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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION  
(of Unesco)

*EXECUTIVE SUMMARY AND RECOMMENDATIONS*  
*of the*  
*SCIENTIFIC ADVISORY BOARD'S REVIEW OF*  
*THE INTEGRATED GLOBAL OCEAN STATION SYSTEM (IGOSS)*

This document which was adopted by the Scientific Advisory Board at its fourth session (SAB-IV, Unesco, Paris, 26-30 March 1979) contains an Executive Summary and recommendations. The full text of the review, undertaken by the Board as an in-depth study, has been attached as an Appendix.

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The Scientific Advisory Board has completed its review of the Integrated Global Ocean Station System (IGOSS) programme as requested by the IOC Assembly at its tenth session (Paris, 27 October - 10 November 1977).

First we would like to express our pleasure at the positive response taken by the first meeting of the Joint IOC/WMO Working Committee for IGOS (JWC/IGOS) (Paris, 18-27 September 1978) to the recommendations on IGOS which we prepared at our second session (SAB-II, Paris, 12-16 April 1977). We have summarized that response in the review (see Appendix).

We are also encouraged by the directions IGOS is taking in the development of its programme. The new services provided to the Expanded Mid-Ocean Dynamics Experiment (POLYMODE), the Flemish Cap Experiment and now the First GARP Global Experiment (FGGE) are clear demonstrations of contributions which IGOS can make to scientific research. In addition, the emphasis which IGOS is giving to regional projects and services in the development of its global programme, is very important.

Further, we wish to commend the IGOS organizers on their thorough preparation of the first Joint IOC/WMO seminar/workshop on oceanographic products and the IGOS Data Processing and Services System (IDPSS, Moscow, 2-4 April 1979). This farsighted meeting should go far toward identifying future users of IGOS data, making user groups aware of IGOS capabilities; and ensuring that best scientific and engineering methods and techniques are used in the IGOS programme.

We have just a few recommendations to make which we believe are important, will further strengthen the programme and should not present the IGOS organizers with too many difficulties:

- 1) We have recommended, after our second session, that IGOS issue a quarterly newsletter in order to inform the community more widely about its activities. We believe that this would increase participation of scientists and Member States in the programme. Neither the Secretariats nor the Joint Working Committee for IGOS were responsive to that recommendation. We are still of the opinion that increased communications about changes in personnel, availability of new data, new services, incorporation of new projects, etc., are very important to the continued development of IGOS. Based on discussions during our fourth session, it appears that our concerns may be met by expanding the contents of the Programme Information Circular (PIC) series now issued by IGOS and by increasing the distribution list of the circular to include institutions and individual scientists.

The new Operations Co-ordinator for IGOSS could assume responsibility for these actions and we recommend their adoption. We also recommend that the reports of the first Joint IOC/WMO seminar/workshop be given wide distribution and, similarly, that the involvement of IGOSS in the proposed world climate programme be given wide notification as it develops.

2) The Joint Working Committee on IGOSS at its first meeting, decided that its Marine Pollution (Petroleum) Monitoring Pilot Project (MAPMOPP) should be completed as of July 1980 and that appropriate elements of the projects should be incorporated in an operational marine pollution monitoring programme at that time. It dissolved the existing IGOSS sub-group of experts on MAPMOPP and established a sub-group of experts on Marine Pollution Monitoring (MARPOLMON), and requested the new sub-group at its first meeting to evaluate the results of MAPMOPP and to consider what pollutants should be included in MARPOLMON.

The Executive Council at its eleventh session assumed that the Working Committee for the Global Investigation of Pollution in the Marine Environment (WC/GIPME) would have adequate participation in the evaluation of the scientific results of MAPMOPP and in assessing the feasibility and desirability of monitoring additional pollutants other than petroleum during the new MARPOLMON programme.

In order to ensure future co-ordination with the GIPME programme we recommend that the terms of reference of the new Sub-Group of Experts on MARPOLMON be modified so that membership of the Sub-Group will be selected jointly by the Chairmen of the Joint IOC/WMO Working Committee for IGOSS and the Working Committee for GIPME, and that findings and recommendations of the Sub-Group be submitted jointly to both IGOSS and GIPME.

3) The regional approach now being encouraged by IOC in much of its scientific efforts is very important to the continued development of IGOSS. Also, the importance of participation by IGOSS in regional projects has been clearly demonstrated by the service provided by IGOSS in POLYMODE, the Flemish Cap Experiment, and now, in the First GARP Global Experiment. The regional approach also presents IGOSS with the opportunity to determine more specifically the needs of the developing countries for Training, Education and Mutual Assistance in the marine sciences (TEMA) activities related to its programmes. After identifying what services are required by the regional scientific projects, IGOSS will be able to determine the needs of the region for observational equipment, communication facilities, processing equipment, training in product preparations, etc.

We recommend that the IGOSS Operations Co-ordinator, the Chairman of the JWC for IGOSS (or some member of the JWC for IGOSS also knowledgeable about the programme), participate in all planning meetings for regional programmes. The purpose of his participation is to ensure that needed IGOSS services and centres, and needed IGOSS related TEMA activities, are identified early and that the assistance which IGOSS can provide is included in the scientific planning for those regional programmes.

4) It is our conviction that IGOSS (and IODE) will play an important role in the proposed world climate programme as the ocean climate component of that programme develops. We recommend that the IGOSS organizers be closely associated with development of the programme. With these views in mind we are pleased to note that IOC is co-sponsoring, with SCOR, the Committee on Climatic Changes and the Ocean (CCCC), and that the Chairman of the Joint Working Committee for IGOSS will be a corresponding member of CCCC and will attend its first meeting in September 1979 in Miami.

## APPENDIX

## INTRODUCTION

The Integrated Global Ocean Station System (IGOSS) is a Joint IOC/WMO Operational Ocean Service. Its primary elements are: the collection of oceanographic data in real-time; the distribution of that data regionally and globally using several rapid communications modes; and the preparation and dissemination of analyses and forecasts of oceanographic parameters such as sea surface and subsurface temperature, locations of major current systems and eddies, and near-surface drift. The IGOSS Programme also includes a pilot project for monitoring marine pollution (petroleum) and a system for data archival.

The system is designed such that all interested Member States of IOC and WMO may receive oceanographic data in real-time\* obtained by ships (XBTs, STD or Nansen Casts, SSTs), buoys (anchored or drifting) or remotely (spacecraft or aircraft). For example, during 1978 over 40,000 subsurface temperature observations (BATHY and TESAC) were made available. These data are usually transmitted to central processing facilities from ships or buoys via coastal radio stations. The central facility then enters the data into the Global Telecommunications System (GTS) of the World Weather Watch for distribution to all interested nations.

Each nation may use the data as it sees fit, but selected facilities act as IGOSS Centres and generate special products (analyses and prediction) for use by all nations. These selected centres may support regional activities such as POLYMODE or global activities as in the case of the National Meteorological Centres in Moscow and Washington. The IGOSS products produced adhere to agreed standards and practices and are usually in response to multi-national requirements.

Data have been exchanged through IGOSS since 1972. The preparation and dissemination of IGOSS Programme products have been tested and are now being made available routinely to users via the GTS, radio facsimile and mail. The nature of these products varies considerably because of these dissemination modes, thus a particular SST analysis may be obtained in digital, graphic or summary form. Some products are computer generated while others are subjective. Present emphasis within the IGOSS Programme is on product development within the IGOSS Data Processing and Services System (IDPSS). A 13-nation Workshop and Seminar is to be held in Moscow in April 1979 to discuss the further development of regional products, product and data quality control, and methods of analysis and prediction.

The marine pollution element of the IGOSS Programme has been tested thus far through the monitoring of petroleum pollutants (slicks, tar balls, dissolved hydrocarbons). The monitoring procedures are presently being evaluated with the objective of converting the pilot project (MAPMOPP) into an operational programme in 1980. The operational programme (MARPOLMON) will eventually address other pollutants but only after requirements have been thoroughly examined and feasibility studies have been conducted with the co-operation of GIPME.

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\* Within 48 hours after observation.

The management of IGOSS consists of: (1) a Joint IOC/WMO Working Committee for IGOSS; (2) three Sub-groups of Experts; and (3) National Representatives. The role of a Sub-group of Experts is to provide the Working Committee with advice on oceanic processes and their application to IGOSS and to foster related research. While an IGOSS research group of experts has existed in one form or another for over a decade, a new group is presently being formed as a result of recent reorganization.

Forty-three nations can be identified as taking part in IGOSS in one form or another, from simply having designated a national contact to full participation in all elements

#### PREVIOUS SAB RECOMMENDATIONS ON IGOSS

At its second session (Paris, 12-16 April 1977), the Board invited Dr. Ferris Webster to present his views on the relationship between IGOSS and the Commission's scientific programmes. On the basis of those discussions, the Board made seven recommendations to the tenth session of the IOC Assembly (Paris, 27 October - 10 November 1977). The Assembly felt that those recommendations should be given further consideration at the first session of the Joint IOC/WMO Working Committee for IGOSS (Paris, 18-27 September 1978).

Summaries of those seven recommendations and actions taken by the Joint IOC/WMO Working Committee for IGOSS are presented as follows:

#### Recommendation 1

*"IOC should recognize IGOSS as one of the Commission's high priority items and, in order to implement IGOSS successfully, it is essential to improve quality control of IGOSS data and to increase the flow of data to IGOSS so as to enable the production of useful IGOSS products and services."*

#### Action taken

The Joint IOC/WMO Working Committee clearly recognized the need to increase the flow of high quality data in several of the resolutions passed at the first session (Paris, 18-27 September 1978). Resolution JWC-IGOSS-I.1 expressed concern about the loss of BATHY/TESAC reports for use by IGOSS participants and recommended action by the WMO Commission for Basic Systems, the CMM Rapporteur on marine telecommunications and the IOC and WMO Secretariats. Resolution JWC-IGOSS-I.5 called upon the Secretariats to assist developing countries to participate in IGOSS programmes and requested the appointment of an IGOSS/TEMA Co-ordinator. Resolution JWC-IGOSS-I.6 called for implementation of IGOSS on the basis of regional contributions and resolution JWC-IGOSS-I.7 contained several recommendations about IGOSS support for the First GARP Global Experiment (FGGE) and for the Post-FGGE second GARP objective.

## Recommendation 2

*"IOC should establish a group of experts or a similar body to provide regular scientific guidance to the Working Committee for IGOSS. It is essential that this body be composed of active scientists."*

### Action taken

The Joint IOC/WMO Working Committee for IGOSS concurred and in resolution JWC-IGOSS-I.4 of the September 1978 meeting resolved to establish a Subgroup of Experts on Scientific Matters Related to IGOSS with the following terms of reference:

To further the development of IGOSS by reviewing and fostering relevant research and providing scientific advice to the Working Committee for IGOSS on:

- oceanic processes and their interactions as they relate to meteorology, fisheries, climate, the maritime industry and other ocean users;
- review and update of the scientific rationale contained in the present General Plan for Implementation of IGOSS; and,
- co-ordinate these activities with other scientific programmes of IOC and WMO.

## Recommendation 3

*"The terms of reference for the new Joint Working Committee for IGOSS be redrafted to ensure increased interaction between IGOSS and IOC's scientific programmes with regard to users' requirements for IGOSS data, products and services and on the development of needed models and prediction methods."*

### Action taken

The Joint IOC/WMO Working Committee for IGOSS concurred during the September 1978 meeting and in recommendation JWC-IGOSS-I.3 recommended that an additional phrase be inserted in paragraph (a) of its terms of reference. This provides that, in planning and co-ordinating the implementation of IGOSS in accordance with purposes and principles set forth in the Plan and Implementation Programme for IGOSS, the Joint Working Committee will pay particular attention: "...to the requirements of scientific programmes of the IOC, WMO and other international organizations."

#### Recommendation 4

*"The IOC arrange for an IGOSS operations co-ordinator to be assigned full time to assure the implementation of the IGOSS plan, as developed by the Working Committee for IGOSS with the assistance of the IOC Secretariat. This co-ordinator should be co-located with the IOC Secretariat."*

#### Action taken

The United States has agreed to provide such a co-ordinator. He will be seconded to IOC and will work with the IOC Secretariat in Paris. This action should be accomplished by June 1979.

#### Recommendation 5

*"IOC Member States participating in IGOSS be requested not only to designate national co-ordinators for IGOSS, but to ensure that those co-ordinators have sufficient authority within their own countries to implement IGOSS programmes effectively."*

#### Action taken

The Joint IOC/WMO Working Committee for IGOSS recognized the importance of strong national representation for IGOSS and in recommendation JWC-IGOSS-I.2 recommended that:

"...each Member State of IOC and WMO be encouraged to designate a National Representative for IGOSS whose main tasks include:

- (1) to act as the permanent focal point in his country and maintain contact with competent national authorities on IGOSS matters;
- (2) to promote co-ordination of efforts and opinions among national services concerned with IGOSS;
- (3) to ensure that all correspondence on IGOSS matters be addressed to both Secretariats; and,
- (4) to communicate with the Secretariats on IGOSS matters within his competence."

#### Recommendation 6

*"The WMO be asked to ensure that staff personnel which it seconds to the IOC Secretariat are assigned on a long-term basis and that, when it is necessary to replace such personnel, an overlap of assignments is arranged, rather than a gap between them."*

#### Action taken

This recommendation has been transmitted to the WMO Secretariat but no feedback has resulted. It was noted that this is not only an administrative matter, but it is also up to the seconded scientist himself to give ample notification of his intention to leave, so that an adequate overlap of assignments can be arranged

## Recommendation 7

*"The IOC give wide circulation to Dr. Webster's\* report on IGOSS and that the Commission consider initiating publication of an IGOSS newsletter which would provide regular information as to the availability of IGOSS data products and services."*

### Action taken

The question of the need for an IGOSS newsletter was discussed at the first session of the Joint Working Committee but no conclusions were reached. The IOC and WMO Secretariats are planning a popular brochure which will explain the goals and programmes of IGOSS to scientists and non-scientists alike. This should go far toward educating the IOC Member States about the value of IGOSS and the ways in which it can be of service to them. However, the need still remains for additional communication about IGOSS to a wider variety of possible users and contributors. If the concept of a quarterly newsletter presents the Secretariats and the JWC for IGOSS with too many difficulties, then other means should be found to meet this need. The present Programme Information Circular (PIC) series issued by IGOSS might fulfil the need if given wider distribution and issued more frequently to include information about changes in personnel, availability of new data, new services, incorporation of additional projects, etc.

### ADDITIONAL DISCUSSIONS

#### *Future IGOSS Data Processing and Service*

During the 1970s IGOSS has experienced a slow but steady growth while the communication links, global data centres and procedures were being developed and arranged. These are now pretty well established and the 1980s will see the greatly increased use of the system for science and services. This has already begun. The IGOSS support of the POLYMODE Experiment in the Atlantic Ocean was very successful both as a tool for final design of the field experiment and for producing products providing up-to-date pictures of oceanographic conditions in the POLYMODE region. IGOSS support for the Flemish Cap Experiment was also of value to the research scientists. The First GARP Global Experiment (FGGE) is now underway and IGOSS is a major component for keeping the scientific community informed of the global and regional oceanographic conditions.

Looking to the future, IGOSS has organized a two week seminar/workshop (Moscow, 2-11 April 1979) to discuss oceanographic products and the IGOSS Data Processing and Services System (IDPSS). The combined seminar/workshop has six objectives:

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- \* Circulation of Dr. Webster's report was not given the wide distribution recommended, but it was distributed to all participants in the September 1978 meeting of the Joint IOC/WMO Working Committee. Its impact on the deliberations of the meetings are evident in this review of actions taken in response to the SAB second session recommendations.



1. Identify applications and benefits of existing and possible future products by various marine user groups.
2. Review and evaluation of existing oceanographic products.
3. Review of methods and techniques being used for the preparation of oceanographic products.
4. Data processing, including quality control and standardization of methods and techniques of processing.
5. Identification of the data base required for the preparation of oceanographic products, as well as means to ensure that data base.
6. Identification of types of guides and supporting documentation for IDPSS.

The first five objectives form the basis for the seminar during 2-5 April 1979 during which 34 lectures are scheduled for presentation and discussion. The sixth objective will be the subject of the 9-11 April workshop which will not only take advantage of the seminar discussion to identify the types of guides and supporting documentation needed but will also attempt the preparation of manuals and guides related to IGOSS data processing services.

This farsighted seminar/workshop should go far toward identifying future users for IGOSS products, making user groups aware of IGOSS capabilities and ensuring that the best scientific and engineering methods and techniques are used in the preparation of IGOSS products. The Scientific Advisory Board should commend the IGOSS organizers for this thorough preparation for the future.

#### *Marine Pollution Monitoring*

As was mentioned in the introductory section, IGOSS also includes a marine pollution (petroleum) monitoring pilot project (MAPMOPP) which was initiated in 1975 to test the organizational machinery of IGOSS in a monitoring context and possibly to determine an estimate of the extent of oil pollution in the oceans. Four types of data are reported under the project: (1) oil slicks and other floating pollutants; (2) tar balls and particulate petroleum residues; (3) beach tar; and, (4) dissolved hydrocarbon.

The Joint IOC/WMO Working Committee for IGOSS at its first session (Paris, 18-27 September 1978) decided to recommend to IOC and WMO that the Pilot Project should be terminated as of 1 July 1980 and that appropriate elements of the project should be included in an operational Marine Pollution Monitoring Programme (MARPOLMON) at that time. In order to determine which elements of the pilot project and what additional pollutants should be eventually included in MARPOLMON resolution JWC-IGOSS-I.2 calls for a meeting by mid-1979 of the IGOSS Subgroup of Experts on Marine Pollution Monitoring to prepare:

1. a final evaluation of MAPMOPP
2. a document on the usefulness and scientific significance of MAPMOPP data and products
3. a draft of the operational plan for the petroleum elements of the Marine Pollution Monitoring Programme (MARPOLMON)

4. a draft report on the state of oil pollution in the oceans
5. a report on the desirability and technical feasibility of including other pollutants in MARPOLMON.

The resolution also invites the Working Committee for GIPME to participate in the evaluation of the scientific results of MAPMOIP and to prepare a review for the mid-1979 meeting on the possibility of differentiating between dissolved/dispersed petroleum hydrocarbons of recent biogenic origin and fossil fuel.

The Scientific Advisory Board recognizes that any pollution monitoring programme will require guidance both from the IGOSS and the GIPME organizers. This was emphasized by the Executive Council at its eleventh session which pointed out that the decision to monitor additional pollutants would be made by the IOC Assembly or the Executive Council, based on advice from the Working Committee for GIPME.

Accordingly, it seems proper to the Board that the Subgroup of Experts on MARPOLMON be selected jointly by the Chairmen of the Working Committees for IGOSS and GIPME and that the findings and recommendations of the subgroups be submitted jointly to both IGOSS and GIPME. This will require a change in the terms of reference for the Subgroup of Experts on MARPOLMON.

#### *Regional Approach*

It is worth noting that IOC is encouraging a regional approach to much of its scientific efforts at the same time that IGOSS is emphasizing the importance of regional projects and services in the development of the global IGOSS Programme. The value of coupling scientific experiments with IGOSS has been clearly demonstrated in the POLYMODE Experiment and in the present role of IGOSS in FGGE.

IGOSS can be of major importance in the development of WESTPAC, "El Niño", IOCARIBE, LINCWIO and other regional programmes of IOC. It is important that the Secretariat/IGOSS Operations Co-ordinator participate in the planning for regional programmes in order to ensure that needed IGOSS services and centres are identified early, and that the assistance which IGOSS can provide is included in the scientific planning for those regions.

#### *Training, Education and Mutual Assistance in the marine sciences (TEMA)*

Finally, IGOSS like other IOC programmes, has had difficulty carrying out effective training and education activities. If the regional approach is emphasized, however, specific TEMA/IGOSS activities will be relatively easy to identify and undertake (providing sufficient funds are available). For example, having a specific region identified, IGOSS could assess the potential of the region, to determine the needs of the participation for: observational equipment; communications facilities; processing equipment; training in product (analyses and production) preparation; and training in the application of IGOSS. The IOC Voluntary Assistance Programme (IOC/VAP) is well-suited for obtaining such support and IGOSS experts (governmental and academic) are well-suited for training purposes. IGOSS has already assessed the potential for Peru, Columbia, and Trinidad and Tobago and has taken steps to enlist their participation (ref: resolution JWC-IGOSS-I.5).