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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

JOINT IOC-WMO STEERING GROUP ON GLOBAL TEMPERATURE-SALINITY PILOT PROJECT
Fourth Session, Washington DC, USA, 16-19 April 1996

SUMMARY REPORT

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ANNEXES

1. OPENING OF THE SESSION

The Fourth Session of the IOC-WMO Steering Group on Global Temperature-Salinity Pilot Project (GTSPP-IV) was opened by Dr. J.R. Wilson, Chairman of the Group on Tuesday, 16 April 1996 at the NOAA/NODC Headquarters in Silver Spring, MD, USA.

Dr. Wilson invited the Acting Director of the US NODC, Mr. R. Fauquet to address the Session.

Mr. Fauquet welcomed the participants to the Session, stressed the importance of GTSPP for the global user community and for WOCE, in particular. He emphasized that the success of the project was achieved, to a large degree, due to the efforts of those experts who participate at GTSPP-IV. They have established rules and procedures of how to manage ocean data coming in different modes and developed continuous data management arrangements. GTSPP is a big boon for many scientists involved not only in WOCE, but as well as in TOGA, JGOFS and GOOS. He expressed his belief that due to the developments in the technology of ocean data management and due to the willingness of scientists and data managers to co-operate, there would always be an opportunity for future progress in GTSPP. He stated that the GTSPP success is not only for the GTSPP's sake, but for ocean sciences in general.

Dr. Wilson reminded the participants of the 5 years of the project implementation, highlighted the main achievements and referred to the decisions of IODE-XV relevant to GTSPP. He requested participants to focus attention not only on the technical issue of GTSPP management but think also about the actions which should be taken at the time when GTSPP has become a permanent IGOSS and IODE programme. He drew the participant's attention to many things which are still not going the way they should be and called on the participants to help resolve the problems.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 ADOPTION OF THE AGENDA

The Agenda was adopted as presented in Annex I.

2.2 DESIGNATION OF THE RAPPORTEUR

The Meeting designated Ms. E. Tanner (Australia) and Mr. R. Keeley (Canada) to be the rapporteurs of the Session.

2.3 CONDUCT OF THE SESSION

The Technical Secretary, Dr. Oliounine, reviewed the arrangements for the Session, presented the List of Documents and informed the participants on new documents which had not been included in the Provisional List. The Participants agreed on the Time-table of the Meeting. The List of Documents is given in Annex IV and the List of Participants in Annex III.

3. REVIEW OF THE OBJECTIVES OF GTSPP

3.1 REVIEW OF THE GTSPP CMD AND RELATIONSHIP TO GODAR, CONTENT AND METADATA STANDARDS

The Meeting reviewed the progress in the development of the GTSPP CMD and standards and raised 5 topics.

The first was that while GTSPP started with the intention to undertake the management of all historical temperature and salinity profile data, the GODAR project was addressing that activity. However, the relationship between GTSPP and GODAR needed to be clarified. The GODAR Project Leader, Mr. S. Levitus, gave a short presentation of this project and described a new CD-ROM to be called the Global Ocean Database '96 which was in development. He estimated that there was still a decade of work to process historical data that have not been included in global archives. GODAR intends to archive all data that it locates. It also intends to replace data as better quality data become available. The long-term goal is to form a common database system within the US NODC so that all data would be handled in the same fashion and be available in the same form.

The Meeting was informed of the similarities and differences in the testing of duplicates and observed-level data between documented GTSPP and GODAR procedures. It then went on to discuss an inter-comparison between profiles on the Ocean Atlas '94 CD-ROM set and data from MEDS archives. The participants noted that the data on the CD-ROM is not the same as those now in the MEDS archives for the same cruises and a direct inter-comparison of QC and duplicates procedures could not be done at this time.

The Meeting concluded that there would need to be a greater degree of co-operation between GODAR and GTSPP. It was suggested that agreed-upon practices be established and that a document be prepared for the next IODE meeting to present the differences, commonalities and points of co-operation between the two programmes. The document must address such aspects as metadata to be held, the framework for the metadata, the meaning and usage of data quality flags and how best to use the newer climatologies generated from the activities of GODAR. As far as possible, the meaning of flags and metadata standards should be the same between the programmes.

The second topic concerned the duplicates management system of GTSPP. The Meeting was in agreement that the techniques of the GTSPP were adequate to maintain the level of duplication in global archives at the 1-2% level. A caution was raised that some low resolution data will never be replaced. This may happen if the high resolution profile is found to be bad. At this point, the low resolution data from that station must be tagged as rejected.

The Meeting agreed that this needed attention and requested NODC and MEDS to establish mechanisms to handle this problem.

The third topic concerned the metadata presently contained in a GTSPP record. The requirement for information about the observation techniques and instrumentation was deemed to be necessary. There was also discussion about the need for all of the information presently held in the "history" section of the record. In particular, the information recording the changes in quality flags assigned at various stages of processing was noted.

It was decided that some statement about the "judicious" use of the history records was required and should be prepared. MEDS, the US NODC and Scripps were asked to do this and to circulate a draft for discussion, agreement and implementation.

The fourth topic concerned the required update frequency of the continuously managed database. The present schedule was considered adequate. There was some concern expressed about users being unable to get a copy easily of the highest quality data available at any time. The Representative of the US NODC noted that, in fact, his centre was in the process of establishing this capability for Internet access.

Finally, there was a discussion about the intentions of GTSPP to handle other kinds of temperature and salinity data than BATHY/TESAC. The discussion centred around surface observations such as those exchanged in TRACKOB messages or from moored or drifting buoys.

It was noted that the inclusion of surface temperatures from drifting buoys would add upwards of 100,000 observations each month (compared to the 6,000 presently available from BATHYs and TESACs) to the CMD. MEDS will continue to capture and archive the TRACKOB data against loss. After much discussion it was concluded that GTSPP should not attempt to expand its operations into this area. The GTSPP decision not to include surface observations in the GTSPP data flow at this time was partially based on the fact that a high quality blended SST product including satellite and *in situ* data is already being distributed by the US. However, management of surface observations is important, and unless some activity is organized, IODE may well face a need for a data rescue activity for these data at some future time. It was decided to refer the matter to the IODE and IGOSS committees for guidance as discussed in Agenda item 8.1.

3.2 STATUS OF GTSPP QC SYSTEMS, STANDARDIZATION OF SCIENTIFIC QC AND INTER-COMPARISONS

Document IOC-WMO/GTSPP-IV/8 was introduced. This document discussed the levels of information that was being stored in the use of QC flags and history structures of the GTSPP format; the QC flags to mark the level of confidence in individual observed values; the history level structure to store information about the reasons for certain observations being assigned lower quality flags.

It was decided that the GTSPP should continue to make every effort to acquire and store the information that describes the measurement techniques and the processing history.

Document IOC-WMO/GTSPP-IV/9 summarized the agreements between the science centers undertaking quality control for GTSPP and WOCE. The paper set out the guidelines adopted by all 3 science centers. The guidelines establish a common flagging system for data, and advice on when data may be deleted from profiles rather than flagged.

There was also a brief presentation of an inter-comparison of quality assessment carried out on the same data by CSIRO, MEDS, NODC and which data are flagged automatically by a numerical model at BMRC. The work demonstrated that automated flagging of data cannot reliably identify problems in profiles yet. It is necessary for all profiles to be viewed by a knowledgeable expert. It was suggested that there were differences in the climatologies and that this needed to be specially addressed. The Meeting suggested that everyone should use the same climatology.

Discussions turned to the question of ensuring an adequate level of QC after WOCE programmes cease, since the science centers involved with GTSPP operate in support of WOCE activities. The Meeting noted the need for the science centers to continue to be involved in ensuring high quality data in international archives.

The Meeting concluded that science centers and data centers must work closely together to transfer quality control expertise to the data centers and that quality control be recognized as an important on-going activity that must be integrated into processing systems in both the scientific and national data centres (e.g., Figure 1).

Under this Agenda item, the findings of the IGOSS Task Team on Quality Assessment of Automated Systems regarding the fall rate of XBTs were briefly discussed. The Meeting agreed that the fall rate equation used in determining depth must be very clear to a user so that there can be no misunderstanding. It was also agreed that metadata about XBT systems used in data collection should now be acquired by all centers as a routine.

3.3 GTSPP DATA FLOWS IN REAL-TIME AND DELAYED MODE

Document IOC-WMO/GTSPP-IV/11 presented a summary of the data flows (Figure 2) and discussed some of the problems that have arisen during the course of the project. In particular, it was noted that data sometimes arrive at the data centres with no time of day attached. Since this is a mandatory field, data centres should assign a time, but attach a flag of '5' to indicate it has been assigned to ensure there is no confusion by a user. A second issue was that various codes are being generated as required to accommodate associated data and metadata. These are being assigned by data centres with little co-ordination. While no conflicts have yet appeared, there is a clear need to co-ordinate this. This was discussed in detail under Agenda item 5.1.

Some statistics were presented on the relative amounts of real-time and delayed mode data presently in the CMD (Figure 3). There was still a large proportion of real-time data not replaced in the database, even 5 years after the start of GTSPP. It was noted that these statistics are biased high by the fact that some real-time data will never be replaced (for example from moored buoys). It was also noted that the inter-comparison of delayed mode data holdings between the WOCE Centre in Brest and the US NODC was finding significant differences which would increase the numbers of delayed mode data available. WOCE emphasized that data centres must be proactive in seeking out data rather than waiting for data submissions. The Representative of WOCE also noted that there appeared to be a need within GTSPP for some participants to take the responsibility to actively seek out the delayed mode data for which the real-time data had been received.

The Meeting decided to await the results of the NODC/BREST comparison and exchange, and to see what should be the required activities to improve the flow of delayed mode data to the project.

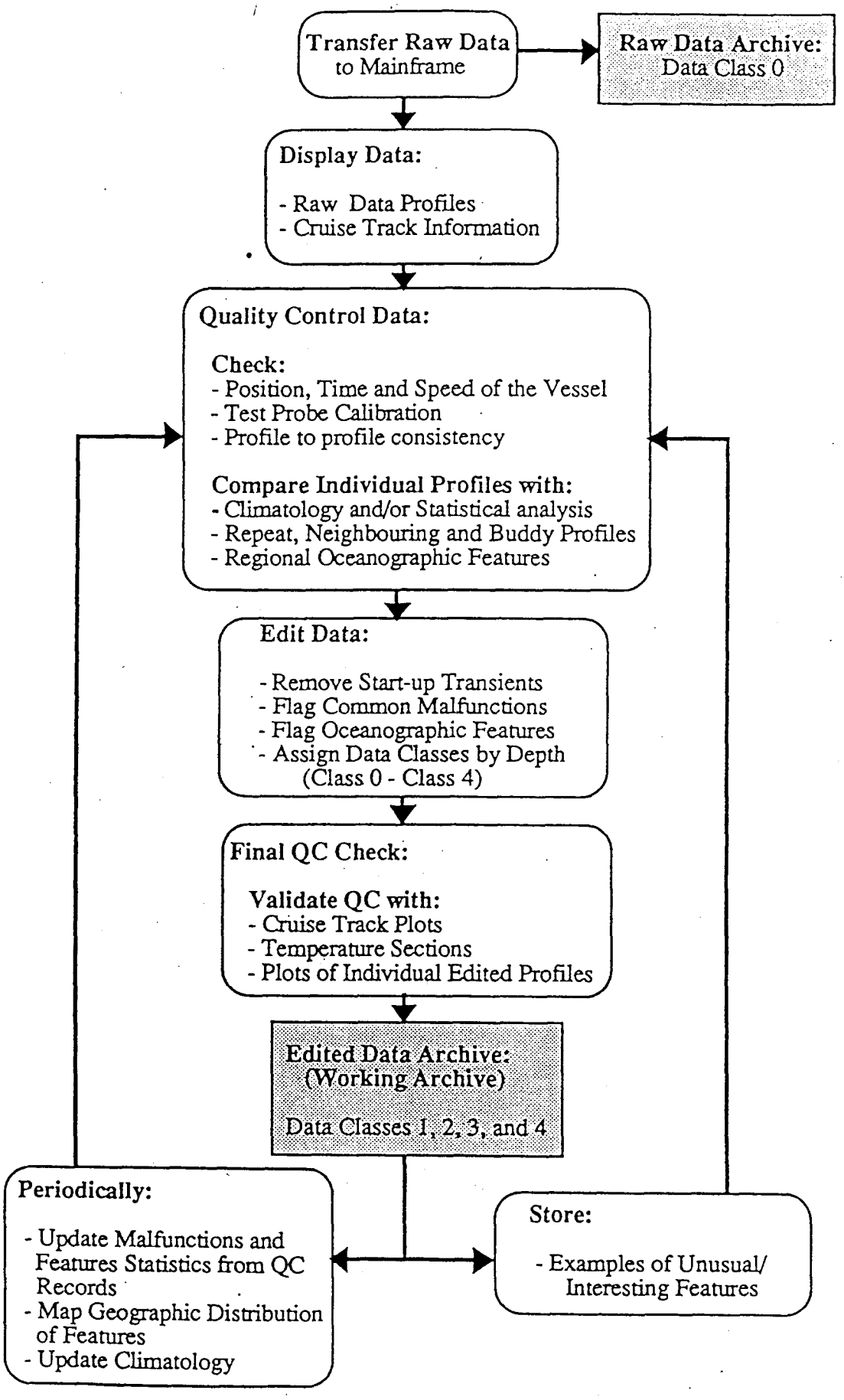

Figure 1. Scientific Quality Control Procedures at the WOCE Indian Ocean UOT DAC

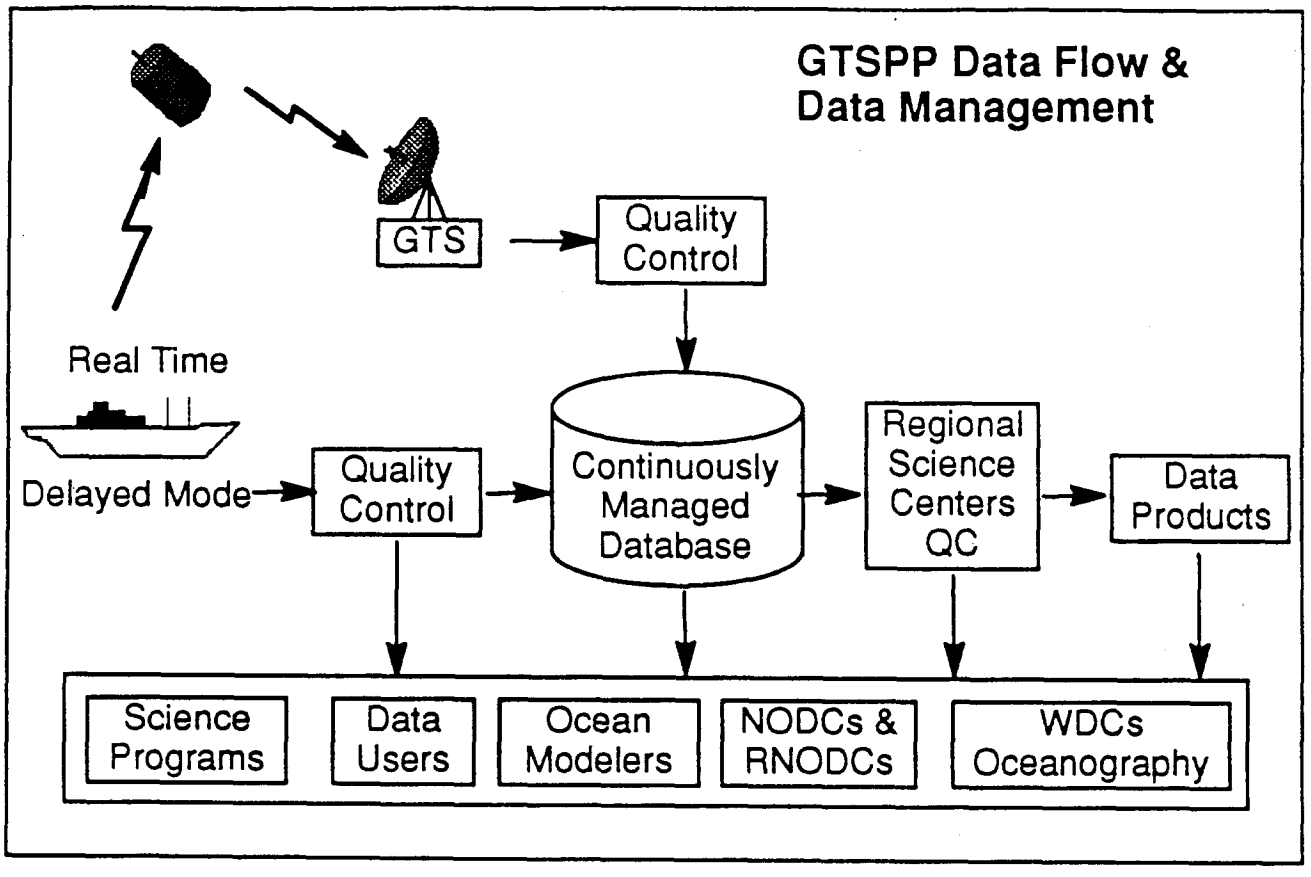

Figure 2. The GTSPP Data Flow

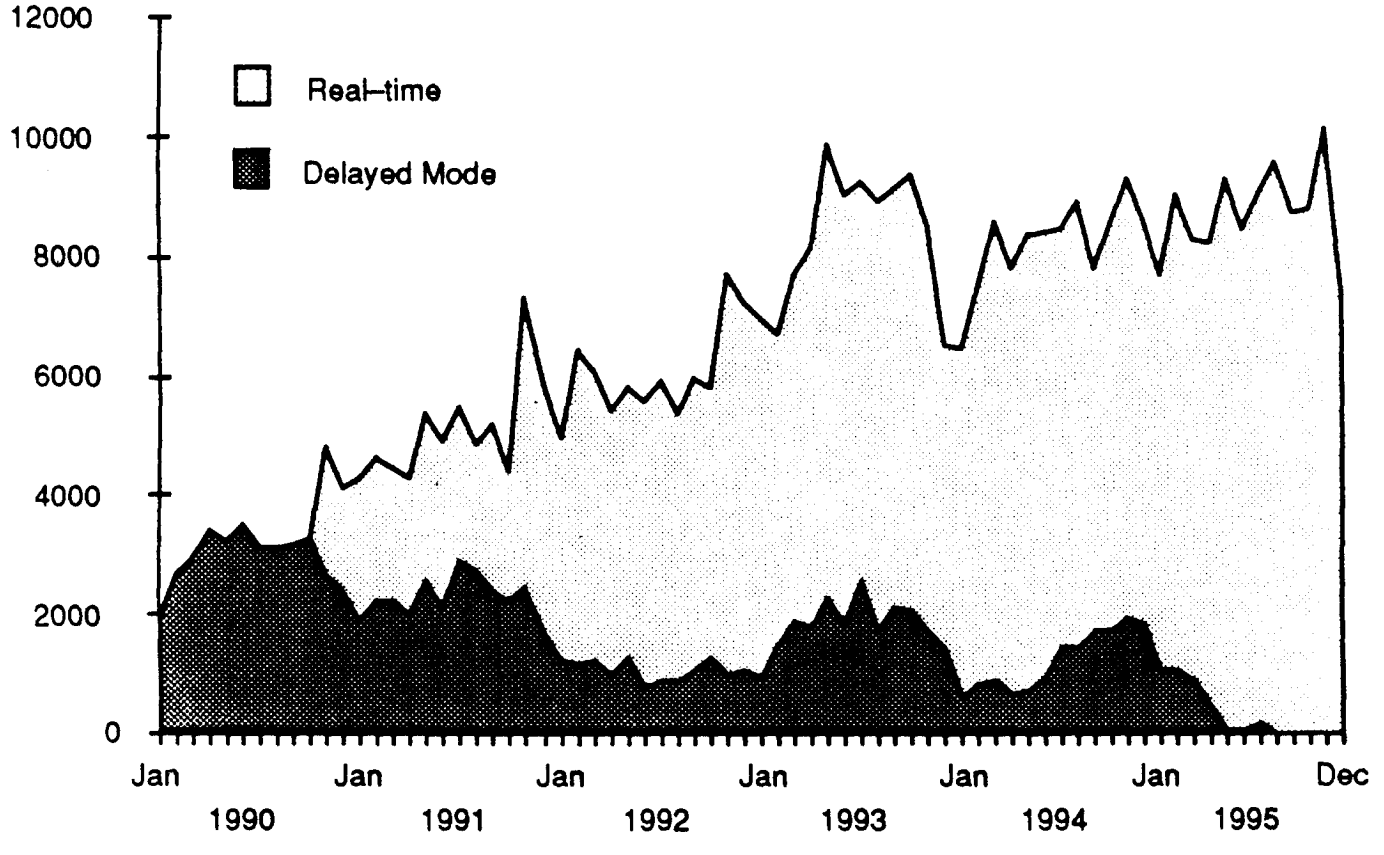

Figure 3. Delayed Mode and Real-Time Observations in the CMD, March 1996

3.4 DISSEMINATION OF PUBLISHED INFORMATION ON PERFORMANCE AND SUCCESSES OF GTSPP

The Chairman introduced Document IOC-WMO/GTSPP-IV/12 on information and publications disseminated from GTSPP, stressing that one of the objectives of GTSPP was to demonstrate to participants and clients the successes in achieving the goals of the project. He referred to the publications of GTSPP monthly and quarterly reports, GTSPP Project Plan, GTSPP brochure and logo and other actions taken in order to ensure continued support to GTSPP, to increase awareness in the project and to attract additional participants, clients and contributors of data.

The Meeting acknowledged the achievements in demonstration of the GTSPP performance to a wide audience and agreed that it would be very beneficial at a new stage of the GTSPP development to make available up to date and complete information on the programme and its capabilities and accomplishments.

The Meeting agreed on possible approaches to the problem which include:

(i) an up-to-date overview of the programme including data flows and responsibilities;
(ii) complete information on contacting GTSPP participants;
(iii) an overview of existing clients and how they use GTSPP;
(iv) some GTSPP success stories (an example is given in Annex V);
(v) a detailed list of products and services;
(vi) a complete set of publications as on the CD-ROM;
(vii) on-line data flow and data monitoring reports.

A number of tasks were identified to implement the approaches documented above:

(i) review, update as necessary and circulate the GTSPP Brochure widely;

(ii) design and implement a distributed WWW Site for GTSPP with as many participants that can do so implementing a GTSPP page with data, or information available. These pages should be co-ordinated between participants and with the IOC and WMO Home Pages. All pages should contain the necessary navigation to permit clients to view the system as a whole and reach all pages from any of the locations. The Chairman of the Steering Group volunteered to take the responsibility for co-ordinating the format and content of available GTSPP Home Pages;

(iii) publish data and information on-line, such as manuals and reports, datasets and data flow monitoring reports;

(iv) use all opportunities of governmental and other high-level meetings for demonstration of GTSPP CD-ROMs. The Second Conference of the Parties of the United Nations Climate Change Convention planned for 8-18 July 1996 in Geneva, was specifically mentioned;

(v) scientific journals and "grey" literature, like IMS, should be widely used to demonstrate scientific benefits of the programme and products;

(vi) GTSPP should utilize the WOCE scientific workshops as a forum to publicize the GTSPP dataset and products. The Meeting noted that WOCE is holding a series of scientific workshops starting with the Pacific Basin Workshop in August 1996. The list of planned workshops is given in Table 1.

Table 1: WOCE Workshops for 1996-1999 (as of April 1996)

Date	Basin	Location	Organizer/Contact
August 1996	Pacific	Newport Beach, CA	Talley
Spring 1997	S. Atlantic	Brest, France	Desaubies
July 1997	Southern Ocean	Hobart, Australia	Rintoul
1998?	Indian	USA?	Chapman
1999?	Atlantic	(Offers from Russia, Germany, and UK)	

At these workshops, WOCE data and products will be made available to scientists for interpretation and analysis. WOCE Data Assembly centers and principle investigators will provide their datasets for participants, and be given the opportunity to demonstrate the products and services they provide. It was recommended to make the GTSPP CD-ROM available at these workshops;

(vii) an additional point for GTSPP would be to publish platform independent software for use in dealing with the GTSPP data at all stages. This was an obvious area of useful co-operation which GTSPP should continue to pursue.

3.5 GTSPP PRODUCTS, NETWORKS AND ELECTRONIC PUBLISHING, GTSPP CD-ROM

The Representative of Australia opened this Agenda item describing a number of possibilities of better using the World Wide Web to promote GTSPP and better distribute data, information and products provided by both the science and data centers (Document IOC-WMO/GTSPP-IV/13). A proposal was made that the existing GTSPP Data Flow and Data Management diagram (Figure 1) should be used as a mechanism to provide access to data and products. It was suggested that it be made an active image with the boxes as the diagram buttons providing links directly to the appropriate WWW Server. For example, the box showing quality control would be linked to the GTSPP Quality Control documents. Science center 'boxes' will have links to the 3 participating science centers. It was further determined that it was necessary to provide recognition of both GTSPP and the agency providing the server that was accessed. A common 'look and feel' at the point of access in each participating agency would be achieved by using a Web Page template.

The Meeting suggested that a full set of documentation, code lists, and diagrams with links to other participants WWW pages should be built. All participants remarked that they were interested in linking their pages relevant to GTSPP to such a presentation. Some visual identifier of GTSPP should be used by all participants on their pages. It was suggested that use of an FAQ (Frequently Asked Questions) page could be helpful. The Representative of Scripps remarked that they have built a number of CGIs that they were willing to make available to others. A GTSPP WWW co-ordinator is needed to ensure that there is a framework into which everyone can build their pages. The Chairman of the Steering Group volunteered to draft this and to circulate it to participants.

The Representative of MEDS informed the Meeting that the GTSPP CD-ROM was completed except for some minor adjustments. Two hundred and fifty copies were going to be provided to IOC by the end of June. The IOC Secretariat welcomed this news since the CD was widely expected. The Representative of WMO expressed interest in helping with the distribution of the CD-ROM for WMO users.

The Meeting then considered a range of products based on temperature and salinity data that are produced in the countries participating in GTSPP.

The Representative of IFREMER-SISMER, France, presented a number of data management products all of which are available via the WWW. These included various maps showing data distributions and sampling in space and time, and data selection and retrieval capabilities.

MEDS showed two products. The first, produced on the west coast of Canada shows maps of SST, temperatures at 100 and 300m and depth of the mixed layer. There is also a summary describing the major features shown in the maps. From the east coast, there is a presentation of the oceanographic conditions each

month. For this product an imagery from NOAA was made which is now unavailable and so has ceased. MEDS has also been working on a climatological database, which is soon to be available on the WWW.

AOML intends to place bimonthly maps of SST, temperatures at 100m and upper ocean heat content and anomalies of the same on the WWW within 6 months by the end of 1996. They also will present time-longitude maps for frequently sampled sections in the Indian and Atlantic Oceans.

CSIRO noted that they intended to place similar products to those described by AOML on their WWW pages as well. They noted, however, that there was no funding targeted to this activity and so these products would appear as resources permitted.

JODC publishes bi-weekly bulletins of the oceanic conditions close to their country which will soon be available to users via WWW servers. Most of the data used in the product are derived from national sources available on the WWW. In the planning of NEAR GOOS the concepts of the CMD of GTSPP have been agreed upon.

The US NODC makes available on the WWW quarterly data files. They are building an interface to their database that will permit on-line WWW data selection and downloading. In addition to dot plots of station locations, the US NODC also makes available and prepares maps of sampling along TOGA/WOCE tracks which are then supplied to the WOCE DIU.

AODC produces similar products to the French and US NODCs with many inventory maps available on the WWW. Weekly SST and sub-surface analyses are also constructed for oceanic conditions for the east and western regions of Australia.

The Russian NODC is using the GTSPP data for creating a model for monitoring temperature-salinity conditions in the North Atlantic. In 1996, it is planned to use the GTSPP database for the development of long time-series datasets and of an atlas "Inter-annual Variability of the Upper Layer of the Ocean" (Vol. 5) under the IOC GODAR project.

The Meeting noted that some users want a much simpler format for data delivery without all of the metadata contained in the GTSPP format. France has such a form that it uses, as does MEDS. MEDS, NODC, IFREMER, Scripps and AODC agreed to work to come to an agreement on a simpler form that could be provided to clients.

The Meeting recognized that all of the information presently available or planned for presentation on the WWW needed to be organized in a framework for a coherent presentation of the products derived from GTSPP. Australia offered to contact all of the sites and to make available on their WWW pages links to these other sites. This would provide a useful jumping off point to GTSPP products while the co-ordinated planning was undertaken by the Chairman of the Steering Group.

4. REVIEW OF CO-OPERATIVE PROGRAMMES AND FUTURE REQUIREMENTS

4.1 WOCE UPPER OCEAN THERMAL PROGRAMME AND WOCE DPC ACTIVITIES

Document IOC-WMO/GTSPP-IV/16 presented activities where GTSPP could provide a service to WOCE.

The first was to assist in the transition of WOCE supported data quality assessment activities to more stably funded national oceanographic data centres. Establishing improved quality control procedures is an important goal of the UOT DACs. The transition of these procedures to the national data centers is another goal that has been performed on an *ad hoc* basis. Formal mechanisms for transferring new techniques from the DACs to the data centers should be established (e.g., personnel transfers and exchange visits; equipment and software exchanges/purchases as required; training over a prolonged period; commitment from both sides). The ultimate objective is to establish national data centres as the sites for the highest level quality control needed to meet accuracy criteria to be specified by the scientific community.

The second comment was that the GTSPP can offer expertise and experience in the data management of other variables, such as surface velocities. This matter is discussed under Agenda item 8.1.

The third was that data centres should become more proactive in seeking out data as discussed under Agenda item 3.3. This was acknowledged by the Meeting to be important and an area that required urgent actions and significant improvement.

The fourth activity was to strengthen the feedback to data collectors on the quality and timeliness of the data submissions. Discussion proved to be extensive on how the data monitoring reports for real-time data can be more effective.

The Meeting decided that it was important to continue to contact ship operators which consistently show higher failure rates. To save time, MEDS was asked to mail their monthly reports directly to ship operators as well as the IGOSS SOOP Coordinator and to request responses to be sent to the IGOSS SOOP Co-ordinator at IOC Headquarters. The IGOSS SOOP Co-ordinator was asked to review the information provided by MEDS and to make contact with those operators that show continuing data collection problems. At the end of each 6 months, he was also asked to prepare a summary of ship performance problems and to circulate this to operators and to the Chairman of the IOC-WMO SOOP Panel. MEDS and the IGOSS SOOP Co-ordinator will work together to meet these new requirements for monitoring data quality.

It was noted that the GTSPP needed to demonstrate to users including the scientific community the added value that the scientific quality control brings to the dataset. Scripps have recently prepared maps of SST fields before and after quality control was applied. These were very effective at demonstrating the added value of scientific quality control activities. This type of information should be distributed widely to users, e.g., through international newsletters and the World Wide Web.

GTSPP should also strive to provide more products and data manipulation tools. This will help to demonstrate how GTSPP and data centres can support the data analysis phase of WOCE.

4.2 IGOSS/IODE END-TO-END DATA MANAGEMENT STRATEGY

The item was introduced by Mr. Searle (Australia) who presented Document IOC-WMO/GTSPP-IV/17 This document provided an overview of the approach that will be taken by the IGOSS and IODE communities to provide an integrated data management system to support GOOS requirements. In the document, details are given on IGOSS and IODE, and an overall mission statement and objectives. A series of 4 goals were defined that will be used to provide a framework for the future development and activities of IGOSS and IODE.

The Meeting discussed this document and reviewed its role. It was agreed that the document would provide a high level or philosophical view of existing and future IGOSS/IODE activities, and would also provide a mechanism to better inform the developing GOOS user community of existing data management capabilities.

The Meeting agreed that GTSPP should be used as an example of a successful implementation of an End-to-End Data Management Programme, and the participants agreed to provide any additional comments to the author before it would be presented to the second planning session of the IOC-WMO-UNEP Committee for GOOS (Washington DC, 16-17 May 1996) on behalf of the IGOSS and IGOSS committees.

4.3 IGOSS SHIPS-OF-OPPORTUNITY PROGRAMME PLAN (SOOP)

Mr. R. Bailey from Australia, presented the IGOSS plan for end-to-end management of the SOOP (Document IOC-WMO/GTSPP-IV/18).

With the end of TOGA (1995), and most field programmes and on-going requirements for WOCE data collection (1997) and with on-going requirements for upper ocean thermal data for operational uses (e.g., climate prediction) as identified by the OOSDP, an urgent need has been realized for a mechanism to ensure the on-going co-ordination of the SOOP. The plan calls for Member States of the IOC to commit resources to the programme and to ensure its transfer from the research environment to the operational area. The role of the GTSPP in this plan is to ensure the provision of quality controlled real-time and delayed mode datasets for operational and on-going research requirements (Figure 4).

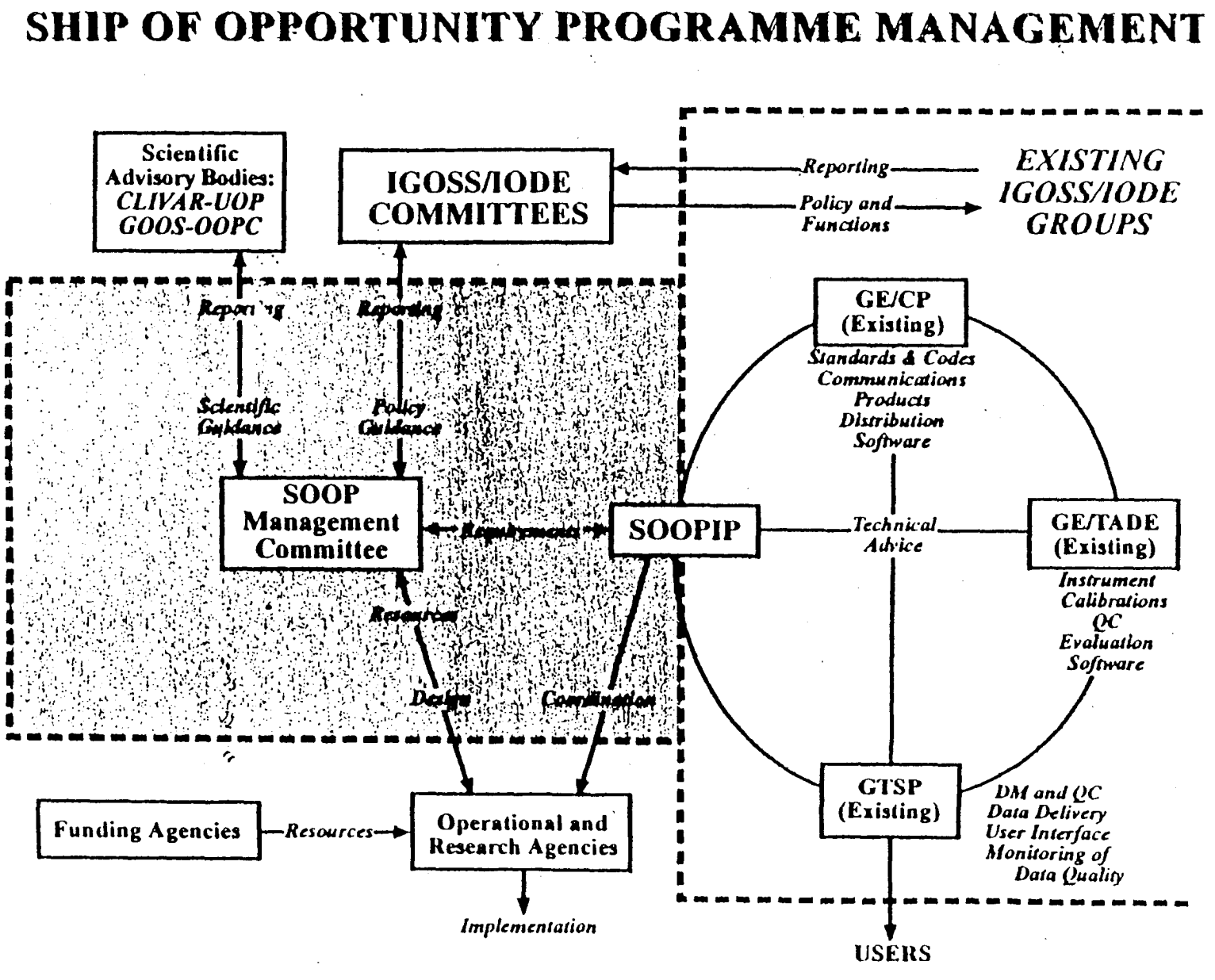

Figure 4. Ship-of-Opportunity Programme Management

The Meeting noted that the US NODC and MEDS have made commitments at the IGOSS-VII and IODE-XV meetings to continue their data management support through GTSPP. The Meeting agreed that every action would be taken by the GTSPP partners to meet objectives specified by the plan.

4.4 GOOS REQUIREMENTS AND GOOS OCEAN SERVICES MODULE

The Meeting reviewed the possible areas of co-operation between GTSPP and GOOS and generally agreed that the communication between programmes need to be improved. The appropriate groups within the GOOS planning committees should be informed of the activities and processes existing within GTSPP. GOOS also needed to be informed of the existing clients of GTSPP data and products, and how data collected as part of GOOS would also benefit the existing clients of GTSPP. The Chairman of GTSPP was requested to continue the efforts of contacting the GOOS main and subsidiary bodies, and the officers of the GOOS programme to provide details of GTSPP activities, including products and potential areas of co-operation.

The Meeting was informed of the developing activities within the North East Region GOOS Programme (NEAR GOOS) by the Representative of Japan. NEAR GOOS is in the process of developing its data management policy. The technologies developed by GTSPP will be used as a model for end-to-end data management within this regional programme. The success of NEAR GOOS will depend to a large degree on the effective data management policy, and in this regard, using the GTSPP experience and established GTSPP procedures for NEAR GOOS will be essential.

The Meeting noted that today the policy of data exchange and access to NEAR GOOS data has not yet been determined, although it is expected that the technologies and GTSPP practices will be used and data will be made available to all IOC Member States.

4.5 WMO TELECOMMUNICATION MATTERS AND GTS DATA FLOW MONITORING.

The Meeting discussed Document IOC-WMO/GTSPP-IV/20 summarizing procedures for the exchange of BATHY/TESAC/TRACKOB bulletins and reports on the GTS and results of a pilot monitoring of IGOSS data flow related to the international exchange of the IGOSS operational data through the GTS. The monitoring was undertaken by Regional Telecommunication centres located in Cairo, Offenbach and Toulouse during the period from 1 to 15 July 1995. The results of the monitoring were compiled and analyzed by the experts from a telecom unit of the WMO Secretariat.

The Meeting noted with interest the presentation by the WMO Representative, Mr. M. Krasnoperov, on the results of the pilot monitoring which showed that the specialized MTN monitoring centers in Offenbach and Toulouse in charge of the analysis of BATHY/TESAC/TRACKOB messages, received 100% of all bulletins and reports introduced in the GTS for international exchange. However, concern was expressed that the capitol RTH Cairo received only bulletins from Japan. Mr. J. Fenix explained the possible reason for this failure.

The Meeting noted further Recommendation 2 of IGOSS-VII and accepted the MEDS (Canada) offer to co-operate with a national telecommunication meteorological center in Dorval, Canada, in pilot monitoring of oceanographic operational data flow. This will be done in accordance with the WMO procedure established for the pilot MTN monitoring. The Meeting agreed that this co-operation will contribute to more effective and comprehensive monitoring of the exchange of oceanographic data on the GTS and to more efficient use of the analysis of the results of monitoring.

5. SOFTWARE AND SYSTEM IMPROVEMENTS

5.1 FORMATS AND METADATA

Document IOC-WMO/GTSPP-IV/21 presented some of the issues that required special attention. Firstly, the need for co-operation in codes development was discussed. Each participant of GTSPP has been creating new codes as needed. While there has not yet been conflicts in these codes, it was clear that co-ordination is required. Likewise, code tables have been created. These too, require co-ordination so that a master set of tables are available for everyone.

It was agreed that Brest, AODC, NODC and MEDS would work together to co-ordinate the current codes and code tables, provide a mechanism to make these tables available to all (likely through a WWW page) and to establish a mechanism to control the creation of additional entries when needed.

Secondly, the issue of how to deal with unstructured metadata was reviewed. This type of information could range over calibration information about instruments to anecdotal comments about the data collection at a station. The Representative of AODC stated that they had taken steps to codify all of this type of information so that it was accessible to software.

The Meeting noted this with interest but decided that it was not necessary for this additional information to be exchanged within GTSPP. The information should be retained by the data centre receiving it and made available on request.

Finally, it was noted that the use of certain fields (such as STREAM_IDENT) was not completely clear. Because of this, certain deviations were noted that could cause difficulties. MEDS and the US NODC were requested to develop a clearer definition of the contents of all of the fields in the GTSPP format and to make this information widely available.

The Workshop for Quality Control of WOCE Upper Ocean Thermal Data (24-25 May 1995, Scripps, USA) requested GTSPP to consider whether it would be more useful to assign the overall profile flag according to the 'best' flag present in the profile. The Representative of CSIRO expressed the view that users would wish to get all of the good data available and using the flag in this way would facilitate this. This was strongly opposed by MEDS who argued that the value of the overall flag would become meaningless as a quick way to locate problem-free profiles. Support for MEDS view was expressed by Scripps. It was agreed to continue with the existing definition and usage.

5.2 CONVERSION OF THE GTSPP QC SOFTWARE TO C AND UNIX, OCEANPC OPPORTUNITIES

The Meeting discussed the feasibility of converting the GTSPP QC and duplicates management software to a format that is platform independent for general distribution and inclusion in OceanPC.

The Meeting concluded that this was not possible now due to the resources that would be required to accomplish the task. The availability of a suitable general purpose graphics package for a variety of platforms and operating systems was also a serious problem.

It was noted that the US NODC is developing the profile quality control package (referred to as QCB on the GTSPP CD-ROM) for a UNIX environment. That software will be available and adaptable to a variety of UNIX platforms. Other than that, the GTSPP QC and duplicates software will not be available for general use without considerable investment in conversion costs by the user.

5.3 SOFTWARE STANDARDS AND SOFTWARE SHARING OPPORTUNITIES

The Meeting considered the opportunity for sharing the development of common software systems in the future. At the Third Session of the Steering Committee, guidelines for programming languages were established. It was noted that if software systems are developed in a modular fashion using these languages, a significant percentage of the software will be common even if the graphics and user interface portions are different. Thus, there is still an opportunity for co-operation and sharing of costs of development.

It was recommended that organizations advertise these software and development plans on their GTSPP WWW servers so that others interested in the systems can make contact and explore opportunities for co-operation. This is considered an important opportunity because of the potential savings in development costs and time.

6. NEW PARTNERS, CLIENTS AND SERVICES

6.1 SOURCES OF ADDITIONAL TEMPERATURE AND SALINITY DATA

The Meeting reiterated the importance of surface temperature and salinity data to climate monitoring and research.

Several sources of SST and SSS data were identified. The Palace floats and undulating T/S profilers were identified as potential sources of profile data which required GTSPP attention. Participating members of GTSPP were invited to request their research organizations who collect the undulating T/S profile data to enter it into the system in delayed mode. This would require additional metadata in the GTSPP format. NOAA ships have recently been fitted with automated systems for recording all data types, which should increase the timeliness by which this data are received by the US NODC. It was recommended that GTSPP, IGOSS and IODE consider all options for capture and archival of this surface data for future use.

It was also noted that emerging technologies of satellites to telecommunications may greatly innovate the availability of ocean data, especially sea-surface data from ship-of-opportunity vessels. Iridium, a satellite communication facility which will be in operation from October 1998, will provide satellite communication from cellular phones, at a cost of a couple of US dollars per minute. ORBCOM, which will provide data communication, will be available from 1997, for sending a postcard length message at the cost of a postcard. These inexpensive systems, both in hardware and communication cost, light and small transmitter, can be easily accepted and installed on fishery vessels, merchant vessels or even drifting buoys, and will be able to transmit high resolution data in real-time.

As GOOS will require as many sea-surface data as are available for the calibration of remotely-sensed satellite data, the above-mentioned communication technologies will enable the capture of massive amounts of sea-surface data and even real-time profile data. The Meeting recommended that IGOSS, IODE and GOOS urgently establish a mechanism for handling and managing these data.

6.2 SERVICES TO NEW NODCs, REGIONAL RNODCs AND PROJECTS

The Meeting noted an increased interest of the IOC Member States in IODE activities and in oceanographic data. Information was provided on newly established NODCs and Regional RNODCS, as well as on the projects recommended by IODE-XV, the implementation of which will require big volumes of data which are now in the possession of GTSPP, e.g., MEDAR/MEDATLAS.

The Meeting expressed readiness to support activities of the centers and implementation of projects by providing available services. GTSPP should be more proactive in meeting demands and needs for data, through contacting NODCs, RNODCs and project leaders providing them information on GTSPP datasets, and offering services.

7. DEVELOPMENT OF THE 1996 - 1996 INTERSESSIONAL PLAN OF ACTIONS

The Meeting reviewed the implementation of the 1994-1995 intersessional activities and decided to present the status of their implementation in Annex VII.

The Meeting took into account recommendations formulated during the Session under previous agenda items, decisions of the GTSPP parent bodies - IGOSS and IODE committees, and drafted an implementation plan for the next intersessional period as given in Annex II.

The Meeting considered the need for a revision of the GTSPP Project Plan to be published in 1996. The table of contents of the Plan was revised, necessary changes were made and is presented in Annex VIII, and it was decided that urgent actions should be taken for its complete revision and updating. The Chairman was instructed to provide guidance to the IOC Executive Secretary on the most appropriate way to implement this task.

8. OTHER BUSINESS

8.1 FUTURE OF THE IOC-WMO STEERING GROUP

At the Fifteenth Session of the IOC Committee on IODE, the future of the Steering Group was discussed. Because the development of the GTSPP is nearing completion and it has been adopted as a permanent project, it was necessary to review the future need for the Steering Group.

It was the conclusion of GTSPP-IV that GTSPP no longer needs the full attention of a Steering Group. There are, however, several aspects that will need continuing attention. One example is the development of future services to new programmes including GOOS and CLIVAR. Another relevant consideration is the obvious need for GTSPP-like programmes for other oceanographic variables as IGOSS and IODE implement end-to-end data management systems for other aspects of their programmes. Thus, the Steering Group should be renamed and the terms of reference be reconstituted to assist in developing these end-to-end data management programmes for other IGOSS and IODE needs. In this manner, guidance would continue to be provided to the GTSPP and the core expertise and experience developed in GTSPP could be applied to the development of other programmes featuring different groups of centers as participants and implementers.

The Meeting decided that its Chairman with the assistance from the Chairmen of IODE and IGOSS, who volunteered to help, should develop the terms of reference for such a new function and give consideration and guidance from IODE and IGOSS.

8.2 PROJECT NAME AND ACRONYM

The Group noted a slight contradiction in the decisions of IGOSS-VII and IODE-XV relevant to a new name of the project and an acronym. It was decided that a new name of the activity would be IGOSS-IODE Global Temperature-Salinity Profile Programme and keep the acronym as GTSPP. The Chairmen of the IGOSS and IODE committees present at the Meeting agreed upon the change. The Group requested the IOC and WMO Secretariats to inform their Member States accordingly.

9. APPROVAL OF THE SUMMARY REPORT

The Summary Report was adopted and recommendations approved as presented in Annex II.

10. DATES AND PLACE OF THE NEXT SESSION

The Meeting noted that it would be most beneficial to co-join the next meeting with the WOCE DAC meeting which is planned for October 1997. However, the availability of only limited funds to implement the meeting should also be taken into account and the venue of the meeting should be in a place which would reduce IOC expenditures to a minimum.

The Chairman was requested to explore different options for the place and dates of the next meeting in consultation with the IOC Secretariat and inform potential participants of the decision at least a year before the meeting.

11. CLOSURE OF THE SESSION.

The Meeting was closed at 14:00 on 19 April 1996. The Chairman thanked the local organizers for the excellent organization of the Meeting and for all the necessary facilities which contributed to its success.

ANNEX I

AGENDA

1. OPENING OF THE SESSION

2. ADMINISTRATIVE ARRANGEMENTS

   2.1 ADOPTION OF THE AGENDA
   2.2 DESIGNATION OF THE RAPPORTEUR
   2.3 CONDUCT OF THE SESSION

3. REVIEW OF THE OBJECTIVES OF GTSPP

   3.1 REVIEW OF THE GTSPP CMD AND RELATIONSHIP TO GODAR, CONTENT AND METADATA STANDARDS
   3.2 STATUS OF THE GTSPP QC SYSTEMS, STANDARDIZATION OF SCIENTIFIC QC AND INTER-COMPARISONS
   3.3 GTSPP DATA FLOWS IN REAL-TIME AND DELAYED MODE
   3.4 DISSEMINATION OF PUBLISHED INFORMATION ON PERFORMANCE AND SUCCESSES OF GTSPP
   3.5 GTSPP PRODUCTS, NETWORKS AND ELECTRONIC PUBLISHING, GTSPP CD-ROM

4. REVIEW OF CO-OPERATIVE PROGRAMMES AND FUTURE REQUIREMENTS

   4.1 WOCE UPPER OCEAN THERMAL PROGRAMME AND WOCE DPC ACTIVITIES
   4.2 IGOSS/IODE END-TO-END DATA MANAGEMENT STRATEGY
   4.3 IGOSS SHIPS-OF-OPPORTUNITY PROGRAMME PLAN
   4.4 GOOS REQUIREMENTS AND GOOS OCEAN SERVICES MODULE
   4.5 WMO TELE-MONITORING MATTERS AND GTS DATA FLOW MONITORING

5. SOFTWARE AND SYSTEM IMPROVEMENTS

   5.1 FORMATS AND METADATA
   5.2 CONVERSION OF THE GTSPP QC SOFTWARE TO C AND UNIX OCEANPC OPPORTUNITIES
   5.3 SOFTWARE STANDARDS AND SOFTWARE SHARING OPPORTUNITIES

6. NEW PARTNERS, CLIENTS AND SERVICES

   6.1 SOURCES OF ADDITIONAL TEMPERATURE AND SALINITY DATA
   6.2 SERVICES TO NEW NODCs, REGIONAL RNODCs AND PROJECTS

7. DEVELOPMENT OF INTERSESSIONAL PLAN OF ACTIONS

8. OTHER BUSINESS

   8.1 FUTURE OF THE IOC-WMO STEERING GROUP

9. APPROVAL OF THE SUMMARY REPORT

10. DATES AND PLACE OF NEXT SESSION

11. CLOSURE OF THE SESSION

ANNEX II

IMPLEMENTATION PLAN OF GTSPP FOR 1996 - 1997

The following implementation plan contains items that have been carried over from the last intersessional period and the new items from the GTSPP-IV Meeting. For clarity related items have been combined.

1. Sources of Additional Data

- Participants are requested to seek out data from profiling and undulating instruments that collect sub-surface temperature and salinity data and put them into the system in delayed mode. A standard is required which describes any additional metadata to be carried with the data. MEDS and NODC are to produce a draft standard for comment by all participants.

  Action: NODC and MEDS

- All centres are requested to be proactive in getting the delayed mode data for which real-time versions have been received and forwarding it to the CMD in the US NODC.

  Action: All Participants

- MEDS is to archive TRACKOB data received from the GTS and make it available to IODE in delayed mode.

  Action: MEDS

2. QC

- The WOCE Science Centres will continue to be involved in QC but a transfer of expertise to data centres must be done as the Science Centres will probably not be able to continue to do all the QC as they do now. Formal links (national, and where possible, international) are recommended (e.g., personnel visits, exchanges, commitments to training by both sides, etc.)

  Action: Science Centres, NODC, MEDS

- A study is to be undertaken to examine the feasibility and how to implement use of a common climatology for GTSPP QC by all participants.

  Action: MEDS

- The present procedures for notification of ships that routinely report bad data are to be modified. MEDS will send reports directly to the ship operators to save time. The SOOP Co-ordinator will continue to contact operators that continue to submit bad data in spite of such a notification.

  Action: MEDS and SOOP Co-ordinator

- Procedures are to be implemented by NODC and MEDS to remove low resolution profiles from the CMD when the high resolution profile has been found to be bad by the originator and therefore has not replaced the low resolution version.

  Action: NODC and MEDS

3. Standards for data, metadata, etc.

- MEDS and NODC are to prepare and circulate an agreed definition on the contents of all fields in the GTSPP format.

  Action: MEDS and NODC

- Data centres are encouraged to retain unstructured metadata and supply on request. Not to be exchanged routinely within GTSPP.

  Action: MEDS and NODC

- Develop a procedure for assigning parameter and other codes to new variables so that common codes are always used for the same variable. Procedure and Codes are to be posted on a WWW page.

  Action: Brest, AODC, NODC, MEDS

- Data centres are to attach a time to reports that do not have a time field and set the date-time flag to 5.

  Action: MEDS, NODC

- Standards are to be set, and metadata for collection, processing systems in regard to fall rate, etc. are to be obtained and appended for all delayed mode data as a routine activity.

  Action: Data Centres and Suppliers of Data

- MEDS, NODC and Scripps are to develop a policy in regard to judicious use of the history record.

  Action: MEDS, NODC, Scripps

- GTSPP and GODAR to establish agreed-upon standards for metadata to be retained with the data, QC procedures, the meaning of the QC flags, and duplicates identification. A document is to be prepared for the next IODE meeting.

  Action: Chairman of GTSPP Steering Committee, Project Leader for GODAR

4. Formats

- A simpler format for circulating GTSPP data is to be developed by MEDS, IFREMER, Scripps and AODC.

  Action: MEDS, IFREMER, Scripps, AODC

5. Data Flow Monitoring

- MEDS is to co-operate with the Canadian GTS Centre in Dorval in pilot monitoring projects for oceanographic data on the GTS.

  Action: MEDS

- France and USA to exchange data as necessary to have a 100% overlap in holdings and work out routine exchange of data between IFREMER and the CMD so as not to get out of step in the future. The routine exchange is to be worked out once the present exchange is complete and the causes of the present mismatch are understood.

  Action: IFREMER, NODC

- To prepare annual reports with a description of the flow of data through the WOCE UOT centres.

  Action: WOCE Science Centres, WOCE IPO

6. Administrative Items

- Arrange the location of the next meeting in consultation with IOC Secretariat.

  Action: Chairman of the Steering Group

- Develop new Terms of Reference for the Steering Group as an end-to-end systems development steering group to be referred for comment and appropriate action to the next IODE Officers and IGOSS Bureau meetings.

  Action: Chairman of the Steering Group

- Member States are to examine and make what commitments are appropriate and possible to the continuation of the SOOP operations. NODC and MEDS have already committed to continue the services now provided.

  Action: IOC and WMO Secretariats to inform Member States of the Need

- Since GTSPP deals only with observations that include sub-surface data, management of surface only observation data is to be referred to IGOSS and IODE to avoid a later rescue effort. (A possible solution would be a proposal for a GTSPP-like project for surface observations.)

  Action: Chairman of the Steering Committee

- To consider ways to attract new MS to GTSPP for various tasks and services (on-going).

  Action: All Participants.

7. Co-operation with Other Bodies

- There is a need to write to GOOS in regard to GTSPP. The letter is to inform the Chairman of J-GOOS and I-GOOS of the clients of GTSPP and their needs for data that might be available from the marine services module of GOOS, and of GTSPP data and services that might be of interest to GOOS.

  Action: Chairman of the Steering Committee

- In the future, development and publication of long time-series and climatologies will be the responsibility of GODAR.

  Action: GODAR Project Leader

- There may be a requirement for a PC programme for key entry of data to the GTSPP format so that GODAR will have fewer formats to deal with and so that the data is then available to GTSPP centres in a format they can deal with. This requirement should be reviewed with GODAR.

  Action: Chairman of the Steering Committee

8. Publications and Communications

- A revised version of the GTSPP Project Plan is to be published.

  Action: IOC Secretariat

- Demonstrate in published form the added value of QC as in the Scripps before and after QC maps.

  Action: WOCE Science Centres

- AODC to contact all sites and make available links from their GTSPP home pages from the AODC home page as an interim measure for publicizing GTSPP data and services.

  Action: AODC

- For dissemination of GTSPP information and services and knowledge thereof.

  (i) Republish the GTSPP brochure.

Action: NODC

(ii) Develop a series of linked Web Sites and Appropriate CD-ROMs to publish data and information on-line on overview of programme, contacting participants, GTSPP clients, how they use GTSPP, success stories, list of products and services, complete set of publications, on-line data and data flow reports.

Action: Chairman of the Steering Committee

(iii) Conduct demonstrations of GTSPP at all appropriate national and international meetings - all.

Action: All Participants

(v) Use IMS, scientific journals, other publications to demonstrate the benefits of GTSPP.

Action: All Participants, IOC and WMO Secretariats .

(vi) Use the series of WOCE Scientific Workshops as a forum and provide datasets for the Workshops.

Action: NODC

(vii) Attempt to publish platform independent software for all aspects of GTSPP by following the specifications for common software as specified in the GTSPP Summary Report.

Action: All Participants.

- Announce the availability of the GTSPP CD-ROM in the IMS and International Newsletters.

Action: Chairman of the Steering Committee

- Propose to GTSPP members simple electronic forms with information on data sets received and status of processing which may be circulated among GTSPP participants by mail or put on a common directory or the Web Site.

Action: IFREMER, NODC

9. Operational activities

- Distribute the datasets for 1993 to the Science Centres.

Action: NODC (Check with NODC)

- Data Flow Monitoring. MEDS will continue to produce the monthly GTS data flow analysis. NODC will continue the reporting of the TOGA/WOCE line occupations to the WOCE IPO. WOCE will continue to report on the data flow through WOCE UOT centres. WOCE and IODE will produce a report on the data flow through the system.

Action: MEDS, NODC, WOCE IPO

- The WOCE Science Centres are to complete QC of delayed mode data in their possession for 1990-1992.

Action: WOCE Science Centres

10. Software

- Participants will in future advertise software development plans on Web pages, etc., so that interested parties can contact and perhaps co-operate to develop software that will run on multiple platforms.

Action: All Participants

- NODC to provide duplicates checking software to SIO for inclusion in SIO quality control application and to provide access to the system as a service for use.

  Action: NODC, Scripps

- CSIRO and Scripps visualization software for QC to be provided to data centres, in particular MEDS and NODC.

  Action: CSIRO, Scripps, NODC, MEDS

ANNEX III

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ANNEX IV

LIST OF DOCUMENTS [1]

WORKING DOCUMENTS

Document Code	Title
IOC-WMO/GTSPP-IV/1	Agenda
IOC-WMO/GTSPP-IV/1	Timetable
IOC-WMO/GTSPP-IV/2	Annotated Agenda
IOC-WMO/GTSPP-IV/3	Summary Report
IOC-WMO/GTSPP-IV/4	List of Documents
IOC-WMO/GTSPP-IV/5	List of Participants
IOC-WMO/GTSPP-IV/6	Review of the Status of the GTSPP CMD and Standards
IOC-WMO/GTSPP-IV/7	Comparison of GTSPP and GODAR Standards for Metadata and QC
IOC-WMO/GTSPP-IV/8	Status and Development of GTSPP QC Systems
IOC-WMO/GTSPP-IV/9	Scientific QC in the WOCE UOT DAC System
IOC-WMO/GTSPP-IV/10	CD-ROM of QC Flagging Examples from Various Centres (CD demonstration)
IOC-WMO/GTSPP-IV/11	GTSPP Real-time and Delayed Mode Data Flows
IOC-WMO/GTSPP-IV/12	Information and Publications Disseminated from GTSPP
IOC-WMO/GTSPP-IV/13	Suggestions for GTSPP and the World Wide Web
IOC-WMO/GTSPP-IV/14	Products, Services and Clients for Temperature and Salinity Databases
IOC-WMO/GTSPP-IV/15	GTSPP/WOCE UOT Arrangements and the Future
IOC-WMO/GTSPP-IV/16	GTSPP/WOCE DPC Co-operation and the Final WOCE Archive
IOC-WMO/GTSPP-IV/17	IGOSS-IODE End-to-End Data Management Strategy
IOC-WMO/GTSPP-IV/18	SOOP Data Management Plan
IOC-WMO/GTSPP-IV/19	A Discussion of the Roles of GTSPP and GOOS in Ocean Services
IOC-WMO/GTSPP-IV/20	WMO GTS Monitoring
IOC-WMO/GTSPP-IV/21	GTSPP Formats and Standard Metadata Codes

[1] This list is for reference only. No stocks of these documents are maintained, except for the Summary Report.

ANNEX V

A GTSPP SUCCESS STORY

The Marine Environmental Data Service became involved in the Global Temperature-Salinity Pilot Project (GTSPP) at its conception in 1989. It began as a joint Canada-US project. The goal of the project was to implement an end-to-end data management system for global temperature and salinity data, including duplicate identification and resolution, improved quality control, and a timely and complete database from which the "best" available copy of temperature and salinity profiles in the ocean would be available at time-scales from a very few days to decades.

This "best" available copy concept was based on what was termed a "continuously managed database" scheme. The underlying concept of such a database is that as soon as data from an ocean observation are available they are entered into the database. After more sophisticated processing and quality control are done on the observation, the first "lower quality" copy of the data is replaced by the "higher quality" fully processed copy. Of course, metadata are included in the database so that a user can tell what version of the profile data has been supplied and therefore what he can expect the accuracy and quality of each observation to be.

There were 3 significant advances made in developing the GTSPP. The first one was that a group of 7 Member States of IOC and WMO joined the project actively. Very soon after, GTSPP entered into a partnership with the World Ocean Circulation Experiment (WOCE) to manage the data collected by the Upper Ocean Thermal Programme of WOCE. All these organizations contributed data, ideas and software systems. This large partnership resulted in the specification of a very complete and comprehensive system design for inclusion of metadata, for duplicates resolution, and for quality control for temperature and salinity data. In fact, the system had capabilities well beyond anything that was in use internationally then or now.

The partnership was also able to compile for the first time a virtually complete global set of the available real-time temperature and salinity data. This was evidenced by an increase of the order of 30% in the real-time data compared to the capture rate prior to GTSPP.

The second gain for GTSPP was in improved real-time data flow monitoring. Because data are being submitted in operational time-frames from 5 centres around the world, receipts from any centre could be compared to the available global set of observations. Losses in the transmission of real-time data on the Global Telecommunications System (GTS) could then be identified and steps taken to solve the problems. In addition, since the data were going through a single data centre for quality control, it was possible to compile statistics on errors by ships and to contact those ships with the more serious problems to have the errors rectified.

Thus the quality and completeness of the global temperature and salinity real-time dataset has been improved.

The second major advance was the improvement of the quality control and duplicates resolution functions due to the comprehensive set of criteria implemented in the GTSPP. The QC criteria included checks against climatology and bathymetry, spike detection, etc. This formed the most complete set of criteria ever routinely applied to large datasets. Coupled with an efficient man-machine system for the identification of duplicate observations, the GTSPP database has achieved a level of reliability that has been welcomed and praised by many data users in science and operations.

All this has lead to an increase in productivity because of the efficiency realized by implementing the automated and semi-automated QC and duplicates resolution. In the Marine Environmental Data Service (MEDS) in Canada, processing systems can now deal with input of 10,000 oceanographic stations per week, including visual inspection of profiles for problems or spikes of a type that can probably never be detected by automated systems. This processing also includes the setting of flags and addition of metadata to describe completely what has been done to the data and to record any changes made to the data or the flags attached to the data.

The third and most significant success for GTSPP in Canada, is that the technology and systems developed could be applied directly to national data management and could be used by the DFO science regions as well.

The immediate benefit for MEDS as the national oceanographic data centre was twofold. Firstly, the quality of databases of Canadian data realized an immediate improvement. Secondly, the problem of the

resolution of duplicate observations within a database and between databases was solved in a single operation. For the first time, a CTD observation and the IGOSS TESAC message prepared from it are recognized as duplicate observations by the database update software and are marked as such in the database. Coupled with the large increase in throughput in processing temperature and salinity data and the associated saving of resources, these improvements have allowed MEDS to maintain improved and more timely databases in the face of reductions of resources that would otherwise have destroyed our ability to cope with the job. Productivity in this area has more than doubled, while the quality assessment and documentation and the duplicate resolution has been done in a fashion which simply could not have been aspired to with the earlier systems. All this of course, has resulted in an enhanced reputation for ocean data management both in MEDS and the DFO regions.

The improved systems at MEDS have also lead to improved data processing in the regions. In particular, the GTSPP software has been implemented on a $7K workstation purchased for the purpose and installed in the Bedford Institute. Thus, the improvement in productivity has been applied to BIO temperature and salinity data processing at the price of that workstation. In addition, this processing system has allowed BIO to improve their quality control operations to immediately meet the agreed global standards.

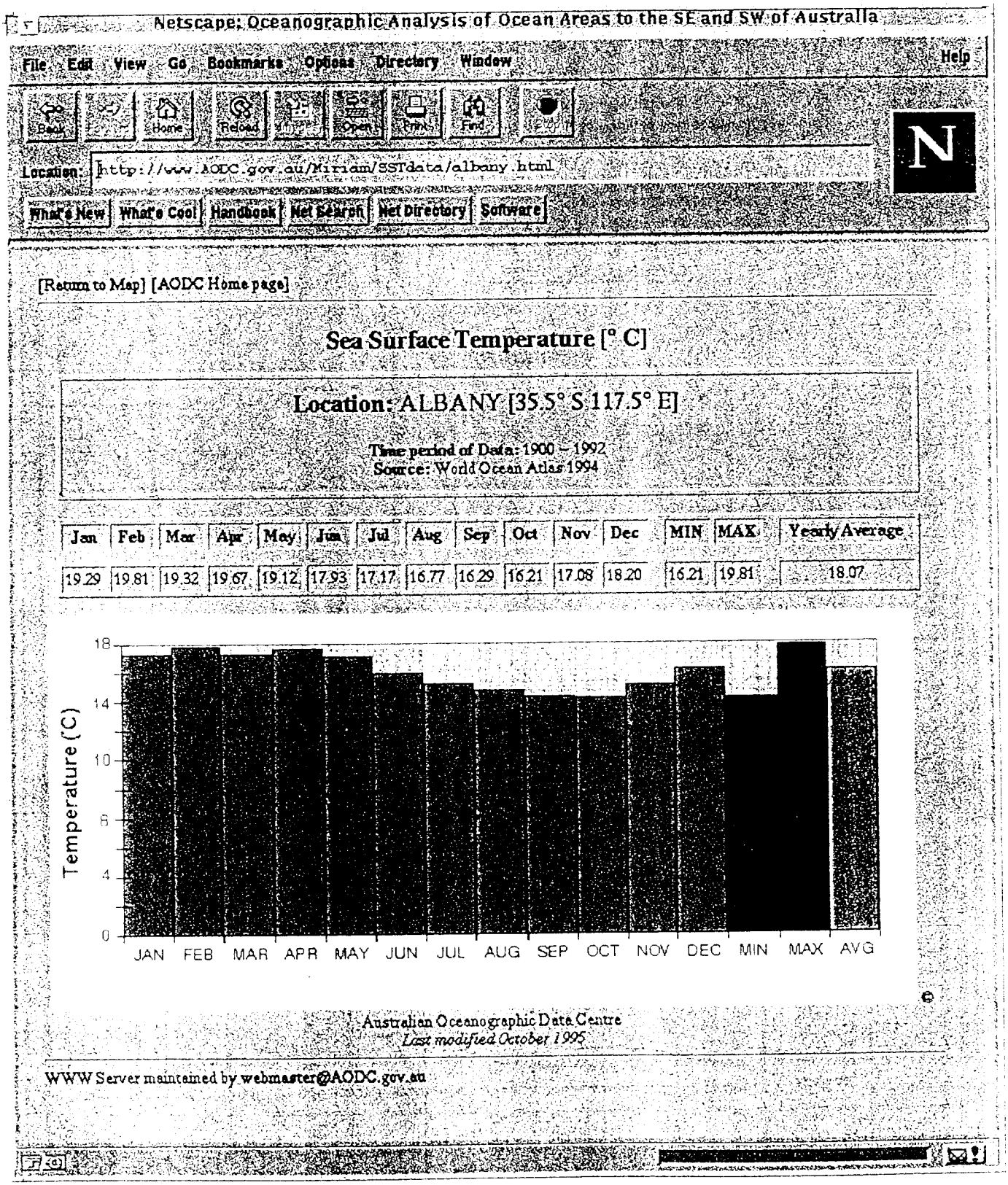
Finally, it is important to note that the benefits realized in Canada alone have more than paid for the costs of developing and implementing the GTSPP systems in our data management programmes. When one realizes that these benefits have been spread across the 7 active partners at a cost much less than 7 times the cost for one centre, the true savings in this sort of a partnership begins to emerge. Further, we have a model that can be applied to other data types than temperature and salinity data at some fraction of the cost of the original development so the economic benefits continue to accrue.

All in all, the GTSPP experience for Canada has been extremely positive. We have realized efficiencies and benefits well beyond what was anticipated at the beginning of the project.

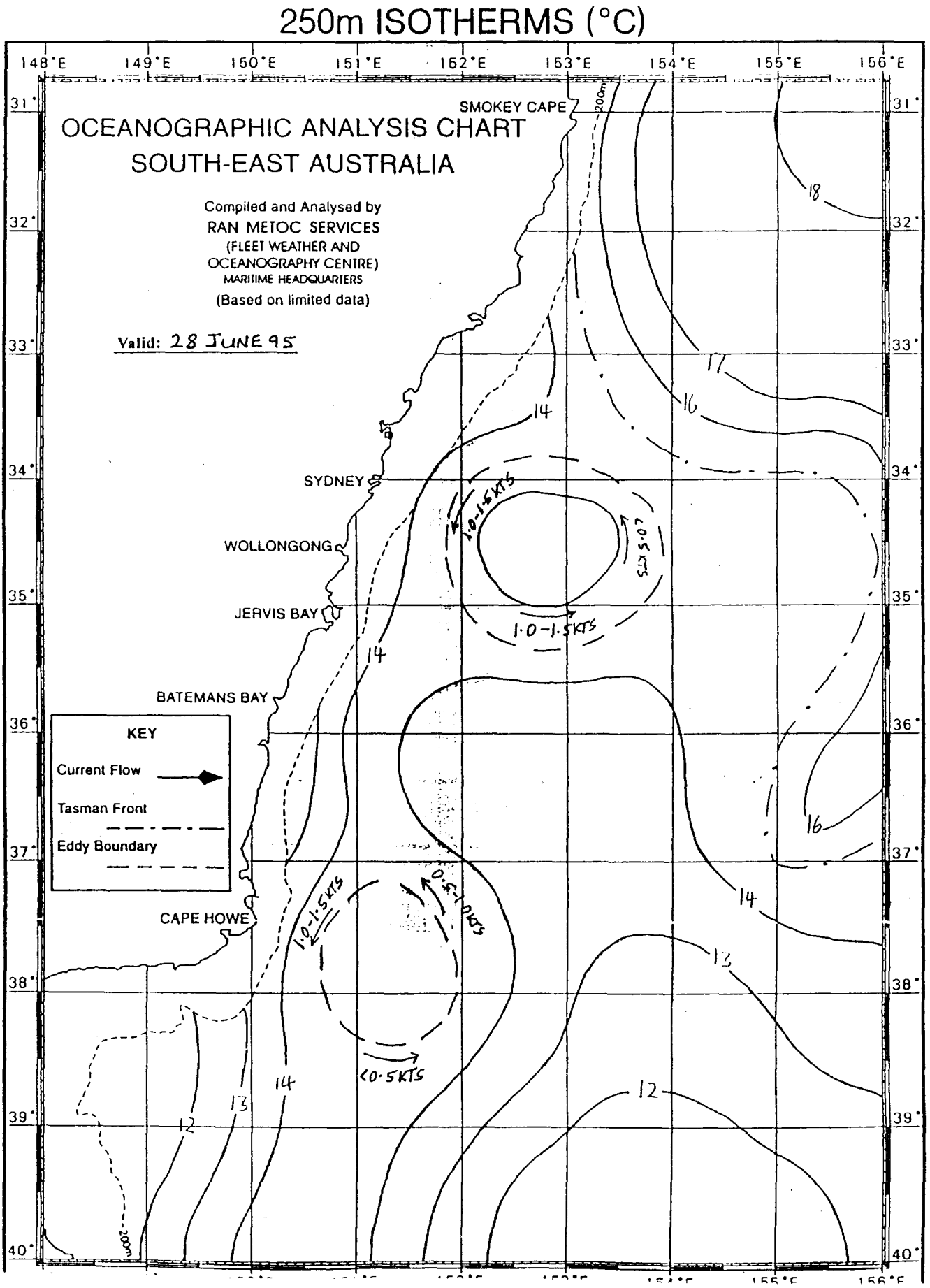
ANNEX VI

SOME PRODUCTS DEVELOPED BY GTSPP PARTICIPANTS

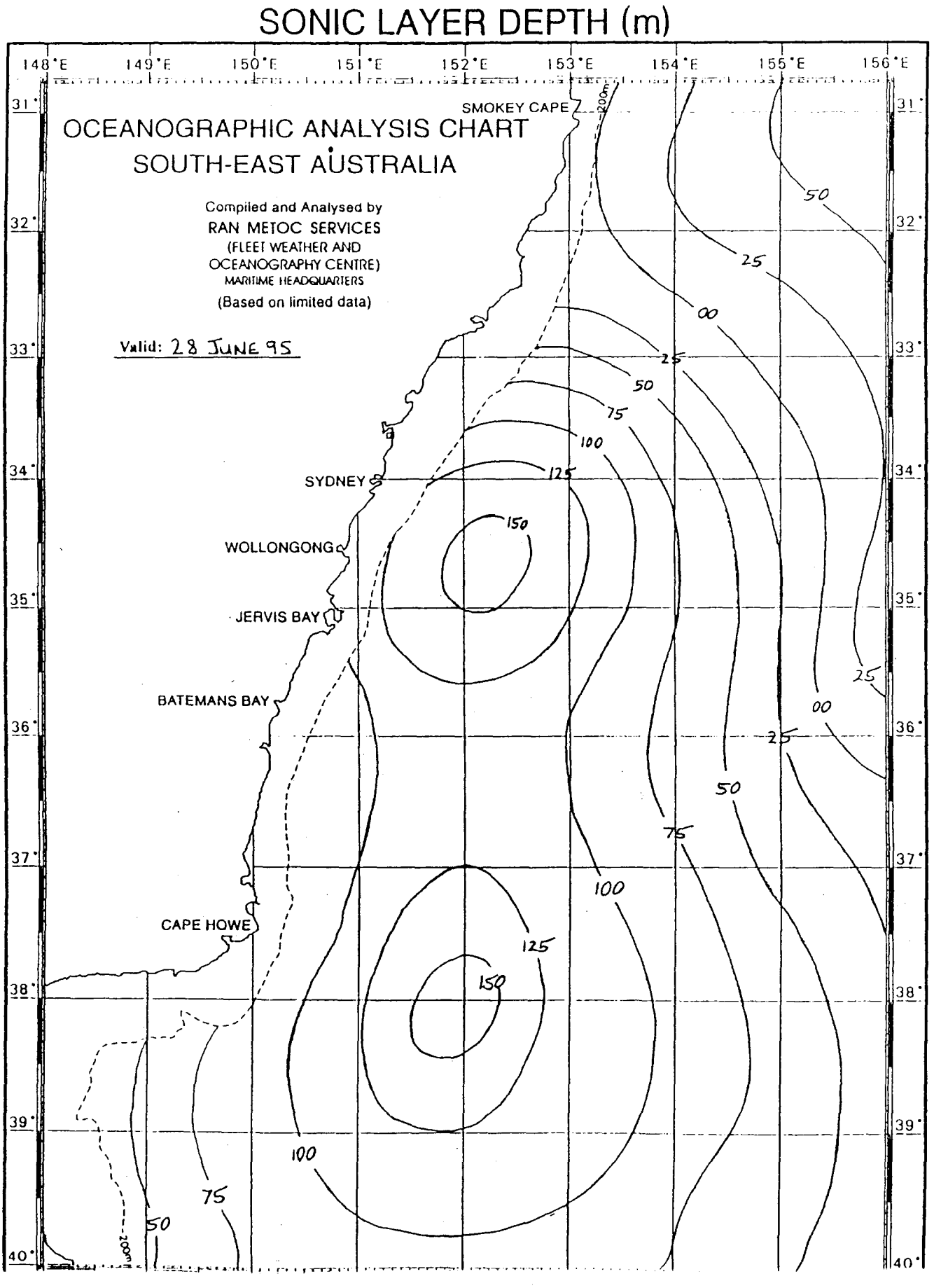
AUSTRALIA



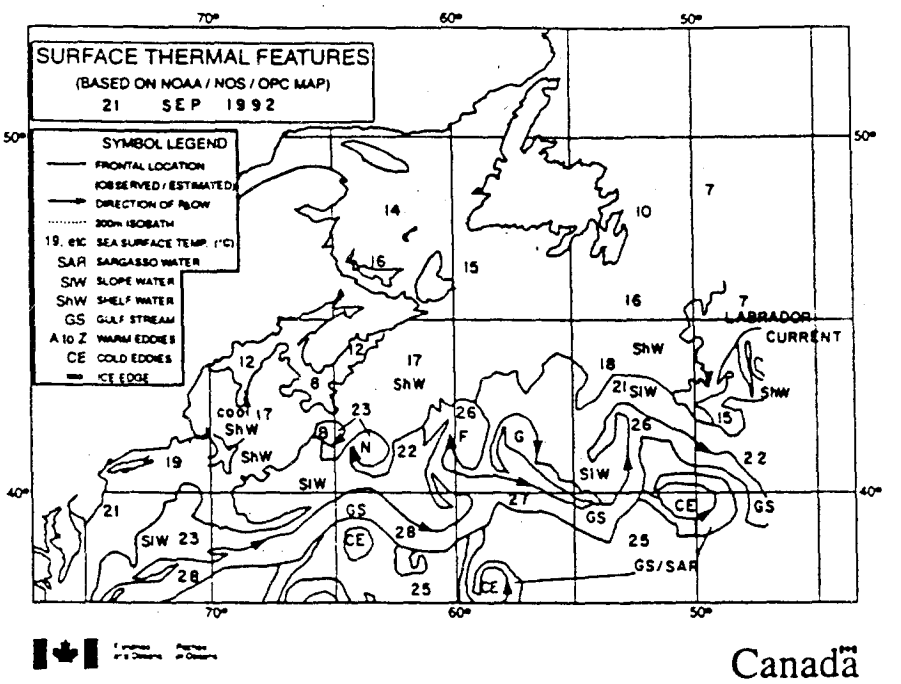
AUSTRALIA (cont.)

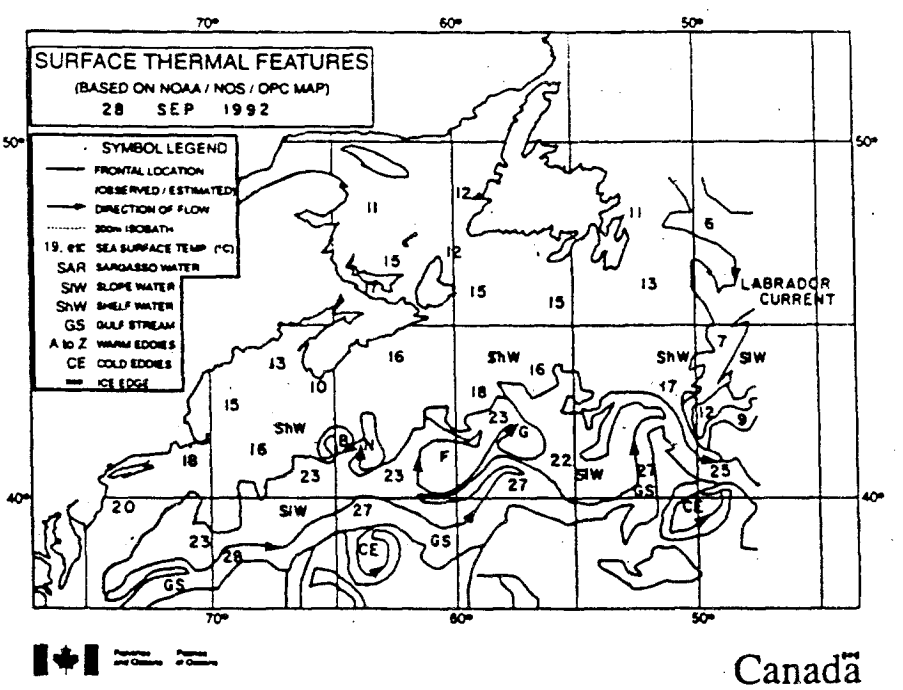


AUSTRALIA (cont.)

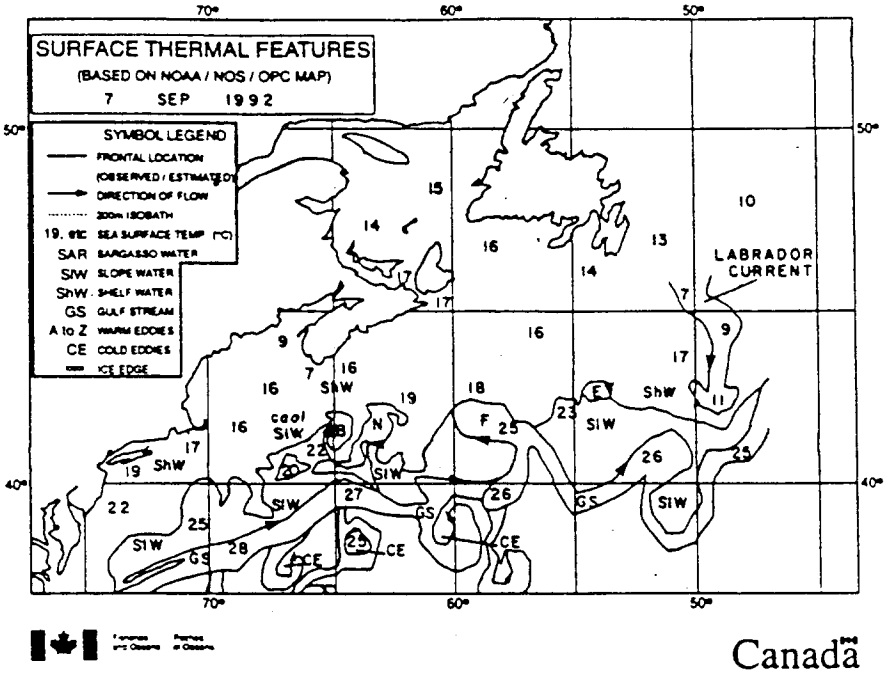


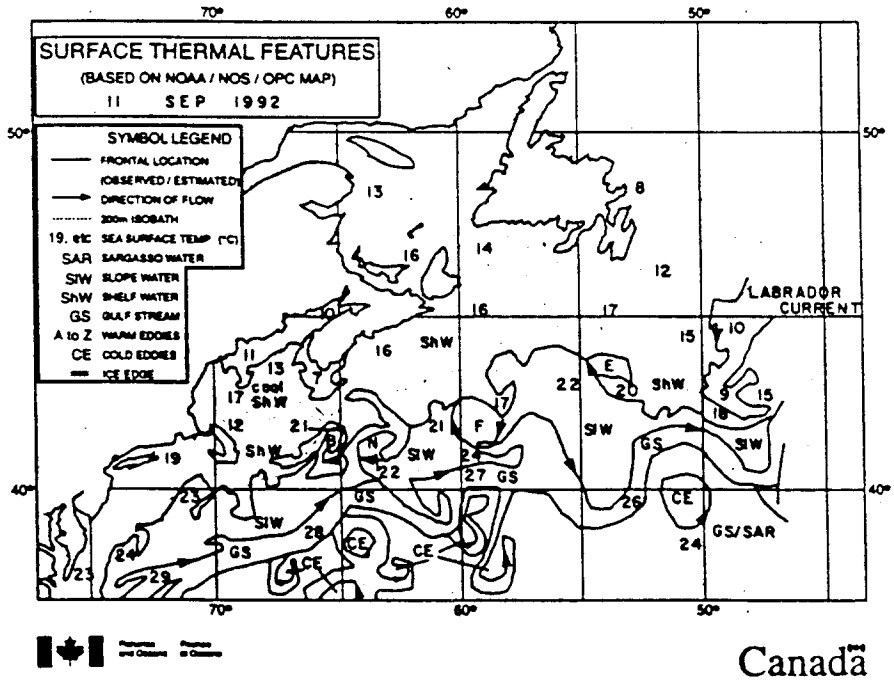
CANADA


SURFACE THERMAL FEATURES
(BASED ON NOAA / NOS / OPC MAP)
21 SEP 1992
SYMBOL LEGEND
FRONTAL LOCATION
(OBSERVED / ESTIMATED)
DIRECTION OF FLOW
200m ISOBATH
19, etc SEA SURFACE TEMP. (°C)
SAR SARGASSO WATER
SlW SLOPE WATER
ShW SHELF WATER
GS GULF STREAM
A to Z WARM EDDIES
CE COLD EDDIES
ICE EDGE
LABRADOR CURRENT
GS/SAR
70°
60°
50°
40°
Canada

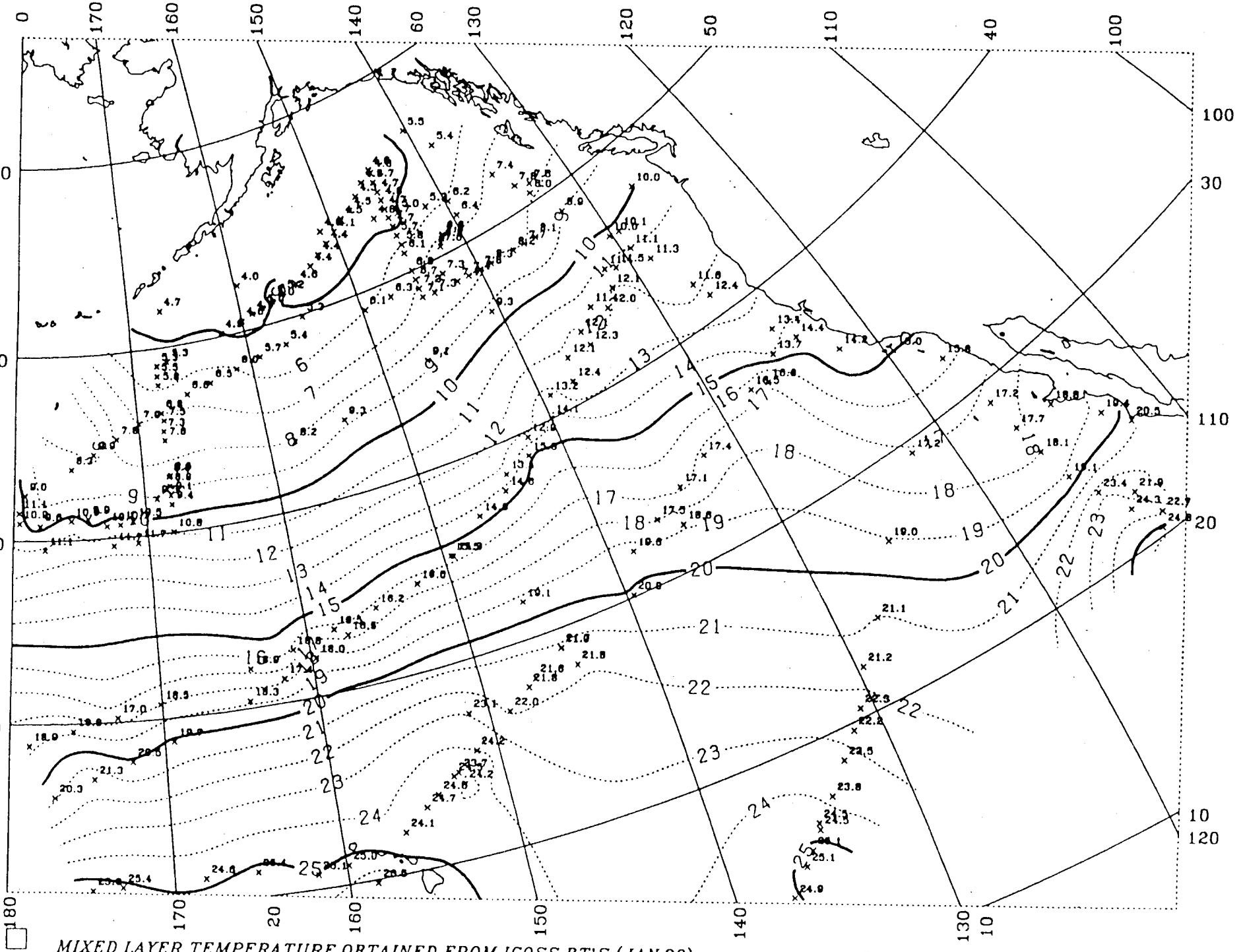

SURFACE THERMAL FEATURES
(BASED ON NOAA / NOS / OPC MAP)
28 SEP 1992
SYMBOL LEGEND
FRONTAL LOCATION
(OBSERVED / ESTIMATED)
DIRECTION OF FLOW
200m ISOBATH
19, etc SEA SURFACE TEMP. (°C)
SAR SARGASSO WATER
SlW SLOPE WATER
ShW SHELF WATER
GS GULF STREAM
A to Z WARM EDDIES
CE COLD EDDIES
ICE EDGE
LABRADOR CURRENT
70°
60°
50°
40°
Canada

CANADA (cont.)


SURFACE THERMAL FEATURES
(BASED ON NOAA / NOS / OPC MAP)
7 SEP 1992
SYMBOL LEGEND
FRONTAL LOCATION
(OBSERVED / ESTIMATED)
DIRECTION OF FLOW
200m ISOBATH
19, etc SEA SURFACE TEMP (°C)
SAR SARGASSO WATER
SlW SLOPE WATER
ShW SHELF WATER
GS GULF STREAM
A to Z WARM EDDIES
CE COLD EDDIES
ICE EDGE
LABRADOR CURRENT
cool SlW
cool ShW
70°
60°
50°
40°
Canada


SURFACE THERMAL FEATURES
(BASED ON NOAA / NOS / OPC MAP)
11 SEP 1992
SYMBOL LEGEND
FRONTAL LOCATION
(OBSERVED / ESTIMATED)
DIRECTION OF FLOW
200m ISOBATH
19, etc SEA SURFACE TEMP (°C)
SAR SARGASSO WATER
SlW SLOPE WATER
ShW SHELF WATER
GS GULF STREAM
A to Z WARM EDDIES
CE COLD EDDIES
ICE EDGE
LABRADOR CURRENT
GS/SAR
cool SlW
cool ShW
70°
60°
50°
40°
Canada

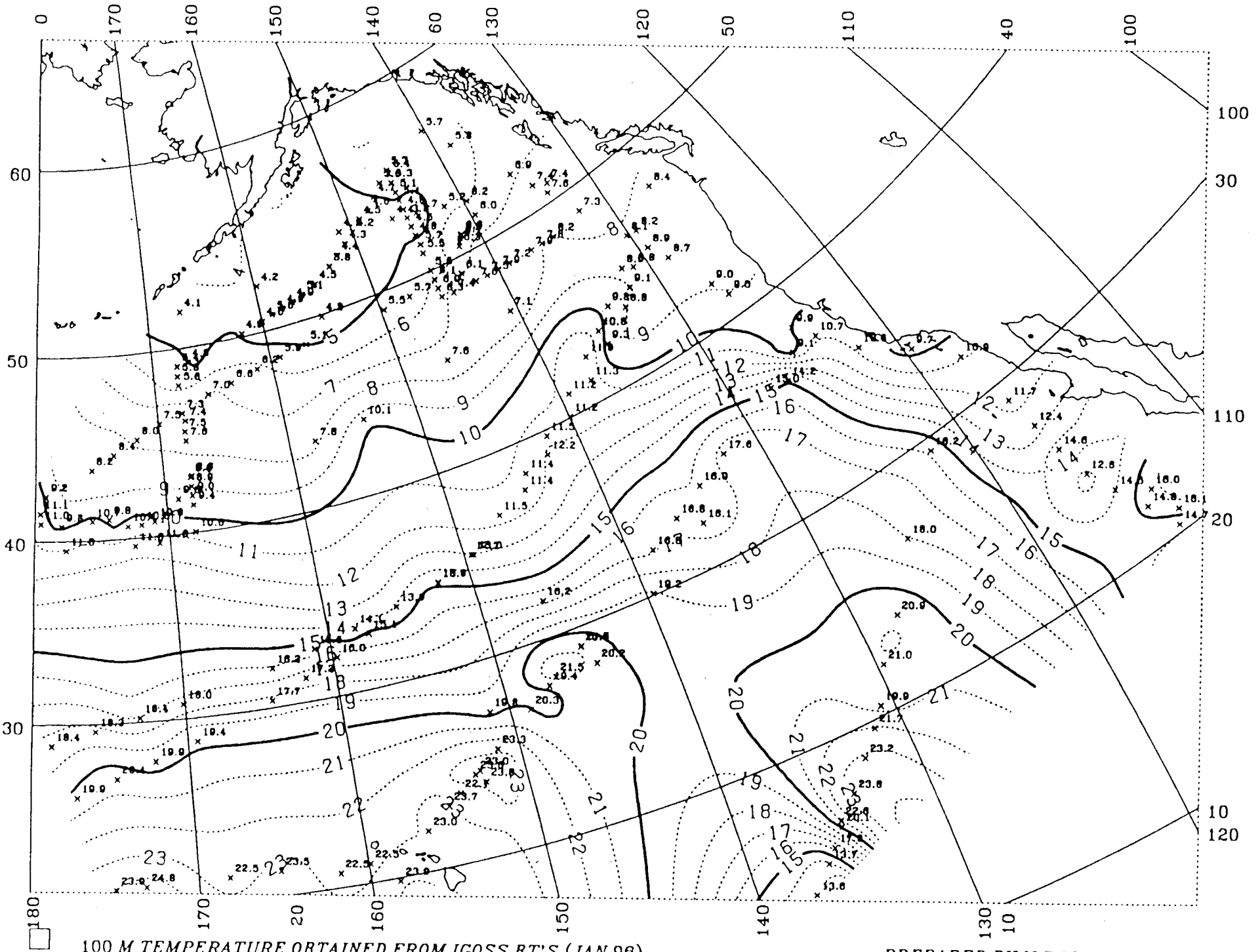
CANADA (cont.)



MIXED LAYER TEMPERATURE OBTAINED FROM IGOSS BT'S (JAN 96)

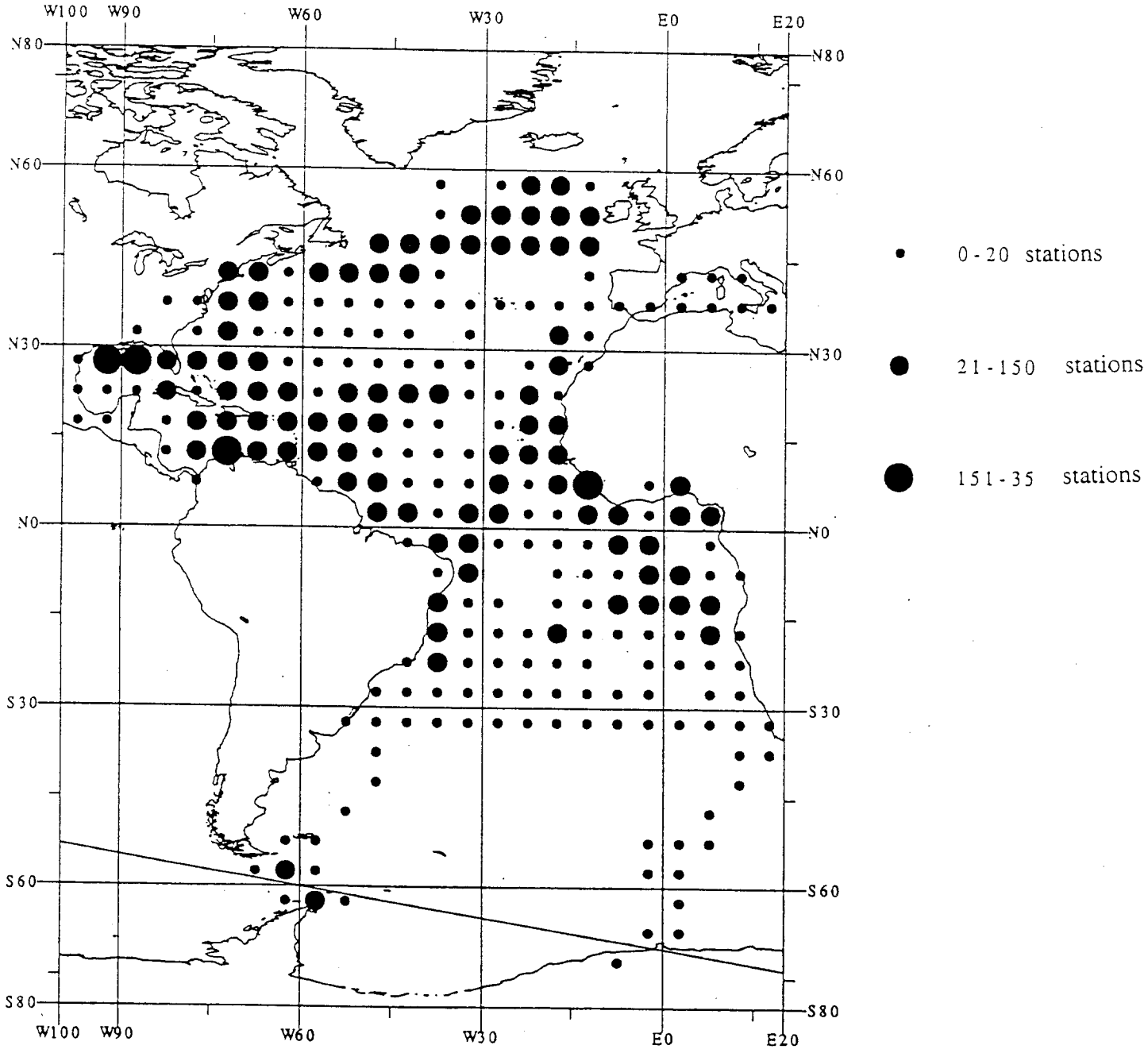
PREPARED BY IOS 12-FEB-96

CANADA (cont.)


100 M TEMPERATURE OBTAINED FROM IGOSS BT'S (JAN 96)
PREPARED BY IOS 12-FEB-96

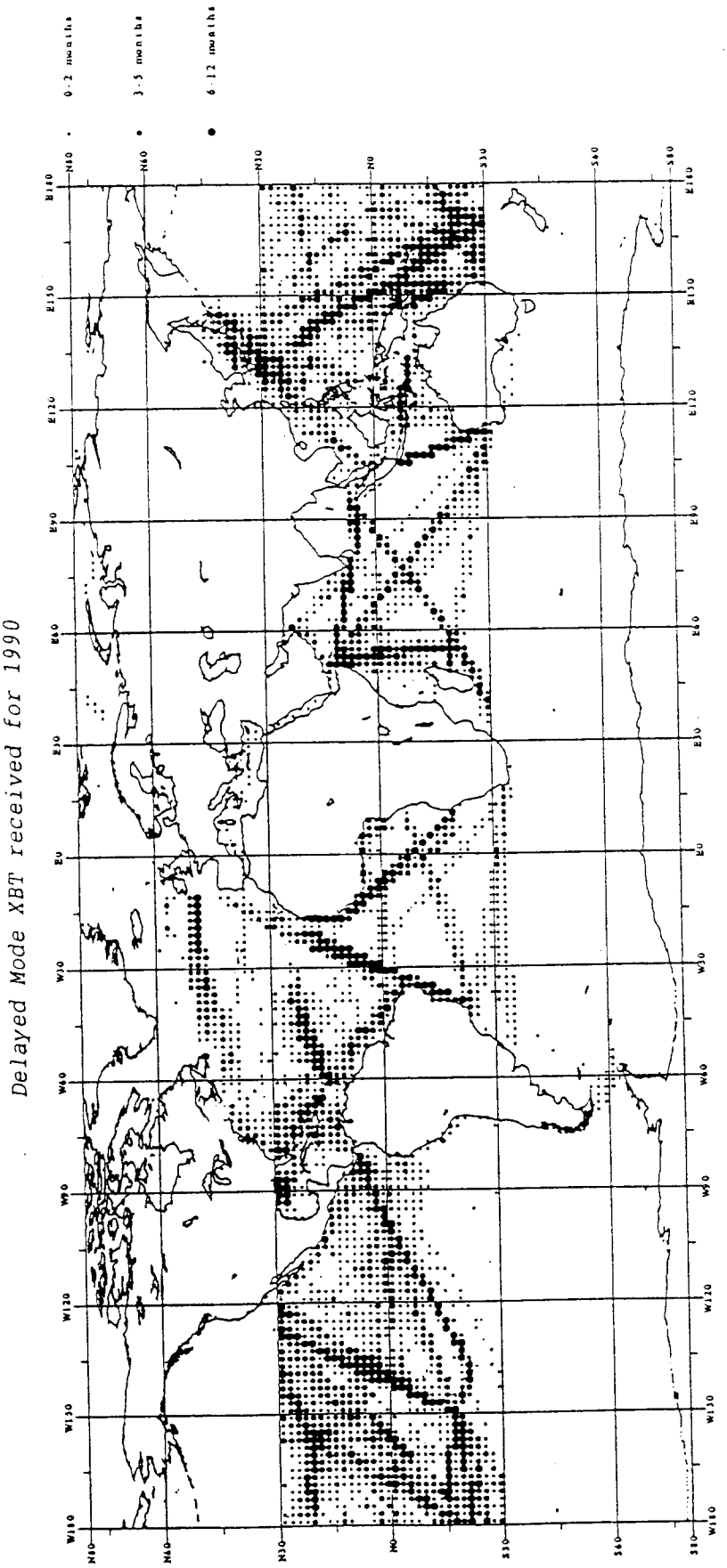
FRANCE

Fig.4 - Dots as a function of classes of profile numbers by geographical squares.
(5x5 degrees)



FRANCE (cont.)

Fig.5 - Dots as a function of the number of months for which profiles were archived for each geographical square (2 x 2 degrees)



RUSSIAN FEDERATION

Tabl.1

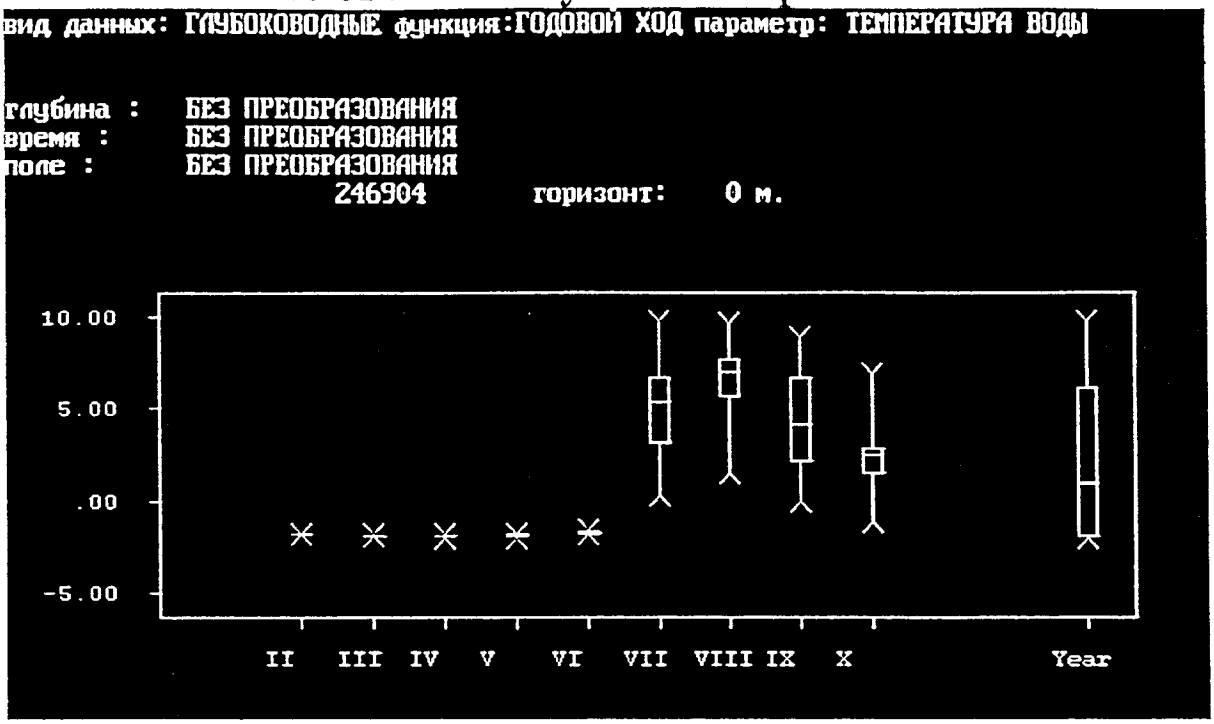
The collection of BATHY/TESAC data in Russian NODC for 1994-1995

Year	Month	From GTS		From Russia Navy ODC
		BATHY	TESAC	BATHY
1994	1	2850	124	12
	2	3132	133	80
	3	3958	231	196
	4	3918	155	91
	5	4032	62	1
	6	3762	76	237
	7	3720	71	409
	8	3993	79	151
	9	3308	80	64
	10	2559	71	24
	11	4526	14	71
	12	4204	19	13
1995	1	3532	76	53
	2	3878	50	81
	3	4296	1	105
	4	4113	7	236
	5	5204	316	44
	6	4603	119	16
	7	4721	175	122
	8	5632	20	117
	9	4996	149	15
	10	5125	84	-
	11	1582	275	33
	12	404	68	23
Sum:		92048	2486	2163

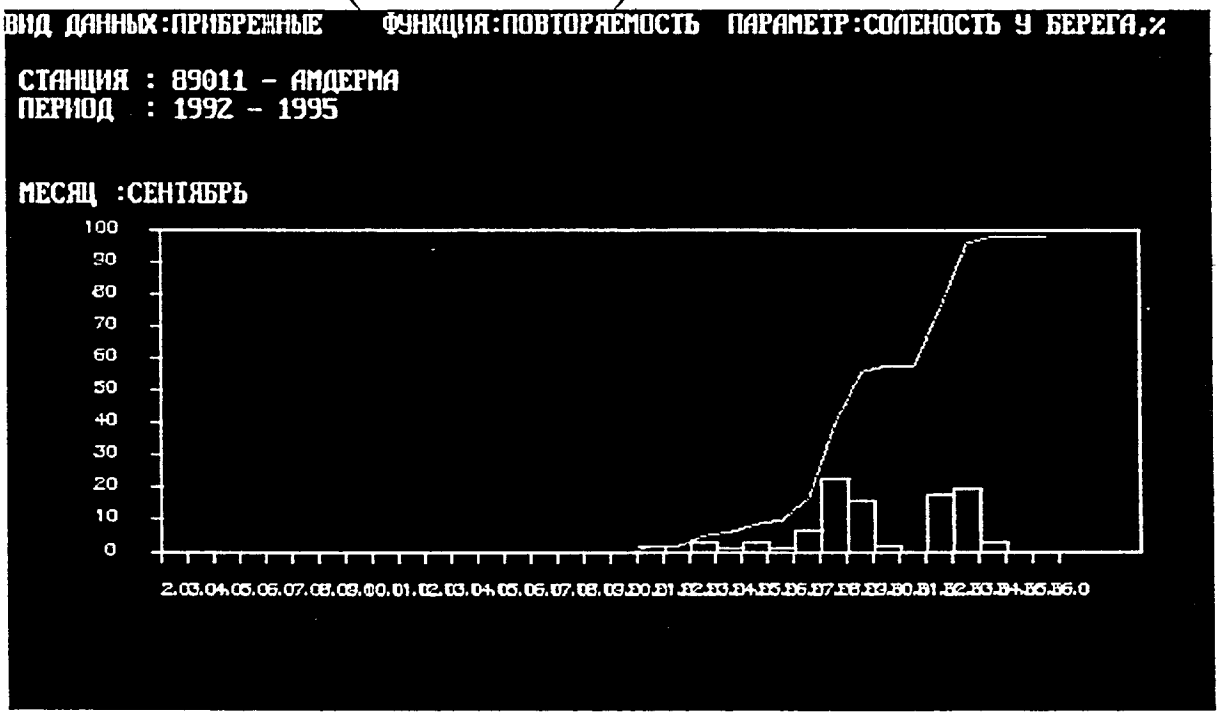
***Remark:** The BATHY data from NAVY ships will include in GTSPP data base. Before including the BATHY/TESAC data from GTS It is necessary to check duplication messages(stations/profiles) with monthly portion of data which MEDS receives*

RUSSIAN FEDERATION (cont.)

Characteristics of annual cycle of temperature



Characteristics of statistical distribution of salinity (coastal data)



ANNEX VII

REVIEW OF THE GTSPP ACTION PLAN FOR THE PAST INTERSESSIONAL PERIOD

Introduction

This review is based on Annex II of the Summary report of GTSPP-III. It will present the action proposed by the Annex, then report on known actions taken. In some cases, actions are grouped when it is appropriate to discuss all of them at one time. Information presented has been updated to include decisions of the GTSPP-IV Meeting.

Implementation of the Elements of GTSPP

1. To encourage GTSPP participants to use the term "*low and high resolution data*" in describing their datasets.

   Completed. The terms have come into common use in GTSPP.

TRACKOB Data

1. To distribute TRACKOB data in accordance with methods established by GTSPP.
2. To include TRACKOB data in the GTSPP monthly monitoring reports.
3. To make available to the GTSPP track temperature and salinity data along with any other parameters observed simultaneously that are not reported via TRACKOB.

No progress has been made in including TRACKOB data into the GTSPP. MEDS acquires and decodes the data but has not been able to find resources to develop the necessary software to carry these data further.

At a recent WOCE meeting, there were extensive discussions about thermo-salinographs and TRACKOB. It appears the French have developed a reliable system for acquiring data suitable for TRACKOB and this could mean substantial increases in data exchanged this way. GTSPP needs to discuss if managing along track surface data is a priority and how this might be achieved.

There is a MEDS-ICES-NODC project from IODE-XV that to test the BUFR format. One of the datasets that will be used for this is the TRACKOB dataset.

The decision of the GTSPP-1V Meeting was that surface only data should not be included in GTSPP databases and data flows as the GTSPP systems were designed and work best for profile data: The matter of surface only data is to be referred to IODE and IGOSS for consideration. See the action plan in Annex II for details.

4. To formulate structures and methods for handling data collected using undulating instruments.

MEDS has had some recent experience in processing and archiving data collected with a CTD towed on a net. The characteristics of these data are quite similar to what would be returned from undulating instruments.

MEDS has also carried out some preliminary work on data received from undulating instruments. In this case, the various up and down oscillations are averaged and the statistical results (means, standard deviations and so on) are delivered to MEDS. In this case the data look like typical profiles, but now as well as physical variables, there are statistical variables as well. This causes no difficulty to the format used by GTSPP.

See Annex II for the action item on data from undulating instruments for the intersessional period.

5. To survey IGOSS National Representatives in Member States to determine what surface observational data are being collected and reported in TRACKOB.

As noted above, a meeting of WOCE (WCXXPC) reviewed this issue in detail. See the notes associated with 1,2,3 above.

Navy Declassified Data

1. To contact national navies requesting them to declassify data including high resolution data.

A number of navies have started to release data to the public. In particular, it is known that the US, Australian, and Russian Navies are doing so.

2. To keep the Secretariat IOC and the Chairman IODE informed through letters, on developments in declassifying ocean data.

Various information on the subject was circulated during the intersessional period.

3. To contact US Navy to obtain any available high resolution copies of declassified data.

Task pursued by NODC. Unfortunately in most cases the high resolution data were not available.

4. To assign a unique identification code when the call sign is absent but the ship is known.

NODC assigns unique call signs, identification, or cruise numbers where possible in the development and maintenance of the CMD.

Data Flow Monitoring

1. To prepare an annual report for the real-time data flow along the lines of the TOGA/WOCE data rescue document and circulate it to the NODCs of GTSPP members.

This action was not completed and is no longer considered necessary.

2. To enhance the usage of electronic mail systems by WDCs for distribution of CSRs.

This action was not completed and is no longer considered an appropriate action for the GTSPP.

3. To complete the development of the software system to assign real-time data assembled by the GTSPP to WOCE/TOGA lines.

This software has been completed by the US and results are available on a quarterly basis on the US NODC web site.

4. To continue production of the monthly GTS data flow analysis

MEDS continues to produce monthly North American and International reports of low resolution data received. These are sent to the IGOSS SOOP Co-ordinator in Paris. MEDS also started a monthly report on the use of JJYY messages (the revised form the of BATHY message). These reports are also sent to the IGOSS SOOP Co-ordinator.

5. To prepare semi-annual reports with the description of the flow of data through the WOCE UOT centres.

The Meeting decided to continue these reports on an annual basis.

6. To provide annually an overview of the flow of real-time and delayed mode data, identify problems and priorities for solutions, publish this information in the GTSPP semi-annual Report series.

Report production has been sporadic at best due to other work pressures. Production of quarterly and semi-annual reports by MEDS has been cancelled because of lack of resources to do so. Consideration will be given to meeting the requirement by including the information on a GTSPP Web home pages of participants.

CMD

1. To tag real-time data which are replaced by delayed mode data.

This is now routinely done by the US.

2. To accept and merge scientific QC information on real-time data from DACs.

Data returns from DACs has tended to be slow. At a meeting in Scripps in spring of 1995, common flags and a flagging scheme was agreed upon by the DACs. Since then, some data have been received and the flags preserved.

3. To reformat 1990-1992 delayed mode data from original datasets to GTSPP format.
4. To complete QC of 1990-1992 delayed mode data.
5. To add QCed delayed mode data from 1990-1992 to CMD.

These tasks have been completed.

6. To distribute annual datasets for 1991-1992.

The data for 1991 have been distributed. The data for 1992 are in the process of distribution.

7. To distribute annual datasets for 1993.

The data for 1993 has not been distributed pending resolution of an inconsistency in the holding at NODC vs the holdings at IFREMER.

8. To QC the real-time datasets for 1994 and onwards alert SIO and AOML of problems.

This task was no longer required.

9. To carry out comparative quality control on the Indian Ocean data for a short period in 1994 to validate MEDS procedures for that data.

A general comparison of QC methods between CSIRO, NODC and MEDS has been completed including one Indian Ocean cruise. A report will be posted on a GTSPP Web Site.

10. To review the data and meta data being supplied with the delayed mode upper ocean XBT data and to recommend how best to incorporate all fields into the GTSPP format.

The GTSPP-IV Meeting produced action items to deal with this requirement in the section of Annex II on standards.

QC and Integration of Historical Data Files into GTSPP

1. To pass all current archived data through the GTSPP QC procedures and duplicates management control.

This action was delayed pending joint consideration of the requirement with GODAR. The decision a GTSPP was for GODAR to deal with QC of the historical dataset. GTSPP will concentrate on QC for recent (last 2 to 3 years) real-time and delayed mode data.

2. To undertake upgrading of the archives in data quality and eliminating duplications for particular ocean areas which coincide with national interests.

This task is being carried out within the GODAR project.

3. To provide software for data quality and eliminating duplicates developed under GTSPP to all GTSPP members.

MEDS software and algorithms have been published on the GTSPP CD-ROM. However, the software is platform dependent and will only run on DEC workstations in Fortran. None of the participants of the GTSPP-IV Meeting was in a position to commit the necessary resources to produce a platform independent version. NODC has some C software written for UNIX that may be available.

GTSPP Quarterly Reports

1. To continue production of GTSPP reports on a half a year basis.

2. To include analyses produced by WOCE UOT Science Centres not included in the IGOSS Products Bulletin into the GTSPP Reports.

3. To include in the GTSPP reports lists of available software and associated documentation, and information on regional and higher resolution climatologies.

Production of the semi-annual GTSPP report was not done due to resource limitations in MEDS. MEDS was unable to commit to future production of these reports.

4. To investigate with the scientific community what products they might like to see.

This task was undertaken at the GTSPP-IV Meeting. See the Summary Report of that Meeting.

Time-Series, Climatologies, Datasets and Other Products

1. To complete datasets from Ocean Weather Stations as agreed at the GTSPP-III Meeting, quality control them and issue as a CD-ROM.

Responsibility taken over by GODAR Project.

2. To identify repeat sections for the geographical areas of interest.

Responsibility taken over by GODAR Project.

3. To co-ordinate efforts in the preparation of time-series.

Responsibility taken over by GODAR Project.

4. To suggest GTSPP climate products as international standards for climatic characteristics (1 degree square arranged by months and standard levels of observations, climatic characteristics in the grid of the 1 degree square).

Task cancelled. Needs and requirements for such products are now the responsibility of GODAR.

5. To implement a pilot sub-project on climate product development for an agreed-upon geographical area.

Task cancelled. Needs and requirements for such products are now the responsibility of GODAR.

GTSPP CD-ROM

1. Start publication of GTSPP CD-ROM series.

The first GTSPP CD-ROM is complete and is being issued.

2. To provide reports of the WOCE UOT DAC meetings in electronic form for inclusion in the GTSPP CD-ROM.

Task completed.

3. To engage a consultant to develop a CDS/ISIS customized user interface to be used in conducting bibliographic and directory databases.

Task completed. Included on the GTSPP CD is software developed by IOC (called Heurisko) which is a user interface to CDS/ISIS. This is used to access files of bibliographic, ship and participating scientists information on the CD.

4. To announce the availability of the GTSPP CD-ROM in the IMS and International WOCE Newsletter.

   Task carried forward to next intersessional period.

5. To provide CD-ROM copies to the IOC Secretariat for distribution.

   CD-ROM completed. Copies are being prepared for the IOC.

WOCE/TOGA

1. To extend the GTSPP monitoring system along TOGA/WOCE lines in accordance with WOCE Report N°. 106/93.

   Task completed.

2. To provide the WOCE IPO with statistics for the annual datasets (from 1990 onwards) for incorporation in the WOCE Data Management Handbook every 6 months.

   This is an ongoing requirement. The statistics are provided on a regular basis.

3. To write routines for conversion of the originator's data into the GTSPP format before passing the data to the Science Centres.

   On-going task in MEDS and NODC.

4. To return the flagged real-time data which has undergone scientific QC to US NODC for incorporation into the GTSPP CMD.

This plan has changed slightly. Now only high resolution, are sent to science centres for QC. Return of these data have been slow partly due to a lack of agreement of how science centres would flag data. A WOCE meeting in Scripps in 1995 came to agreement on this issue. There is a question as to whether there are any low resolution data that have been quality controlled by the Science Centres that has not been returned.

5. To supply MEDS with the names of the programmes under the auspices of which the data were collected in order to encode this information in the surface code group.

   This task has become deleted as no longer necessary.

6. To propose to GTSPP members simple electronic forms with information on datasets received and status of processing which may be circulated among GTSPP participants by mail or put on a common directory accessible by ftp.

   Task not completed. Carried forward to the intersessional period.

GOOS

1. To summarize TOGA/WOCE and IGOSS/IODE achievements in ocean data management and in interpretation of these successes on the GOOS development in oceanographic data services.

   The present IODE Chairman has presented such a document to an appropriate GOOS meeting.

OceanPC

1. To include on the GTSPP CD-ROM improved data input and output software using the GTSPP format in order to enhance the integration of new data with the GTSPP data and accept the GTSPP meta data.

Software is included on the CD-ROM to transcribe GTSPP formatted data to that format required by OceanPC.

2. To convert the internal format of OceanPC to that for larger collections of data.

3. To recommend the ways for OceanPC to accept software that is written in other computer languages.

This task was not an action task for GTSPP. It was a recommendation to the OceanPC Project.

4. To consider steps to be taken to make OceanPC an exchange format for GODAR operations.

This task was also an item for consideration by the OceanPC Project.

GODAR

1. To identify ways in which GODAR and GTSPP will co-operate by sharing processing responsibilities.

Task not completed. Co-ordinating actions were defined at the GTSPP-IV Meeting.

2. To assist GODAR in re-formatting and processing new data so that it becomes available more quickly.

Data can now be provided to GODAR in the GTSPP format. All participants can assist GODAR by providing their data in the GTSPP format.

3. To share QC C-code software with data centres participating in GODAR data processing.

Interested participants can discuss requirements with the US NODC who have such software.

4. To help GODAR to accept, QC and input re-saved data in the GTSPP database.

NODC has received all of the data submitted through GODAR and is working to QC and load them into the archives. All data from 1990 and more recent years are loaded to the GTSPP CMD while older data go to a different archive. This is as per the agreement that GODAR maintain the historical archives separate from the GTSPP archives.

5. To develop, test and document QC software for GODAR purposes.

GODAR has developed its own set of QC software. It is roughly a combination of GTSPP and Science Centre procedures. It has been documented by the GODAR project.

6. To provide a PC programme for key entry of data for the GODAR project and description of meta data.

This item has not been pursued. It was not discussed at the GTSPP-IV Meeting and will need to be activated in discussions with GODAR during the intersessional period.

Formats and Meta data

1. To work with DACs to test adding 80-character free text groups to the GTSPP format.
2. To add free text groups to the GTSPP format to meet requirements for meta data which accompanies high resolution data.

Consideration was given to this requirement. The decision of the GTSPP-IV Meeting was that such unstructured meta data should be retained by the originating data centre with the data, but that it should not be routinely exchanged within GTSPP.

Conversion of the GTSPP QC Software to C and UNIX

1. To complete the duplicates management software.

Automatic duplicates identification software is complete at NODC. The MEDS software is platform dependent and therefore is not of general interest. In the NODC software no provision is made for manual resolution of questionable duplicates.

2. To test the portability of the GTSPP QC software for the database conversions.

This task was not completed. It is considered not relevant any longer as the development of portable versions of the software has been delayed due to resource limitations in the participating centres.

QC Review and Revisions

1. To review the text of Document IOC-WMO/IODE/GTSPP-III/16 "*Proposals for Revision to the GTSPP QC Procedures for Real-time and Delayed Mode Data*" and to distribute copies to science centres, WOCE IPO and the TOGA/WOCE SOC for their review in order to start implementation of agreed modifications in 1994.

The proposals were agreed to and software implementation carried out. Revisions have been made to the document describing GTSPP QC procedures. The latest version is available on the GTSPP CD-ROM.

Pilot Ocean Data Network

1. To establish 3 servers to meet the needs of GTSPP users.

   (i) US NODC server to hold authority lists for ship codes and other GTSPP codes.
   (ii) AODC server to hold a GTSPP software inventory and documentation available to other centres.
   (iii) MEDS server to hold the MEDI catalogue and implement them on Internet.

2. To implement a server for maps of temperature and salinity prepared with the GTSPP data.

The MEDI Server has not been implemented in MEDS. These servers are being further developed under a new project established at the GTSPP-IV Meeting.

3. To publish servers that are already available for some of the WOCE DACs and for SISMER in Brest in the GTSPP Reports.

Instead, and since the GTSPP Reports are no longer produced, WOCE has published a list of all DAC servers on the DIU server.

Software Standards and Exchange of Software

1. To develop an inventory of the 4 categories of GTSPP software and make it accessible via Internet.

   This action was not completed. It will become a part of the new GTSPP Web Project.

2. To adopt FORTRAN, C and X-windows as a standard software development environment for the GTSPP software development.

   These standards have been implemented in most centres.

3. To investigate IFREMER, Scripps and CSIRO visualization software used in their quality control systems.

This software was demonstrated at a QC Workshop held at Scripps in the spring of 1995. Recommendations were made to MEDS and NODC about extending their QC procedures to those used by Science Centres. Actions are being undertaken in the present intersessional period.

4. To provide duplicates checking software to SIO for inclusion in the SIO quality control software application and to provide access to the system as a service for use.

   Action to be taken by NODC and Scripps in the present intersessional.

General

1. To inform IOC Member States and international organizations by a Circular Letter on the state and plans of the GTSPP implementation.

The GTSPP Summary Reports are circulated to Member States and will be published along with other relevant information on the GTSPP Web Sites.

2. To review the GTSPP Project Plan of 1991 and make proposals for the need of a new, modified publication.

   An action item has been specified by the GTSPP-IV Meeting to update the Plan during 1996.

3. To make arrangements for GTSPP-IV in 1995 jointly with the WOCE UOT-DAC session.

   The Session was arranged and held in Washington in April 1996.

4. To consider ways to attract new Member States not actively participating in GTSPP to assist GTSPP by accepting a variety of responsibilities in the development of delayed mode data flow monitoring and in the historical aspects of this project.

   This is a continuing activity by all GTSPP Participants.

ANNEX VIII

GTSPP PROJECT PLAN, TABLE OF CONTENTS (as revised by GTSPP-IV)

The GTSPP Project Plan was written and published at the beginning of the Pilot Project. There have been a number of significant changes in the scope and direction of the project since that time, including the conversion of the project to a permanent IOC-WMO Programme. The document is therefore seriously out of date and needs updating as follows.

1. The complete document needs to be brought up to date in terms of participants, data flow, responsibilities of the various organizations that are involved, infrastructure, priorities, new thrusts and general information.

2. In particular, certain sections must be rewritten to present additional information that has become available, that have been learned during operation of the pilot project, knowledge of future directions of the project and the development of improved services to clients.

   (a) Section 3 on "*Benefits of GTSPP for Member States*" should be modified to include success stories for the GTSPP and the need and usefulness of GTSPP products.

   (b) Section 5.1 on "*Interface with TOGA/WOCE Subsurface Data Centre*" should be updated to include information on the Interface of GTSPP with CLIVAR and GOOS.

   (c) Section 6 on "*Science Support*" should be updated to discuss the added value of the GTSPP QC and the transfer of Science QC to the Data Centres.

   (d) Section 7.8 on "*Historical Data and Long-Term Time Series*" should be updated to reflect the co-operative arrangements in place between GODAR and GTSPP for historical data and the convergence towards common QC methods for these data.

   (e) Section 8 on "*Projects Priorities*" should be updated to include the new focus on products and services and the transfer of knowledge from science centres to data centres. In addition, this section needs to be updated to reflect the fact that the project has been operational for a number of years and has become a permanent project of IOC and WMO.

   (f) The Section on "*Project Management*" needs to be modified to reflect that GTSPP is now a permanent project and the broadening of the responsibilities of the Steering Committee to include other end-to-end management systems.

3. The document needs to be better designed for presentation as a GTSPP Home Page document on the World Wide Web.

ANNEX IX

LIST OF ACRONYMS

AODC	Australian Oceanographic Data Centre
AOML	Atlantic Oceanographic & Meteorological Laboratory
BATHY	Bathythermograph
BUFR	Binary Universal Form for Representation
CDS	Computerized Documentation System
CLIVAR	Climate Variability & Predictability
CMD	Continuously Managed Database
CSIRO	Commonwealth Scientific & Industrial Research Organization (Australia)
CSR	Cruise Summary Report
CTD	Conductivity, Temperature, Depth
DAC	Data Assembly Centre
DIU	Data Information Unit
DPC	Data Processing Centre
FAQ	Frequently Asked Questions
GODAR	Global Oceanographic Data Archaeology & Rescue Project
GOOS	Global Ocean Observing System
GTS	Global Telecommunication System
GTSPP	Global Temperature-Salinity Pilot Project
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
IGOSS	Integrated Global Ocean Services System
IMS	International Marine Science Newsletter
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data & Information Exchange
IPO	International Project Office (WOCE)
JGOFS	Joint Global Ocean Flux Study
JODC	Japan Oceanographic Data Centre
MEDAR	Mediterranean Data Archaeology
MEDATLAS	Mediterranean Atlas
MEDI	Marine Environmental Data Information & Referral System
MEDS	Marine Environmental Data Service (Canada)
MTN	Main Telecommunication Network
NESDIS	National Environmental Satellite, Data & Information Service (USA)
NOAA	National Oceanic & Atmospheric Administration (USA)
NODC	National Oceanographic Data Centre
NWS	National Weather Service (USA)
OCEANPC	Ocean Personal Computer Project
OOSDP	CCCO-JSC Ocean Observing System Development Panel

QC	Quality Control
QCP	Quality Control Package
RNODC	Responsible National Oceanographic Data Centre
RTH	Regional Telecommunication Hub
SIO	Scripps Institute of Oceanography (USA)
SISMER	Systèmes d'Information Scientifiques pour la Mer (France)
SOOP	Ship-of-Opportunity Programme
SSS	Sea Surface Salinity
TESAC	Temperature, Salinity, Currents
TRACKOB	Report of Marine Surface Observations Along A Ship's Track
UCSD	University of California, San Deigo (USA)
UNEP	United Nations Environment Programme
UOT	Upper Ocean Thermal
WDC	World Data Centre
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment
WWW	World Wide Web
XBT	Expendable BathyThermograph Instrument