C.M.1984/C:30
Hydrography Committee

International Council for the
Exploration of the Sea

Report of the Working Group for Oceanic Hydrography , Oban, United Kingdom
22-23 May 1984

1. OPENING OF MEETING AND ADOPTION OF AGENDA

1.1 The Working Group met at the Dunstaffnage Marine Research Laboratory of the Scottish Marine Biological Association under the chairmanship of Dr. W.J. Gould (UK). Those attending were welcomed to the laboratory by the director, Professor R.I. Currie, CBE, FRSE. There were present:

K. Agaard (USA)
D. Booth (UK)
E. Buch (Denmark)
B. Butman (USA)
Y. Camus (France)
A. Clarke (Canada)
R. Dickson (UK)
D. Ellett (UK)
A. Foldvik (Norway)
B. Hansen (Faeroe Islands)
J. Huthnance (UK)
K.-P. Koltermann (FRG)
Mlle. C. Maillard (France)
S.-A. Malmberg (Iceland)
A. Martin (UK)
T. McAndrew (UK)
J. Meincke (FRG) (Hydrography Committee Chairman)
L. Middtun (Norway)
G. Prangsma (Netherlands)
B. Rudels (Norway)
O. Saelen (Norway)
P. Saunders (UK)
A. Svansson (Sweden)
J. Swift (USA).

1.2 D. Ellett announced the administrative arrangements for the meeting.

1.3 T. McAndrew served as Rapporteur.

1.4 The agenda (attached as Annex 1) was agreed. The Chairman and Group sent their good wishes to the previous Chairman in his new post as ICES Hydrographer.

2. RESEARCH RESULTS AND PLANS

2.1 Aagaard reported that theories on deep water formation were still very speculative but it was believed that four interacting processes were involved viz.

(a) Deep reaching convection

(b) Shallow and deep circulatory cells linked by diffusion

(c) Very small cells within large eddies

(d) Instability in association with strong fronts.

He presented an ocean-wide view of the postulated flows in the Arctic Ocean, Greenland and Iceland Seas from the Bering to Denmark Straits, emphasising that the Greenland Sea is the region of deep convection (and drew attention to a proposal for a programme to study ventilation and exchange in that sea). Many tracers were available to assist in studies in the region - tritium, a variety of nutrients and the effluent from Windscale. A large feature in the Greenland Sea cirulation was a branch of the West Spitzbergen current which turns round and goes south again at about 79°N; a long-standing need for current measurements along 79°N between 5°W and 10°E may be partially fulfilled by the MIZEX experiment now in progress.

Middtun presented work showing a correlation between cod recruitment and the inflow of Atlantic water into the Barents Sea together with some evidence for bottom water formation on the continental shelf and slope in the Barents Sea; results form observations between Novaya Zemlya and Svalbard were also described.

Swift, Malmberg and Clarke briefly reported their work in the Greenland, Iceland, Norwegian and Labrador seas.

2.2 Plans for future work were then described by Koltermann, Rudels, Swift and Meincke together with the proposal mentioned in 2.1 by Agaard. A useful progression was noted: following the MIZEX cruises (which included three latitudinal sections between 70° and 80°N) there would be a DHI cruise from NW Svalbard to NE Greenland, followed by a Norwegian cruise in the same area, all before the end of August. Koltermann noted that the section along 78°55'N would be occupied four times in 1984; Swift asked that a station at 75°N 0°E/W be occupied as often as possible (for T, S, Oxygen, Tritium & Helium). Aagaard also called attention to the need to make observations on top of topographic

features for filament structures.

Meincke drew attention to a proposal by a meeting of a group of the Directors of Arctic laboratories and of various funding agencies that a Greenland Sea programme should be part of the World Ocean Climate Experiment (WOCE) of WCRP and said that ICES and/or SCOR might be asked for advice.

Koltermann mentioned a lack of data available from eastward of 25°E. Middtun and Malmberg reported cordial working relationships with PINRO Murmansk and, whilst it was agreed that it would be preferable to have liaison and exchange with the USSR scientists through ICES, it was appreciated that much work was achieved by existing bilateral cooperation. In particular, Middtun had proposed an extension of Norwegian/USSR cooperation to include pelagic fish studies.

A proposal by the Chairman that a collation of papers on the Deep Water Project be made and presented at the 1986 Statutory meeting was agreed; see also 4.6.

2.3 Hansen proposed a cooperative study of the Iceland Basin waters contained in the area bounded (approximately) by Hatton Bank to the south, Lousy Bank to the south-east, Iceland-Faeroe Rise to the east (but extendng some way into the Norwegian Basin), Iceland to the north and by a line from SW Iceland running SSE to Hatton Bank in the west. His principal contention was that, in the two previous Overflow experiments (1960 and 1973), the inflows in the Denmark Strait and the Rockall Channel had been studied but that between Iceland and the Faeroes had not. The inflow appeared to be related to a weakening of the East Icelandic current. Ships, drifters and current meter moorings would be required for the study.

Malmberg reviewed recent Icelandic observations but agreed that much remained to be done in the area proposed by Hansen. Meincke drew attention to the weak currents between the mid-Atlantic ridge and Rockall Bank and the masking effect of westerly winds on drifters. Dickson reported that the UK (MAFF) may be running a section into the Icelandic basin from SW of Rockall Bank in July 1985. Foldvik also supported Hansen's proposal.

The Chairman observed that although it would be a major undertaking to produce volume transport figures and to revise Worthington's equations, it was probable that there would be sufficient interest for ships to carry out stations and even sections in the area. After further discussion it was agreed

that a small group would work by correspondence and prepare a proposal along the lines suggested by Hansen for the approval of the ICES Hydrography Committee meeting in October 1984 and that ICES be asked to bring this to the attention of the CCCO; 1986 was mentioned as a suitable time frame for the observations, to provide a 13-year periodicity in overflow experiments!

2.4 Buch reported studies west of Greenland which showed that running means of temperatures were approaching the extreme low of the 1970 anomaly. Met. reports had also shown an anomaly of -12° C in air temperature at one location. Malmberg reported that there was no correlation with temperatures on the Iceland side - this had been a markedly ice-free year: indeed it had generally been observed that ice-free years on the eastern side had been associated with very cold periods on the western side.

2.5 Other participants gave brief reports of field work, as follows:

Dickson - Eddy kinetic energy studies in the area east of Rockall bank; there were seasonal signals - max April/May, sub-max in December/January.

Gould - 3 to 4 month delay between wind energy and current energy but strong correlation from surface to 500m+ - so where does the energy exist in the intervening period, Is there a topographic influence? Clearly there is involved some important mechanism for getting energy from atmosphere to ocean - but what is it?

Booth - Reported tracking 11 Argos drifters, drogued at between 15 and 175m, from May 1983 to February 1984 with some surprisingly high rates - max 150 cm/sec. The continental slope acted as a boundary for all except the shallower ones.

Gould & Huthnance - Reported results from CONSLEX (Continental slope experiment) from September 1982 to March 1983. Stronger currents NE of Wyville-Thomson ridge (ca 40 cm/sec), weaker to SW (ca 15 cm/sec). Marked event (max 115 cm/sec) in 62°N 0° E/W. Results of tide gauge observations were reported, including a marked change of MSL (from +15 to -20 cms) which had occurred

during the period late January to early February.

Prangsma - Results of observations from OWS 'M' during July to September 1980, together with further studies on the development of the density structure during the year.

Maillard - Long term mooring (5 years) in the Tourbillon area at (PA) 49°N $14^{1}/_{2}$W. Data available for about 2 yrs shows lack of correlation between temperature and current.

Foldvik - Observations in the vicinity of 75°N 0°E/W showed, through computation, that the freezing of 15cms into ice at surface (a not unlikely occurrence) would reduce the heat content sufficiently to make the typical profile homogeneous.

Clarke - reported 3 experiments -

(a) Newfoundland Basin - salinity gradient decrease with depth: shallow, N. Atlantic current shows as front in S but deeper this is not seen

(b) entry of fresh water into N. Atlantic current - seen at tail of Grand Banks; E. of Flemish Cap; possibly from Hamilton Bank thence SE across Labrador current and joins NAC; a very strong T° front noted (14° to 6° in less than 10 km).

(c) correlation of satellite imagery of Gulf Stream with CM and station observations.

Rudels - reported results of his observations in the North Greenland Sea including studies of interaction between Greenland Sea Deep Water, Norwegian Sea Deep water, Canadian basin outflow and the flow off the Eurasian shelf.

2.6 This item was omitted since it had been covered under discussion of 2.3.

2.7 The Chairman reminded members of the need to update the ICES inventory of work planned, in progress or being analysed, by completing forms which were available at the meeting and sending them to the Secretariat. The 1983 list was circulated and a number of amendments made.

3. CTD DATA QUALITY AND EXCHANGE

3.1 Saunders presented results of a study on stability of Eastern N. Atlantic deep θ-S observations, and on the calibration of CTDs. Briefly, below 3000m depth and in a region 20-46°N, 10-30°W a very uniform and stable θ-S was found. Furthermore systematic differences had been found between IOS, Scripps and WHOI measurements; in the case of S, these systematic differences were about 0.005°/oo, Scripps measuring fresher and WHOI saltier than IOS. In measuring temperature he drew attention to three lessons IOS had learned about calibrating instruments:

(a) Good calibration takes a lot of time

(b) The best calibration requires that the whole instrument goes into the bath

(c) There should be as little direct handling of the transfer standard as possible.

He described methods used by IOS to calibrate CTDs and current meter temperatures and drew attention to the fact that, for temperature, the Aanderaa CM temperature sensor showed a remarkable stability. He drew attention to a related paper in Deep Sea Research (Vol. 30 p. 663-667).

This led to a discussion as to whether moorings carrying deep, well calibrated Aanderaa meters might be used as field references for CTD calibration. It was agreed that interested laboratories should exchange positions where they had such meters moored with this end in view; Saunders asked that anyone interested in such comparisons in the vicinity of 31°N 24°W during 1985/86 should contact him.

3.2 A proposal from the ICES Data Management Group that bottle thermometer and bench salinometer data should be included with all observations by CTD of T and S (within the header data block) for calibration and quality control purposes was discussed at length. The task of checking data before submission to ICES was a not inconsiderable problem and one which the data centres probably could not undertake; it was also appreciated that, if required accuracies of data were stipulated by ICES or by data centres as a result of the deliberations of SCOR WG 51, this might inhibit people from submitting their data. There was also some disagreement on the format to be used and whether GF3 was to be used principally between data centres, with national or bilateral arrangements operating between laboratories and centres, or whether

all laboratories were supposed to submit data to data centres already in the GF3 format.

It was eventually agreed that:-

(a) everyone was encouraged to send data to ICES via national data centres

(b) an indication of the quality and accuracy of data should be given by the submitting scientist

(c) calibration information should be included with each set submitted

(d) clarification on the use of formats was required.

(e) the group awaited the report of SCOR WG 51.

4. ICES MATTERS AND INTERACTION WITH OTHER BODIES

4.1/4.2 Meincke introduced proposals tentatively put forward to a WOCE (World Ocean Climate Experiment) working group for the North Atlantic at a meeting in Scripps 19-21 March 1984. These attracted some constructive criticism and the filling of a number of gaps was suggested. A unanimous view that any ocean climate experiment must include measurements of the inflow, transformation and outflow of waters to and from 'Northern Oceans' (sic) was expressed in the light of experience of the Overflow and Deep water projects.

The Chairman pointed out that the group looking at the Iceland Basin proposal might be able to put forward views; the agreed action remained as in 2.3 above.

4.3 There had been little progress in compiling outstanding OWS data, especially that from mid-1970s on. Ellett, McAndrew and Prangsma agreed to cooperate in expediting the matter.

4.4 The Chairman summarised a letter to the President of ICES from the Chairman of IGOSS seeking a closer liaison between IGOSS and ICES and drawing attention to the fact that France was considering offering to establish a specialised oceanographic data centre for IGOSS which would cover the North Atlantic and Mediterranean. Several participants spoke in favour of the IGOSS system, recalling that ICES and IGOSS had cooperated during Overflow '73 when the DHI acted as a specialised oceanographic centre. It was acknowledged that in some ways the system was of only limited use to the scientific community,

but it was available for use when required and indeed was so used. The Chairman encouraged members to report their XBT observations via IGOSS, pointing out that no extra costs were involved. Clarification was requested on the relationship between the proposed French SOC and the work of Huber at DHI.

4.5 A Marine Chemistry programme requiring monitoring of trace metals had asked, through G. Topping, for suggestions for positions at which reference stations might be established - in effect for positions with constant hydrographic characteristics. The group agreed with suggestions put forward by the ICES Hydrographer and proposed, in addition, Mediterranean Water, the Bay of Biscay and the southern end of the Rockall Trough.

4.6 Meincke informed the Group of various decisions of the ICES Consultative Committee regarding the conduct of the next Statutory meeting, at which more joint sessions of the Hydrography Committee with other committees would be held. The programme for the mini-symposium on the mid-1970s anomaly was also discussed and various combinations of the papers submitted were considered: the finally agreed version is to be sent to all contributors.

Topics for the 1985 meeting were suggested: either 'Fronts in Shelf Seas' or - 'Procedures for collecting and processing hydrographic data'. One topic was suggested for the 1986 meeting - 'Deep Water Project - results'. These would be considered by the Hydrography Committee at the 1984 meeting.

Members were asked to note that the caveat printed at the top of each ICES contribution, which placed a restriction on citation of the paper, may be lifted at the discretion of the author(s): this decision is contained in the Proces Verbal of the 1983 meeting and was welcomed by the WG members.

The early dead-line for contributions to be presented at Statutory meetings (which had been advanced to April) had caused some difficulties; it was reported to the group by Meincke that it was expected that this would be relaxed somewhat.

4.7 Meincke advised the group that the means by which formal membership of ICES Working Groups was achieved was for the national delegate to announce the name of his country's intended member of the Group to the General Secretary.

5. ANY OTHER BUSINESS

5.1 It was suggested that the next W.G. meeting should be held in the Faeroe Islands during the first two weeks of June 1985 and that the meeting should focus on the oceanographic problems of the Iceland Basin and of the Faeroe Shetland Channel. It is recommended that the ICES hydrographer be invited to attend this and subsequent W.G. meetings.

5.2 There was no other business and the Chairman closed the meeting by thanking all those attending and, in particular, Professor Currie and David Ellett for their hospitality and for the excellent arrangements which they had made for the meeting.

ANNEX 1

ICES OCEANIC HYDROGRAPHY WORKING GROUP

AGENDA

22 - 23 May
1984

1. Organisation
   - 1.1 Open meeting
   - 1.2 Local arrangements (DJE)
   - 1.3 Appointment of Rapporteur
   - 1.4 Additions to Agenda

2. Research Results and Plans
   - 2.1 Deep Water Project. Report progress on understanding ventilation in high latitudes and exchanges between basins (KA)
   - 2.2 Future plans and proposals for work related to 2.1
   - 2.3 Iceland basin proposals (BH)
   - 2.4 Recent anomalies West of Greenland
   - 2.5 Other reports of field work
   - 2.6 Strategy for future ICES initiatives
   - 2.7 ICES inventory updates

3. CTD data Quality and Exchange
   - 3.1 Stability of N. Atlantic Deep θ-S (PMS)
   - 3.2 Quality control of CTD data, ICES archiving

4. ICES Matters and Interaction with other Bodies
   - 4.1 ICES and WOCE/WCRP (WJG, JM, GP)
   - 4.2 SCOR WG 68 Strategy for understanding N. Atlantic circulation (JM)
   - 4.3 OWS Data compilation for mid 70's (DJE, TMcA)
   - 4.4 ICES and IGOSS (WJG)
   - 4.5 Marine Chemistry proposals for trace metal monitoring
   - 4.6 1984 Statutory meeting papers and 1985 topics
   - 4.7 W.G. membership

5. Any other Business
