

International Council for
the Exploration of the Sea

C.M.1968/C:5 •
Hydrography Committee

Report on the ICES Meeting on
Development of Marine Data Systems,
Charlottenlund, March 25-29, 1968

List of Participants

	<u>Institution</u>
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James Crease	National Institute of Oceanography, England.
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L.C. Samples	" " "
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AGENDA

1. Adoption of Agenda
2. Review, present status of, and plans for, development of national oceanographic data centres (report by representative from each member nation).
3. Review, general problems, data exchange (a) among NODC's (b) among NODC's and ICES, (c) among NODC's, ICES and WDC-A and B, and relationship among ICES, IOC and WMO (IGOSS).
4. Review, problems and questions related to (a) input, storage and retrieval of continuously recorded observations (e.g., buoys, towed sensors, etc., (b) synoptic data, particularly those for air/sea interaction studies and fisheries forecasts and (c) intercalibration of sampling and analytical techniques.
5. Discussion in detail of the subjects listed below:
 - a. Exchange formats (Agenda item 3)
 - b. Input-output cycles for casts, STD's, BT's and XBT's
 - c. Input-output cycles for data (other than 5 (b) (particularly those from buoys, towed sensors, etc.)).
 - d. Synoptic oceanographic and meteorological data for use in air/sea interaction studies.
6. Adoption of resolutions.
7. Adjourn.

Summary of Discussions on
the future role and responsibilities
of the Service Hydrographique
by
a Meeting of ICES Member Countries
Charlottenlund, March 25-29, 1968

In accordance with an ICES Resolution (C.Res.1967/2:14) a meeting was held in Copenhagen. As requested in C.Res.1967/2:15 the meeting also reviewed Recommendation A (2) of the Hydrography Committee's 1967 meeting.

1. The Agenda was approved. The meeting also decided to undertake a study and review of guidelines to Marine Data Systems prepared in advance by the meeting delegates.
2. Working papers and reviews were tabled prior to the meeting by Canada, Germany, U.K., U.S.A. and ICES. (C.M.1968/C:4).

Developments in other ICES countries were discussed with members expressing concern over the general lack of information available from absentee countries.

The Secretariat was asked to communicate with these countries to ascertain the intention, plans and status of NODC's (C.M.1968/C:6.)

The members of the meeting went on record in advocating that membership to the Working Group on the Development of Marine Data Systems (C.Res.1967/2:20) be appointed and meet at the 1968 ICES Meeting. Furthermore it is recommended that the Bureau appoint the Chairman of the Working Group as soon as possible with the intention that the first meeting of the Working Group be held prior to or during the ICES Meeting in order that the Chairman can report to the Council.

The Hydrography Committee's Recommendation A (2) (cf. C.M.1968/C:4) was reviewed with the following conclusions:-

- a. (i) That countries with oceanographic data centres undertake the processing of national data as defined in subpara (b) and the development of inventories subsequent to 1962, further that ICES will receive, collate and reproduce pre-1963 inventories for all member countries.
- (ii) ICES should act as the joint national data centre for those countries wishing it to perform data processing work.

- (iii) The Secretariat is being asked to determine which member countries will use the ICES data centre as a processing facility and to determine which countries will maintain and operate their own data centre for data or information interchange with data centres of any member country.
 - (iv) It was recognized that each of the data centres should actively operate as a focal point for acquisition and location of data and should promote expeditious submission of observation results. The NODC's could provide a useful communication link for other relevant information, e.g., computer programs. It is further recognized that data collection and analysis will be a prime responsibility of the new ICES data centre.
- b. That data are assumed to be surface and serial oceanographic observations originated by that member's activities or by agreed joint expeditions when the responsibility for data collection is accepted by (or allocated to) that centre. The data area will include the entire ICES area of concern, i.e., the Atlantic ocean and adjacent seas.
 - c. It was agreed that ICES continue to punch and list serial oceanographic data (at cost) for those countries which desire this service. It is to be understood that the Service Hydrographique and NODC's will exchange data on request and to WDC A and B in accordance with previous established practices.
 - d. That all ICES member countries (excluding countries joining since January 1963) complete their submission of pre-1963 oceanographic surface and serial data to ICES by December 1969 in order that these data may be included in the final issue of the ICES Oceanographic Data Lists. Publication of the lists are tentatively set for the year end 1970.
 - e. All ICES member countries will provide inventories as outlined in this report.
 - f. In view of the general lack of interest in reporting BT data to ICES it has not been possible to develop an adequate data bank at the Service Hydrographique. As a result, the attendees of the meeting reaffirm the recommendation that BT data no longer be submitted to ICES, however it contends that an inventory should be developed for national holdings and submitted to ICES.

A common format for cataloguing is to be prepared by members of the meeting for consideration by the Working Group on Marine Data Systems in September, 1968.

The inventory should begin with 1968 holdings and be updated at yearly intervals. An historical inventory should also be developed if possible.

The members of the meeting agreed that there was a continuing need for the Service Hydrographique as a data analysis centre to perform the type of tasks laid down by the Plankton Committee at the October 1967 meeting and the ICES Meeting on Service Hydrographique in March 1966 (appended as Annex I).

There was some discussion of the financing of the Monthly Means of Surface Temperature and Salinity for Areas of the North Sea and the North-Eastern North Atlantic following which Mr. Smed pointed out that this Atlas was being subsidized by a few countries only and was one of the few cases in which data products generated by ICES was not available free to all countries. The meeting members recognized that in the future some supplemental finances will be necessary for projects of this nature.

3. The U.S. Observers pointed out that the IOC Working Group on Data Exchange expects to utilize the deliberations of the ICES Working Group as a possible framework of a universal (53 countries) system of data exchange. Background material and resolutions on IGOSS, Data Exchange and other relevant matters from the October 1967 IOC meeting were submitted by the U.S. observers and are appended to these minutes (Annex II).

4. Item 4 (a) was dealt with in connection with item 5. It was agreed to defer discussions of item 4 (c) until such time as the permanent Working Group is constituted, so that the matter can be studied in the depth it warrants.

4 (b) Synoptic data: Captain Houston and Lt.Cdr. Samples described the applied oceanographic work being done at Rota and presented some charts prepared in response to a request from the Hydrography Committee in October 1967. The request was made for as much additional synoptic data as possible to be fed into the national meteorological networks for onward transmission to Rota. Further requirements were for additional climatological data to update the base references. The Rota representatives offered to supply a synoptic service for sea surface temperature charts to ICES and/or member countries.

A summary of Lt.Cdr. Samples' presentation is contained in Annex III.

5. Under this item Guidelines for the Development of Marine Data Systems were discussed. Notes are attached (Annex IV).

6. The following recommendations were passed:-

1. ICES Service Hydrographique.

In view of the limited space allocation, staff and resources it is recommended that urgent action be undertaken by ICES to make provision for the necessary resources and facilities to the Service Hydrographique in order to provide it with the capability of carrying out its obligations as a Data Analysis Centre for the ICES community.

Attention should be directed specifically to

- 1) additional space
- 2) additional staff
- 3) rental of automatic data processing equipment on a contractual basis.

2-9. General

The following recommendations or concepts were reached during a general round-table discussion of data-handling problems and exchange:

2. In principle a data center has a two-fold responsibility:
 - a) Archives - to provide a place for permanent storage of data for retrieval retention.
 - b) Service - to provide a service for the retrieval of data for the national and international community of scientists.
3. The most desirable and economical medium for the exchange of data is on magnetic tape. Due to the state of flux and individual capacity the format and recording mode of tape should be arranged on an individual basis. Whenever possible it is recommended that the recording mode should be 7-track even parity, BCD card image, blocked 10 with a recording density of 556 bpi in order to be compatible with a wide variety of computing systems.
4. With the widespread use of the ICES format as an exchange medium, it should be considered as the base for developing future systems for exchange.
5. In the future a cruise master card should be adopted for further definition of Nansen cast data techniques, identification, instruments and intercalibration.
6. The serial oceanographic data exchanged between NODC's should include as a minimum, observed data with the option of calculated data but should not necessarily contain interpolated data.
7. Calculations performed, for the exchange of data received by NODC's should be standardized for the NODC's. Further thoughts should be given to the acceptance of standard methods of calculations and interpolations on data for exchange among ICES' countries.
8. Further consideration should be given by the Working Group on the Development of Marine Data Systems to keep under active review the current international moves towards standardization on the international systems of units, recognizing that data centres are in a position to actively influence the introduction of internationally agreed units.
9. It is recommended that a study be initiated to develop
 - (1) a BT inventory format
 - (2) a Serial oceanographic format

Common to the ICES countries.
This study should be initiated with a review of the contents of the Common Core fields for Heterogeneous Data. (Annex V.)

7. The meeting adjourned on March 29 at 1 p.m.

Annex I

ICES Service Hydrographique as
a Data Analysis Center

Tasks suggested by the Plankton Committee 1967, and by the Meeting in 1966 on the Service Hydrographique.

1. Furnish more details of the hydrography of coastal waters.
2. Give long-term series of data on the conditions in the open sea and in the open ocean.
3. Furnish dates of establishment of thermal stratification, area by area and year by year.
4. Distribute more details of the chemistry of the sea, its seasonal, annual and geographic variation.
5. The series (1876-1963) of monthly anomalies of surface temperatures for regions of the northern North Atlantic and of an area off the eastern coast of Scotland should be continued and also summarized in one volume.
6. Taking into account that the monthly charts of surface temperature and salinity, partly including also residual currents, prepared for the years 1950-52 by the Lowestoft Laboratory and for 1952-58 by the Service Hydrographique, apparently have proved quite useful, in the long run, their continuation should be made possible provided that the time-lag can be reduced to six months at maximum. The Meeting feels furthermore that this service should be re-started on a tentative basis only and covering limited areas. Finally, the charts should be prepared by a computer.
7. Preparation of tables of mean monthly surface temperature and salinity for the years 1955 onwards. (Continuation of the tables of the ICES Atlas: "Mean Monthly Temperature and Salinity of the Surface Layer of the North Sea and Adjacent Waters from 1905 to 1954.")
8. The tables and diagrams of monthly surface temperature and salinity anomalies for 1905-1964 started in the Lowestoft Laboratory on basis of the ICES Atlas should be completed in collaboration with the Service Hydrographique.
9. Continuation of the series (1957-1962) of tables of monthly means of surface temperature and salinity for areas of the North Sea and the north-eastern North Atlantic.
10. Preparation and publishing of historical charts of temperature and salinity at a number of depth levels, based on data of certain cruises or surveys, possibly with the occurrence of fish indicated.

Annex II

Resolution V-20

of

Fifth Session of IOC

INTEGRATED GLOBAL OCEAN STATION^{*} SYSTEM (IGOSS)

The Intergovernmental Oceanographic Commission,

Considering the growing need for oceanic data on a global scale, by a wide range of users, including workers in research, engineering, navigation and commerce, fisheries and forecasting services, and in order to further the scientific study of the ocean and the atmosphere;

Recognizing the activities of the World Meteorological Organization and particularly the marine aspects of its World Weather Watch (WWW);

Noting the advice of the International Telecommunications Union that an initial plan and programme for an Integrated Global Ocean Station System should be prepared by early 1969, 'this plan to include the geographical distribution of oceanographic stations, their system of operation, the deployment of frequencies in the system and the manner in which oceanographic information is to be transmitted';

Noting further Resolution 9 (Cg-V) of the 5th Session of the World Meteorological Congress which stresses the need for closer cooperation between WMO and other international agencies concerned with marine activities, such as IOC, including the establishment, as required, of joint working groups (IOC/V-22A);

Decides to establish within the Commission a permanent Working Committee for an Integrated Global Ocean Station System, with a membership of no more than twelve of those member states which are most active in this field, the Chairmen of the various subsidiary groups (ex-officio), observers and representatives of other interested organizations;

*) as defined in the report of the 1st Meeting of the Working Group on Fixed Oceanographic Stations (Annex V to UNESCO/NS/180)

Authorizes the Working Committee:

- (i) to plan and coordinate an IOC programme of studies and services in oceanic areas, both within the Commission and jointly with WMO and other organizations;
- (ii) to act as the Commission's authority for the discharge of its responsibility for the IGOSS work of the IOC/WMO Panel of Experts on Coordination of Requirements and those groups on Data Exchange, Telecommunications and Ocean-Atmosphere Interaction, as detailed in Resolutions V-20A, 20B, 20C, 20D, 20E hereafter, and
- (iii) to form additional panels of experts, as considered necessary.

Invites the WMO and other organizations to consider favourably cooperation with the above Working Committee.

RESOLUTION V-20A

OCEANOGRAPHIC DATA EXCHANGE

The Intergovernmental Oceanographic Commission,

Accepts the report of the third meeting of the Working Group on Oceanographic Data Exchange (IOC/V-13), appreciates the recommendations contained in the report of the Ad Hoc Group on Format Standardization (IOC/V-13A), and applauds the Working Group for its work on the Second Edition (revised) of the Manual on International Oceanographic Data Exchange as approved by the 7th Meeting of the Bureau and the Consultative Council (IOC/B-30), and particularly thanks the Canadian Oceanographic Data Centre for its assistance on these matters.

Amends the terms of reference of this Working Group (Res.I-9) by adding the following:

- a) to review and reappraise the whole international oceanographic data exchange system as recommended in Section 8 of the report "International Ocean Affairs" (IOC/V-INF.111), and as reaffirmed in Recommendation (ix) of the summary of the recommendations of the Working Group meeting in The Hague in September 1967 (IOC/V-4);
- b) to continue and encourage the present work leading towards format standardization for use with automated techniques for data input, storage, retrieval, dissemination, and exchange, but recognizing the considerable financial implications inherent in such automation;
- c) to continue the development of means whereby geological, geophysical, biological, special air-sea interaction data, and data from "continuously recording" sensors are incorporated into the international oceanographic data exchange system.

Directs the Working Group to establish and maintain close collaboration with National and Regional Data Centres and with those groups of the Working Committee concerned with various aspects of the Integrated Global Ocean Station System (IGOSS); and

Invites WMO, FAO and other interested organizations to send observers to the meetings of the Working Group.

RESOLUTION V-20 B

TELECOMMUNICATIONS

The Intergovernmental Oceanographic Commission,

Accepting the verbal report of the Chairman of the Working Group on Communications that the work of the existing group has been completed and noting the contents of the paper "Radio Frequencies for Oceanographic Data Transmission" (IOC/V-12);

Decides to dissolve the Working Group and offers to all members of the group the sincere thanks of the Commission for their services over the past five years.

Noting with appreciation the action taken by the ITU World Administrative Radio Conference for the Maritime Mobile Service, Geneva 1967, in designating radio frequencies for transmission of data relating to oceanography;

Considering

- 1) that the need exists for the urgent establishment of guide lines, technical standards and plans for the efficient utilization of these frequencies;
- 2) that these activities, according to the invitation of the Radio Conference, should be developed jointly by IOC and WMO;

Resolves to authorize the IOC Bureau to negotiate with the WMO as a matter of urgency, the establishment of a joint IOC/WMO Group of Experts on Radio Communications to act on these matters on the following lines:

- a) that the joint IOC/WMO group of experts be composed of preferably not more than six experts but with the possibility of calling on additional experts to deal with specific problems on an ad-hoc basis,
- b) that the joint IOC/WMO group develop jointly, in consultation with the IFRB, and in consultation with ITU administrations as appropriate, a coordinated frequency assignment plan designed to meet existing and future requirements of all interested ITU member countries, for use by stations in the collection of data relating to oceanography in a world-wide system, within the framework of provisions made by the WARC for such a system,

- c) that the IOC/WMO group assume jointly the responsibility in consultation with the IFRB, for keeping such a plan current, in the light of changing requirements for data relating to oceanography,
- d) that the joint IOC/WMO group should meet with the IFRB at an early date, preferably at the beginning of 1968, and should continue on a semi-permanent basis, meeting as often as would be necessary, to prepare this frequency assignment plan by early 1969,
- e) that the terms of reference of the joint IOC/WMO group of experts are those defined in the Resolution No. MAR 20 of WARC, Geneva 1967, for the purpose of establishing a plan for the coordinated use of the radio frequencies by the stations in the collection of data relating to oceanography.

Proposes that the joint group collaborate closely with the Working Committee and with other groups concerned with various aspects of the Integrated Global Ocean Station System (IGOSS); and

Invites the WMO to consider favourably the above proposal and to provide a substantial part of the secretariat services for the joint group of experts.

RESOLUTION V-20 C

OCEAN-ATMOSPHERE INTERACTION

The Intergovernmental Oceanographic Commission,

Having considered, the Report of the First Meeting of its Working Group on Ocean-Atmosphere Interaction,

Recognizing the considerable interest demonstrated by a number of international bodies to the problems of the ocean-atmosphere inter-action studies,

Accepts the Report of the Working Group.

Decides to dissolve the Group, and

Authorizes the IOC Bureau to negotiate with the WMO the establishment of a joint working group on ocean-atmosphere interaction, composed of representatives of no more than twelve Member States actively engaged in studies of ocean-atmosphere interaction, and to reach with WMO an agreement on the terms of reference of this Joint Working Group along the following lines:

- (1) To examine proposals for scientific investigations of ocean-atmosphere interaction in order to ascertain their applicability to intergovernmental programmes of joint action;
- (2) To consider operational problems involved in the development of such programmes, including questions of standardization of methods and instruments;

- (3) To consider and make recommendations on the ways in which intergovernmental action could strengthen both oceanic and meteorological forecasting services;
- (4) To recommend appropriate intergovernmental action to the Commission, to WMO, and to other international bodies concerned;
- (5) To maintain close collaboration with other groups of the Working Committee concerned with various aspects of the Integrated Global Ocean Station System (IGOSS).

Invites the WMO to consider favourably the above proposal and to provide a part of the secretariat services for meetings of this Working Group.

RESOLUTION V-20 D

VARIABILITY IN THE OCEAN

The Intergovernmental Oceanographic Commission,

Recognizing the variable nature of the marine environment and the important role that the knowledge of this variability plays in modern oceanography,

Considering the scientific results of the SCOR Symposium on the Variability of the Ocean held in Rome in May 1966,

Noting, that there are an increasing number of cooperative international programmes utilizing continuously recording instruments, such as the SCOR-IAPSO-UNESCO sponsored projects on Continuous Velocity Measurements and Deep Sea Tides, and the ICES work on variability in physical and chemical properties of the sea, as well as the increased interest of SCOR and IABO in developing programmes on biological variability in the ocean, and

Taking into account the ICES plan to convene a symposium on the Physical Variability in the Northern Atlantic, to be held in Dublin in 1969,

Decides to dissolve the Working Group, and

Resolves to establish an IOC Group of Experts in the field of Ocean Variability, requesting SCOR, ACMRR, IAPSO, IABO, ICES and UNESCO to suggest, as early as possible, names of experts, and from which suggestions appointments are to be made to the Group by the Working Committee on IGOSS.

Establishes as terms of reference for this group the early development of a scientific programme for monitoring, measuring and understanding ocean variability that will become a part of the Integrated Global Ocean Station System (IGOSS), taking into consideration existing regional programmes; and

Proposes that the Group of Experts collaborate closely with the Working Committee and with other groups concerned with various aspects of the IGOSS.

RESOLUTION V-20 E

OCEAN-DATA STATIONS

The Intergovernmental Oceanographic Commission,

Adopts the Report of the Working Group on Ocean Data Stations (IOC/V-11).

Believing that all continuing matters in the report are being adequately catered for by other groups existing or to be formed, such as the Working Committee for IGOSS,

Decides that the Working Group shall be dissolved and offers to all members of the Group the sincere thanks of the Commission for their services over the past five years.

Considering, with regard to the Legal Status of Ocean Data Stations, that the role of the Commission is to study existing national laws and regulations, to state the problems existing and difficulties encountered in their use, and to propose ways and means by which these may be overcome,

Instructs the Secretariat to continue to arrange the work of the Group of Legal Experts established by the Bureau, with a view to completing its work at an early date, in order that the Bureau and Consultative Council may consider further appropriate action by the Commission on this important matter.

Further instructs the Secretariat to invite WMO to take part in the work of this group.

Annex III

ICES Sea Surface Temperature Charts

by

the Fleet Weather Central
Rota, Spain

In response to ICES Resolution C.Res.1967/1:16 United States Fleet Weather Central at Rota, Spain has been computing synoptic analyses, means and anomalies of sea surface temperature for the geographical area covered by the ICES Atlas. Analyses are computed twice daily, means and anomalies are computed automatically after each 5, 10, 15 and 30 day period and are sent by mail each five days to Service Hydrographique.

The analysis program is designed to adjust a "guess field" (a previous analysis) to be representative of current reported SST data. Where no new data are available, the system utilizes climatological data to adjust. It follows then that good climatological means as well as dense current data are required for valid synoptic analyses. The climatological values used for the ICES area are those digitized from the ICES Atlas of data from 1905 to 1954.

As a routine developmental function FWC Rota computes synoptic SST analyses twice daily on a 25 mile grid for the ICES area plus three other areas of the North Atlantic and two sections in the Mediterranean Sea. These analyses are contoured and drawn for display by a computer driven incremental line plotter at a scale of 1:7.5 million. An analysis of SST computed on a 50 mile grid for a 1:15 million presentation is computed operationally twice daily for transmission by FWC Rota radio facsimile.

The "ZOOM" technique used permits analysis for any geographical area for any desired grid mesh length. In practice, grid size is dictated by data density. The FWC Rota SST analysis program accepts SST measurements from any standard synoptic source, e.g., ships' surface meteorological observations, BT, XBT or AXBT, soundings and ART observations. Significant advances are being made in data collection, but improved cooperation in synoptic environmental data transmission is required since analysis validity is directly tied to data input.

Routine copies of the ICES experimental SST means and anomalies may be sent upon request. Address inquiries to:

Commanding Officer
U.S. Fleet Weather Central
Box 31
Base Naval de Rota
Apartado 155
Jerez de la Frontera
Cadiz, Spain.

Annex IV

Guidelines for the Development of
Marine Data Systems

For the purpose of developing the guidelines, consider the following four classes of oceanographic data:

- I Serial oceanographic data - e.g. manually recorded observations and analyses
- II Continuously profiled data - e.g. BT, STD or XBT
- III Parameter time observations - e.g. current meters
- IV Parameter distance observations - e.g. towed sensors

with respect to the following ,

A. Original Data Storage Media

- 1) Hand written report forms
- 2) Digital records
 - a) cards
 - b) paper tape
 - c) magnetic tape
 - d) other
- 3) Analog records
 - a) strip chart
 - b) single graph
 - c) magnetic tape
 - d) film
 - e) other,

B. Machine Processing of Data

- 1) Feasibility
- 2) Conversion analog to digital
- 3) Data to be processed
 - a) recorded original units
 - b) oceanographic units
 - c) standard oceanographic units
- 4) Sampling rate and criteria
- 5) Quality control
 - a) method of quality control
 - b) handling of doubtful or questionable data, e.g.
 - accept
 - flag
 - discard
 - replace or correct
- 6) Publication of data records,

C. Storage of Processed Data

- 1) Analog
 - a) microfilm
 - b) aperture cards
 - c) other
- 2) Digital
 - a) cards
 - b) paper tape
 - c) magnetic tape
 - d) disk
 - e) other
- 3) Format
 - a) fixed
 - b) open-ended
 - c) other ,

D. Retrieval of Processed Data

- 1) Data accessing
 - a) sequential, e.g.
 - cruise
 - area
 - time range
 - depth range
 - parameter range
 - b) direct, e.g.
 - station
 - position
 - time series
 - depth value
 - parameter value
- 2) Data sampling on accessing, e.g.
 - periodic
 - means
 - maximum
 - minimum
 - anomalies
- 3) Output media
 - a) print out
 - b) cards
 - c) paper tape
 - d) magnetic tape
 - e) disks
 - f) other,

E. Exchange of Data

Method of exchange

- 1) Original (copies), e.g.
 - data records
 - microfilm
 - magnetic tape
 - paper tape
 - other
- 2) Processed, e.g.
 - print out
 - cards
 - paper tape
 - magnetic tape
 - disk
 - plots
 - other .

Guidelines for the Serial Oceanographic Data
System in the ICES Data Centre

A. Original Data Storage Media

- 1) Hand written report forms are stored as original data.
- 2) Hand written report forms are key-punched onto cards with some data submitted on magnetic tape and cards in ICES format along with a print-out.
- 3) Not applicable.

B. Machine Processing of Data

- 1) Only feasible to the point of producing a listing.
- 2) Not applicable.
- 3) Data are submitted in standard oceanographic units.
- 4) Sampling rate determined by originating agency.
- 5) a) Quality control checks should be undertaken either by machine or hand.
b) Doubtful data are not discarded but referred back to originating agency.
- 6) Data records are not generally published.
- 7) Recommended that data calculations of δ_t be undertaken as part of the ICES data procedures.

C. Storage of Processed Data

- 1) Not applicable.
- 2) Cards and magnetic tape.
- 3) ICES format.
- 4) Original documents and cards are retained.

D. Retrieval of Processed Data

- 1) Present facilities only permit manual accessing by cruise of cards and print-outs.
- 2) Not applicable.
- 3) Print-outs, cards and magnetic tape.

E. Exchange of Data

- 1) No reason.
- 2) Print-outs, card and magnetic tape.

II Guidelines for the Development of Continuously
Profiled Data Systems

A. Original Data Storage Media

- 1) Deck log sheet giving indicative information.
- 2) and 3) While accepting that in the foreseeable future storage problems may have to be solved, it is agreed that the present policy should be that original records are discarded only when the data centre is convinced that a more conventive, permanent analogue record has been stored, from which the original could be reproduced, if required, without loss of information. The Marine Data Systems group should study the aperture card as a means of storing the analogue record. NODC's recommend input of digitized information.

B. Machine Processing of Data

- 1) Feasible with present day oceanographic observations but not for high rate of input.
- 2) Analogue to digital is considered essential but degradation of the record is inhered. The method of digitization should be identified.
- 3) Process in oceanographic or standard oceanographic units, e.g., BT and XBT depth in metres, temperature in °C.
- 4) The sampling rate and criteria is a function of instrument response and user requirements.
- 5) Doubtful data are discarded by the data centre when the data are voluminous. Otherwise the data centre should not alter or add to the data.
- 6) Not generally applicable.
- 7) Computations are recommended when possible.

C. Storage of Processed Data

- 1) Microfilm and aperture cards.
- 2) Cards for exchange and magnetic tape for archives and storage.
- 3) Fixed.
- 4) Retain indefinitely.

D. Retrieval of Processed Data

- 1) Cruise and area with special files for time series observations.
- 2) Customer defined.
- 3) Print-outs, magnetic tape and plots.

E. Exchange of data

- 1) Only copies should be exchanged.
- 2) Print-out, cards, magnetic tape and plots.

III and IV. Guidelines for Continuously Recording Data Systems

Present day data centres are not equipped to handle developmental data with volumes expected from continuously recording systems. Some formal efforts should be made to adapt data at a selective rate of acquisition. Alternatively when compression techniques are proven NODC's should explore means and criteria for selection of data. (U.S. NODC will undertake a study on temperature gradients from horizontal temperature gradients.)

It is recommended in the case of current meters that NODC's maintain and encourage the acquisition of these data at hourly intervals and attempt to inventory all sources.

