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GUIDE TO IGOSS SPECIALIZED OCEANOGRAPHIC CENTRES (SOCs)

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FOREWORD

The present Guide was prepared in response to Resolutions 3 (JWC-IGOSS-III) and 4 (JWC-IGOSS-IV), adopted at, respectively, the third and fourth sessions of the Joint IOC-WMO Working Committee for IGOS (Paris, 21 February - 2 March 1983, and Geneva, 11 - 20 November 1985). Its main objective is to provide Member States of IOC and Members of WMO which consider establishing an IGOS Specialized Oceanographic Centre with information regarding the international responsibilities they would assume in so doing.

This Guide is intended to become at a later stage part of the IGOS Guide to the IGOS Data Processing and Services System (IDPSS). At that time, its introductory part will disappear in order not to duplicate the information already provided in the Guide to IDPSS.

The Secretariats wish to thank all those who kindly agreed to undertake the preparation of the successive draft versions of the Guide, including the then Chairman of the former Task Team of Governmental Experts on the Further Development of the IGOS Observing System and the Director of the Canadian Marine Environmental Data Services.

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for the Secretary-General of WMO

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1. PURPOSE OF THIS GUIDE

1.1 The purpose of this Guide is to explain the role and functions of the Specialized Oceanographic Centres (SOCs) of the Joint IOC-WMO Integrated Global Ocean Services System (IGOSS), to detail the two types of SOCs and to describe the procedure for establishing them.

1.2 Other publications relevant to IGOSS and SOCs include:

- Integrated Global Ocean Services System - General Plan and Implementation Programme 1982-1988 (WMO - No. 582, jointly prepared by IOC and WMO, January 1982).
- Guide to the IGOSS Data Processing and Services System. (WMO-No.623, jointly prepared by IOC and WMO, 1983).
- Guide to Operational Procedures for the Collection and Exchange of Oceanographic Data (BATHY and TESAC) (IOC Manuals and Guides series No.3, jointly prepared by IOC and WMO, revised edition, 1984).
- Guide to IGOSS Data Archives and Exchange (BATHY and TESAC) (IOC Manuals and Guides series No.1, revised edition, 1985).
- Guide for Responsible National Oceanographic Data Centres (IOC Manuals and Guides series No.9, Annex II, 1982).

2. INTRODUCTION

2.1 The primary purpose of IGOSS is to make available to Member States of IOC and WMO oceanic information required by them in the provision of efficient and effective ocean services whether for operational applications or research. To achieve this purpose, IGOSS is designed to promote, develop and co-ordinate the international arrangements necessary for the timely global acquisition and exchange of oceanic data, the provision of ocean services and the dissemination of oceanic products¹ including observations, analyses and predictions of important ocean features to various user groups.

2.2 In order to carry out its functions, IGOSS has developed a three element organization. The elements are as follows:

- (a) the IGOSS Observing System (IOS), the purpose of which is to provide an appropriate global mechanism for the timely collection and exchange of standardized oceanic and related meteorological data for synoptic analysis and derived products;
- (b) the IGOSS Data Processing and Services System (IDPSS), the purpose of which is to provide a common basis for the operation of the IGOSS

¹Note - Within IGOSS, a "product" is defined as "any analysis, forecast or summary of oceanographic conditions prepared and disseminated in a format, and according to a schedule, that meets the needs of some governmental, commercial, academic, or private user group".

oceanic data-processing centres, provide for the standardization of ocean products, ensure that the requirements for ocean products of all Member States are recognized, and minimize duplication;

- (c) the IGOSS Telecommunication Arrangements (ITA), made up of telecommunication facilities of the WWW Global Telecommunication System (GTS) and other arrangements necessary for the rapid and reliable collection and distribution of the required observational data and processed information.

2.3 The IGOSS Data Processing and Services System carries on its tasks through a network of oceanographic/meteorological centres of various types. Because of the diversity of the tasks involved and because of the variety of expertise required to perform them, a variety of types of centres is required.

2.4 A National Oceanographic Centre (NOC)/National Meteorological Centre(NMC) performs a service basic to the IGOSS Observing System. The NOCs/NMCs collect data from national sources, perform quality control and formatting and enter the data on the GTS. These centres generally use the IGOSS observations from a limited geographic area to prepare products of national interest. Participation in IGOSS thus serves national and international needs.

2.5 Another type of centre is the World Oceanographic Centre (WOC). These centres collect and process the GTS data to prepare data sets and other products on a global scale.

2.6 IGOSS data are used for research and monitoring of ocean processes also at intermediate scales. In addition, there is a need to support international science or service programmes with a variety of operational data services. For these reasons a third type of centre is required. This centre is called the Specialized Oceanographic Centre (SOC). The SOC is an important element of the IGOSS Data Processing and Services System in that it fills the gap between the national scope of the activities of NOCs/NMCs and the global scope of WOCs by dealing with data and products of regional or ocean basin scales of interest, or by performing other specialized tasks which may be designated in response to well identified requirements.

2.7 As an example, a SOC may be required to support regional activities which encompass the area of interest of more than one Member State, prepare a particular product (e.g., sea-level anomaly maps) that is required on a regional or global scale, or assist the WOCs with certain of their tasks.

2.8 A SOC can be established at the request of several Member States or in response to the requirements of an international programme to provide products for designated regions or specific projects.

2.9 With the addition of the SOC concept, IGOSS should be capable of meeting a much wider range of users' requirements and could respond to IOC and WMO programme requirements more effectively.

2.10 In addition to providing a specific service a SOC can and should take an active role by recommending changes in observing techniques, densities and coverage of observations. The SOC's are well situated to perform this role because of the experience gained in preparing a specific product.

2.11 A SOC must demonstrate that it can perform the specialized service it wishes to provide and must be accredited by IOC and WMO. The accreditation procedure is described in section 8. A SOC is supported by the Member State or States which volunteered to establish it.

3. TYPES OF SOC's

3.1 Although SOC's can be established for a wide variety of purposes, they presently fall into two general categories, the "Data Type" SOC and the "Specific Programme/Process Type" SOC. Additional types of centres may be established as IDPSS evolves.

Data Type SOC

3.2 A "Data Type SOC" is a specialized centre which is established to collect and process data to a certain standard and deliver either quality controlled data sets or standard data or data information products to its users. The need for such a SOC is permanent since it is established to meet permanent IGOSs requirements.

3.3 Examples of permanent "Data Type" SOC's are the ones for BATHY/TESAC data operated at: the Marine Department of the Japan Meteorological Agency (JMA), Tokyo, Japan; the National Oceanographic Centre (NOC) - National Meteorological Centre (NMC), Moscow, USSR; and the Ocean Product Centre of the National Oceanic and Atmospheric Administration (NOAA), Washington, D.C., USA. The specific functions of these SOC's are also listed in section 9.

Specific Programme/Process Type SOC

3.4 When new parameters are introduced into the system on a pilot basis, or to support an international project of limited duration, the SOC eventually established to meet related requirements is a temporary one and is considered as a "Specific Programme/Process Type" SOC.

3.5 More generally, a number of IOC and/or WMO regional or global programmes may need the support of specialized centres for the operational processing of data. For example, regional programmes such as IOCARIBE, WESTPAC or the Southern Oceans Programme, and global programmes such as the TOGA or WOCE elements of the World Climate Research Programme need several specialized centres, some of which may be IGOSs SOC's. This type of SOC, which is called "Specific Programme/Process Type" SOC, may be established either on a permanent or temporary basis, depending upon the different kinds of requirements to be met.

3.6 An example of a specific programme SOC is the one for the IGOSs Sea Level Pilot Project (ISLPP) in the Pacific Ocean. This SOC is operated at the University of Hawaii. Its specific functions are listed in section 9.

This SOC was established because there was a need to support the World Climate Research Programme with a sea level data product.

4. GENERAL FUNCTIONS OF SOCs

4.1 When a NOC/NMC considers the possibility of becoming a SOC of any type, it needs to know which responsibilities it would have to assume. The functions listed below should be considered as guidelines for potential candidates in becoming SOCs: they are of a general nature and not all of them need be discharged by a particular SOC. The exact functions of any particular SOC are established on an individual basis when the SOC is accredited (see below paragraph 8.8).

4.2 The general functions of SOCs are split into operational and non-operational functions. For IGOSS purposes, "operational" is defined as "within 30 days from the time of observation". Moreover, an operational function should be regarded as compulsory.

Operational Functions

A SOC shall:

- (a) collect and process data from (i) the GTS and/or other operational sources, and (ii) within its area of responsibility (within IGOSS, "area of responsibility" is defined as "the geographical area for which a data centre assumes the obligation to compile and maintain oceanographic data and to render services from IGOSS data bases");
- (b) exercise at least the minimum quality control procedures specified in IGOSS publications and provide data quality control flags;
- (c) compile data sets covering its area of responsibility and submit at the end of each month the data received during the month, together with the quality control flags, to the appropriate IODE Centre in computer-compatible form;
- (d) prepare and disseminate operational data sets and products according to the tasks for which it was established;
- (e) provide for operational monitoring of the data collected from the GTS and provide this data management information on a regular basis to the IOC and WMO Secretariats;
- (f) exchange data sets with other SOCs, NOCs, WOCs and RNODCs on request in GF-3 or bilaterally agreed formats.

Non-operational functions

A SOC should:

- (a) develop and document procedures used for data processing and data quality control, and exchange such information upon request;

- (b) develop and document product specifications, methods of analysis/forecasting and monitoring as necessary;
- (c) recommend changes in observing procedures and densities of observations when necessary to improve operational products;
- (d) provide training in data processing and product preparation with the assistance of IOC and WMO;
- (e) host seminars and sponsor research at the centre with the assistance of IOC and WMO.

5. PRODUCTS AND SERVICES PROVIDED BY SOC's

5.1 SOC's provide products in the form of analyses, forecasts (if feasible), various other data products, and quality controlled data sets tailored to the needs for which they were established.

5.2 The data products prepared by the existing SOC's for BATHY/TESAC data can be classified as data information products or data analyses/forecasts. Data information products are disseminated on a regular basis. This type of product is used to inform users of the availability of IGOS data. Table 1, Annex I, contains a list of the monthly data information products produced by the SOC's for BATHY/TESAC data and by some NOC's/NMC's.

5.3 Table 2, Annex I, contains a list of the data analysis/forecast products which IGOS SOC's hope to produce collectively in the future. Many of these products are prepared now by NOC's for areas of national interest. The goal for the future is to begin to prepare these products collectively on a global or ocean basin scale.

6. RELATIONSHIP BETWEEN SOC's AND RNODC's

6.1 The network of RNODC's of the IODE system is described in IOC Guide for Responsible National Oceanographic Data Centres. The RNODC's have a similar role and place in the IODE system to the SOC's role in IGOS. In some cases, when a RNODC and a corresponding SOC are involved in the same programme, the activities of both centres should be closely co-ordinated to maximize efficiency and minimize the users' task of obtaining similar data from two sources. When a corresponding RNODC exists, the SOC will submit the operational ocean data originating from the IOS (and other operational sources) to that RNODC in computer-compatible form. Formats and quality control procedures are specified for data exchange between IGOS and IODE centres.

6.2 RNODC's operating in the IODE system have a primary responsibility to provide for the long term archival of oceanographic data and data products in the World Data Centres. SOC's have a prime responsibility to make data and data products available to users in an operational time frame.

6.3 Operational time frames range from a few hours to one month (30 days) depending on the parameter and process being monitored or studied. It is a goal of the IGOSS system to transfer the data from the IGOSS SOC's to the IODE RNODCs by the time the observation is no longer operational. Later on, the IODE system should be receiving non-operational data from other sources and should be able to provide more comprehensive data sets to users.

7. TRAINING AND INFORMATION EXCHANGE

7.1 A SOC is a centre with experience in the operational use of the particular data sets relating to its responsibilities. An important function of the SOC will therefore be to transfer this knowledge and experience to other centres and to research workers concerned. The SOC can assist with the training of personnel as required both in the host country and in other Member States. Personnel can be taught the specialized analysis and/or forecast procedures developed by the SOC as well as receive training on the special data manipulation and quality control procedures used at the centre for future application.

7.2 Researchers need to know the problems encountered with operational data processing and they can, in turn, advise in the development of operational products which are of maximum use to the research community. Such interaction can be achieved through consultations, meetings and seminars as well as by the sponsoring of on-site research by investigators needing access to the operational data sets.

8. SELECTION AND DESIGNATION OF SOC's

8.1 A SOC should be established when, and if, an actual need develops and there is a volunteer centre willing to provide the service. The following procedure should be used as guidelines when establishing a new SOC.

8.2 Any Member State which considers, or is informed, a need exists to establish a SOC, and which believes that a domestic centre can fulfill the functions described and wishes it to do so, may state its wish in a "Letter of Intent" addressed to the Secretary IOC and the Secretary-General of WMO. The letter should include a detailed list of available facilities as well as proposed terms of reference for the centre, together with information relating to the need and requirements for the proposed SOC.

8.3 Any international body or programme, at a regional or global level, which considers there is a need to establish a SOC, may issue a "Letter of Request" addressed to the Secretary IOC and the Secretary-General of WMO, stating the need and requirements for the proposed centre and suggesting potential candidate(s).

8.4 A Letter of Request or Letter of Intent received by the Secretariats should be submitted to the Joint IOC-WMO Working Committee for IGOSS for technical evaluation. During the intersessional period, the Joint Working Committee delegates its powers in that respect to

its Chairman assisted by its Vice-Chairman, the Secretariats and experts selected on an ad hoc basis.

8.5 Additional information may be requested from the letter's signatory to allow the technical evaluation to be performed. In such a case, the task of obtaining the required information is entrusted to the Secretariats.

8.6 In the case of a Letter of Request:

(a) If the technical evaluation demonstrates that there is an actual need for establishing the proposed SOC, suitable potential candidates are approached through official IOC and WMO channels with a view towards the candidates issuing a Letter of Intent for the SOC.

(b) If the need for establishing the proposed SOC appears doubtful, the Secretariats provide the letter's signatory with the results of the technical evaluation.

8.7 In the case of a Letter of Intent:

(a) If the technical evaluation demonstrates that there is an actual need for establishing the proposed SOC and that the proposed centre can fulfill the relevant functions, the Chairman of the Joint IOC-WMO Working Committee for IGOSS, in consultation with the Secretary IOC and the Secretary-General of WMO, takes the final decision on whether to accept the applicant as a SOC.

(b) If the need for establishing the proposed SOC, or if the ability of the proposed centre to fulfill the relevant functions appear doubtful, the Secretariats provide the letter's signatory with the results of the technical evaluation.

8.8 When the establishment of a new SOC is accepted, the Secretary IOC and the Secretary-General of WMO issue a formal "Letter of Accreditation" to the successful applicant and the Secretariats circulate the relevant information, including the terms of reference of the new SOC, to Member States of IOC and Members of WMO, and to all potentially interested.

9. FUNCTIONS OF EXISTING SOCs

9.1 The following sections present the terms of reference for SOCs which have already been established by IGOSS. Amendments and additions to this guide will be published as new SOCs are established or as the terms of reference to existing SOCs are modified.

Terms of Reference of the SOCs for BATHY/TESAC data

9.2 The IGOSS General Plan and Implementation Programme for 1982-88 lists the operational and non-operational SOC functions. These functions were modified by the Joint IOC-WMO Meetings of Experts on IGOSS/IODE Data Flow, Tokyo, Japan, November 1984, and Ottawa, Canada, January 1988. The modified functions are listed below. Figure A of Annex II presents the

data flow in pictorial form. Figure B of Annex II presents the data flow between the SOCs for BATHY/TESAC and the RNODCs-IGOSS.

Operational Functions

9.3 SOCs for BATHY/TESAC data will:

- (a) Collect and process data from the GTS and other operational sources within the framework of their respective areas of responsibility;
- (b) Exercise at least the minimum quality control procedures specified in IGOSS publications and provide data quality control flags;
- (c) Compile data sets covering their respective areas of responsibilities and submit at the end of each month data received during the month to the respective RNODCs-IGOSS, together with the quality control flags, preferably in GF-3;
- (d) Prepare and disseminate operational products according to tasks for which they have been established, including analyses and forecasts; these products will be made available to the respective RNODCs and on request to other bodies;
- (e) Arrange for operational monitoring exercises on the data collection from the GTS and include results of this data monitoring in the statistical information to be provided to the IOC and WMO Secretariats;
- (f) Exchange data sets with other SOCs, NOCs, WOCs and RNODCs on request in GF-3 or bilaterally agreed formats;
- (g) Exchange data internationally in GF-3 format.

Non-operational Functions

9.4 SOCs for BATHY/TESAC data will:

- (a) Develop documentation on the procedures used for data processing, data quality control, and product specifications, and exchange such upon request;
- (b) Publish descriptions of methods of analysis, forecasting and monitoring whenever possible;
- (c) Support the IGOSS training and assistance programme by providing opportunities for training in the operation of SOCs as feasible.

Terms of Reference of the SOC for the IGOSS Sea Level Pilot Project (ISLPP) in the Pacific Ocean

9.5 The SOC for ISLPP has been established at the University of Hawaii. Because mean sea level is a new parameter for IGOSS and because these data are not presently exchanged on the GTS, data are presently

received directly at the SOC from the gauge sites via a number of communication modes. Some data are pre-processed at national processing centres. The archiving facility is the Permanent Service for Mean Sea Level (PSMSL) in the United Kingdom rather than an RNODC-IGOSS.

9.6 The SOC for ISLPP carries out the general operational and non operational functions listed in Section 4 of this guide. In addition the centre will perform the following specific functions:

Operational Functions

- (a) Collect tidal and complementary environmental information from gauge sites.
- (b) Quality control the data based upon intercomparison of the monthly data set from the gauge, the previous records from the gauge, and comparisons with other gauges.
- (c) Exchange data with other centres as required.
- (d) Prepare products based on the data, including but not limited to:
 - (i) Listings of gauges and the respective monthly MSL and mean air pressure values to a locally defined datum;
 - (ii) Gridded maps of the Pacific monthly MSL and total pressure relative to the long-term mean at each site;
 - (iii) Updated maps or lists based upon data received after the 30-day operational production;
 - (iv) Contour maps of seasonal MSL and total pressure anomalies relative to the long-term mean for that month;
 - (v) Updated charts of anomalies as in (iii);
 - (vi) Tabulations of complementary environmental information.
- (e) Make these products available to users upon request.

Non-Operational Functions

- (a) Forward completed data sets to PSMSL for archiving.
- (b) Develop documentation for tide gauge data processing procedures and for the quality control and the analysis procedures used to prepare the products.
- (c) Participate in or host workshops on the ISLPP evaluation.
- (d) Provide opportunities for training in the processing and product preparation of MSL data.

(e) Choose an initial list of tide gauges based upon reliability, length of record, exposure and distribution from the list offered by Member States; prioritize each gauge site according to its importance to the system.

(f) Carry out a detailed evaluation of a selected sub-set of gauges for the development of standards and quality control procedures.

(g) Advise in the following goals:

(i) The identification and recruitment of tide gauges into an operational MSL network.

(ii) The improvement of the data communication network for tidal and sea-level data.

(iii) The evaluation of the usefulness and feasibility of synoptic MSL charts for the prediction of climatic trends, long-range weather, ocean processes and fisheries information.

(iv) The improvement of the timeliness, quantity and quality of data flowing into the PSMSL archive.

(h) Identify new sites where a gauge would increase the overall effectiveness of the network.

10. DEVELOPMENT PLAN FOR ACCELERATED IMPLEMENTATION OF IDPSS

10.1 A Joint WMO/IOC Meeting of Experts on IGOSL SOC's was held in Geneva, 6-8 November 1985. The purpose of that meeting was to investigate ways to increase the scope and coverage of products issued by IGOSL. The meeting agreed that for economic or technical reasons the goal of global coverage for products issued by SOC's was not immediately feasible. However a feasible approach to the problem of increasing the coverage of the world's oceans was developed and adopted.

10.2 The presentation of data on a global basis can be accomplished in two ways. The first method is to have a single SOC produce a single global map of the parameters. A more effective method is to have several SOC's each prepare a map for an area or region so that collectively several SOC's cover the globe, provided that each SOC is allocated a distinct area of responsibility which is strictly adhered to in order to avoid duplication. To facilitate this approach eight regions have been defined which when taken together cover the global oceans. The areas are as follows:

1. South Pacific
2. South Atlantic
3. Indian Ocean
4. Equatorial Pacific
5. Equatorial Atlantic
6. North Atlantic
7. North West Pacific
8. North East Pacific

A map showing these regions is included as Annex III.

10.3 It was recognized that such an approach to global coverage would require standardization of techniques, map projections, map scales, contour intervals and several other variables. It is not possible to develop such standardization at this early stage of IDPSS implementation. However as SOCs gradually develop the enhanced services it will be necessary for them to co-ordinate with the other SOCs to accomplish the required standardization.

10.4 The Meeting of Experts also developed lists of existing and recommended products to be provided by SOCs. The first list contains the data information products presently available or soon to be available from SOCs. This list is included as Table 1, Annex I, to this guide.

10.5 Table 2, Annex I, contains a list of recommended products that SOCs should consider providing in the future. This list is based entirely on data from the BATHY/TESAC operational programme.

10.6 Member States operating SOCs (or other IDPSS centres) are encouraged to provide, where feasible, products from the lists in Annex I for any of the ocean areas identified above that are not presently covered by a similar product. In this way it is felt that global coverage for IGOSS products can eventually be realized.

ANNEX I

EXISTING AND PROPOSED SOC PRODUCTS

PRODUCTS	CATEGORY COVERAGE/ FREQUENCY	PRODUCING COUNTRIES	PROCEDURES STANDARDIZATION/ UNIFORMITY
<u>Data information products</u>	Global	FRG, France, Japan, USSR, USA.	Uniform but needs improvement
(a) Monitoring (GTS data)	Global/ Yearly	RTHs of GTS	Re. WMO Manuals on GOS, GDPS and GTS
(b) Data inventories			
(i) Dot map	Global/ Monthly	FRG, France, Japan, USSR, USA	- BATHY and TESAC separately - preferably by time of insertion onto GTS - Same projection as Marsden square plots - Distribution to National Representatives for IGOSS*
(ii) Marsden square plots	Global/ Monthly	FRG, France, Japan, USSR, USA.	- BATHY and TESAC separately - preferably by time of insertion onto GTS - Same projection as dot plots
(iii) Ship identification plot/ship call sign listing	Regional Global/Regional	Recommended for future considerations Japan, USA, France, FRG, Canada	- Oceanic divisions as specified
(iv) Penetration depth	Global Regional	Japan, USSR, USA, Canada. Recommended for future consideration	- Dot plots for profiles 500m Specified depths in 100m ranges, listed data or plots

TABLE 1 - Monthly Data Information Products to be Issued by NOCS and BATHY/TESAC SOCs

* Japan will only distribute these products to WESTPAC countries

PRODUCTS	CATEGORY REGIONAL/GLOBAL	PRODUCING COUNTRIES	PROCEDURES STANDARDIZATION/UNIFORMITY
1. Regional products			
(a) BT profiles			To be implemented when possible /Since October 1986, the USA have been issuing analyses of sub-surface temperatures in the tropical Pacific, under the IGOSS Sub-surface Thermal Structure Pilot Project - ISTPP. They include data distribution maps, contour maps of anomalous SST, anomalous vertically averaged temperatures (0 - 400 m), anomalous 14° C isotherm depth and anomalous dynamic height (0 - 400 db)⁷
(b) SST analyses/forecasts			
(c) Surface current analyses			
(d) Mixed layer depth			
(e) Temperature at given depths			
(f) Frontal analyses			
(g) Buoy tracks			
(h) Cross sections			
(i) Quality-controlled data sets			
(j) Heat Content			
2. Global products			
(a) SST analyses			
(b) SST anomalies			
(c) Heat content			
(d) Quality-controlled datasets			
3. Special products			
(a) MSL monthly anomaly	Regional/Pacific	USA	Extension to North Atlantic recommended.
(b) Salinity/depth	Regional/Baltic		Under consideration by Baltic countries.
(c) TOGA data set (Level-II)	Regional/Equatorial Ocean		Possible need for an IGOSS SOC to supply data set to TOGA sub-surface data centre. USA will supply SST data to TOGA SST data centre.

Table 2 - Recommended List of Products that SOC's May Propose.

ANNEX II

THE IGOSS/IODE DATA FLOW FOR BATHY/TESAC DATA

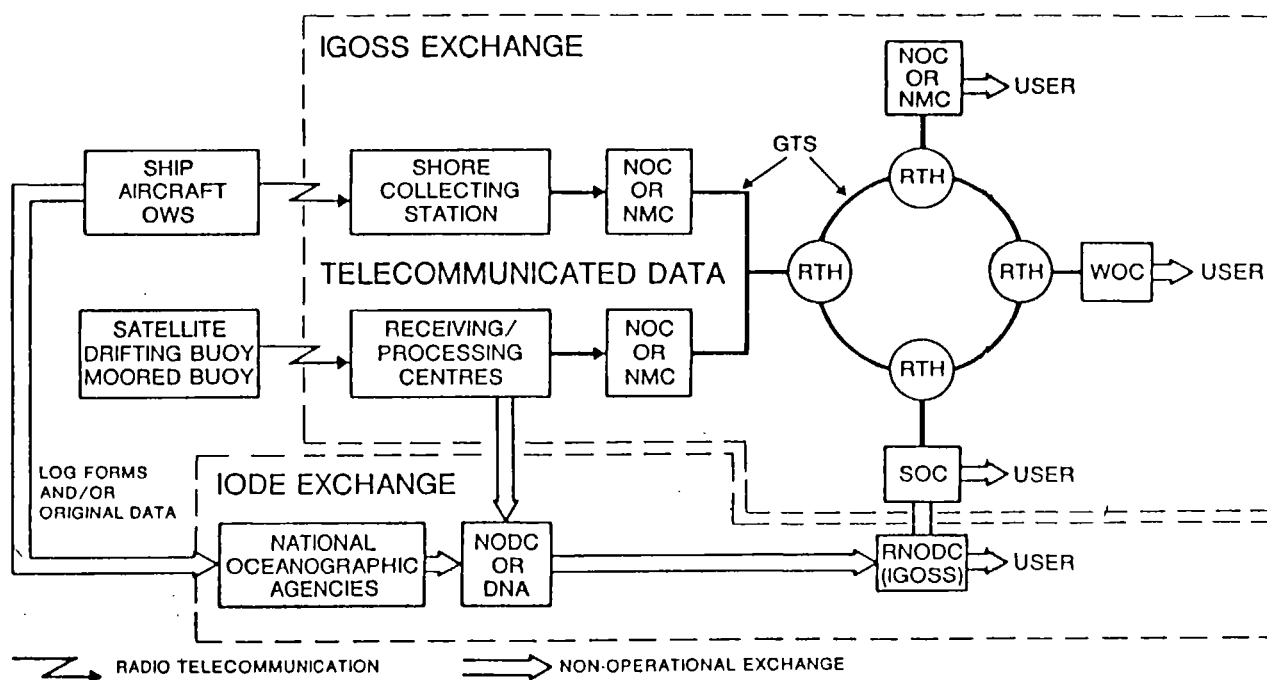


Figure A The IGOSS/IODE Data Flow Diagram

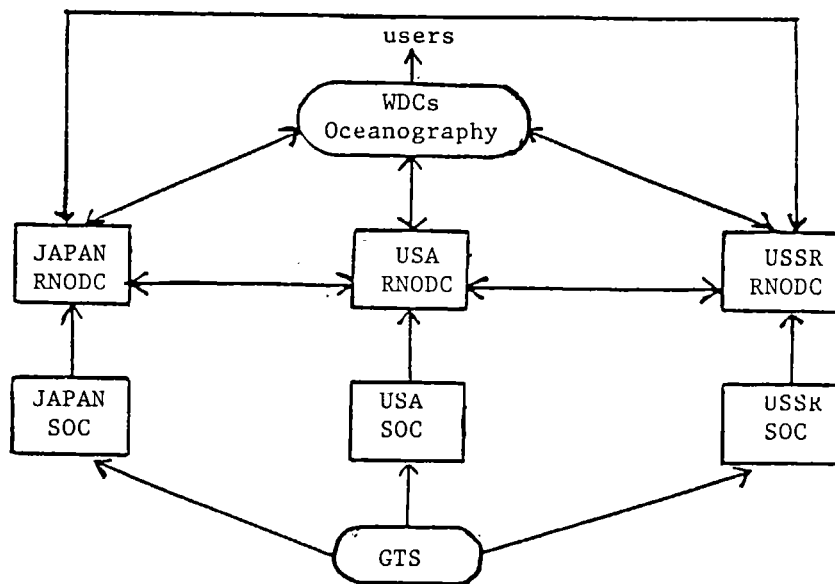


Figure B Data Flow between existing SOC's for BATHY/TESAC data and RNODCs-IGOSS

ANNEX III

MAP OF REGIONS OF RESPONSIBILITY FOR SOCS

