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Hydrography Committee

Report of the

WORKING GROUP ON MARINE DATA MANAGEMENT

Torshavn, 23 - 25 April 1992

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1. Opening of the meeting

The meeting was opened at 0930 on 23 April 1992, hosted by the Fisheries Laboratory of the Faroes, Torshavn. Participants were welcomed by Bogi Hansen of the Fisheries Laboratory, who also explained local arrangements.

Members of the Working Group present were: P. Alenius, Finland, J. Blindheim, Norway (Chairman), N. Håkansson, Sweden, K. Jancke, Germany, L. Lastein, Faroes, S. Lygren, Norway, H. Loeng, Norway, L. Rickards, UK (Rapporteur), L. Smit, the Netherlands, C. Smith, UK and J. Szaron, Sweden. The Council was represented by G. Hopwood. Apologies for absence were received from E.V. Collins, U.S.A., E.W. Henderson, UK, C. Maillard, France, P. Bo Nielsen, Denmark and C. Wulf, Germany. Also the announced participation by a representative from the IOC Secretariat was cancelled shortly before the meeting.

2. Adoption of the Agenda

The agenda for the WG meeting was adopted as a resolution of the Statutory Meeting in La Rochelle (C.Res. 1991/2:38, Annex 1). Election of a new chairman would be included under Any Other Business.

3. Management of ADCP and SeaSoar data

The management of SeaSoar and ADCP data presents new challenges to those involved in data management, since vast quantities of data can be collected in a relatively short time. The need to manage these data properly was recognised as important and the MDM group is in a unique position to set standards for data archival and to collaborate with data collecting laboratories on data handling procedures.

i) ADCP data

ADCPs are instruments used to measure current profiles and may be used as fixed instruments (i.e. on the sea bed or moored) or may be mounted on the hull of a ship and collect data as the ship travels along its cruise track.

Noting that data from moored or bottom mounted ADCP systems can be handled as other current meter data, it was agreed that discussions should concentrate on shipborne ADCPs. It was then discussed how the shipborne ADCP operates and collects data, and known sources of error were identified.

Each ADCP beam measures a single velocity component, so three beams are needed to obtain three components of velocity. The RD Instruments ADCP (the instrument used by almost all operators) has four beams which allows some redundancy in the system. This allows an error velocity to be calculated, which can be used as a means to estimate data quality. The parameters recorded by the RD Instruments ADCP include:

two horizontal components of velocity (average of a given ensemble of pings),
vertical velocity,
per cent good (a given percentage threshold for accepted pings),
error velocity (difference between the two vertical velocity components measured),
AGC (automatic gain control), the strength of backscattered signal,
header data, including date/time and position.

ADCPs can operate in bottom tracking mode (in water depths <530m for the 150 kHz version). This means that at given intervals a bottom echo pulse (longer than the water sampling pulse) is emitted which is used to reference the ships speed over the bottom. This enables the calculation of accurate current profile velocities.

In deeper water where bottom tracking is unavailable, correction for ship speed is more difficult. A good navigation system (i.e. GPS) is essential. G. Hopwood suggested that differential GPS should be used to improve accuracy. This requires a shore based station to act as an additional receiving station and it is not widely used. It depends further on a system of components such as the ADCP itself, the orientation of the transducer relative to the axis of the ship, the accuracy and stability of the ship's gyrocompass, each of which contributes its own errors.

It was stated that various known problems occurring with ADCP data include:

- Gyro errors and stability, which depends on the make of gyrocompass. One source of error is the Schuler oscillation, a direction error with a period of 84 minutes and an amplitude of typically 0.5-1.0 degree. The Schuler oscillation is often excited when the ship makes a turn. A good vertical reference is also essential.
- Transducer misalignment, which is a result of the difficulty in measuring the orientation of the transducer in the ship. The alignment itself need not be in any specific direction, but the orientation must be known. The system can be calibrated to determine the correction to the speed and direction that needs to be applied to motion relative to the ship measured by the instrument.
- Ship position, important in deep water.
- Contamination of data by high ship speed (propeller noise).
- In rough seas, breaking waves generate bubbles near the surface which entrain under the ship's hull. This attenuates the transmitted acoustic waves, causing a reduction in profiling range.
- Change of ship direction, which may result in spurious data .
- Ship speed zero.

J. Blindheim described how ADCP data are handled at IMR, Bergen. The data are stored in an INGRES database, with a similar structure to CTD data (i.e. a table of header records and one for current profile data records). In this database bin depth, E-W and N-S current components are stored. Per cent good is used to discard bad/suspect data prior to loading onto the database. Vector plots are produced to show the currents at various depths. These may also show up erroneous currents, for example, when the ship is slowing down or turning. These are edited out interactively using a mouse to point and edit the data.

L. Rickards described the ADCP data held by BODC from the NERC North Sea Project. These are from ~18 cruises collected in bottom tracking mode. For this data set, BODC have decided to discard the vertical component of velocity as was felt likely to be open to misinterpretation. They have also combined the information given by the per cent good and error velocity into a quality flag (marking the data as good, suspect or null). In addition, data from the top bin will have a special flag associated with it, as recommended by the Principal Investigator, so that they can easily be distinguished from other data since they appeared to be inconsistent with them. This data set was part of larger data set to be included on a CD-ROM of North Sea Project data. This was the first time that BODC had dealt with ADCP data and they were, in effect, starting to set up some quality control procedures.

A discussion followed on what parameters to store, from which it emerged that at this stage it was probably best to store all the parameters collected, but that N-S and E-W components of current should be stored in preference to current components relative to the

ship. N. Håkansson suggested that date/time/ship code should serve as a unique identifier for the data in databases.

Discussions in the previous day's session of the Working Group on Oceanic Hydrography (OHWG) had concluded that there were so many unknowns in ADCP data that it should not routinely be stored by data centres. In particular this applies to data from deep water where bottom tracking is unavailable. In support of this, J. Blindheim had received a letter from J. Gould at IOSDL, UK, stating that quality and usefulness of the complex ADCP data depended upon many variables. He was cautious about getting too involved and being swamped with data of questionable quality.

During the joint session with the OHWG it emerged that RD Instruments has now produced software which will log each ping. This will greatly increase the volume of data which could be stored, but will allow data to be reprocessed as required. The OHWG were not sure how valuable it was to store ADCP data at data centres since at this stage much of the data were considered experimental. Only data obtained in bottom tracking mode or with the use of differential GPS were considered fairly reliable. It was concluded that each institute should store their ADCP raw data and send an inventory of these data with an estimate of their quality to the appropriate data centre. However, they appreciated the needs of MDM to be in a position to cope with these data. Data centres are not actively searching out shipborne ADCP data, but wish to be in a position to handle them intelligently when the need arises and thus wish to be aware of any pitfalls in handling the data.

Following the joint session MDM reviewed the discussion and concluded that it was of utmost importance to include an information file to accompany the data to include information such as initial instrument setting and processing. This is set out in more detail in the guidelines in Recommendation 1. In setting out these guidelines, the advice of the OHWG - of not routinely collecting ADCP data into data centres because there are too many unknowns and problems - will, of course, be taken into account.

It was noted that Japan was the IOC RNODC for shipborne ADCP data and that, although they had volunteered to send information to BODC relating to ADCP data handling techniques, nothing had been received as yet. L. Rickards volunteered to chase this up. She will also investigate whether there is a WOCE ADCP centre, one was to be set up as a referral/information centre.

ii) SeaSoar data

SeaSoar (also known as Batfish or Dolphin) data are collected by a CTD unit housed in a towed body fitted with wings for vertical manoeuverability. When it is towed behind the ship, it undulates between two depths and is controlled from the ship by means of signals down the towing cable. Ship speeds for operation may vary between 4 knots (2m/s) and 10 knots, depending on weather conditions. The SeaSoar undulates in a sawtooth pattern with a period of about 10 minutes between approximately 10m and 300m (at 8 knots). Thus a complete ascending and descending profile will be made every kilometre. Data are recorded on both ascent and descent. SeaSoar measures temperature, conductivity and pressure but can be adapted to include extra sensors (for example, oxygen, fluorescence for chlorophyll). Date and time are also logged. Data are usually reduced to 1 second averages, and parameters like ship's speed, gyro heading and bottom depth may be merged with the data.

Although SeaSoar measures familiar parameters, it cannot be calibrated *in situ* in the same way as a CTD (i.e. with a Rosette sampler). During long tows of the instrument, the conductivity cell is prone to biological fouling which does not always clear, but may be cumulative and lead to salinity offsets. Hence one must be realistic about the quality of the data obtained. Temperature, pressure and conductivity calibrations should be obtained from

pre-cruise laboratory calibrations, as recommended by the SCOR WG 51 publication (Unesco technical papers in marine science, 54, Unesco 1988). As commented by J. Gould, before and after the CTD being deployed in the SeaSoar unit, it should be lowered as a conventional CTD and calibration samples be taken. It was noted that thermosalinograph data may be used for statistical comparison with the SeaSoar data (when it is near the surface). For such comparisons, water samples can also be taken from the non--toxic supply for salinity determinations. These samples should be timed to coincide with the SeaSoar being near the surface.

Two possibilities have been suggested for handling SeaSoar data:

a) Store the data collected on one SeaSoar deployment as one time series (parameters to include pressure, temperature, salinity, etc., and possibly distance along track and date/time). Navigation information needs to be merged with the data.

b) Each descent or ascent can be treated as a separate "station". The distinction between descents and ascents give a better opportunity for systematic correction of hysteresis (especially for oxygen). Additionally verticalization into regular CTD station format makes storage, retrieval and sorting of the final corrected data easier.

Some discussion took place around the idea of splitting the data into "casts". The resulting data would look like CTD data with a header record, including information such as start/-end position, up/down indicator, date/time and data records containing pressure, temperature and salinity, plus any other parameters recorded (i.e. fluorescence and oxygen). Ship/-date/time could be used as a unique identifier to link the header information and data in a database. It was agreed that an information file should be stored with the data giving processing information, quality control procedures, calibration information and the details of changing calibrations during the tow.

L. Rickards briefly mentioned a SeaSoar database being set up at BODC as part of the Vivaldi experiment to be carried out as part of the UK contribution to WOCE. Although BODC will keep copies of the raw 1 second data and an index to these will be available, the working database will comprise pseudo CTD cast data at 5 dbar intervals. Quality flags are attached to data cycles so that comments on data quality are translated to quality control flags, although the comments would also be retained.

The discussion at the joint session with the OHWG centred around data quality and how to indicate this in the data. The OHWG felt that accuracies of 0.01 PSU were attainable when using a Neil Brown CTD. All agreed that the accuracy of the data must be included, but there was a diversity of opinion on how this should be achieved. Possibilities included: an overall comment indicating the accuracy of the data set, a quality flag set to indicate the quality of each "profile", or flags attached to the data cycles themselves. Overall it was felt that the important thing was for the Principal Investigator to state the accuracy of his data in the way most convenient to him, rather than constraining him to a particular way.

Although initial discussions were based around the idea of splitting the data into pseudo CTD casts, in the end the feeling of the OHWG was that it would be better to retain the original data series, so that one series would be equivalent to one deployment of SeaSoar, or a leg of a deployment. In this case navigation information should be merged with the data. This would usually result in series of 1 second values.

The OHWG agreed that an information file containing relevant calibration/processing/-quality control details should accompany the data, including any information about any corrections made to the data.

Following the joint session MDM reviewed the situation and concluded the following: keep

the 1 second time series, merge navigation information and include in the header ship/cruise and date/time. A documentation file should accompany the data and comprise information on calibrations, processing procedures/quality control and a format description. This is given in more detail in Recommendation 2.

4. Assess developments PC software for supporting data management Applications

The following packages were reviewed:

i) ASAP

A data system has been developed to chart pollution in the Gulf region by Delft Hydraulics, the software house BSO/ORIGIN and MARIS. The product has been given the name ASAP (A System for the Analysis of Pollution). In the system a large variety of data and meta-data can be recorded, four main categories of data are distinguished - sources of pollution, measurements, ecology and standards.

In developing the system much use was made of existing software. The database was built using DBase/Clipper, while additional processes can take place using Lotus 1-2-3 and StatGraph. For data presentation Harvard Graphics is utilised. Topographical data are presented with Atlas GIS.

ii) UK Digital Marine Atlas

The United Kingdom Digital Marine Atlas (UKDMAP) is being developed as a reference work on all aspects of the coastline and seas around the British Isles which will be of use to the scientific, educational, government and commercial sectors. It contains a wide diversity of themes, with a variety of presentation methods, including contoured plots of physical, chemical and geological parameters, colour coded distribution charts of sea-use, biological and fisheries information, oceanographic data catalogues, and geo-referenced directories which present detailed information on demand. A brochure describing the product and a User Guide is available. System requirements are: IBM PC or true compatible, DOS 3.0 or later, 640kb of RAM, hard disk with 7 megabytes of free space, EGA/VGA display, mouse desirable but not essential. The next release, which should include extra software features in addition to many more thematic charts, is due in the next few months.

iii) GLOSS Station Handbook

The Global Sea Level Observing System (GLOSS) is based on an international network of sea level measuring stations, coordinated by IOC. As part of the GLOSS programme, a GLOSS Handbook has been complied containing a comprehensive database of information about the 300 GLOSS tide gauge stations. A full description of each gauge in the network is provided including tide gauge details, benchmark information, data delivery systems and the GLOSS national contact point. It is freely available to members of the scientific community. System requirements are: IBM PC or true compatible, DOS 3.0 or later,512kb of RAM. Version 1 was released in June 1991, updated information is now being collated for the production of Version 2 hopefully by the end of 1992.

iv) European Directory of Marine Environmental Data (EDMED)

BODC has been contracted by the CEC, through a supporting initiative to the MAST programme, to undertake the first phase in the development of EDMED as a PC based referral

system to the main marine data collections within the European Community. So far BODC have developed PC software to support input to the Directory and to enable the Directory to be searched and browsed and for information to be extracted out on a selective basis. EDMED is being designed to be compatible in content with other major data directory systems now being developed (for example, the MEDI system of IOC). The Directory currently contains entries for Ireland, which was chosen for the pilot phase, but during 1992, entries for the remaining EC countries will be compiled and added to the PC based system. One feature of the system is the ability to search on keywords which have been assigned as the data set descriptions have been loaded to the Directory.

v) North Sea Project CD-ROM software

A large volume of data covering physical, chemical, biological and sedimentological parameters has been collected by UK laboratories as part of the NERC North Sea Project during 1988 and 1989. This data set is being compiled by BODC and should be available on CD-ROM by the end of the year. PC software has been developed to display images of time series of CTD data or water sample data in a variety of ways, to extract data from individual sites - by date and time, cruise number or parameter(s) and to dump these to a file. In addition to these data the CD-ROM will also contain surface underway data, shipborne ADCP data, current meter and thermistor chain data.

vi) KLOTET, a 3-dimensional plotting package

KLOTET is a PC-software package to present coastlines, and other geographical features of the earth's surface, together with marine data. The user specifies the part of the earth's surface he wants to project by giving the latitude and longitude for a focal point. The perspective is then determined by specifying the direction, elongation and distance in relation to the focal point. Marine data are presented as staples. The data input file is a flat ASCII file where each record consists of latitude, longitude and parameter value(s). It is also possible to store the final picture in an HPGL-file for later inclusion into, for example, a word processing document. A tutorial (in Swedish) provides loading and operation instructions. In the near future a window-based version of the software will be available, including a version in English.The system requirements are: IBM PC or true compatible, DOS 3.0 or later version, 640 kb of RAM and at least 1 Mb of hard disk space. The software is commercially available from Envirograf AB, Gotgatan 108, S-1162 Stockholm, Sweden. The cost of the software is about 3800 SEK.

vii) Software for plotting shipborne ADCP profiles

Simple quality control software has been produced to take an RD Instruments ADCP data file and plot out the current profiles. Parameters plotted include horizontal velocity components, error velocity, per cent good and AGC. It is possible to step through the profiles one by one, and also view the data values for each bin, or to automatically plot one profile after another. When a complete file has been read, a histogram of the error velocities is displayed, followed by a histogram of the per cent good - both of these can be saved to a file, for later re-display, if required. These histograms are a useful indication of overall data quality. The software was written for use in checking out the NERC North Sea Project ADCP data, but could be adapted quite easily for other data sets.

viii) Logging and postprocessing of CTD data

Following discussions during the MDM meeting in 1990, PC software for logging and post processing of CTD data (N. Brown, Mark III) was developed at IMR, Bergen. Post processing follows the procedures recommended by the SCOR WG 51 (Unesco technical papers in marine science, 54. Unesco 1988). System requirements are: IBM PC (prefer-

ably 386 or higher), GPIB interface, DOS 3.0 or later, ~ 50 Mb of hard disk space for data storage, alternative medium for data transport. The system and documentation is available from the Institute of Marine Research, Bergen.

It was noted that many of the software products demonstrated were for specific tasks which did not lend themselves to adaption for other tasks, although other related applications could be seen. For example, the North Sea CD-ROM display software could be would be useful for display of other CTD data collected at a repeat site. The ADCP plotting software was thought to be useful, as a quick look facility for the data. It was further noted that IOC is compiling an inventory of software packages as part its OCEAN-PC project. MDM will follow with interest the developments associated with this project.

5. Any Other Business

i) Election of new chairman

J. Blindheim explained that he had been chairman for 4 years and it was now time to elect a new chairman. He proposed that the next chairman should be L. Rickards, and this was agreed unanimously by the Working Group.

ii) Ocean Climate Data Workshop (OCDW)

J. Szaron gave a brief review of the OCDW which was held in Washington, February 1992 which had attracted about 120 people. The ICES Hydrographer had presented a paper on data archaeology. The papers from the Workshop were due to be published. In the meantime, copies the workshop report (IOC Workshop Report No. 78) were distributed to the WG. Some PC software was demonstrated at the workshop, including Ocean Atlas for Mackintosh and Atlast for PCs.

iii) Institute of Marine Research database

S. Lygren gave a review of the database currently being set up at IMR, Bergen. The Institute has a need for an integrated database and a steering group was formed to oversee the design and implementation of this. There was a need to compare data which had previously been stored on different computers using different database systems. The new system is based on a UNIX platform with 2 large database servers which are connected to Mackintosh and IBM PC machines. Different disciplines with different needs have been brought together to meet the complex task of producing a structure to everyone's liking. The present system is based on an INGRES relational database and has a large number of tables. Data and information can be extracted with SQL queries. Gradually application software will be built up to access the database.

iv) International Bathymetric Chart of the Northern Atlantic (IBCNA)

A letter from Thomas Osborn, chairman of the Hydrography Committee, containing information about IBCNA from IOC was distributed to the WG and discussed during the joint session with OHWG. The discussion centred around the request for research vessels at sea to collect soundings and deliver the data to Hydrographic Offices (HOs) for quality control. From there, data will be forwarded to the IHO who will prepare maps. The OHWG was asked to support this by collecting data where possible and submitting the data to HOs. S-A Malmberg was concerned that the oceanographers did not meet the accuracy requirement of the HOs and that their data may not be accepted. C. Smith, G. Hopwood and E. Buch explained that the GEBCO series had different accuracies and that HOs were compelled by IHO to accept all data submitted. Nevertheless guidance would be required on procedures and standards from the IHO to provide the best quality data. There was some

discussion about software for data collection. In addition it was pointed out that many sonars are not digital, but paper records are acceptable if properly annotated.

It was suggested that the area covered should be extended further north, which met with wide support. There was general agreement that the OHWG should support the initiative from a data collection point of view.

v) Topics for the next meeting

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

a) *Data quality control, in cooperation with OHWG.* During the discussions of ADCP and SeaSoar data, a need emerged for data quality control to be taken up in general. This may also relate to conventional CTD data and observation.
b) Examine oceanographic data flows within the ICES area of interest and make recommendations to improve the situation. This will look at the state of data flow between IODE and other national centres and the ICES Service Hydrographique and will make use of tools such as ROSIN and ROSEARCH.
c) Consider ways of rising the profile of the data held by the ICES Service Hydrographique. With the development of products like the UK Digital Marine Atlas (UKDMA), digital data sets from the SH (for example, the IYFS data set) can be given wider exposure. This will investigate fisheries and oceanographic products in UKDMA and others, and evaluate how these can be used to the best advantage.
d) *Investigations of coastline and bathymetric data sets available* . It was stated that there is a need for files with digitized coastlines and main bathymetry for the North Atlantic and the Nordic Seas. This will be useful for modelling purposes and oceanographic work in general.
e) *ADCP and SeaSoar data management: update.* This is meant as a summing up of this topic and to act on possible remarks from the Statutory Meeting and also to include input from the USA and the RNODC(ADCP) in Japan.
f) *Review of databases.* Several data centres and institutes are now establishing data banks based on commercially available databases. It was felt useful to review this development and exchange experiences.
g) *Assess developments in PC software for data management applications.* New PC software may be reviewed and demonstrated.

i) Time and place of next meeting

The WG expressed its wish that the next meeting should be held at the Institute of Marine Research, Bergen, 19-21 April 1993, to allow joint discussions of data quality control standards with the OHWG, which meets 21-23 April 1993.

In closing the meeting, the Chairman thanked the participants for their active and valuable contributions and thanked B. Hansen for an efficiently arranged meeting. L. Rickards, on behalf of the WG, expressed thanks to J. Blindheim for his work as chairman over the last 4 years.

Annex 1

Agenda

ICES Res. 92/2:83

The Working Group on Marine Data Management (Chairman: Mr. J. blindheim, Norway) will meet in Tórshavn, Faroe Islands, from 22-24 April 1992 to:

a) make proposals for the management of high volume data sets acquired from new instrument types, specifically the ADCP and SeaSoar (towed undulating temperature-salinity recorder);

b) assess developments in PC software for supporting data management applications with a view to promoting their use in ICES Member Countries;

c) report to the Hydrography and Statistics Committees at the 1992 Statutory Meeting.

Annex 2

Recommendations

Recommendation 1. Proposed Guidelines for the Management of Shipborne ADCP

It is felt premature to store all ADCP data in data centres. Each institute should store their own data and send an inventory of these data with an estimate of their quality to the appropriate data centre. Data could then be submitted to the data centre on request.

All parameters collected should be stored (i.e. two horizontal components of velocity, vertical velocity, error velocity, per cent good and automatic gain control (AGC). Navigation should also be submitted, either merged with the data or as a separate file which can be linked to the ADCP data file using date and time.

The data should be fully checked for quality and pre-edited or flagged for erroneous values such as spikes, gaps, etc. An explicit statement should be made of the checks and edits applied to the data.

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

Data can be exchanged in the IOC standard format GF3, but it is equally acceptable to exchange data as ASCII files provided a format description accompanies the data.

1. Series header information should include the following:
1.1 Project, platform (i.e. ship), cruise identifier
1.2 Country, organisation
1.3 Date, time, latitude, longitude, (error of GPS), water depth for each profile

2. Accompanying information
2.1 Details of the instrument (eg manufacturer, model number, instrument configuration and any modifications carried out)
2.2 Data collection: description of operational procedures including time interval over which ensemble averages are performed, bin size, number of bins, bottom tracking on/off, pitch & roll on/off, methods of position fixing
2.3 Data calibration, quality and processing: brief description of procedures including
a) whether horizontal components of velocity are N and E components or are components relative to the ship
b) criteria used for flagging or rejecting data (eg threshold values of error velocity and/or per cent good)
c) method used for correction of profiles for ship speed (i.e. bottom tracking, navigation or reference level of no motion)
d) calibrations carried out to correct for transducer misalignment
e) problems of contamination of the data due to bubbles in rough weather, high ship speed (propeller noise), change in ship direction or ship speed zero and how dealt with
f) estimate of final accuracy in the data
2.4 Applied units in which the data are expressed, should be clearly stated.
2.5 Any additional information of use to secondary users which may have affected the dataor have bearing on its subsequent use.

Recommendation 2, Proposed Guidelines for the Management of SeaSoar Data

Data should be stored as time series (of 1 second averages) and should be merged with navigation data. If the navigation has not been merged, they should be submitted as a separate file which can be linked to the SeaSoar data using date and time. If data are not available in this form, then data split into "pseudo-CTD" casts are acceptable.

All relevant calibrations should be applied to the data including instrument calibrations and field corrections. The data should be fully checked for quality and pre-edited or flagged for erroneous values such as spikes, gaps, etc. An explicit statement should be made of the checks and edits applied to the data.

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

Data can be exchanged in the IOC standard format GF3, but it is equally acceptable to exchange data as ASCII files provided a format description accompanies the data.

1. Series header information should include the following:

1.1 Project, platform (i.e. ship), cruise identifier
1.2 Country, organisation
1.3 Date and time of the start and end of the SeaSoar run
1.4 For data supplied as "pseudo-CTD" casts date, time, latitude, longitude and an up/down cast indicator for each cast

2. Accompanying information

2.1 Details of the instrument (eg manufacturer, model number and any modifications carried out)
2.2 Data collection: description of operational procedures including sampling rate, sensor resolutions, undulation rate, methods of position fixing
2.3 Data calibration and quality
   a) types of sensors
   b) laboratory calibrations (eg whether carried out in accordance with SCOR working group 54 recommendations)
   c) *in situ* calibrations (eg lowering the CTD before and after a SeaSoar run as a conventional CTD, use of thermosalinograph, or water samples taken from the non-toxic supply)
   d) report on corrections made to data especially for offsets in salinity due to fouling of the conductivity cell
   e) estimate of final uncertainty in the data
2.4 Data processing: brief description of procedures including
   a) filtering/de-spiking/smoothing methods
   b) editing/quality control methods
   c) time lag correction scheme
   d) adjustments made due to variations in calibration
2.5 Data should be expressed in oceanographic units, which should be clearly stated.
2.6 Any additional information of use to secondary users which may have affected the data or have bearing on its subsequent use.

Recommendation 3. Proposed Agenda for next year's meeting

a) Data quality control, in cooperation with OHWG.
b) Examine oceanographic data flows within the ICES area of interest and make recommendations to improve the situation.
c) Consider ways of raising the profile of the data held by the ICES SH.
d) Investigations of coastline and bathymetric data sets available.
e) ADCP and SeaSoar data management: update.
f) Review of databases.
g) Assess development in PC software for data management applications.