide credible taxonomic information
- Components
  - Dynamic, relational on-line database
  - Taxonomic Work Bench tool
- Organization
  - Steering Committee
  - Two Work Groups - Taxonomy and Database

ITIS Database

- **Content**
  - Scientific nomenclature and classification, with author, date
  - Synonyms and common names
  - Unique number linked to a name (TSN)
  - Source information and expanded documentation
  - Change tracking (future)
- **Scope**
  - All taxa except viruses in all habitats
    - terrestrial and aquatic (marine and fresh)
  - Primary geographic focus: North America
  - Includes NODC Version 8.0, PLANTS, and more

Taxonomic Code Products

- NODC Taxonomic Code
  - TSN and correct spelling
  - synonymy
  - hierarchy
  - duplicate name differentiation
- ITIS
  - US Federal collaboration/coordination
  - Expanded documentation and tracking
  - Web access at: http://www.itis.usda.gov/itis/

Data	TSN or SN and name	mod	realm	troph	sex	lifest	feat	dimen	size
Calanus finmarchius (adult males)	85272 *Calanus finmarchicus*				M	adult			
Foraminifera + Radiolaria	44030 Foraminifer**id**a 46088 Radiolaria								
Biddulphia sp. (frustule)	2678 *Biddulphia*	sp.				dead			
other Mollusca	69458 Mollusca	other							
Phyllosoma	97646 Palinuridae					X			
algae (benthic)	-5011 Algae		benth						
small truncated-conical flagellate	-5014 Flagellate						tru/ con		small (-1)
phototrophic nanoplankton	-5015 Plankton			photo					0.002 to 0.02
5 u coccoid paired cells	-5015 Plankton						sph/ pair	2.5 u radius	

Annex 10

Recommendations

The Working Group on Marine Data Management (Chairman: Dr. L.J. Rickards, UK) will meet in Brest, France from 20-23 April 1998 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, including consideration of biological oceanographic data types;

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

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

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

f) Investigate the Data Services available from NODCs in ICES Member Countries and suggest a scheme to improve cooperation between countries to provide and improved service to the community;

g) Investigate and evaluate the Data Dictionaries available to the marine science community.