

This report not to be cited without prior reference to the Council*

International Council for the
Exploration of the Sea

C.M. 1992/C:4
Hydrography Committee

Report of the Working Group on Oceanic Hydrography

Thorshavn, 22 - 24 April 1992

This document is a report of a working group of the International Council for the Exploration of the Sea and does not necessarily represent the views of the council. Therefore it should not be quoted without consultation with the General Secretary.

General Secretary
ICES
Palægade 2-4
DK-1261 Copenhagen K.
Denmark

**Report on the meeting of
the ICES Working Group on Oceanic Hydrography
Thorshavn (Faroe Islands)
22-24 April 1992.**

1. Opening

The chairman, E.Buch, opened the meeting at the scheduled time and welcomed the participants (Appendix I). He asked attention for the documents handed out to the participants of the meeting. In the discussion of the proposed agenda (Appendix II) it was decided to add a discussion at a possible high salinity anomaly in the N.E.Atlantic and the North Sea to the discussion of results from standard sections and to discuss the IOC proposal on bathymetric maps of the Atlantic Ocean with any other bussiness. He also announced the discussion on ADCP and Seasoar data management to take place in a joint session with the Working Group on Marine Data Management.

2. Review of membership

The chairman welcomed H.Loeng (Institute of Marine Research, Bergen, Norway) as a new member of the working group.

He also mentioned the apologies of members who were unable to attend the meeting, but several of these members had sent written contributions for the meeting.

3. Remarks from the ICES Hydrographer.

The remarks of the ICES hydrographer, handed out in a 3 page paper, were discussed point by point.

- The participants agreed with the hydrographer that the Greenland Sea theme session during the last statutory meeting was disappointing. It was stated that this was in part caused by the fact that during the preceding EGS meeting in Wiesbaden, a special session was devoted to the Arctic and Subarctic studies as well as the fact that a GSP workshop was planned to take place in Copenhagen in December 1991. Moreover, biology formed only a minor part of the first field phase of the GSP, so that not many interdisciplinary contributions could be expected.
- The participants accepted the way service was given on request for data from the ICES data bank as described by the hydrographer. They were surprised by the disappointing quality of the nutrient components in the GSP data set and spent some time on quality requirements for nutrient determinations. They were reminded that the Marine Chemistry Working Group has not yet formulated an answer on the questions on nutrient determinations posed during a joint session in Copenhagen in 1990.

The participants supported the efforts of the hydrographer to acquire the hydrographic data from O.W.S.Charlie. They proposed to ascertain which parts of the data contain reliable salinity values.

- GTSPP was discussed. The importance of reliable XCTD probes was expressed. It was reported that the accuracy of the presently available XCTD probes agrees with the manufacturers specifications (0.05 psu). Some doubt was expressed on the necessity of the availability of real time T and S-profiles via the IGOSS system. It was proposed to recommend to the Hydrography Committee that it should promote the acquisition of sea surface salinities by voluntary observing ships (VOS). Such data form on valuable tool for the establishment of the fresh water budget of the ocean and of the importance of the hydrological cycle in the climate system. Widespread introduction of systems capable of measuring sea surface salinity and temperature may contribute to a continuation of the "Route" programme which ended in 1970.

4. Results from standard sections

G.Becker presented data from the winter of 1990 which show positive salinity anomalies in the Southern Bight of the North Sea and the northern North Sea. A note from D.Ellett showed the presence of vast amounts of high salinity surface waters in the northeastern North Atlantic in the autumn of 1989 and the winter of 1990. However, data from the Faroes showed a negative salinity anomaly north at the Faroe early 1992, while no extreme values were observed on the Norwegian standard sections. The working group decided to establish a sub-group which has to document a possible high salinity anomaly in 1989-1991 for the ICES 80-th statutory meeting and to collect data to support this study. G.Becker will convene this sub-group.

The existing list of standard hydrographic sections was reviewed. It was concluded that the known existing standard sections cover only a limited part of the North Atlantic. The chairman was asked to get information from Canada, Russia, France, Portugal and Spain on existing regularly surveyed hydrographic sections which may be incorporated in the group of standard sections to be reported to the WGOH. The working group proposed to ask the Hydrography Committee to recommend to member states to supply or continue to supply funding for the regular surveying of standard hydrographic sections in the North Atlantic and to urge scientists to submit data from these sections without delay to the ICES data bank.

5. Establishment of a net of standard stations.

The existing list of standard stations was reviewed. H.van Aken reminded the participants that the request of WOCE for the establishment of oceanic time series station has not yet been fulfilled satisfactorily. The working group asked for the establishment of 3 more standard hydrographic stations, one in the centre of the Greenland Sea Gyre (75°N,005°W), one in the Iceland Basin (60°N,020°W) and one over the Porcupine Abyssal Plain in front of the English Channel, regularly passed by research vessels from Europe. The chairman will consult the ICES hydrographer on the position of the latter station.

6. ADCP and Seasoar data management.

In a joint session with the Working Group on Marine Data Management, chaired by J.Blindheim, requirements for the data management of continuous recording ADCP and Seasoar-like systems were reviewed. All participants agreed that data from moored or bottom mounted ADCP systems can be stored in a way similar to current meter data. With regard to ship mounted ADCP data existing problems with the interpretation of these data were discussed extensively. Storage of ADCP velocities in north and east components may cause problems because of possible variations in gyro headings. Only data obtained in bottom tracking mode or with the use of differential GPS were considered reliable. Storage of reduced data, e.g. 5 minutes averages was assumed inappropriate because this makes the application of future improvements in data processing impossible. But storage of the raw data, that is each individual ping, will flood the data banks. This is especially the case when the broad-band ADCP with a hundredfold increase in data flow will come into use. With the capacity problems which will occur then, priority has to be given to the more reliable data. It was concluded that each institute should store a complete set of raw data and send an inventory of these data with an estimate of their quality to the appropriate data centre. These data will be submitted for storage in the Data Center upon request from that center.

The discussion on Seasoar data was mainly directed to the establishment of a quality indicator which reflects the overall accuracy of the Seasoar tow as well as the varying accuracy of individual profiles or "casts". It was also considered whether it was possible to use the same data structure as for now classical CTD profiles for storage of Seasoar data. It was the general feeling of the participants that it should be preferred to consider Seasoar data as a continuous time series. After ample discussions on details it was concluded that Seasoar like data should be stored as a time series with 1 second average values of the measured parameters. At the beginning of each down - or upward profile a header record should be inserted with position information as well as indicating whether the data from the following "profiles" are suspect or acceptable. Together with the data a file should be submitted describing the calibration procedures, the data reduction procedures and an estimate for the overall accuracy of the data.

In the joint session also a letter from IOC to the chairman of the Hydrography Committee on an International Ocean Mapping Project for the North Atlantic was discussed. All participants agreed that the establishment of an accurate bathymetry for the North Atlantic

may form an improvement for our knowledge of the ocean. Especially numerical models are expected to gain advantage from improved bathymetric knowledge. Therefore both working groups decided to advise the Hydrography Committee to support the initiative of IOC in cooperation with IHO and ICES to establish a precise bathymetry of the North Atlantic and the publication of bathymetric charts of the North Atlantic. It was however, appreciated to extend the bathymetric description so that it will include the Nordic Seas, for which accurate bathymetric information is quite scarce.

7. Nansen Project Final Report.

The participants expressed their feelings that the special theme session in LaRochelle formed a valuable contribution to the reporting on preliminary results of the ICES Nansen Project. The opinion was expressed that a review paper describing the programme and reviewing the preliminary results should be published in the open literature. In a consultation by telephone J.Gould confirmed that he was willing to continue his efforts to coordinate such a review.

8. Salinity intercalibration and quality assurance procedures

The general feeling of the participants was that it is not necessary to repeat the salinity intercomparison excursion 6 years after the previous ICES initiative. This intercomparison has strongly improved the general quality of the salinity determinations. It was proposed to review regularly the experience with all types of hydrographic instrumentation, including current meters and CTD's during future meetings of the working group to communicate unformally observed problems.

9. Numerical models of the North Atlantic

Dr. C. Heinze presented a review of existing models of the ocean circulation, ranging from low resolution global models with timescales of several thousands years to limited area models of the North Atlantic or the Nordic Seas with time scales of one year and less. After a discussion on the different aspects of these models and their applicability to answer questions on the interaction of biology and fish stocks with the hydrography it was concluded that a range of these models is needed to answer these questions, depending on the timescales involved and the type of event to be simulated. However, these models are still in a development stage and are not able to predict or hindcast short term changes in full detail. Questions posed by ICES on short term changes of fish stocks and hydrography cannot be answered yet reliable with the use of existing models.

Simple cause/effect links may not be sufficient for explaining the observed ocean climate fluctuations as the mid seventies anomaly. These variations may as well be due to stochastic forcing of the ocean system and oscillations determined by the spatial scale of the ocean basins.

Modelling efforts on short time scales could be improved considerably by a more detailed high quality observational data set for initialization and forcing of models.

10. Review of planned and ongoing international programmes.

The participants were informed on a number of international oceanographic programmes. The first phase of the Greenland Sea Project was reviewed and a number of highlights of this phase were presented by different participants. The variability of physical processes in the Greenland Sea appear to be of prime importance. Therefore the GSP Scientific Steering Group has planned a second intensive field phase in 1993. The working group was informed on the plans for the second phase by means of a paper, sent by J.Meinke.

The developments on cod and climate were discussed in some detail. It was concluded that recruitment is a large-scale process where recruitment of fish stocks is related to the hydrography and atmospheric forcing via the food chain, primary and secondary production and specific predator-prey relationships. It was the opinion of the working group that in order to understand and predict changes in fish stocks, a combination of interacting physical and biological models is needed. Hydrographers can help the modellers to improve their models by supplying reliable hydrographic data.

In the discussion on JGOFS in the North Atlantic it was stressed that PI's from past and future JGOFS cruises should be invited to submit the hydrographic data from these cruises to the ICES data bank.

The chairman informed the participants on the plans for a European North Atlantic Gyre Experiment. The working group supported this initiative as a welcome contribution to questions relating to cod and climate as well as to the WOCE Core Project 3. The chairman was asked to act as an intermediary between WGOH and the planning group of the project.

11. The ICES Hydrographic Inventory.

The new hydrographic inventory, compiled by ICES, was distributed. The participants were asked to control this inventory and, if necessary, submit proposals for changes.

12. Any other bussiness.

Proposal for special theme sessions and special topic sessions at the statutory meetings in 1993 and later years were discussed. It was decided to recommend to the Hydrography Committee to have a special topic session during the 1994 Statutory Meeting on "Observations and modelling of the variability in the North Atlantic Ocean", to be convened by ?? (Dr. W. Krauss and Dr. J. Backhaus have been suggested)

13. Place, time and topics for the next meeting.

The participants from Norway invited the working group to have their next meeting in Bergen, Norway and a preliminary time of 21-23 April was decided. The items to be discussed in the 1993 meeting should include:

- Standard sections and stations. An updated list of standard sections and standard stations has to be reviewed and new data from these sections and stations will be presented and discussed.
- Instrument performance. The performance of different types of hydrographic instrumentation has to be discussed and new developments in instrumentation, data processing and data quality have to be reviewed.
- North Atlantic Hydrography Workshop. The results of the workshop on the Hydrography of the North Atlantic, to be held in late November 1992 at the WOCE Special Analysis Centre in Hamburg will be reviewed and a presentation of these results for the Hydrography Committee during the 1993 Statutory meeting will be prepared.
- Salinity anomaly 1989-1991. The sub-group founded to document a possible high salinity anomaly in the northeastern North Atlantic, convened by G.Becker, will report their findings. Presentation of these results to the Hydrography Committee has to be considered.
- Cod and Climate. Recent developments in the study of the relation between Cod recruitment and climate variations will be reviewed.
- WOCE activities in the North Atlantic. Hydrographic activities in the North Atlantic, carried out within the framework of WOCE in the preceding year, will be reported.
- Review of planned and ongoing international programmes. Developments in international hydrographic programmes with relevance to ICES will be reviewed. Special attention should be given to research activities in the Eastern Boundary Current and the planning of the North Atlantic Gyre Experiment.

14. WOCE coordination.

The meeting of the WGOH ended with a session on WOCE matters, chaired by Hendrik van Aken. The following items were discussed:

- 1) Report from previous meeting.
- 2) Overview activities in the North Atlantic.
- 3) Section AR7/A1.
- 4) Commitments shift to 1994-97.
- 5) Core Project 3 (remarks from John Gould).
- 6) Future tasks.

Item 1.

The report from the 1991 meeting was discussed and the group agreed:

- That the coordination of the WOCE program is well taken care of by the WOCE organisation for which reason the task of the group shall be restricted to advise on questions related to the North Atlantic.
- To recommend that the current meter mooring south of the Denmark Strait should be continued.
Dickson has applied for funds to continue his previous observations. The NORDIC WOCE moorings are north of the sill.
- To review research activities in the Eastern Boundary Current on the 1993 meeting.

Item 2.

The chairman gave an overview of the recent WOCE Activity Plan.

One-time surveys.

- A1E completed.
- A2 will be completed by Germany in 1992, but there are problems with the number of berths i.e. problems with nutrient measurements. UK do also have plans for this section although uncertain at the moment. The possibility of a joint German - UK cruise was suggested.

- A4 and A20 are completed but not according to WOCE standards.
- A16 is completed but as early as 1989, shall possibly be repeated.
- For the remaining sections (A1W, A3, A5, A6, A18 and A22) the situation is the same as in 1991. Commitments are uncertain for a number of these sections.

Repeat sections.

- Work has started on AR7E,W; AR5 and AR6 but some commitments are still needed.
- AR3 and AR18 are still uncertain.
- AR1 needs commitments.

Control Volumes.

- Work has started on AR11, AR12 and AR16.
- Canada has made commitments to AR13.
- Canadas commitment to AR10 is at the moment uncertain.
- AR14 un-committed.

VOS-XBT's

- Not all lines are committed. The group recommended to support this programme element.

Moorings.

Situation unchanged from 1991, see 1991 report.

Item 3.

The station spacing on the eastern part of the A1/AR7 section is still under debate. Work on the section to clarify the problems has suffered from bad weather.

Item 4.

A great part of the work in the Atlantic will be carried out by US-research groups; but due to heavy engagement in WOCE programmes in the Pacific and Indian Ocean USA can not start their Atlantic work before 1994. Canada and some European countries are performing measurements before 1994, having the effect that the Atlantic work will be highly non-synoptic.

Canada and the European countries are therefore requested to extend their programmes to the 1994-97 period. Germany will try to cover A2 again in 1995 and UK hope to extend their VIVALDI programme.

Item 5.

The WOCE-CP3 group met at Wormley early April, 1991 and a report from the chairman John Gould was presented to the WGOH:

- 1) The main time frame for CP3 is 1994-97. The end point is in line with the US plan to do a one time survey of the Atlantic in 1997.
- 2) CP3 is setting up working parties to look at
 - a) float and drifter sampling strategy - how many records (float days) are needed in a box to define e.g. eddy variability, mean flow.
 - b) how much of the gyre scale shape can be learned from VOS-XBT data.
- 3) CP3 are worried about the proliferation of bodies all trying to coordinate/organize/fund circulation/climate research in the Atlantic. This will be raised at the SSG meeting in May.
- 4) Much more surface salinity data are needed and CP3 are pressing to get it collected on the VOS fleet. Some moves down that road have been started by NOAA.
- 5) Hydrography Workshop in Hamburg in late November will review the 1991 hydrography data from the North Atlantic, assess its quality and work towards the formation of a single year data set of high quality hydrography. There are over 900 stations identified. CP3 will meet immediately after the workshop.
- 6) WOCE is holding a workshop in UK in September to discuss modelling in relation to WOCE observational programmes. CP3 poses some of the hardest problems of comparing models with data and carrying out critical tests since it is concerned with time-dependence while most other parts of WOCE give a "snap shot" of the circulation.

- 7) CP3 is still under-resourced as far as the repeat hydrography is concerned. The subtropical gyre in particular is very poorly covered. Any repeat section in the supolar gyre would be very welcome.

Item 6.

The tasks of the WGOH WOCE subgroup shall in 1993 focus on:

- advise on station positions and other scientific questions related to the North Atlantic.
- review results from the Hydrography Workshop in Hamburg.
- review plans for the North Atlantic.
- encourage WOCE scientists to present their results at ICES Statutory Meetings.

APPENDIX I.**List of participants.**

Hendrik van Aken	NIOZ P.O.Box 59 1790 AB den Burg Netherlands
Gerd Becker	Bundesamt f. Seeschiffart und Hydrographie Bernhard-Nocht Strasse 78 2000 Hamburg 36 Germany
Johan Blindheim	Institute of Marine Research P.O.Box 1870 - Nordnes N-5024 Bergen Norway
Juan Brown	MAFF Fisheries Lab. Pakefield Road Lowestoft NR33 OHT Suffolk U.K.
Erik Buch (chairman)	Farvandsvaesenet Overgaden o. Vandet 62B 1023 Copenhagen K Denmark
Eberhard Fahrbach	Alfred Wegener Institute Columbusstrasse W-2850 Bremerhaven Germany
Bogi Hansen	Fiskirannsoknarstovan Noatun FR-100 Thorshavn Faroe Islands
Christoph Heinze	Institut f. Meereskunde University of Hamburg Troplowitzstrasse 7 D-2000 Hamburg 54 Germany

Regin Kristensen

Fiskirannsóknarstofan
Noatun
FR-100 Thorshavn
Faroe Islands

Harald Loeng

Institute of Marine Research
P.O.Box 1870 - Nordnes
N-5024 Bergen
Norway

Peter Lundberg

University of Gothenburg
Department of Oceanography
P.O.Box 4038
40040 Gothenburg
Sweden

Svend Aage Malmberg

Marine Research Institute
Skulagata 4
Reykjavik
Iceland

Christophov Smith

Hydrographic Department
Taunton
Somerset TA1 2DN
U.K.

APPENDIX II.
ICES Working Group
on
Oceanic Hydrography

Thorshavn 22 -24 April 1992

AGENDA

1. Opening
2. Review of membership
3. Remarks from the Hydrographer
4. Results from standard sections
5. Establishment of a net of standard stations.
6. ADCP and Seasoar data management
7. NANSEN project final report.
8. Salinity intercalibration and quality assurance procedures
9. Numerical models of the North Atlantic
10. Review of planned and ongoing international programmes
 - a. Greenland Sea Project (GSP)
 - b. European Subpolar Ocean Programme (ESOP)
 - c. Cod and Climate Change
 - d. JGOFS
 - e. North Atlantic Gyre Experiment
 - f. Euro-tracer
 - g. Euro-float
11. The ICES Hydrographic inventory
12. Any other business
13. Place, time and topics of next meeting
14. WOCE coordination (chaired by Hendrik van Aken)

APPENDIX III

Recommendations

- 1) The Working Group on Oceanic Hydrography recommends that the Hydrography Committee should promote the acquisition of sea surface salinities by voluntary observing ships (VOS).
- 2) The Working Group on Oceanic Hydrography recommends the ICES member states to supply or continue to supply funding for the regular surveying of standard hydrographic sections in the North Atlantic and to urge scientists to submit data from these sections without delay to the ICES data bank.
- 3) The Working Group on Oceanic Hydrography recommends the Hydrography Committee to support the initiative of IOC in cooperation with IHO and ICES to establish a precise bathymetry of the North Atlantic and the publication of bathymetric charts of the North Atlantic. It is furthermore recommended to extend the bathymetric description to include the Nordic Seas, for which accurate bathymetric information is quite scarce.
- 4) The Working Group on Oceanic Hydrography recommends to meet again in Bergen, Norway during the period 21-23 April 1993 to discuss:
 - Standard sections and stations. An updated list of standard sections and standard stations has to be reviewed and new data from these sections and stations will be presented and discussed.
 - Instrument performance. The performance of different types of hydrographic instrumentation has to be discussed and new developments in instrumentation, data processing and data quality have to be reviewed.
 - North Atlantic Hydrography Workshop. The results of the workshop on the Hydrography of the North Atlantic, to be held in late November 1992 at the WOCE Special Analysis Centre in Hamburg will be reviewed and a presentation of these results for the Hydrography Committee during the 1993 Statutory meeting will be prepared.
 - Salinity anomaly 1989-1991. The sub-group founded to document a possible high salinity anomaly in the northeastern North Atlantic, convened by G.Becker, will report their findings. Presentation of these results to the Hydrography Committee has to be considered.
 - Cod and Climate. Recent developments in the study of the relation between Cod recruitment and climate variations will be reviewed.

- WOCE activities in the North Atlantic. Hydrographic activities in the North Atlantic, carried out within the framework of WOCE in the preceding year, will be reported.

- Review of planned and ongoing international programmes. Developments in international hydrographic programmes with relevance to ICES will be reviewed. Special attention should be given to research activities in the Eastern Boundary Current and the planning of the North Atlantic Gyre Experiment.