

**Intergovernmental Oceanographic Commission**  
*Reports of Meetings of Experts and Equivalent Bodies*

**Joint IOC-WMO-CPPS  
Working Group  
on the Investigations  
of “El Niño”**

**Fifth Session**

Guayaquil, Ecuador, 3-5 November 1986



IOC-WMO-CPPS/EI Niño-V/3  
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**In this Series**

**Reports of Meetings of Experts and Equivalent Bodies**, which was initiated in 1984, the reports of the following meetings have already been issued:

- Third Meeting of the Central Editorial Board for the Geological/ Geophysical Atlases of the Atlantic and Pacific Oceans
- Fourth Meeting of the Central Editorial Board for the Geological/ Geophysical Atlases of the Atlantic and Pacific Oceans
- Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of «El Niño»
- First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in relation to Living Resources
- First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in relation to Non-Living Resources
- First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
- First Session of the Joint CCOP (SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
- First Session of the IODE Group of Experts on Marine Information Management
- Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
- Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
- First Session of the IOC Consultative Group on Ocean Mapping
- Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
- Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
- Third Session of the Group of Experts on Format Development of the Working Committee on International Oceanographic Data Exchange
- Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
- Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
- Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
- Second Session of the IOC Group of Experts on Effects of Pollutants
- Primera Reunión del Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica
- Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
- Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources

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1. OPENING

1 The Session was declared open at 09:30, Monday,  
3 November 1986, by Dr. David Enfield, Chairman of the Joint Working  
Group (JWG), in the Auditorium of the Banco Central, Guayaquil, Ecuador.

2 The List of Participants is given in Annex III. A list of  
Acronyms and Abbreviations is given in given IX.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 ADOPTION OF THE AGENDA

3 The Joint Working Group adopted the Provisional Agenda  
without amendments. The Agenda as adopted is given in Annex I.

2.2 DESIGNATION OF RAPORTEURS FOR THE SESSION

4 The Joint Working Group designated Mr. James Buizer, USA, as  
English Rapporteur and Professor Sergio Avaria, Chile, as Spanish  
Rapporteur, for the Session.

2.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

5 The IOC Senior Assistant Secretary and Technical Secretary  
of the Joint Working, Dr. Fernando Robles, outlined the working  
procedures for the Session and proposed a provisional Timetable that  
was adopted.

3. REVIEW OF INTERSESSIONAL ACTIVITIES

3.1 REPORT OF THE IOC SECRETARIAT

6 The Technical Secretary informed the Joint Working Group  
about the main IOC activities in support of El Niño investigations,  
namely, Ocean Processes and Climate (OPC) and Ocean Science in Relation  
to Living Resources (OSLR).

7 Regarding the Ocean Processes and Climate Programme, the  
IOC actions were addressed to support activities being developed or  
planned under the SCOR-IOC Committee on Climate Changes and the Ocean

(CCCO), mainly the regional component of the Tropical Ocean and Global Atmosphere project (TOGA), and also some elements of the World Ocean Circulation Experiment (WOCE) and the Ocean Observing System Development Programme (OOSDP). Different development steps were taken by the Secretaries of the JWG and CCCO, to assure the maximum regional participation in these programmes, notably through an active participation in these programmes of scientists of ERGEN of CPPS. Among them: supporting the attendance of these scientists to important planned meetings; promoting the ERFEN Programme in the CCCO Sessions; and supporting training activities in vital aspects of the ocean component of the World Climate Research Programme (WCRP).

8 Referring to the OSLR Programme, important efforts have been made oriented towards the regional development of the Sardine/Anchovy Recruitment Project (SARP). Emphasis has been placed in training scientists in methodology and techniques relevant to SARP through courses organized with the support of institutions of the region. It has also facilitated, through regional consultations, the formulation of specific SARP operational projects for which financing is being sought with some bi-lateral technical assistance agencies.

9 IOC has continued its support of the quarterly publication of the ERFEN Bulletin, edited by the CPPS, and it is considering support, commencing in 1987, for the recently published ERFEN monthly Climatic Analysis Bulletin.

10 In spite of severe financial constraints of the Unesco budget, IOC has kept its support to the meetings of the ERFEN Scientific Committee and other relevant scientific events organized by CPPS.

11 The formulation and negotiation of the UNDP/IOC/CPPS Regional Project Proposal on "Monitoring and Prediction of El Niño Phenomenon in the South East Pacific; Application to Development" have been continuing with the UNDP. At present, this has permitted a priority rating of this proposal among other regional projects under the consideration of UNDP, as well as the granting of a Preparatory Assistance phase, mainly oriented to assure participation of an important number of Latinoamerican Scientists in the Chapman Conference: an International Symposium on El Niño, co-sponsored by the AGU/IOC/WMO/ and CPPS.

12 The complete text of the report on the IOC intersessional activities is enclosed in Annex VI.

13 The Joint Working Group approved the report presented by the IOC Secretariat with minor additions which were incorporated into the text that appears in Annex VI.

### 3.2 REPORT OF THE CPPS SECRETARIAT

14           Upon request by the President of the JWG, the Assistant General Secretary for Scientific Affairs of CPPS and Scientific Coordinator of ERFEN, Dr. Romulo Jordan explained that CPPS primarily emphasized the interdisciplinary character of the ERFEN Programme, as well as its gradual development under an exemplary framework of regional cooperation which is at the same time connected with global programmes. He also pointed out that receipt of data as well as activity in research projects have increased remarkably, with concerted support from the four governments (Chile, Colombia, Ecuador, Peru), because of the presence of the "El Niño" phenomenon in 1982-1983.

15           As a summary of the activities developed by the ERFEN Programme under coordination by CPPS, Dr. Romulo Jordan underlined the following points: The CPPS, with support from the IOC and the WMO, organized in April 1986 the Fifth Meeting of the Scientific Committee of ERFEN (Bogota, 21-24 April 1986), and the Seminar "Interaction of Atmospheric Oceanic Phenomenon and their influence on Living Resources in the South East Pacific" (Bogota, 25-26 April 1986). He emphasized that as a result of both meetings, the Scientific Committee of ERFEN developed a 1986-1987 Action Plan and resolved to publish a monthly Bulletin of Climatic Analysis for the Southeast Pacific as a product of international data exchanges. He mentioned that publication of the Bulletin began on July 1986, and that it is currently in its third issue, but that it is still under limited distribution. Given the positive reception of the Bulletin by the scientific community, its continuity is foreseen, extending its distribution and improving its appearance, with the hope of receiving support of the IOC.

16           Regarding the Seminar, an extensive report on the results was presented, which highlighted the following: the need for periodic predictions and for adequate international mechanisms for the planning of economic and social activities in an environment of high variability; the importance of the establishment of a network of fixed stations for the permanent measurement of physical and biological variabilities; and the need for integral analyses of the physical and biological parameters so to have a better understanding of the variability of fishery resources resulting in the better utilization of these resources.

17           Dr. Jordan mentioned that the South-East Pacific countries are still awaiting and negotiating with the UNDP through the IOC and the CPPS on the Project proposal "Monitoring and Prediction of the El Niño Phenomenon in the South-East Pacific: Application to Development", of which the original version was presented in 1982 immediately before the most destructive occurrence of the El Niño in this area. He emphasized that the project has been permanently supported by the respective governments through their representatives to the United Nations in New York.

18 Dr. Jordan let it be known that the CPPS has sketched an initial draft of a project of socio-economic amplification. It is hoped that the Joint Working Group gives the backing and orientation for this project to the CPPS.

19 The ERFEN Co-ordinator added that regarding the coordination of ERFEN with extra-regional projects, open channels have been maintained with global programmes such as TOGA, WOCE and OSLR/SARP. He pointed out that the ERFEN Programme, as well as the research institutions of the region, have been co-operating actively with the Ocean-Climatic programme initiatives with the hope to increase data exchanges.

20 Finally, Dr. Jordan renewed his appreciation to the IOC and the WMO for their permanent support to the coordination activities of the CPPS in the region, particularly to the Regional Investigation of the Phenomenon El Niño (ERFEN) Programme.

21 The complete text of the report of the CPPS Secretariat is appended in Annex VII.

22 The Colombian Delegate, Lt. Carlos Alberto Andrade, presented a summary of Colombian research activities in Colombian Pacific waters, as well as a statement regarding the quantity of data obtained. He also referred to the new infrastructure which is being installed on the Colombian Coast such as the Center for Pollution Control in Tumaco, and the new Naval Base being developed in the Bahia Malaga (Lat 3°58'N). He delivered a report on the status of the new oceanographic vessels purchased by Colombia in 1981, mentioning that they can be made available to foreigners interested in using them by contracting with the Oceanographic Vessel Service of Colombia. Finally, he delivered a summary of the problems and expectations of Colombia with respect to oceanographic research, and of Colombia's interest to actively participate in investigations of the El Niño phenomenon and in exchanges at an academic and technical level through inter-institutional agreements which would be mutually beneficial.

### 3.3 REPORT OF THE WMO SECRETARIAT

23 The report of the WMO intersessional activities relating to "El Niño" was introduced by the representative of the WMO, Mr. Fernando Guzman of the Ocean Affairs Division of the World Weather Watch Department of the WMO. He reiterated the support that WMO is giving to the activities of the Joint Working Group, and particularly to the ERFEN Member States. He noted, however, that in view of the present restricted economic conditions affecting the whole of the UN Organization System, it may be advisable to schedule no more than one meeting at one time during a single calendar year.



- 24                   The Secretary General of the CPPS has requested the WMO to establish a formal working agreement between the two organizations. This request will be presented to and considered by the next Session of the WMO Executive Council, scheduled to meet in Geneva in June 1987.
- 25                   .           The Joint Working Group was given a brief report on the Fourth Session of the Joint Working Committee for IGOSS, which was held in Geneva from 11 to 20 November 1985. Special mention was made of the Committee's consideration that the concept and principles of the General Plan and Implementation Programme of IGOSS 1982-1985 were still valid. It was therefore decided to recommend to the parent governing bodies that this Plan be extended to cover the next inter-sessional period. Mention was also made that the collection of ocean sea level data in the Pacific, and the publication of monthly anomalies, have been very well received, and that the on-going installation of automated data acquisition systems is fulfilling its promise of usefulness to the IGOSS.
- 26                   With regard to the availability of BATHY/TESAC reports and data, the WMO representative expressed concern in view of the consistent trend of a decreasing amount of observations being transmitted through the Global Telecommunication System (GTS). As an example, it was mentioned that the daily input average from South American countries collected through Argentina was zero in 1985. The Joint IOC/WMO Working Committee for IGOSS recognized possible reasons for the downfall of contributions to the IGOSS (see Annex VIII).
- 27                   The Joint Working Group was informed about several activities related to drifting buoy programmes. As part of the WMO monitoring of drifting buoys, the WMO Secretariat continues to publish, in the "Monthly Letter on the Operation of the World Weather Watch (WWW) and Marine Meteorological Services (MMS)", regular reports on the status of drifting buoys reporting over the GTS. In addition, WMO gives, on a regular basis, status reports from the European Center for Medium-term Weather Forecasts (ECMWF) on the drifting buoy data received by them over the GTS.
- 28                   The Joint Working Group took note with pleasure the WMO's Executive Council strong reiteration of its belief in the importance of drifting buoys as a large element in the Global Observing System (GOS).
- 29                   The Joint Working Group also took note of the activities under the TOGA Southern Hemisphere Drifting Buoy Programme and of the data being received from 55 buoys through the GTS at the ECMWF. It was hoped that the deployment of drifting buoys, and the mooring of fixed buoys continue as planned in view of the importance of the data provided by the buoys from the Pacific sparse data areas.

30                    The Joint Working Group considered the concern expressed  
by the Fifth Session of the JSC/CCCO/TOGA Scientific Steering Group  
relating to the lack or slowness of XBT data exchange by several ERFEN  
countries.

31                    Furthermore, the Joint Working Group expressed the view  
that the main problem may be due to, among others, the lack of intro-  
duction or non-transmission of oceanographic and meteorological data  
into the GTS. Comments were also made regarding several weaknesses of  
the GTS, especially at the Regional Telecommunications Hub (RTH) level.  
The Joint Working group hoped that on-going automation of telecommuni-  
cation systems will help solve these problems.

32                    Other activities of WMO during the intersessional period  
include: co-sponsorship and/or financial support for the participation  
of meteorologists from ERFEN countries in the Fifth Session of the  
Scientific Committee for ERFEN (Bogota, 21-24 April 1986), in the CPPS  
Regional Workshop on Ocean-Atmospheric Phenomenon and Variability of  
Marine Resources (Bogota, 25-26 April 1986), in the AGU-IOC-WMO-CPPS  
Chapman Conference: An International Symposium on El Niño (Guayaquil,  
27-31 October 1986), and in the Fifth Session of the Joint IOC/WMO/CPPS  
Working Group on the Investigations of "El Niño" (Guayaquil,  
3-5 November 1986). There was also co-sponsorship with IOC of a Joint  
Mission to several Latin American countries relating to IGOS/IODE  
(23 April to 8 May 1984).

33                    The complete text of the report of the WMO Secretariat is  
appended in Annex VIII.

4.                    RECOMMENDATIONS OF THE AGU-IOC-WMO-CPPS CHAPMAN CONFERENCE:  
AN INTERNATIONAL SYMPOSIUM ON "EL NIÑO"

34                    The Joint Working Group noted with satisfaction the high  
scientific quality of the contributions presented by the approximately  
130 scientists of the 30 countries represented at the Chapman Conference,  
and endorsed the Recommendations produced herewith included in this  
Report as Annex IV.

5.                    REQUIREMENTS FOR ON-GOING AND PLANNED ACTIVITIES

5.1                  MONITORING AND PREDICTION OF THE "EL NIÑO" PHENOMENON IN  
THE SOUTH-EAST PACIFIC: APPLICATION TO DEVELOPMENT

35                    The Technical Secretary informed the Joint Working Group  
about the present state of negotiations with the UNDP for the  
implementation of this regional Project. He emphasized the urgent need  
for the four Member States directly concerned to update their counter-  
part contributions to be appended as Annex VIII of the Project Document.

He noted that the deadline set by the UNDP for the Project so as to be considered during 1987 was December 1986. This requirement was transmitted to the four Member States through a formal communication of the Secretary General of the CPPS, dated 9 September 1986.

36

The Joint Working Group formulated the following suggestions regarding the planning and implementation of the scientific activities of the UNDP/IOC/CPPS Regional Project:

(1) Priority Tasks

The following activities are considered to be especially important in the implementation of the project:

- (a) In order to improve the collection of "real time" measurements from data collection platforms within the ERFEN region, common satellite channels for all data collection platforms transmitting oceanographic and meteorological data in the region should be implemented. The facilities of the countries in the region for receiving these common channels should be upgraded and disseminated to regional users.
- (b) In order to implement the relevant Recommendation of the Fifth Session of the ERFEN Scientific Committee (Bogota, 21-24 April 1986), a programme of weekly sub-surface sampling at nearshore stations, and at depths of up to 100 meters should be established. Stations within this network should be chosen according to rational criteria such as the existence of long historical time series (e.g. sea level, shore temperature), available logistical support, or areas of specific interest. The variables to be sampled should include both physical and biological parameters (e.g. temperature, salinity, oxygen, chlorophyll, nutrients, indicator species, etc.).
- (c) In order to complete the ERFEN monitoring network, it is advisable to add island monitoring stations both in the Galapagos Archipelago (0°, 90°W) and Malpelo Island (4°N, 81°W). Both physical and biological variables will be sampled, including meteorological parameters, temperature, salinity, tides and nutrients. This island sampling programme should be supplemented by regular oceanographic sections connecting the islands with appropriate coastal points.

(ii) Training Component

It was recommended that those training requirements essential to achieving high quality results in the most important activities be given highest priority among the totality of training needs in the region.

(iii) Management and Co-ordination

Management and co-ordination activities within the UNDP/IOC/CPPS Regional Project, should be implemented in the most efficient manner possible so as to optimize the availability of project funds for execution activities. The Joint Working Group felt that savings can be achieved by combining co-ordination and periodic reporting activities and/or by recommending that project co-ordinators be also involved in training activities.

The Joint Working Group made the suggestion to incorporate, as part of the general aims and specific objectives stated in the Project Document, the concept that the project is directed at strengthening and improving the existing ERFEN Regional Programme. In the same context, the Scientific Committee for ERFEN, according to functions defined in the text and Annex VI of the Project Document, should be the technical body charged with scientific advisory and evaluation of the project developments, and should be collaborating with the IOC/CPPS Co-ordinating Unit and the National Programmes represented by their respective National Committees to that end.

The Joint Working Group suggested further that as soon as the Project be approved, a detailed Work Plan and Timetable be established according to the priorities stated above and in Annex IV of the Project Document, and funds finally assigned.

In order to comply with Recommendation E1 Nino-IV.1, the Joint Working Group also agreed that full co-ordination before and during the implementation of the Project would be maintained with the WMO.

A number of additional suggestions for improvements in the text of the Project Document were made by specific Drafting Groups, and are appended as Annex V.

5.2 REGIONAL COMPONENT OF THE IOC GLOBAL SEA-LEVEL OBSERVING  
SYSTEM (GLOSS)

37 The IOC Assistant Secretary, Mr. John Withrow, presented  
the current state of the Global Sea-Level Observing System (GLOSS).  
The Joint Working Group was informed that all of the countries in the  
ERFEN region were contributing the requested data to the GLOSS Sea Level  
Project (ISLPP), and therefore into GLOSS.

38 The Chairman of the Joint Working Group presented the state  
of the Regional Sea-Level System. The strategy for the System and its  
future development were discussed.

5.3 REGIONAL COMPONENT OF THE IOC-WMO INTEGRATED GLOBAL OCEAN  
SERVICE SYSTEM (IGOSS)

39 A brief description of the Integrated Global Ocean Service  
System (IGOSS) was presented by Mr. John Withrow in his capacity of  
IGOSS Operations Coordinator. He went on to give the state of the global  
BATHY/TESAC Programme and its state within the ERFEN region.

40 The Joint Working Group noted that the amount of real time  
upper ocean thermal structure data exchanged within the region was  
insufficient, but the recent initiation by Peru of a ship-of-opportunity  
(Scrim) is an encouraging development.

41 The Joint Working Group urged all Member States of the  
ERFEN region to increase their efforts in the collection of real time  
upper ocean thermal structure data and its submission into the IGOSS  
System.

5.4 FUTURE REGIONAL REQUIREMENTS FOR "EL NINO" MONITORING

42 The Joint Working Group examined two issues with regard  
to data exchange. The first was real time data exchange. The Joint  
Working Group discussed the current situation and avenues that might be  
explored to facilitate better data exchange. The use of electronic  
mail was described and discussed. A deep concern was voiced by  
Delegates regarding the lack of efficiency of the GTS within the ERFEN  
region.

43 A special Drafting Group was formed to prepare a  
Recommendation for approval by the Joint Working Group. The  
Recommendation as approved is contained in Annex II.

44                   The second item discussed was the ERFEN Regional Climatological Bulletin edited by Dr. Pablos Lagos for the CPPS.

45                   The Joint Working Group urged strong support from the countries in the region for the Bulletin, and encouraged its further development.

## 5.5                   REGIONAL SYSTEM FOR MARINE INFORMATION MANAGEMENT

46                   The Technical Secretary informed the Joint Working Group about a Workshop on Marine Information Management for the El Niño/Humboldt Current Area organized by the International Development Research Center (IDRC) of Canada (CIOH, Cartagena, Colombia, 28-30 July 1986). The Workshop was co-sponsored by the IOC. The CPPS was among the invited participants. The Workshop's objective was to formulate a proposal to the IDRC to develop in the CPPS region (Chile, Colombia, Ecuador and Peru) a marine information network primarily oriented to the living resources and fisheries sector. The IDRC requested two specialists from Chile to prepare the preliminary proposal, with an expected completion date around December 1986. In general, the proposal will follow the ASFA/ASFIS Format System sponsored by several organizations including FAO and IOC.

47                   The Joint Working Group welcomed with interest this initiative, which could supplement some aspects of the UNDP/IOC/CPPS Regional Proposal on El Niño Investigations.

## 6.                   ELECTION OF OFFICERS

48                   The Delegation of Peru proposed Dr. David B. Enfield for re-election as Chairman of the Joint Working Group for the inter-sessional period. This proposal was seconded by the Delegations of Chile, Colombia, and Ecuador, and Dr. Enfield was unanimously elected.

49                   The Delegation of Colombia proposed Dr. Pablo Lagos for Vice-Chairman of the Joint Working Group. This proposal was seconded by the Delegations of Chile and Ecuador, and Dr. Lagos was unanimously elected.

7. DATES AND PLACE OF THE SIXTH SESSION

50 Chile was proposed as the location for the Sixth Session of the Joint Working Group to take place in about two years time. It was also proposed that the Session be held in co-ordination with a meeting of the Scientific Committee for ERFEN as well as some other event of one of the participating organizations.

51 The Joint Working Group recommended, for reasons of scientific evaluation that may be associated with an eminent "El Niño" phenomenon, that the Session takes place in the Southern Hemisphere Spring. The Delegation of Chile accepted these proposals. The IOC, WMO and CPPS were asked to co-ordinate final dates and place with the host country for the Sixth Session of the Group.

8. ADOPTION OF THE SUMMARY REPORT

52 The Summary Report and Recommendations of the Session were adopted.

9. CLOSURE

53 In closing the Session, the Chairman manifested the appreciation of the Joint Working Group for the excellent facilities and support provided by the Instituto Nacional de Pesca, Sub-Secretaría de Recursos Pesqueros, Ecuador, to both the Fifth Session of the Joint Working Group and the preceding International Symposium on El Niño.

54 The Session was closed at 18:30, on 5 November 1986.

ANNEX I

AGENDA

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ANNEX II

Recommendation El Niño-V.1

NEED FOR AN IMPROVEMENT OF THE GTS AT THE  
REGIONAL TELECOMMUNICATION HUB LEVEL

The Joint IOC/WMO/CPPS Working Group on the Investigations of  
"El Niño",

Considering the absolute need for a fast and efficient mechanism for the collection and distribution of meteorological and oceanographic data among the ERFEN countries, as expressed in the Recommendations of the AGU-IOC-WMO-CPPS Chapman Conference: An International Symposium on El Niño, and also the data requirements of the WCRP and TOGA, IGOSS and other interdisciplinary programmes; and

Recognizing that the most appropriate available mechanism is the Global Telecommunications System (GTS) of the World Meteorological Organization (WMO);

Considering further the deep concern expressed by the Delegates from the ERFEN Member States about the continuous failures of the GTS, especially at the Regional Telecommunications Hubs (RTH) of Maracay and Buenos Aires; and given the high costs of operation of the telecommunication links through satellite,

Recommends to WMO:

- (i) To inform the countries hosting the RTH's of Maracay and Buenos Aires, through the appropriate channels, about the problems on the transmissions observed by the users of those RTH's, especially with regard to the transmission quality (noise), loss of data, and follow-up of schedules;
- (ii) To take all possible steps so that as soon as possible both RTH's reach an operational level compatible with the Member's and user's requirements; and
- (iii) To give priority to implement the automation of the GTS in the South American region.

Recommends further to the ERFEN Member States to improve the links at the national level between the meteorological and oceanographic organizations to optimize the collection and further distribution of data through the GTS.

ANNEX III

LIST OF PARTICIPANTS  
LISTA DE PARTICIPANTES

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ANNEX IV

RECOMMENDATIONS OF THE AGU-IOC-WMO-CPPS CHAPMAN CONFERENCE:  
AN INTERNATIONAL SYMPOSIUM ON "EL NINO"

<u>Recommendation Number</u>	<u>Title</u>
Recommendation 1	Meteorology
Recommendation 2	Physical Oceanography
Recommendation 3	Biology
Recommendation 4	Socio-Economic Aspects
Recommendation 5	Data Exchange
Recommendation 6	Monitoring and Prediction of the El Nino Phenomenon in the South-East Pacific: Application to Development (UNDP-IOC-CPPS Regional Project)
Recommendation 7	Spanish Publication of Select Symposium Presentations



Recommendation 1

METEOROLOGY

Considering that a detailed knowledge of meteorological conditions is required in order to make a definitive progress in the description and understanding of the atmospheric and oceanographic process associated with disruptive regional El Nino anomalies, and that scientists interested in continental-scale synoptic climatological studies have noted with satisfaction the data and information exchange programme initiated through the ERFEN Climate Analysis Bulletin,

Recommends

- (i) that efforts be intensified to improve the collection and exchange of real time meteorological data from the entire South American continent and adjacent oceanic regions through the GTS,
- (ii) that an adequate mechanism be provided for the collection and dissemination of required monthly summary climatological data through GTS, in addition to that currently provided through CLIMAT exchange such as sea surface temperature and other marine data from coastal stations and other coastal platforms. (The CPPS's ERFEN Climate Analysis Bulletin seems to be a convenient medium for the distribution of these data sets.),
- (iii) continued exchange of South American historical data of interest to scientists studying the synoptic climatology of the continent including its relationship to El Nino anomalies, and
- (iv) that the feasibility of establishing a regional South American meteorological and climate analysis and research center be examined.

Recommendation 2

PHYSICAL OCEANOGRAPHY

Recognizing that a substantial knowledge of oceanic conditions in the Pacific Ocean off shore of the South American continent is required in order to make definitive progress in the description and understanding of the transport processes associated with the evolution of normal and El Niño conditions; and

Noting with satisfaction the initiation of a programme of data and information exchange through the ERFEN Climate Analysis Bulletin and the increased interest by South American scientists in physical oceanographic studies in the tropical and offshore zones,

Recommends that efforts be continued to:

- (i) improve the collection and exchange of "real time" physical oceanographic data;
- (ii) assemble and disseminate regional historical data sets related to the description of the El Niño phenomenon;
- (iii) maintain existing time series and to identify new sites for effective time series measurement opportunities. (Time series include fixed stations reporting "real time" data on a continuing basis, and hydrographic and XBT sections repeated on a monthly or bi-monthly basis for several years);
- (iv) sample selected nutrient observations as well as biological parameters when possible; and
- (v) examine the possibility of installing a satellite-transmitting sea-level and SST station on Malpelo Island, combined with monthly or bi-monthly hydrographic sampling along the Buenaventura-Malpelo Island route.

Recommendation 3

BIOLOGY

Considering that the importance of biological investigations in understanding the consequences of El Niño in reducing the negative effects and in better utilizing the beneficial changes needs the development of the following three general areas of research: (a) standardization of methods; (b) biological time-series of economic and/or ecologically important species; (c) population dynamics, especially related with reproduction and recruitment process studies of fish and invertebrates,

Recommends that

- (i) workshops be organized to address specific habitats or taxonomic groups, for example, the different responses of rocky shore communities to El Niño on a latitudinal gradient,
- (ii) priority be given to programmes carried out from the shore where the costs involved are considerably lower than when using research vessels,
- (iii) working methods be standardized particularly in the ERFEN region for a better understanding of the changes associated with El Niño,
- (iv) investigations of the early life stages of commercially important fish and invertebrates be emphasized in relation to environmental parameters, to predict the recruitment success under El Niño and non-Niño conditions,
- (v) experiments be initiated under simulated El Niño conditions to determine how reproduction, growth and survival of fish and invertebrates are affected by the phenomenon,
- (vi) continuous biological time series be accumulated to adequately statistically describe the El Niño and non-Niño conditions, in particular to achieve the full utility of Indicator species,
- (vii) statistics on shellfish be improved for management purposes, mainly for rectifying the confused nomenclature and for providing information on catch-per-unit of effort,
- (viii) investigations be increased on both local species which flourished under El Niño conditions and those of commercial importance which invaded the area during the event, and
- (ix) with the aim of supporting the biological studies, physical studies of temperature, salinity, oxygen, and currents, be carried out principally on the shelf. These studies should provide continuous time series by instruments mounted on the bottom and in mid-water depths down to at least 100 m.

Recommendation 4

SOCIO-ECONOMIC ASPECTS

Considering that El Niño is a phenomenon of a recurrent nature and that it constitutes a most drastic alteration of natural order in the continent, in the sea and coastal zones of the region,

Recognizing the importance of the El Niño phenomenon to the South American Pacific Member States, and that it must be viewed in terms of its impacts,

Noting the importance of the socio-economic evaluation of the effects of the phenomenon in the various productive activities of goods and services of the South-east Pacific countries, mainly in the sectors of agronomy, housing, road systems, fishing and health,

Further noting the desirability to reduce and/or eliminate the negative effects and to take advantage of those cases where the effects are positive,

Recommends

- (i) quantitative and appraised evaluations of the negative effects (damage) and positive effects (benefits) of the phenomenon by economic sectors and geographical areas, using the "input product matrix" and the macro-economical ex-post analysis to allow the governments and the productive agents, both public and private, on funding actions, reconstruction of infrastructure and re-ordering of activities. (Such evaluations must be completed with the information existing from past occurrences of the phenomenon.), and
- (ii) the design and development of institutional arrangements to allow the Integration of the national entities responsible for the investigation, prevention, evaluation and reconstruction, optimizing a surveyance plan of the effects of the phenomenon starting from the alert signals up to the most trustworthy predictions in order to reduce the adverse effects and take advantage of the beneficial effects within the context of the planning and managements of the coastal and maritime zones.

Recommendation 5

DATA EXCHANGE

Considering that proper studies of El Niño require data from many sources which should be available on a timely basis to the international scientific community,

Recognizing that the CPPS/ERFEN "Boletín de Análisis Climático Pacífico Oriental Sudamericano" has proven to be an effective mechanism for exchanging analyses and summaries of data,

Recommends

- (i) that countries both within and outside the ERFEN region give high priority to submitting to the publication selected sets of oceanographic and meteorological data according to requirements in the region;
- (ii) that a mechanism be sought to establish an electronic mail system among the ERFEN countries; and
- (iii) that all data collected in the region by platforms, fixed buoys and ships, that are transmitted via satellite, be put into the GTS, and that this system be improved to make the data available to interested countries.

Recommendation 6

MONITORING AND PREDICTION OF THE EL NIÑO PHENOMENON IN THE SOUTH-EAST PACIFIC: APPLICATION TO DEVELOPMENT (UNDP-IOC-CPPS REGIONAL PROJECT)

Recognizing the great adverse socio-economic impact produced by the 1982-1983 El Niño, particularly in relation to the coastal communities, fishing industry and agriculture,

Noting that countries participating in ERFEN require international support to fully participate in the regional investigations,

Further noting the intimate relationship existing between the regional expression of the El Niño phenomenon on the Pacific-wide and global scales,

Gives its fullest endorsement of the UNDP-IOC-CPPS Regional Project on El Niño, and

Recommends

- (i) that Member States participating in the IOC-WMO-CPPS Joint Working Group on Investigations of El Niño actively encourage their national representatives to UNDP to support this important initiative, and
- (ii) Invites UNDP to keep this proposal in high priority within the context of its Fourth Cycle Funding Programme (1987-1991).

Recommendation 7

SPANISH PUBLICATION OF SELECT SYMPOSIUM PRESENTATIONS

Noting the large scientific community performing investigations on El Niño in Spanish-speaking countries,

Recognizing the benefits of broadening the dissemination of the symposium results,

Recommends that AGU, IOC and CPPS support and facilitate translation into Spanish, publication and distribution of selected symposium presentations, particularly those most relevant to the South-east Pacific Region.

Recommendation 8

LONG-TERM STUDIES OF "EL NIÑO"

Recognizing that the El Niño is a recurrent phenomenon which can be evidenced in historical, archeological and geological records; and the value of considering historical, archeological and geological evidence of El Niño events to the understanding of the phenomenon,

Recommends

- (i) that scientific communication between those studying El Niño on long-time scales (hundreds to millions years) and scientists who conduct process-oriented studies of the phenomenon during the most recent fifty years, be improved,
- (ii) that the meaning of El Niño in pre-historical times as evidenced in proxy time-scales, be clarified,
- (iii) increased research efforts on specific time periods showing extreme conditions, or which for other reasons are interesting but lack sufficient data, and
- (iv) similar studies on "non-El Niño" periods, as being potentially informative of the underlying processes, be conducted.

ANNEX V

RECOMMENDATIONS OF THE DRAFTING GROUPS FOR THE UNDP-IOC-CPPS  
PROJECT PROPOSAL ON "EL NIÑO"

Recommendation 1

DRAFTING GROUP ON THE ENTIRE FRAMEWORK OF THE PROJECT PROPOSAL

The Drafting Group recommends that in relation to the organizational structure of the project and particularly referring to the tripartite Commission (constituted by representatives of each government and the IOC, CPPS and UNDP), there are seven representatives to meet four times during the two years of the project execution; funding will be required of approximately US \$30,000. In that respect, it is proposed:

- (a) that the funding for these drafting groups does not come from funds destined for project execution;
- (b) to reduce, if possible, the number of contemplated meetings;
- (c) to establish the concept that the representative of the government(s) be a specialist in Marine Sciences.

Recommendation 2

DRAFTING GROUP ON METEOROLOGICAL STUDIES

The Drafting Groups recommends the following new text for corresponding paragraphs listed in part (ii) of Annex IV of the Project Document:

- (a) the position and intensity of the surface and upper-air large scale atmospheric system and their relationship to atmospheric phenomena observed under El Niño and non-El Niño conditions;
- (b) the daily, monthly, seasonal and annual variations of meteorological parameters from the South-east Pacific;

- (c) the development of numerical indexes for determining a better understanding and prevention of the regional effects of atmospheric phenomena;
- (d) the effect of land-sea processes on coastal winds;
- (e) the co-ordination in developing and implementing the system for obtaining surface and upper-air data; and
- (f) the macro-scale analysis and consideration of the synoptically observed phenomena of atmospheric disturbances throughout the Pacific.

### Recommendation 3

#### DRAFTING GROUP ON BIOLOGICAL STUDIES

The Drafting Group recommends the following to improve the compiling of literals a, b, c, d, e, f, g and the incorporation of literals h and i for the corresponding section listed in part (iv) of Annex IV of the Project Document:

- (a) To identify those organisms of ecological and/or economic importance that better typify the eco-systems, under normal circumstances, and the ones who replace them under "El Niño" conditions.
- (b) To establish determining conditions of the marine species that under non-normal conditions get important in order to achieve better growth, including the effected resources with the purpose to protect them.
- (c) To determine the inter-relation of the abiotic parameters and the biological components of the eco-system, mainly in coastal areas, in order to understand the generation of changes, interactions and their effects primarily on the resources.
- (d) To study how critical phases of the resources, especially under altered conditions, can change aspects related to the survival of eggs and larvae and the recruitment of fishes with economic importance.



- (e) To investigate the quantitative aspects of energy transfer throughout primary, secondary and tertiary trophic levels in some areas selected for their high biological productivity under normal conditions and under "El Niño" conditions.
- (f) To establish effects of different levels of fishing effort on the populations that maintain fisheries under conditions of great environmental change.
- (g) To incorporate the results of the items mentioned above into models of fishing populations in order to improve the management of the living resources in the region.
- (h) To amplify and intensify the biological-marine studies related to "El Niño", incorporating into the Observing Plan strategical points such as the Galápagos Islands (0 degrees latitude and 90 degrees West) and Malpelo (4 degrees North and 78 degrees West).
- (i) To continue with the analysis of time series in biological and fishing studies to acknowledge conditions of normality and alterations such as the phenomenon "El Niño", particularly in aspects related to biological indicators.

NOTE: Drafting Groups were also formed on Integrated Monitoring and on Oceanographic Studies, which are described in parts (i) and (iii) of Annex IV of the Project Document. The conclusions were incorporated into section 5.1 of the Summary Report.

ANNEX VI

REPORT OF THE IOC SECRETARIAT

In the framework of the standing Agreement between IOC and CPPS and related actions between IOC and WMO, the intersessional activities of the Joint Working Group (JWG) have been concentrated in the regional implementation of two main programmes of IOC which are relevant to El Niño investigations: (i) Ocean Processes and Climate; and (ii) Ocean Science in relation to Living Resources.

(i) Ocean Processes and Climate (OPC)

The main activities regarding this programme have been addressed in support of on-going or planned exercises of the Joint SCOR/IOC Committee on Climate Changes and the Ocean (CCCCO), such as the Tropical and the Global Atmosphere Project (TOGA), the World Ocean Circulation Experiment (WOCE), and the Ocean Observing System Development Programme (OOSDP). The Secretaries of the JWG and CCCC maintained permanent consultation so as to keep scientists from the South-east Pacific Region fully participating in these activities. Main actions to assure this participation were the following:

- (a) IOC supported the attendance of the Chairman of the JWG and of scientists from Chile, Colombia, Ecuador and Peru, to the International Conference on the TOGA Scientific Programme (Unesco, Paris, 17-28 September 1984) where national and regional (ERFEN) components were described and incorporated. These inputs were integrated in the TOGA Scientific Programme later published in the WCRP series of WMO.
- (b) In the intersessional period, a number of scientists from the South-east Pacific region have been trained through courses organized or supported by IOC to strengthen the national and regional participation in the Integrated Global Ocean Services System (IGOSS), the Global Sea-Level Observing System (GLOSS), and in El Niño climatological analysis. As part of the latter, it should be mentioned that a specific course organized in October 1984 by the Instituto Geofísico del Perú and supported by IOC, Tinker Foundation and the Instituto Panamericano de Geografía e Historia (IPGH), on "Observation and Interpretation Techniques relevant to El Niño", was attended by 20 participants from Argentina, Brasil, Chile, Colombia, Ecuador, Peru and U.S.A.

- (c) During the Seventh Session of CCCO (Unesco, Paris, 14-20 January 1986), the activities of the JWG and of ERFEN were introduced by the Secretary of the JWG. The Seventh Session of CCCO addressed in particular the needs for Training, Education and Mutual Assistance (TEMA), so to assure an appropriate participation of scientists of developing countries in the oceanic components of the WCRP, included among them scientists from ERFEN Member States. The Recommendations of the Seventh Session of CCCO were later endorsed by the Nineteenth Session of the Executive Council of IOC (March, 1986).
- (d) IOC supported the attendance of the Vice-Chairman of the JWG at the WMO/IOC Planning Meeting on the Implementation of the WCRP (WMO, Geneva, 12-16 May 1986). Two important documents were presented by IOC to this planning meeting, both with regional implications for the South-east Pacific, namely, "Global Sea-Level Observing System" (GLOSS), and "Oceanographic DATA MANAGEMENT in support of the World Climate Research Programme". The meeting proposed a TOGA Intergovernmental Panel jointly sponsored by WMO and IOC, and with regard to the co-ordination of this project at national and regional levels, IOC has co-operated with WMO in requesting Member States to designate common IOC/WMO focal points for matters concerning TOGA.

(ii) Ocean Science in Relation to Living Resources (OSLR)

OSLR is a joint IOC/FAO Programme. The main OSLR activity related to the biological component of the El Niño investigations deals with the SARDINE/ANCHOVY RECRUITMENT PROJECT (SARP). The SARP Project was approved as part of Resolution XIII-I of the IOC Assembly (UNESCO, Paris, 12-28 March 1985). Major activities undertaken for the regional implementation of SARP are listed below:

- (a) An IOC/FAO Consultation on SARP was held at the Southwest Fisheries Center in La Jolla, California, from 5 to 9 November 1984. Participants at the Consultation included the Vice-Chairman of the JWG, and scientists from Argentina, Brazil, Canada, Chile, Ecuador, Mexico, Portugal, Spain, and USA. Proposals were written for three regional SARP exercises: one addressing the sardine population off central and northern Peru (also to include Ecuadorian input), one addressing the sardine population off northern Chile (also to include Peruvian input), and one addressing the anchovy population off western USA and Mexico. All three proposals were for full scale "SARP Within-year-Experiments", involving (1) repeated surveys of spawning intensity and of oceanographic and biological conditions related to starvation, predation, advection, etc., over an extended spawning seasons, and (2) birthdating, via daily otolith readings, of late larvae and early juveniles to determine variation in relative survival rate.

- (b) A prototype SARP exercise, funded entirely by NOAA (U.S. Government), was scheduled off southern California for the winter-spring northern anchovy spawning season of 1986. A pre-SARP oceanography survey of the area was implemented during the northern hemisphere summer 1985. Two SARP surveys were successfully accomplished during January 1986, after which the programme was terminated due to withdrawal of funding because of USA Federal Budget restrictions. The successful completion of two SARP cruises did serve to demonstrate the feasibility of these operations. The continuation of these cruises, which are essential for training and comparison with similar exercises in the South-east Pacific, is foreseen for 1988.
- (c) A two week training session on various methodologies essential to SARP exercises was supported by IOC, UNESCO, and GTZ (the FRG Agency for Technical Cooperation) and organized by the South-west Fisheries Center in La Jolla, California, from 11 to 22 November 1985. Fifteen scientists from Chile, Ecuador, Mexico and Peru participated. Visiting scientists from Argentina, Morocco and Japan also attended lectures and various laboratory and shipboard sessions and demonstrations. Subjects treated included histology, daily otolith reading, data processing and analysis, and oceanography and satellites.
- (d) A Training Course on the Egg Production Method to estimate spawning biomass in SARP experiments was sponsored by IOC, FAO, and GTZ at the Instituto del Mar del Perú (IMARPE), Callao, from 9 to 20 December 1985. The course was attended by 23 participants from Argentina, Brazil, Chile, Ecuador, Peru and Uruguay.
- (e) In terms of funding prospects, there appears to be interest by the FRG Agency of Technical Cooperation (GTZ) in funding some of the South-east Pacific proposed SARP exercises; this possibility is tied to other major funding for El Niño investigations such as the UNDP/IOC/CPPS El Niño Regional Project. Agencies such as U.S./AID have been approached with respect to the northern Chile and northern PERU SARP components, but no positive response has been received as yet. Efforts to develop and expand support for SARP exercises will continue.

In regards to overall support to the regional investigations of El Niño, IOC has continued providing its support for the bilingual (Spanish-English) publication, since 1984, of the ERFEN Bulletin edited by the CPPS and now in its eighteenth quarterly edition (July-September 1986). The distribution of the ERFEN Bulletin, which is done by the CPPS Secretariat, reaches at the present time around one thousand interested institutions in the world. Funds are being sought to support commencing in 1987, the ERFEN monthly Climatic Analysis Bulletin, first published in June 1986 as a result of a recommendation of the Fifth Session of the Scientific Committee for ERFEN (April 1986). The continuous improvement and scientific quality of these publications deserve the congratulation of CPPS for the task accomplished.

In spite of the severe financial constraints posed by drastic reductions in the Regular Budget of UNESCO as well as by the resources to be contributed to the El Niño International Symposium, IOC supported the Fifth Session of the Scientific Committee for the ERFEN Programme and an associated CPPS Regional Workshop on Ocean-Atmospheric Phenomena and Variability of Marine Living Resources (CPPS, Bogota, Colombia, 21-26 April 1986). IOC was also represented, through the Vice-Chairman of the OSLR Guiding Group of Experts, in the Eleventh Session of the CPPS Committee for the Co-ordination of its Scientific Programmes (COCIC-XI, CPPS, Bogotá, Colombia, 24-29 April 1986).

The UNDP/IOC/CPPS Regional Project on Monitoring and Prediction of the El-Niño Phenomenon in the South-east Pacific: Application to Development (Project RLA/83/010), has been given preliminary approval by the UNDP for its 4th Cycle Funding Programme (1987-1991). Based upon a new document prepared by IOC and negotiated jointly with CPPS, UNDP preparatory assistance was approved to enable the present Project Document to be up-dated and finalized following the Recommendations of the AGU/IOC/WMO/CPPS International Symposium on El Nino held in Guayaquil, Ecuador, 27-31 October 1986, which was attended by about 130 scientists, approximately half of them from Latin America. Substantive support for scientists contributing papers to the Symposium was provided through AGU and IOC (including funds contemplated in the UNDP preparatory assistance).

The AGU involvement and assistance was the result of the sustained and enthusiastic effort of the Chairman of the JWG. Important support was also generated by WMO and CPPS. The local organization was kindly and generously provided by the Instituto Nacional de Pesca (INP), Guayaquil, Ecuador. INP is also providing the local organization for the Fifth Session of the Joint Working Group.

ANNEX VII

REPORT OF THE CPPS SECRETARIAT

Since 1983, the ERFEN activities in the South-east Pacific were considerably increased in regards to oceanic exploration cruises, investigations, technical meetings, co-ordination, and publications. The ERFEN Co-ordination Secretariat presents, in a resumed form, information regarding the following activities:

- (i) Results of the Fifth Session of the ERFEN Scientific Committee (Bogotá, 21-24 April 1986).
- (ii) Results of the Oceanic-Atmospheric Phenomenon Interactions and its incidence on the Living Marine Resources of the Southeast Pacific Seminar (Bogotá, 25-26 April 1986).
- (iii) Data Exchange Status and broadcasting of the results.
- (iv) The "Monitoring and Prediction of El Niño Phenomenon in the South-east Pacific: Application to Development" (UNDP/IOC/CPPS Project).
- (v) Project on the Socio-Economic Effects of El Niño in the South-east Pacific.
- (vi) ERFEN co-ordination with extra-Regional Programmes

(i) Results of the Fifth Session of the ERFEN Scientific Committee (Bogotá, 21-24 April 1986)

An alert signal was given by programmes and researchers outside the region in early 1986 about the imminent occurrence of anomalies, and the Fifth Session of ERFEN was held in April 1986 with the support of IOC, CPPS and WMO.

This provided a major opportunity for the scientists of Chile, Colombia, Ecuador, and Peru to compare results of their own research, and to examine their most recent data. The final conclusion with respect to ocean and climate changes was that, given the correct observation of anomalies between January and February 1986 off South American coasts, there did not exist evidence that supported the recurrence of an El Niño phenomenon. The need to continue a permanent surveyance was however emphasized.

The Biological Group proved that in conjunction with favourable environmental conditions during 1984 and 1985, the resources had a sustained return to normality, as well as the species composition of the phytoplankton and in biomass levels. It was pointed out that the anchovy started a clear recuperation since 1984 in the coastal areas of Chile and Peru, with successful spawning and distribution in wide areas including the Ecuadorian seas.

The ERFEN Scientific Committee, after an oceanic, climatic and fishing-biological analysis, designed an Action Plan of its activities for 1986-1987. A document exists that resumes the results of the Fifth Session of the V-ERFEN, and its Recommendations underline definitive actions, considering the need for worldwide co-operation.

(ii) Results of the Oceanic-Atmospheric Phenomenon Interactions and its incidence on the Living Marine Resources of the South-east Pacific Seminar (Bogotá, 25-26 April 1986).

The Seminar, held at the beginning of the Eleventh Session of COCIC as a continuation of the discussions of the Fifth Session of the CC-ERFEN, provided an opportunity for the participants to discuss the complexity of interactions of the physical and biological phenomenon so as to have an integral comprehension of ecological processes of the interannual variations and how El Niño effects the South-east Pacific Region. The most important conclusions of the Seminar are listed as follows:

- (a) It is absolutely necessary to have a long series of statistical data to correctly interpretate the variations of the ocean and climate.
- (b) Due to the high cost of oceanographic investigations, alternative and complementary investigations must be encouraged, as well as constant improvement in regional co-operation.
- (c) There is a lack of integrated investigations in the biological field that would be useful in establishing behavioural patterns in relation to environmental changes. It is therefore necessary to develop studies on biological indicators that can be helpful in anticipating light changes in the environment.
- (d) The need for periodic forecasting dealing with oceanic and climatic variations was proposed, as well as the need to develop a service and an institutional mechanism that will allow for decision-making in the planning and optimizing of social and economic activities in an ecosystem with high interannual variations.

- (e) The value of a network of fixed stations designed for weekly surveyance of the vertical structure in the thermocline zone, as well as biological variabilities before and after El Niño was also noted.
- (f) With respect to changes in living resources, the Seminar noted the importance of a standarized system of fishing statistics and the need to analyze biological parameters with oceano-graphic parameters in relation to the variation in distribution and behaviour of the resources.
- (g) It was noted that the South-east Pacific Coastal Zone represents an ecosystem of high interannual variabilty which effects living resources. In this perspective a scheme should be created for obtaining better results in the development and use of living resources, as well as specific studies on the pelagic resources South-east Pacific Region.
- (h) Finally, full support was given to the value of using inter-disciplinary methods as a means to optimize results, and also for a better understanding of the behaviour of the living resources in relation to the environment.

(iii) Data Exchange Status and broadcasting of the results.

Since data exchange has been kept, in general, in a sort of "Gordiano knot" that prevents an adequate two-way flow of information, the Fifth Session of CC-ERFEN in April 1986 decided to improve this situation by the establishment of the Climate Analysis Bulletin, first published in June 1986 with the support of ERFEN Institutions and CPPS co-ordination. Dr. Pablo Lagos, upon CPPS's request, supplied valuable collaboration as Editor.

During the Symposium on El Niño, the importance of data exchange in real time was pointed out, and infrastructure difficulties were mentioned. This aspect deserves the maximum support of national and international organisms and programmes involved with El Niño studies within and without the ERFEN Region. The Fifth Session of the IOC/WMO/CPPS Working Group might possibly give more precise orientation to this subject.

The CPPS, with IOC's support, has maintained the quarterly ERFEN Bulletin as a means of diffusing news and investigation results on El Niño. Actually, the ERFEN Bulletin goes to 30 specialized libraries, 830 scientists, government authorities and university teachers, with a constant increase in circulation.

The ERFEN countries also provided the international scientific community with the results of five scientific meetings dealing with El Niño, organized in the region between 1983 and 1985.



- (iv) The "Monitoring and Prediction of El Nino Phenomenon in the South-east Pacific: Application to Development" (UNDP/IOC/CPPS Project).

The IOC Secretariat has very detailed information about the present state of the Project. Since its inception in 1982, its role has been to improve the capacities for data collection and investigation by the countries that finance the ERFEN operations. The Project is in a good position to co-operate with TOGA, WOCE, OSLR and other global programmes. The CPPS, as well as the ERFEN programme, have recognized IOC's support of the Project. It is encouraging that UNDP has given support for the realization of the Symposium on El Niño, but the necessary funding for the Project, however, is still expected. Member States of the CPPS repeatedly expressed their interest in the Surveyance and Prediction Project supported by IOC through their Representatives at the UN. The hope is that the Working Group will once again give support to the Project along with suggestions for the improvement of the operational elements using as a base the Recommendations of the Symposium on El Niño.

- (v) Project on the Socio-Economic Effects of El Niño in the South-east Pacific

As an initial draft which will have to be developed, the CPPS has developed a socio-economic project profile whose purpose is to organize activities, design strategies, and standarize evaluation methods which could allow governments and national institutions greater adequacy in the field of prevention and also better use of predictions and scientific information. This Project could have important practical applications, and would compliment the Project presented by IOC to the UNDP.

There are preliminary discussions between CPPS and BID on the development of this socio-economic Project, and the hope is that BID will support it as part of its development strategies for the countries of the region.

(vi) ERFEN co-ordination with extra-Regional Programmes

ERFEN, at the Secretariat level of CPPS, has maintained co-ordination links with TOGA, with WCRP, and the IOC/FAO-OSLR Programme. The CPPS attended the Planning Session of SARP in San Diego (5-9 November 1984), co-ordinated assistance given to representatives of the region for a training course in SWFC, San Diego, and supported the Course on Application of the Egg Production Method for Biomass Evaluation, given at IMARPE (9-20 December 1985). In addition, at IOC's invitation, the CPPS participated in the Planning Session of the World Climate Research Programme (including the TOGA Project) (Geneva, May 1986), where the opportunity was given to inform participants about ERFEN accomplishments namely: international co-operation and co-ordination, the effort to encourage countries in the region to increase their investigations and research, and the decision taken at the Fifth Session of CC-ERFEN (Bogotá, April 1986) to facilitate the exchange of data on a wider scale by the publication of the Climatic Analysis Bulletin.

ERFEN Member States and participating institutions have maintained co-ordination links with TOGA, but the feeling is that there is still missing a co-operation on an operative level which would require mutual compromises by TOGA and ERFEN, but especially on the part of institutions of ERFEN participating in both programmes.

Through bi-lateral arrangements, the institutions participating in ERFEN have been co-operating in ocean and climate programmes offering their infrastructure and logistical support. The hope is that the co-ordination and mutual co-operation of ERFEN with global and national programmes outside the region will be increased with the support of the IOC/WMO/CPPS Working Group on the Investigations of El Niño.

ANNEX VIII

REPORT OF THE WMO SECRETARIAT

General

1. The intersessional period has been marked by the continued support of WMO to the activities of the Joint IOC/WMO/CPPS Working Group on the Investigations of "El Niño" despite the difficult economic situation affecting the Organization. Participants from the ERFEN countries, especially from the Meteorological Services of the Region, have been financially assisted to attend the following events:

- Co-sponsoring of a joint IOC/WMO mission to some Latin American countries on IGOSS/IODE (October 1986)
- Fifth session of the Scientific Committee for ERFEN (Bogotá, April 1986)
- CPPS Regional Workshop on Ocean-Atmospheric Phenomenon and Variability of Marine Resources (Bogotá, April 1986)
- AGU-IOC-WMO-CPPS Chapman Conference: An International Symposium on "El Niño" (Guayaquil, October 1986).
- Fifth session of the Joint IOC/WMO/CPPS Working Group on the Investigations of "El Niño" (Guayaquil, November 1986)

2. It is to be noted that, while WMO is fully committed to the support of "El Niño"-related activities, it may be difficult in future to provide the same level of assistance to participants to meetings and consideration should be given a better co-ordination and longer lead-time in scheduling such meetings.

Planned working agreement with the CPPS

3. Following several years of carrying out scientific tasks of common interest to both CPPS and WMO, the Commission agreed that it may be the time to formalize such mutual collaboration. WMO received in May 1986, from the Secretary-General of CPPS, a request to establish a formal agreement between the CPPS and the WMO. This request is to be considered by the thirty-ninth session of the WMO Executive Council which is to take place in Geneva from 1 to 5 June 1987.

Fourth session of the Joint IOC/WMO Working Committee for IGOSS

4. The Joint IOC/WMO Working Committee for IGOSS held its fourth session (IGOSS-IV) at the WMO headquarters in Geneva from 11 to 20 November 1985. The Committee took careful note of the resolutions of the IOC and WMO Executive Councils requesting implementation of an acceleration phase of IGOSS. The actions already taken before IGOSS-IV and those arising from the session were part of the implementation process.

5. The Joint Working Committee felt that the concept and principles of the General Plan and Implementation Programme of IGOSS 1982-1985 were still valid and therefore decided to recommend to the governing bodies that this plan be extended to cover the next intersessional period whilst the next General Plan and Implementation Programme was being prepared. The new plan will take into account developments during the acceleration phase for IGOSS and the actions being taken by the Joint Working Committee.

6. The Joint Working Committee realized that the IGOSS system was entering a new phase where operational ocean data will be more generally accepted and used. There would be a greater emphasis in the future on the IGOSS Data Processing and Services System (IDPSS) and the dissemination of operational data products to users. The Joint Working Committee was pleased to see the initiation of regular monthly reports from the three IGOSS Specialized Oceanographic Centres (SOCs) and planned ones from other SOCs.

7. The collection of ocean sea level data in the Pacific and the publication of monthly anomalies has been very well received. The development of automated data acquisition systems has fulfilled its promise of usefulness to the IGOSS and is being implemented by many countries. Other technological advances in sensor development and computer techniques are also improving the capability of IGOSS data collection and data handling systems.

#### Availability of BATHY/TESAC reports and data

8. There exists a set of statistical data on the exchange of BATHY/TESAC reports from countries in South-America for the period 1977 to July 1986, transmitted via the GTS, which has been prepared on the basis of monthly information submitted by Argentina, as follows:

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
BATHY	126	259	75	150	81	60	10	82	0	25
TESAC	4	64	23	0	0	0	25	106	0	0
All sub-surface data	130	323	98	150	81	60	35	188	0	25
Daily average	0.36	0.88	0.27	0.41	0.22	0.16	0.09	0.52	0	0.14

9. The decreasing trend from 1978 to 1985, with a total of "0" reports during 1985 is very apparent. The Joint IOC/WMO Working Committee for IGOSS noted several possible reasons for the low rate of contributions of data to the IGOSS programme. Among them:

- The cost of measuring devices (XBTs)
- The reluctance of Member States to commit themselves because of misunderstandings concerning IGOSS objectives
- The fact that IGOSS objectives might not coincide with governmental priorities
- Budget limitations preventing attendance at IGOSS meetings
- Difficulties in identifying users of IGOSS products
- The fact that the relatively long-length of the BATHY/TESAC messages might deter observers from encoding and transmitting measurements.

10. The Committee agreed that the efficient ship-to-shore data transmission arrangements and the exchange of these data among countries concerned are two crucial areas to be addressed. However, it was noted by the Committee that if the acceleration phase of IGOSS Observing System (IOS), particularly with regard to ship-of-opportunity lines, is successfully implemented, then additional reports would be expected to originate from the tropical zones and the southern hemisphere where the number of coastal radio stations is much smaller compared with the northern hemisphere and where reliable data relay to the GTS is not always available. In order that valuable observations

are not lost before they reach the GTS's Main Telecommunication Network (MTN), it was therefore agreed that the efficiency of coastal radio stations in accepting BATHY/TESAC messages and in their forwarding to the GTS should be assessed in appropriate regional circumstances.

#### Drifting buoy programmes

11. As part of its monitoring and updating service regarding the status of the Global Observing System of the World Weather Watch, the WMO Secretariat continues to publish, in the "Monthly Letter on the Operation of the WWV and MMS", regular reports on the status of drifting buoys reporting over the GTS. Information published in the Monthly Letter includes:

- (a) The Argos monthly status report, as provided by CLS/Service Argos;
- (b) Regular reports from Canada and Norway concerning the status of buoys reporting through LUTs in those countries;
- (c) Less frequently, regular reports from the USA, and any other countries which may provide them, on the status of all ODAS operated by these countries.

In addition the WMO Secretariat receives, on a regular basis, status reports from ECMWF on drifting buoy data received by them over the GTS. An example of such a report, which shows the positions of drifting buoys from which data were received over the GTS during a 24-hour period in September 1986, is given in Figure 1.

12. In view of the importance of drifting buoy programmes in support of the WWV, the WCRP and a variety of meteorological and oceanographic research programmes, and also in view of the increasing numbers of drifting buoys which are being deployed by Members for these purposes, EC-XXXVI was of the opinion that the time was now right for additional international co-operative action for the development of co-ordinated drifting buoy programmes. As a result, and with the support of IOC, a Joint WMO/IOC Preparatory Meeting for the Establishment of a Drifting Buoy Consortium took place in Geneva in April 1985. This meeting recommended the establishment of a Drifting Buoy Co-operation Panel and provided draft terms of reference for the panel and for its technical co-ordinator. These particularly took into account the successful co-ordinated drifting buoy activities which occurred with the Southern Hemisphere Drifting Buoy System of the Global Weather Experiment (1979) and the European venture COST-43. This recommendation was subsequently endorsed by EC-XXXVII and the first meeting of the panel took place in October 1985 at CLS/Service Argos in Toulouse. This first session adopted operating procedures for the panel, moved towards the appointment of a full-time technical co-ordinator and developed a comprehensive workplan for the first year's operations.

13. The outcome of the first panel session and subsequent proposed panel activities was presented to WMO EC-XXXVIII. The Executive Council "... approved these actions of the first session of the panel and in particular the detailed workplan which had been developed. The Executive Council felt that this represented a very practical and positive approach to fulfilling the panel's terms of reference. The Council strongly reiterated its belief in the importance of drifting buoys as a key element in the GOS, and agreed that the timely receipt of real-time drifting buoy data was essential if those data were to contribute effectively as input to numerical models and related activities. "

14. The second session of the panel took place at the WMO headquarters in Geneva from 15 to 17 October 1986. The panel tackled the financial and other questions related to the technical co-ordinator's position and requested the Secretariats of IOC and WMO to proceed with the appointment of the co-ordinator for the period of one year. Other matters dealt with at this second panel session, at which there were some

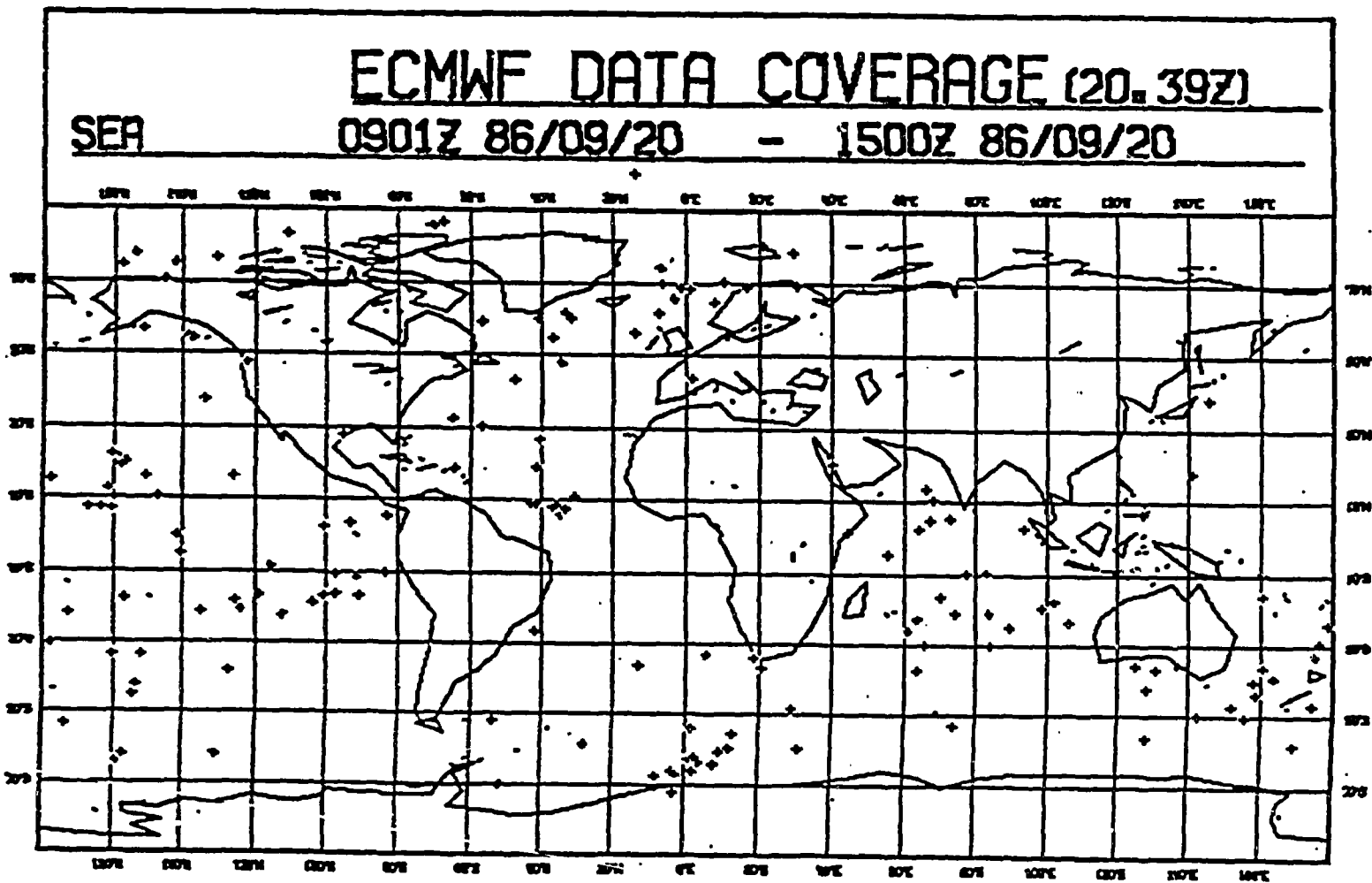


Figure 1 - Distribution of buoys on 20 September 1986 according to GTS receipt of DRIBU reports on the ECMWF

20 participants from eight Members of WMO and Member States of IOC and three international organizations, included the provision of specific support to the WCRP and the OWSE-NA of WMO, quality control of drifting buoy data and various publications such as a quarterly panel newsletter, an annual report and a Guide to Drifting Buoys.

15. A number of Members took an active part in the Southern Hemisphere Drifting Buoy System during the FGGE (in particular Argentina, Brazil and Chile) and these and other Members (in particular Peru) have indicated a continuing interest in drifting buoy programmes in general and in the work of the panel in particular. Past experience has indicated that many countries can play active and important roles in the implementation of drifting buoy programmes through participation in appropriate co-operative and co-ordinated ventures, such as this panel or perhaps its regional subsidiaries, and indeed the panel would welcome any contributions from the ERFEN Member countries.

#### World Climate Research Programme data requirements

16. The experience gained during GARP with the deployment and operation of satellite-tracked drifting buoys has shown that such expendable platforms equipped with suitable meteorological (and marine) sensors, provide a cost-effective method for acquiring surface reference level information over the data-sparse southern hemisphere oceans. Drifting buoys transmit data through and are located periodically by the Argos Data Collection and Platform Location System on NOAA operational meteorological polar orbiting satellites. The near-real time availability of buoy information over the WWV GTS is of crucial importance for numerical weather prediction and diagnostic studies. In view of the relative scarcity of regular shipping lanes in the southern hemisphere, from which VOS could be recruited, a network of drifting meteorological buoys is regarded as a primary source of sea level pressure and other surface meteorological data in that region.

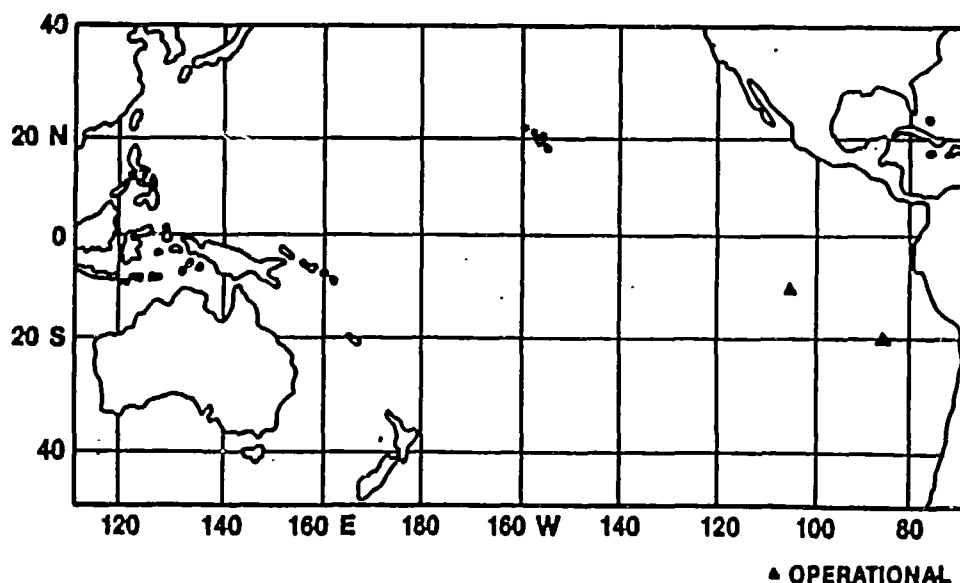
17. Although the provisional sea level pressure data requirement laid out in the Scientific Plan for the WCRP (WCRP Publications Series No. 2) is identical to that of GARP, i.e. one measurement per day in each 500km x 500km areas, subsequent progress in global atmospheric data analysis would permit a relaxation of the horizontal sampling density requirement by a factor of 5 approximately, i.e. one measurement per day in each 1200km x 1200km. This sampling density would in any case be adequate for describing the large spatial scales which constitute climatologically significant features of the atmospheric circulation. In principle, 40 ideally-placed buoys in the southern hemisphere oceans could satisfy the sampling requirement, but in practice because of buoy movements and failures, the maintenance of an adequate array will require an annual deployment of 80-100 expendable drifting buoys.

#### TOGA Southern Hemisphere Drifting Buoy Programme

18. As of 11 August 1986, 107 drifting buoys have been deployed over the southern hemisphere oceans since November 1984, in support of the Tropical Ocean and Global Atmosphere (TOGA) programme. Fifty buoys are still operating satisfactorily. The USA is finalizing an agreement with Chile to deploy a number of buoys in the area from the Chilean coast to approximately 125°W.

19. A number of experimental oceanographic drifting buoys have been deployed by research organizations in the tropical Pacific and Indian Oceans to provide information on transport by currents. The USA has deployed 29 buoys in the eastern and central Pacific and 18 in the Indian Ocean. The USA and China, as part of a bilateral arrangement, have also deployed four buoys in the western Pacific. These drifting buoys measure sea surface temperature and also provide a Lagrangian representation of near-surface ocean currents. Although part of a research programme, deployments have been taking place for some time now and are expected to continue into at least the near future. Data are being collected via the Argos system and buoy reports are available over the GTS.

Figure 2 - MOORED METEOROLOGICAL BUOY LOCATIONS



20. Two moored meteorological buoys recently deployed in the southeast Pacific and designed to provide long-term meteorological parameters measurements in this data-void region, can give further information on the Southern Oscillation phenomenon for diagnostic studies as well as modelling. These buoys now form an integral component of TOGA's Pacific observation system. Figure 2 shows the positions of the buoys relative to the entire Pacific basin. The buoy located at 20°S x 85°W began transmitting data, via the Argos system, in January 1986, while the buoy at 10°S x 105°W began transmitting in February 1986. Parameters reported are sea level pressure; wind speed and direction; air sea surface temperature; and wave height, period and spectra.

21. The basic platforms are towable "W-type" buoys, with 10 foot diameter discus floats, 8.5 foot hinged tripod top masts, 3 foot hull depth, and three 5 foot arms on each buoy that meet at a point 8 feet below the waterline for the mooring attachment. The sensor and Argos packages are powered by solar batteries with one-year lifetimes. Buoy deployments were co-ordinated by the USA TOGA Project Office and NOAA Data Buoy Center, combining deployment elements of Chile, Peru and USA. The present plan calls for the buoys to be rotated annually.

22. With regard to the status of the TOGA XBT networks in the Pacific, it has been reported that 25 ship-of-opportunity (SOO) lines have been implemented with coverage by at least one ship per quarter with most lines being observed at least once per month. As many as nine lines are serviced by three or more ships providing at least semi-monthly coverage. Two new lines should be implemented by the close of the year. Japan reported that it was preparing to implement a TOGA SOO on either line Pacific 5 or 11. Efforts in coming years will be placed on expanding coverage on selected lines where additional coverage is required to meet minimal requirements. However, concern was expressed by the fifth session of the JSC/CCCO TOGA Scientific Steering Group relating to the lack or slowness of XBT data exchange by several ERFEN countries. This was perceived as a particularly significant problem because of the importance of these data in detecting and the study of "El Niño". The Scientific Steering Group recommended that countries providing XBT equipment and supplies to ERFEN countries consider making data exchange a requirement. As a minimum, data should be exchanged through IGOSS if it is not possible to exchange the complete data record.



ANNEX IX

LIST OF ACRONYMS AND ABBREVIATIONS

AOLM	Atlantic Oceanographic and Meteorological Laboratory (NOAA)
BID	Banco Interamericano de Desarrollo
CCCO	Committee on Climate Changes and the Ocean
CIOH	Centro de Investigaciones Oceanográficas e Hidrográficas
CPPS	Comisión Permanente del Pacífico Sur
ERFEN	Regional Investigation of the Phenomenon El Niño (Colombia, Chile, Ecuador, Peru)
ECMWF	European Center for Medium-Term Weather Forecasts
GLOSS	Global Sea-Level Observing System
GOS	Global Observing System
GTS	Global Telecommunication System
IDRC	International Development Research Center
IGOSS	Integrated Global Ocean Services System
IMARPE	Instituto del Mar del Peru
INP	Instituto Nacional de Pesca (Ecuador)
IODE	International Oceanographic Data Exchange, IOC Working Committee on IODE
IOC	Intergovernmental Oceanographic Commission
IPGH	Instituto Panamericano de Geografía e Historia
ISLPP	IGOSS Sea Level Project
JSC	Joint Scientific Committee (WMO/ICSU)
MMS	Marine Meteorological Services

NOAA	National Oceanic and Atmospheric Administration (USA)
OOSDP	Ocean Observing System Development Programme
OPC	Ocean Processes and Climate
OSLR	Ocean Science in Relation to Living Resources
RTH	Regional Telecommunications Hub
SARP	Sardine/Anchovy Recruitment Project
SCOR	Scientific Committee on Oceanic Research
SWFC	South West Fisheries Center, National Marine Fisheries Service (NOAA)
TEMA	Training Education and Mutual Assistance
TOGA	Tropical Ocean and Global Atmosphere Project
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
WCRP	World Climate Research Programme
WOCE	World Ocean Circulation Experiment
WMO	World Meteorological Organization
WW	World Weather Watch