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International Council for the
Exploration of the Sea

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REPORT OF THE WORKING GROUP ON OCEANIC HYDROGRAPHY

23-24 April 1987
De Bilt, Netherlands

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Report of the Working Group on Oceanic Hydrography

The Working Group met at KNMI, De Bilt, Netherlands on 23-24 April 1987.

The following members were present: G Becker, J Blindheim, Y Camus, A Clarke, A-M Larsson, R Dickson, E Fahrbach, J Gould (Chairman), B Hansen, S-A Malmberg, A Martin, L Otto, G Prangmsma, H Riepma, U Schauer and H Van Aken. The meeting was also attended by H Dooley (ICES Hydrographer).

Apologies for absence were received from D Ellett, J Meincke and K Aagaard.

The draft agenda at Annex A was adopted, though it was agreed that the items would not necessarily be taken in the listed order.

R R Dickson acted as rapporteur for the meeting.

L Otto welcomed the Working Group to the Institute and described the local arrangements and timetable.

The meeting began with a round-table description of recent progress and plans for research by the different agencies attending. The principal points are itemised as follows but with the plans for the NANSEN programme described later in this report.

1. Progress and Plans

- (i) U Schauer provided a description of the NOAMP data set including a detailed account of the cyclonic meddy which passed westward through the site and was apparent as a dipping of potential temperature and density surfaces from 1000-2000m. Its origin was suspected to be the deep Mediterranean water core to the east but it was suspected that the meddy might break up further west when it reached the topography of the Mid-Atlantic Ridge.
- (ii) Dickson described the latest results of the MAFF SOFAR float programme in the Iberia-Abyssal Plain which now totalled 3,600 days of float tracks. Primarily analyses of the seasonal change in listening conditions were

described. A second MAPP investigation of bottom-trapped wave motions on the Continental Rise at the mouth of the Rockall Channel was also described. The principal result appears to be that constant phase lines align themselves along the slope for 8d motions and across the slope for 32d motions.

- (iii) Gould described the IOS(DL) SOFAR float experiment in the Madeira Abyssal Plain. Unfortunately, of the four Woods Hole ALSs providing coverage, only one worked on the correct channel for the IOS floats so that some French listening stations are required to provide tracking. The fieldwork is now completed, though CTD and current meter data are presently being worked by up P Saunders.
- (iv) Fahrback (IFMK) presented work aimed at describing the splitting of the North Atlantic current as it crosses the mid-Atlantic Ridge and reported increasing problems in finding the Azores current in their field data. Since most measurements of the current have been taken in summer, the question was raised as to whether the Azores current might be set up by summer conditions.
- (v) Fahrback also described recent work by the Institute für Meereskunde, Hamburg, on the deep convection processes of the central Greenland Sea. As with the earlier Hudson cruise, no deep convection signal had been found, though this did not rule out the possibility that the signal was too intermittent or too localised to be detected by present techniques. Clarke reported that this problem may be overcome in future by a new towing system being developed by BIO which is capable of coping with 6/10th ice without losing the fish.
- (vi) Clarke described work by BIO in April 1986 and March 1987 in the Newfoundland Basin and Continental Slope aimed at investigating the effect of the Newfoundland Seamount Chain in acting as a partial barrier to the southward flow along the slope. Freon distributions confirmed the GEOSECS Tritium observation of a strong deep water front at the Southeast Newfoundland Rise. Clarke also noted a 20% loss in strength of Kevlar after each deployment regardless of the length of deployment. The cause is unknown. Initially it was thought that salt crystals were penetrating and cutting the fibres when the rope dried out, but break tests carried out on rope lengths which were kept wet showed the same result. The expense of replacing Kevlar is now beginning to affect the BIO mooring programme.

The third item described was the monitoring of the Labrador current at the Hamilton Bank. Recent current meter arrays have shown that no more than 8Sv come south in the Labrador current but integrating Sverdrup transport over the northern gyre suggests that this transport should be very much larger (30-40Sv). BIO are therefore extending the Hamilton Bank array to the centre of the Labrador Sea to find the missing transport.

Clarke also described a significant advance in the development by BIO of a Freon analyser which requires only technician support in its use at sea.

- (vii) Camus described work by Mazé to model the internal waves at the shelf break. There is much interest still in the cold plume off Brest, though the specific cause - upwelling or internal tidal mixing - is not yet wholly understood since models are at present too simple to cope with this deeply indented slope. It was agreed that the work of S Thorpe (University of Southampton) on internal motions at the rise/slope break were of equal importance and interest, and efforts would be made to discuss these results at next year's Working Group meeting.
- (viii) Malmberg described the hydroclimatic conditions around Iceland which are now favourable for the third year running with Atlantic water north of Iceland as in 1972-74. Two current meter moorings are being maintained in the Denmark Strait to measure the inflow of Atlantic water.
- (ix) Riepmma noted that despite last year's announced programme in the Norwegian Sea, seagoing research at KNMI had now been stopped as a policy/funding decision. The main interests of oceanographers at KNMI were now in the field of modelling, HEXOS and storm surges. Some cooperation with other seagoing institutes may still be possible however, and especially at NIOZ there is continued interest in the Greenland Sea project.
- (x) Becker described proposed work by DHI to the south and east of Iceland in the summer of 1987. An extensive station grid will provide high quality CTD data plus conventional nutrients and oxygen. Current meter and thermistor chains will form part of this grid on the east flanks of the Reykjanes Ridge but there will be no chance to be involved with tracers at present.

2. Joint Meeting with Working Group on Marine Data Management

The pm session of 23 April was a joint meeting with WGMDM on two specific topics. Firstly the quality of data standards for current meter data and secondly data management aspects of the Working Group on Oceanic Hydrography for the NANSEN project.

The first of these topics was well introduced by Leslie Rickards of the UK MIAS data centre, who described the processes which MIAS adopted for current meter data input, data quality and data exchange. The data input assumed that the incoming data was correct, de-spiked, in the correct oceanographic units and with accompanying qualifying documentation. Though MIAS were unable to provide a full validation of the data set, it did apply quick checks on data quality, eg format, acceptable range of speed and direction, documentation and the use of plotted data to check visually for errors. Regarding data exchange, IOS now maintain an inventory of some 3,500 records from the NW European Shelf.

The meeting then discussed a number of current meter data quality problems. It was agreed that oceanic records with large numbers of threshold values made little difference to the means but could make some difference to spectral analysis depending on the period band of interest. There was also a discussion of the optimum method of calculating daily means of current speed and direction. On the Hydrographer's enquiry as to whether plans exist in other countries for a MIAS-type data bank, Geerders announced that no centralised archive was available in the Netherlands, but Van Aaken noted that NIOZ were beginning to store a current meter data set rather than leaving records with their originators. In Norway, Blindheim noted that there were two centres for current meter data collection with all the North Sea data going to the Met Institutes. Problems of non-standard data such as acoustic doppler, floats and drifters were being experienced and this problem looks like growing as acoustic doppler techniques are extended to ships of opportunity (eg by the SIO Transpac Group). The Hydrographer pointed out that it would be useful if intercalibration of the current meters from various agencies could be carried out at a single laboratory at some time in the future, as had been done in the past for the Irish Sea 1971 joint programme. The Working Group looked forward to renewing this discussion at the special topic on current meter data quality that John Howarth (Proudman Oceanographic Lab) will be convening for the Bergen Statutory Meeting in 1988.

The joint Working Groups then discussed potential data problems during the

NANSEN project. Although C/Res 4:14 has given authority to use the Service Hydrographique as the data centre for NANSEN, the main task of the meeting was to identify what different types of data were to be collected during NANSEN and from this list to identify which components of the data would primarily be held at the Service Hydrographique. To identify the size of the task, the various NANSEN participants were asked to describe the type and quantity of data which they would collect in 1987 et seq and the results are itemised in Table 1 below. Although there were no possibilities to establish formal links with the southern Norwegian Sea programmes of the NATO SAACLANTCEN, La Spezia, these data are also entered in Table 1 since it is the Working Group's understanding that the data will be made freely available to the scientific community by La Spezia.

TABLE 1 Estimated type and volume of data to be collected in 1987 by NANSEN participants and others in the NANSEN area

Date Agency (Ship)	Location	Estimated number of CTDs/ Nutrient stations	Nos of c/m moorings (instr. per mooring) [Duration]	Floats/ drifting buoys	Tidegauges	Acoustic Doppler	Other
May 87 La Spezia (Tydeman)	Southern Norwegian Sea	144	8 (3)	5 / -	-	1	
31Aug-22 Sep La Spezia (Belgica)	Southern Norwegian Sea	100					
May 87 10S Wormley (Challenger)	North of Faroes F-S Channel	50	3 (4) [2 weeks]	- / ?		1	Seasoar + CTD + O ₂ HF Echo Sounder
"	Faroe Bank Channel		5 (3½) [1 year]		1 North of Faroe Bank		Brief Acoustic tomo- graphy across Channel for bottom flow.
April 87 Fiske Dir. Bergen (Eldjar)	Extensive from west of UK to Faroes (Blue Whiting) and polar front (capelin)	30		/ 2			
14d, July 87 Fiskirannsóknarstovan. Faeroes/Geofys Inst. Bergen (H Mosby)	NE of Faroes Faroe Bank	200	7	/ 2	2 shorebased Possibly 1 extra from Bidston		Batfish
Sept 87-Oct 88 SMBA (3 cruises)	Faroe Bank Sections	50	2 (4)	/ 2			
Inst.Mar.Res Iceland (B Saemundsson)	NW of Iceland Polar Front feeding grounds	100	2 - 6) 2 Icelandic 4) Danish?				2 sediment traps
June - Sept 87 Jan 88 DAFS	Faroe (Munken) - Shetland	12+	2				
July 87 DHI	S Icelandic Basin	80	3 (5)				Batfish
July 87 MAFF (Cirolana)	East Greenland	12	8 (2) [1 year]				

- The following more detailed points were noted with regard to these plans:
- * Hansen reported that following the 1986 fieldwork, which had the aim of estimating the transport of the Faroe Current, the 1987 aim would be to discover what happens to the water of the Faroe Current where it splits to the east of the Faroes, and in 1988 the question to be asked concerns where the water of the Faroe Current comes from and how much crosses the Greenland/Scotland Ridge.
 - * Martin pointed out that the intermediate water in the Faroe/Shetland Channel has recently arrived with different characteristics compared with the 1970s, being colder at 1-2°C than the 3-4°C observed for the earlier period, but at roughly the same salinity (34.94). It was agreed that this change reflected the changing predominance of two intermediate water masses, North Icelandic Winter Water during the 1970s and Arctic Intermediate Water in recent years. The Working Group expressed the hope that the valuable Faroe/Shetland Channel time series will be continued following the retirement of the present DAFS member.
 - * Malmberg plans moorings to the northwest of Iceland from the Greenland coast, radio tracers will be collected and intensive hydrography will be worked in the area along the ocean Polar front where the capelin feed.
 - * Clarke reports that Smith of BIO may have found the elevated Caesium levels to have arrived off West Greenland during the summer of 1986, but concentrations in absolute terms are low so this result may be in doubt.
 - * The IOS plans for NANSEN during 1988 involve a CTD survey of the Iceland Basin and moorings in the Charlie-Gibbs fracture zone plus acoustic estimates of bottom flow, but the ship time for this work was still in some doubt.
 - * Gould pointed out that La Spezia would be working a CTD survey right along the Greenland/Scotland Ridge in 1988 (July - September) on their new ship ALLIANCE.
 - * Fahrback described extensive plans for fieldwork from Fram Strait to the latitude of Jan Mayen, mainly on the western side of the Greenland Sea as part of a programme to observe the Greenland Sea gyre circulation over a long period of time and to investigate bottom-induced waves and perturbations over at least 3 years. The VALDIVIA will return to the question of open ocean deep convection in the Greenland Sea during 1987-88.

- * Though Sweden has no ship time of its own it has interests in the deep water flow from the Faroe Bank Channel and in the modelling of these flows and may participate in fieldwork by others.
- * There remains a need to upgrade the sea level stations around the European Sub Arctic Seas in preparation for NANSEN. Clarke noted that the recognised quality standard was that they should be levelled at least once per year in case the datum may be changing. The Working Group decided to pursue the sea level question both via members who will contact their respective delegates directly and by a circular letter from the Permanent Service on Mean Sea Level.
- * The group discussed the possibilities of using cable data to estimate transport. The Faroe/Shetland cable had been investigated by Huthnance but it proved extremely difficult to get access and similar problems exist with the Iceland/Scotland cable.
- * The group decided it would be of value to establish standard sections which all NANSEN participants would be asked to work with in the area as a means of intercalibration. Though no official links are to exist with the La Spezia group, it was agreed that a section from 62°40'N, 06°50'W to 65°24'N, 04°17'W would be one suitable section to use and that the Fair Isle/Munken section would be another. The Hydrographer will, in addition, select from his existing data base some often-repeated sites which can be used as time series stations and intercalibration points in the NANSEN area.
- * The Hydrographer will also investigate the availability of Soviet section data in the NANSEN area which may be available through the GTS.

Following this joint discussion of the likely NANSEN data set and other problems associated with the NANSEN exercise, it became clear that the total data set comprising CTD, nutrients and tracers, current measurements and various Lagrangian drifters would be too large to establish as a unit at the Service Hydrographique. It was agreed therefore that the role of the Service Hydrographique as a data centre for NANSEN should be restricted to the following priorities:

Priority 1 To produce a complete data inventory of the NANSEN data set and other work in the NANSEN area.

Priority 2 To act as the data centre for the total CTD/water bottle nutrient

and tracer data set which in 1987 alone will amount to 800 stations. The Service Hydrographique will be required to make inter-ship comparisons of these data.

Priority 3 National data centres should be asked to act as data centres for the remainder of the NANSEN data set and with the current meter data in particular being referred to MIAS.

Priority 4 Feedback among NANSEN participants should be encouraged via data reports, but plans should be made in addition for a monthly "NANSEN newsletter" which would make participants aware of the first results and interpretations of the data. The Hydrographer was asked to check ICES' capabilities as the publisher of this newsletter.

3. Arrangements for the ICES Statutory Meeting, the Service Hydrographique and ICES administrative matters

- (i) The Working Group reviewed possible contributions to the Statutory Meeting. Though it was too early to have a clear idea of numbers and titles of oceanic hydrography papers, it appears that many of the submissions of the Oceanic Hydrography Group will be directed to the Arctic Ocean Symposium which precedes the Statutory Meeting so that there will be relatively few "oceanic" papers during the Hydrography Committee's normal sessions. It was decided that some time would be allocated during Hydrography Committee to the further discussion of the papers contributed to the Arctic Ocean Symposium.
- (ii) The Hydrographer requested early corrections to the current inventory on hydrographic activities in the oceanic ICES area and sought advice from the group as to how to keep this inventory as brief as possible. At present if an item is in the inventory for seven years without update, it is omitted.
- (iii) Remote Sensing Study Group. The Working Group learned that at its recent meeting the RSSG had recommended its own disbandment since after examining all relevant ongoing ICES projects, including NANSEN, they concluded that the best way of influencing the programmes was to participate as members of the individual Working Groups rather than as a separate entity. The Working Group accepted this decision but felt that it would have two main drawbacks. Firstly there may be a lack of coordination and duplication in dealing with remote sensing matters as

- there has been in the past. Secondly it may not always be possible for agencies to fund the attendance of two people (including the remote sensing specialist) at Working Group meetings.
- (vi) Gould and Dickson described plans by members of the Working Group to contribute papers to the upcoming IUGG meeting in Vancouver (August 1987). Since this meeting will review what is known of the circulation of each ocean basin, the ICES contribution will primarily concern a comparison of Eulerian and Lagrangian data from the Eastern Atlantic.
 - (v) Clarke presented a summary of activity in preparation for the World Ocean Circulation Experiment (WOCE). Of interest to ICES were the points that during WOCE as many ocean scientists as possible should make salinity measurements in locations and times where they would not normally do so and to provide the data to the data banks more rapidly than usual. The exercise that the Working Group had asked the Hydrographer to do for NANSEN (ie selection of standard sections and stations for repeat measurements) would also be appropriate for WOCE. XCTD probes are now available in limited numbers with an accuracy and precision of around 0.02 but of the 50 probes so far constructed by Sippican only half work. On the general subject of links between ICES and WOCE, it was felt that it would be beneficial for the Hydrographer to attend further WOCE planning meetings, to coordinate what ICES is doing into the WOCE programme and to arrange real time data inputs. It was felt that, following our experience in the NANSEN programme, the ICES community investigating exchanges across the Scotland/Greenland Ridge would be well set up with the appropriate techniques, intercalibrations and data housekeeping procedures to participate in the subsequent WOCE exercise.
 - (v) The membership of the Working Group was discussed. To encourage better attendance at the Working Group meeting it was decided to inform delegates of the upcoming primary business of the Working Group from time to time (eg the upcoming NANSEN programme) and to ask them to review their membership of the group in the light of these interests.
 - (vi) The group discussed the appropriate method of electing new chairmen of Working Groups in general and the Oceanic Hydrography Working Group in particular. In view of the present 3-year time limit on chairmanship, it was agreed that the chairman of Hydrography Committee should ballot each

Hydrography Committee member and ask that the Hydrographic Committee member in question talks over the decision with the member of the working group in question before returning one nomination to the chairman, Hydrographic Committee. This was felt to be the most effective and democratic procedure. The Oceanic Hydrography election for the next chairman will take place in February 1988 at the time of the Working Group meeting so that the new chairman can begin work in October 1989 at the Statutory Meeting.

The meeting then moved to a discussion of the venue and the main topics for the next Working Group meeting. It was agreed to hold a meeting of the NANSEN group during the winter to exchange first results from the NANSEN field experiments and to arrange intercalibration etc, at some point with access to a data bank. Since the obvious choice was ICES Copenhagen, it was decided to hold this meeting of the NANSEN group in conjunction with and prior to the mid-term meeting of the working group; thus in Copenhagen in February 1988, the NANSEN group will meet for 3 days followed by a 2 day meeting of the Working Group on Oceanic Hydrography.

In conclusion, the Chairman thanked Leo Otto and others from KNMI for acting as hosts to the meeting.

The meeting ended at 1600h.

4. Recommendations

1. That the next meeting of the Working Group be held at ICES Headquarters in February 1988, and that the main discussion will focus on:

a. results from the NANSEN Project and coordination of further fieldwork;

b. water movements on the lower continental slope west of Porcupine Bank;

c. further considerations of current meter data quality and preparations for the special topic session within the Hydrography Committee at the Bergen Statutory meeting (J. Howarth convenor).

2. That a sub group of the Oceanic Hydrography Working Group (convenor J. Gould), meet at ICES Headquarters for 3 days in February 1988 immediately prior to the working group meeting to report and interpret the results of the NANSEN field programme.

ICES OCEANIC HYDROGRAPHY WORKING GROUP 23-24 APRIL 1987
KMNI DEBILT, NETHERLANDS

AGENDA

1. Welcome - local arrangements
2. Appointment of rapporteur
3. General review of research projects
4. Review of NANSEN research for 1987 and future years
5. Joint session with WG MDM on current meter data quality.
 Presentation by Lesley Rickards plus discussion of data
 management for NANSEN
6. Plans for the Statutory meeting, Santander
7. Report of the Hydrographer and the Inventory of Activities
8. Venue and date of next meeting
9. Any other business
10. Close of meeting

