

Intergovernmental Oceanographic Commission

Workshop Report No. 211



 Independent Administrative Institution
National Institute for Environmental Studies

Ocean Surface pCO₂, Data Integration and Database Development

Tsukuba, Japan
14-17 January, 2004

IOCCP Report Number 2

UNESCO

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Ocean Surface pCO₂, Data Integration and Database Development

Tsukuba, Japan, 14-17 January 2004

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(English)

Abstract:

The goals for this workshop were to understand potential sources of error and differences in ocean pCO₂ systems, to develop guidelines for improving the systems and measurement practices, to reach agreements on data and metadata formats and data exchange practices, and to discuss ways in which we could begin to connect existing activities into a coordinated global network capable of producing high-quality, global data sets of pCO₂ and air-sea flux of CO₂. While much of the workshop focused on technical issues, it also addressed the need to go beyond simply connecting existing activities through common practices and to develop an international implementation strategy for a global network of observations. All workshop information and presentations are available at:

http://ioc3.unesco.org/ioccp/Tsukuba2004Results_files/Tsukuba2004Results.htm

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1. Opening and Introduction

Chair Chris Sabine opened the meeting and reviewed the agenda (Annex II). The goals for this workshop were to understand potential sources of error and differences in ocean $p\text{CO}_2$ systems, to develop guidelines for improving the systems and measurement practices, to reach agreements on the appropriate data and metadata contents, formats and data exchange practices, and to discuss ways in which we could begin to connect existing activities into a coordinated global network capable of producing high-quality, global data sets of $p\text{CO}_2$ distributions and air-sea fluxes of CO_2 . While much of the workshop focused on technical issues, it also addressed the need to go beyond simply connecting existing activities through common practices and to develop an international implementation strategy for a global network of observations. The results of the workshop include:

- A technical report of the intercomparison experiment, to be published by CDIAC, entitled “The International Indoor Seawater Pool $p\text{CO}_2$ Intercomparison – Results and recommended practices”. A more concise version of the report may be developed for publication in a peer-reviewed journal.
- The development of an IOCCP recommendation for a standard content structure for metadata and data for ocean $p\text{CO}_2$ measurements
- Agreements on data center coordination and data management
- Agreements on public data release and a system of acknowledgement for data use
- Agreements on the coordination of data integration, synthesis, and modeling activities
- Plans for the development of an implementation strategy for a coordinated global network of surface $p\text{CO}_2$ observations.

2. WORKING GROUP I REPORT: RESULTS FROM THE 2003 INTERCOMPARISON EXPERIMENT

Experimental Set-up – The pool was located at the National Research Institute of Fishery Engineering, Hazaki, Japan, and contained 170,000 liters of coastal seawater adjusted to a salinity of 33. The water was filtered several days before the start of the exercise. Temperatures ranged between 11.0 and 12.5 °C during the 4 days of the experiment.

Groups and System Specifications – *see Appendix 3.*

General Procedure – The intercomparison experiment was carried out over 5 days between March 10-14, 2003. The instruments were run during the night, $x\text{CO}_2$ was calculated, and results were compiled by a data manager and compared and discussed in the afternoon. The $p\text{CO}_2$ levels in the pool were adjusted using NaOH or HCl. NIES provided calibration gases with concentrations of: 271.33, 329.72, 390.11, and 449.85 ppm. In addition, NIES supplied dry air and CO_2 -free gas, which was used as a reference gas.

March 8

Leak tests for standard calibration gases were carried out and data format was checked.

March 10-11 night-time run

The first test started 10 March at 20:00 with pool $p\text{CO}_2$ at 280 ppm. The $p\text{CO}_2$ was increased to 450 ppm at 02:00 on the 11th. At 08:00 on the 11th, data from all systems were recovered and $x\text{CO}_2$ was calculated and compiled by the data manager.

March 11-12 night-time run

The second test started with a pool $p\text{CO}_2$ of 450 ppm at 20:00 measured over 4 hours, then $p\text{CO}_2$ was adjusted to 360 ppm at 00:00, and then to 270 ppm at 04:00 on the 12th. The 270 ppm was used to check the reproducibility of the first test.

March 12 daytime

Some groups checked possible contamination of CO₂ through the equilibrator vent using dry ice and soda lime (CO₂-free air).

March 12-13 night-time run

The third test was carried out by adjusting the *p*CO₂ in the pool to 270 ppm at 20:00 on the 12th, then to 360 ppm at 00:00 and to 450 ppm at 04:00.

March 13 daytime

Time response test was performed by alternating the water intake between the pool (around 450 ppm) and a smaller tank (500 L) with a different *p*CO₂ (around 250 ppm).

March 13-14 night-time run

Temperature dependence test was performed with constant *p*CO₂ at approximately 400 ppm and the temperature was increased by 1.5°C in the pool water.

March 14 daytime

Test for time response continued. The systems were packed and prepared for shipping.

Summary of Discussion of Results:

1. Systems with small equilibrators must have accurate temperature measurement and correction. The underwater pump with 300 L/min flow rate gave a temperature increase of about 0.05 °C. This implies that an onboard pump with a smaller flow rate will give a larger temperature increase (electric heating / water flow rate). Solutions: Thermal insulation, especially for small equilibrators; precise temperature correction; sea chest thermometer must be prior to the water pump.
2. Organic matter decomposition (from accumulation in the equilibrator) gives a positive bias. Solutions: If possible use an equilibrator design without filtration (large inlet or showerhead hole); clean equilibrator and filter unit frequently; use large water flow equilibrators since they experienced relatively small effects even with significant organic matter decomposition.
3. Re-supply air (circulating equilibrators) give positive bias at low *p*CO₂ and negative bias at high *p*CO₂. Solutions: Minimize need for re-supply air; increase equilibrator efficiency; pre-equilibrate the re-supply air; place NDIR in the circulation loop so measured air is returned to equilibrator.
4. Equilibrator pressurization or depressurization (from changing water levels in the equilibrator, flow rate instabilities, etc) can be a major source of noise. Solutions: Precise measurement of equilibrator pressure so corrections can be applied; pump design and optimized alignment of the pump to minimize fluctuations.
5. Reactive equilibrators (membrane equilibration or chemistry sensors having reactive surfaces for CO₂) may have a memory effect under conditions of large and rapid *p*CO₂ change.
6. Temperature differences between the equilibrator air and standard gas temperatures can lead to error. Solutions: Circulation loop design (low enough flow rate to allow accurate temperature reading); thermal insulation of NDIR system enclosure and enough residence time.

Work Plan for Publications:

The group will follow the outline of Meteor Intercomparison (NDP-067) publication except there will be no data associated with publication (technical report, not an NDP)

All agree to use the same A, B, C designations for systems as used in the NDP-067 report to facilitate comparisons between the 1996 and 2003 intercomparisons.

Timeline: The goal is to have first draft by mid April, with a final draft by June in time to make a presentation at the October PICES meeting.

Title: International Indoor Seawater Pool $p\text{CO}_2$ Intercomparison – results and recommended practices

OUTLINE

- I. Introduction [Nojiri]
- II. Description of Exercise [NIES]
 - a. Pool setup
 - i. Water issue (water source, circulation etc.)
 - ii. Temperature issues
 - iii. $p\text{CO}_2$ control
 - iv. Plumbing (pump, including order of systems?)
 - v. Ancillary measurements
 - vi. Separate experimental designs
 - b. Standard Gas
 - i. What they were and how calibrated
 - ii. Plumbing
 - c. Temperature sensors
 - i. NIES supplied sensors
 - ii. Comparison with individual sensors
 - iii. Comparison with pool sensors
 - d. Data handling
 - i. Individual group calculations
 - ii. combined calculations
 - iii. Use of NIES system as reference for comparison
- III. Methods and procedures (summary table and text on similarities and differences, statement on the differences in what the system types measure ($x\text{CO}_2$ vs. $p\text{CO}_2$), references on individual published techniques can be included in appendix)
 - a. Shipboard type systems [Currie]
 - b. In situ type systems [DeGrandpre, Merlivat, Friederich]
- IV. Individual Results (each group summarize results and what they learned) [each individual group will contribute text]
 - i. Differences between this set-up and normal set-up
 - ii. Observed precision
 - iii. response experiment - observed response time
 - iv. dry ice/soda lime experiment - vent contamination
 - v. other individual experiments
 - vi. other issues that came up
 - b. NIES (short and long)
 - c. KEEC
 - d. NOAA
 - e. MBARI Underway (OM decomposition)
 - f. KOREA (calibration problems)

- g. UEA (high standard deviation, calibration jumps in data)
- h. NIWA (calibration)
- i. IFM (temperature gradient, system flooding)
- j. NRIFS (memory)
- k. MBARI mooring
- l. CARIOCA (OM decomposition)
- m. SAMI-CO₂
- V. Overall results [Nojiri]
 - a. Summary of results with combined plots and tables
- VI. Recommended Practices
 - a. Design recommendations
 - i. Ship issues/water handling (location of intake, temperature contamination-insulating lines, equilibrators, cleaning of lines, etc.) [Kortzinger, Sabine]
 - ii. Electronics package/air handling (detectors, wet vs. dry measurements, pumps, valves, tubing, air filtering, flow rates, etc.) [Luger]
 - iii. Air measurements (why, issues, validity of using ship as a platform, wind direction filtering) [Nojiri]
 - iv. Initial Data handling (important parameters to log, useful ancillary measurements, etc.) [Friederich]
 - v. Calibration [Nojiri]
 - 1. standard gases
 - 2. temperature
 - 3. pressure
 - vi. QA/QC [Sabine]
 - 1. tests to evaluate system
 - 2. data checks
 - 3. intercomparison exercises
 - b. Potential errors to watch out for [NIES]
 - i. Temperature issues
 - ii. OM decomposition
 - iii. Re-supply air issues
 - iv. Equilibrator pressure issues
 - v. Memory
 - vi. Gas standard temp vs. sample temp
 - To Do by end of February:
 - DeGrandpre – send revised data to Nojiri
 - Friederich – send time response
 - Merlivat – send data file
 - UEA – Check data (additional despiking?)
 - Nojiri – send general data to all participants

3. WORKING GROUP II: STANDARDIZATION ISSUES – PROPOSED PRACTICES FOR pCO₂ DATA AND METADATA REPORTING

The following metadata and data file contents were approved by the workshop and will be promoted as the **IOCCP Recommended Format** upon final revision. Alex Kozyr at the Carbon Dioxide Information and Analysis Center (CDIAC) Ocean CO₂ Project will create an easy-to-use Web-based metadata reporting form to facilitate this uniform approach. (*Note: for information about data center cooperation, data management, and data set citations, please see Working Group III report, below*). The Working Group discussed the necessity of using a uniform approach to estimating overall uncertainty for CO₂ measurements, and recommended that a working group be formed to develop and propose guidelines.

METADATA (Separate fields)

(Bold = Required Information ; Regular Text = Additional information that is highly desirable.)

Class of data: Surface ocean carbon dioxide concentrations

Dataset identifier

Statement of how to cite dataset (**see also WG III report*)

Measurement platform identifier: Ship / Buoy / Platform

Cruise Information

Project Information

Scientist responsible for technical quality of this dataset

Full name of person

Contact information for that person

Affiliation when data were collected

Contact person for this dataset

Full name of person

Contact information for that person

Timestamp for initial submission of dataset

Timestamp for most recent update of dataset

Time period the data set refers to (generated automatically from the dataset)

Geographic area the dataset refers to (generated automatically from the dataset)

List of variables that are included in this dataset (for each variable, state units)

Narrative description of system design including

1. Sampling locations

Location of water intake

Location of air intakes

Location of pressure sensors (e.g. height above sea-level)

2. Layout of measurement sub-systems (block diagram)

Narrative statement identifying measurement method for each required parameter

Citation to publication documenting method used

Measurement sequence/timing/averaging information

Additional quality information?

For measurements of carbon dioxide provide:

Analytical Instrument Manufacturer/Model

Description of any additional environmental control

Resolution of measurement

Estimated overall uncertainty of measurement

List of calibration gases used, documenting:

Traceability to an internationally recognized scale (including date / place

of last calibration made)
Uncertainty of assigned value of each calibration gas

For each sensor for Pressure / Temperature / Salinity provide:

Manufacturer/Model

Resolution

Uncertainty of measured value

Document traceability to an internationally recognized scale (including date / place of last calibration made)

Bibliography

DATA FILE FORMAT

(Focuses on results from underway measurement systems.)

I. REQUIRED ELEMENTS

Measured atmospheric information

Date / Time of Measurement (UTC)

Position of measurement

- Latitude in decimal degrees (North is positive, South is negative)
- Longitude in decimal degrees (East is positive, West is negative)

Mole fraction of CO₂ in ambient atmosphere ($\mu\text{mol mol}^{-1}$ in dry air)

Atmospheric pressure at sea-surface pressure (hPa)

Measured seawater information

Date / Time of Measurement (UTC)

Position of measurement

- Latitude in decimal degrees (North is positive, South is negative)
- Longitude in decimal degrees (East is positive, West is negative)

Mole fraction of CO₂ in air from equilibrator ($\mu\text{mol mol}^{-1}$)

Mole fraction of H₂O in air from equilibrator (mmol mol^{-1})

Pressure of equilibration = the pressure in the equilibration vessel (hPa)

Temperature of equilibration = the temperature of the seawater in equilibrator at the time of equilibration (°C)

Sea surface temperature (in situ) (°C)

Sea surface salinity (in situ) (Practical Salinity Scale)

II. DERIVED PARAMETERS

Atmosphere

$x(\text{CO}_2)$ value for the ambient atmosphere ($\mu\text{mol mol}^{-1}$ in dry air); interpolated to match the date/time/position of the seawater information in this section

Seawater

$f(\text{CO}_2)$ for air in equilibrium with seawater at sea surface temperature (μatm)

Note: the air will be at 100% humidity

$p(\text{CO}_2)$ for air in equilibrium with seawater at sea surface temperature (μatm)

Note: the air will be at 100% humidity

$x(\text{CO}_2)$ for air in equilibrium with the seawater at sea surface temperature and 1013.25 hPa applied pressure (expressed as $\mu\text{mol mol}^{-1}$ in dry air)

III. OPTIONAL ANCILLARY INFORMATION

Quality flags

Detailed Ship's Heading Information

Other measurements (chemical / physical / meteorological)

4. **WORKING GROUP III: DATA INTEGRATION AND INVENTORY OF OBSERVATIONS**

Summary of Discussions and Decisions on Data Integration and Data Networking:

Data Integration

The goal is to estimate basin scale annual air-sea flux of CO₂ to better than ±0.2 Pg Carbon. Required data sets include seasonal to inter-annual basin-scale syntheses; 10 year global scale syntheses.

Data Release / Data Center Networking

Data sets (providing the IOCCP-recommended information) should be sent to CDIAC World Data Center for Atmospheric Trace Gases (either directly or via other World, National or project data centers) no later than 2 years after the end of the cruise.

Data Citations and Acknowledgements

When data are submitted to the data center, the contributor should provide information on how the data set is to be cited or acknowledged in publications using the data. For data submitted < 2 years before end of program, CDIAC will limit access to the data until the contributor has been contacted. As a courtesy to the original data contributors, it should become common practice for individuals who prepare scientific products based (even in part) on a particular dataset to inform the contact person for that dataset of this use of the dataset.

Data Integration and Synthesis Activities

Data integration and synthesis activities (such as developing basin-scale and global data sets) in the next few years should be coordinated and carried out as part of SOLAS Focus 3 (especially 3.1), with integration organized around regional groups. Integration will also cover coastal areas.

Summary of Discussions on Future Needs for Data Integration:

The workshop participants concluded that meeting the data integration goals outlined above requires an international implementation strategy. International activities must be coordinated to develop a comprehensive global network by sustaining existing observation programs and developing new programs following a strategy based on the analysis of the spatial and temporal resolution of measurements needed to meet global data set goals. International programs and national funding agencies need an internationally-agreed upon implementation strategy in order to evaluate national efforts in an international context and to prioritize projects that contribute to the global network. The workshop participants outlined the necessary elements for developing a coordinated network of surface ocean CO₂ observations, and noted that many of the elements already exist.

Future Needs = A Global Ocean Carbon Observing System.

- Surface *p*CO₂ Network
- Hydrographic Sections
- Time Series Stations
- Remote Sensing

The Surface *p*CO₂ Network – Developing an Implementation Strategy

(*Grey Italics* = elements needing further work; **Bold Text** = elements we already have).

(Note: the following list was developed at the workshop to place existing coordination efforts and agreements in the context of a global system. It should not be considered as an outline for the implementation strategy.)

1. **Analysis of the spatial and temporal resolution required for the global system – LSCOP Annexes D & E define spatial and temporal resolution required to meet the goals of producing high-quality basin-scale data sets for climate research. This analysis may be used as a first estimate, but has several weaknesses and should be redone to include high-frequency variability.**
2. **The Network Design – based on the analysis from #1 above, define needs in each basin or sub-basin in terms of number of VOS, time series, and drifters? Stringent adherence to quality (needs to be defined globally and for specific measurement platforms).**
3. **The Inventory – existing programs that can be considered to be the initial / developing network. <http://ioc.unesco.org/ioccp>**
4. **Assessment of Gaps – based on the network design and the inventory, where are the critical gaps in the global system? Must consider existing programs and plans for other parts of the observing system (e.g., time series network).**
5. **Implementation Strategy and System Feedback – Based on the analysis, network design, inventory, and analysis of gaps: how to prioritise and fill gaps and sustain existing elements; MUST INCLUDE plans for data analysis, synthesis, modelling, etc. (e.g., via SOLAS Focus 3) required as feedbacks into the system design to ensure that the network is meeting scientific requirements. Research should also include development of interpolation techniques and new approaches / technology (flask sampling, etc) to fill gaps.**
6. **Data Management Plans – where data should be sent, what is the release and exchange policy, what methodologies to follow, what standards to use, what data center(s) manage the network, data formats, file formats, metadata requirements, etc. (based on decisions from this workshop)**
7. **Development Timeframe and Operational Costs – timeframe goals for implementation of the global network and estimation of incremental development and maintenance costs.**
8. **Develop a programmatic link and advocacy for integration of this project into global observing system plans – develop the system as a pilot project under IOCCP / OOPC / GCOS (GOOS). (has already been suggested / requested by OOPC).**

The workshop participants recommended that the IOCCP develop a draft implementation strategy for a surface ocean CO₂ pilot project. While the LSCOP report appendices (D & E) provide a good first estimate of the required temporal and spatial resolution, the methods used in the analysis considerably smooth the data. The workshop participants recommended to proceed with the first draft of the implementation strategy based on this analysis, but to carry out a more rigorous analysis as soon as possible (in parallel). The IOCCP will investigate funding possibilities for this activity (estimated to be 1-2 months salary support).

ANNEX I

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ANNEX II

AGENDA

Wednesday, January 14

10am – 1pm	<p>Introductory Talks Global view of ocean surface CO₂ observations (Taro Takahashi) Status of database and data integration (Alex Kozyr) Status of moored measurement technology (Francisco Chavez) Status of underway measurement technology (Rik Wanninkhof)</p>
1pm – 2pm	Lunch break
2pm – 3:30pm	<p><u>Session I</u> – Intercomparison Results Overview for intercomparison results Previous intercomparison (Arne Kortzinger) March 2003 intercomparison (Yukihiro Nojiri) Open Discussion</p>
4pm – 6pm	<p><u>Session II</u> – Data Integration Inventory of observations and data status North/Eq./South Pacific (Dick Feely and Japanese expert) North/Eq./South Atlantic (Nathalie LeFevre) Indian and Southern Oceans (Nicolas Metzl) Arctic oceans (Truls Johannessen) Coastal seas (Taro Takahashi)</p>

Thursday, January 15

9 am – 1pm	<p>Session III – Intercomparison Workshop Group Presentations (11 groups; 10-15 minute presentations) Session Chairs / Discussion Leaders: Andrew Dickson and Alex Kozyr</p>
1pm – 2pm	Lunch break
2pm – 6pm	<p>Session IV – Standardization Issues (10-15 minute introductions followed by discussion) Standardization – adopting SI units (Taro Takahashi) Metadata reporting – agreements on a standard format and procedures (Alex Kozyr) Standard data formatting (Dorothee Bakker and Andrew Dickson) Data release – minimum items to report (Chris Sabine) Data integration and networking (Alex Kozyr)</p>

Friday, January 16

9 am – 1 pm	<p>Plenary – Instructions to Working / Drafting Groups (~30 minutes) Working Groups: <u>Working Group I</u> Recommendations for improvements to underway operations Publication plans <u>Working Group II</u> Drafting metadata form and agreements on standardization, data release, data center cooperation, and integration activities or needs</p>
1pm – 2pm	Lunch break
2pm – 6pm	<p>Plenary: Presentation of drafting work from WG II and discussion, modification, approval by group Next steps:</p>

	<ul style="list-style-type: none">• How to accomplish international joint planning of observations and how to fill data gaps• How to communicate the results of the workshop with the international community
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IOC Workshop Reports

The Scientific Workshops of the Intergovernmental Oceanographic Commission are sometimes jointly sponsored with other intergovernmental or non-governmental bodies. In most cases, IOC assures responsibility for printing, and copies may be requested from:

Intergovernmental Oceanographic Commission – UNESCO
1, rue Miollis, 75732 Paris Cedex 15, France

No.	Title	Languages	No.	Title	Languages	No.	Title	Languages
1	CCOP-IOC, 1974, Metallogenesis, Hydrocarbons and Tectonic Patterns in Eastern Asia (Report of the IDOE Workshop on); Bangkok, Thailand, 24-29 September 1973 UNDP (CCOP).	E (out of stock)		5-9 June 1978 (UNESCO reports in marine sciences, No. 5, published by the Division of Marine Sciences, UNESCO).		40	24-29 September 1985. IOC Workshop on the Technical Aspects of Tsunami Analysis, Prediction and Communications; Sidney, B.C., Canada, 29-31 July 1985.	E
2	CICAR Ichthyoplankton Workshop, Mexico City, 16-27 July 1974 (UNESCO Technical Paper in Marine Sciences, No. 20).	E (out of stock) S (out of stock)	20	Second CCOP-IOC Workshop on IDOE Studies of East Asia Tectonics and Resources; Bandung, Indonesia, 17-21 October 1978	E	40 Suppl.	First International Tsunami Workshop on Tsunami Analysis, Prediction and Communications, Submitted Papers; Sidney, B.C., Canada, 29 July-1 August 1985.	E
3	Report of the IOC/GFCM/ICSEM International Workshop on Marine Pollution in the Mediterranean; Monte Carlo, 9-14 September 1974.	E, F E (out of stock)	21	Second IDOE Symposium on Turbulence in the Ocean; Liège, Belgium, 7-18 May 1979.	E, F, S, R	41	First Workshop of Participants in the Joint	E
4	Report of the Workshop on the Phenomenon known as 'El Niño'; Guayaquil, Ecuador, 4-12 December 1974.	E (out of stock) S (out of stock)	22	Third IOC/WMO Workshop on Marine Pollution Monitoring; New Delhi, 11-15 February 1980.	E, F, S, R		FAO/IOC/WHO/IAEA/UNEP Project on Monitoring of Pollution in the Marine Environment of the West and Central African Region (WACAF/2); Dakar, Senegal, 28 October-	
5	IDOE International Workshop on Marine Geology and Geophysics of the Caribbean Region and its Resources; Kingston, Jamaica, 17-22 February 1975	E (out of stock) S	23	WESTPAC Workshop on the Marine Geology and Geophysics of the North-West Pacific; Tokyo, 27-31 March 1980.	E, R	43	1 November 1985.	E
6	Report of the CCOP/SOPAC-IOC IDOE International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific; Suva, Fiji, 1-6 September 1975	E	24	WESTPAC Workshop on Coastal Transport of Pollutants; Tokyo, Japan, 27-31 March 1980.	E (out of stock)	44	IOC Workshop on the Results of MEDALPEX and Future Oceanographic Programmes in the Western Mediterranean; Venice, Italy, 23-25 October 1985.	E (out of stock) S
7	Report of the Scientific Workshop to Initiate Planning for a Co-operative Investigation in the North and Central Western Indian Ocean, organized within the IDOE under the sponsorship of IOC/FAO (IOFC)/UNESCO/ EAC; Nairobi, Kenya, 25 March-2 April 1976.	E, F, S, R	25	Workshop on the Inter-calibration of Sampling Procedures of the IOC/ WMO/UNEP Pilot Project on Monitoring Background Levels of Selected Pollutants in Open-Ocean Waters; Bermuda, 11-26 January 1980.	E (Superseded by IOC Technical Series No.22)	44	IOC-FAO Workshop on Recruitment in Tropical Coastal Demersal Communities; Ciudad del Carmen, Campeche, Mexico, 21-25 April 1986.	E
8	Joint IOC/FAO (IPFC)/UNEP International Workshop on Marine Pollution in East Asian Waters; Penang, 7-13 April 1976	E (out of stock)	26	IOC Workshop on Coastal Area Management in the Caribbean Region; Mexico City, 24 September- 5 October 1979.	E, S	44 Suppl.	IOC-FAO Workshop on Recruitment in Tropical Coastal Demersal Communities, Submitted Papers; Ciudad del Carmen, Campeche, Mexico, 21-25 April 1986.	E
9	IOC/CMG/SCOR Second International Workshop on Marine Geoscience; Mauritius 9-13 August 1976.	E, F, S, R	27	CCOP/SOPAC-IOC Second International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific; Noumea, New Caledonia, 9-15 October 1980.	E	45	IOCARIBE Workshop on Physical Oceanography and Climate; Cartagena, Colombia, 19-22 August 1986.	E
10	IOC/WMO Second Workshop on Marine Pollution (Petroleum) Monitoring; Monaco, 14-18 June 1976	E, F E (out of stock)	28	FAO/IOC Workshop on the effects of environmental variation on the survival of larval pelagic fishes. Lima, 20 April-5 May 1980.	E	46	Reunión de Trabajo para Desarrollo del Programa "Ciencia Oceánica en Relación a los Recursos No Vivos en la Región del Atlántico Sud-occidental"; Porto Alegre, Brasil, 7-11 de abril de 1986.	S
11	Report of the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions; Port of Spain, Trinidad, 13-17 December 1976.	E, S (out of stock)	29	WESTPAC Workshop on Marine Biological Methodology; Tokyo, 9-14 February 1981.	E	47	IOC Symposium on Marine Science in the Western Pacific: The Indo-Pacific Convergence; Townsville, 1-6 December 1966	E
11 Suppl.	Collected contributions of invited lecturers and authors to the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions; Port of Spain, Trinidad, 13-17 December 1976	E (out of stock), S	30	International Workshop on Marine Pollution in the South-West Atlantic; Montevideo, 10-14 November 1980.	E (out of stock) S	48	IOCARIBE Mini-Symposium for the Regional Development of the IOC-UN (OETB) Programme on 'Ocean Science in Relation to Non-Living Resources (OSNLR)'; Havana, Cuba, 4-7 December 1986.	E, S
12	Report of the IOCARIBE Interdisciplinary Workshop on Scientific Programmes in Support of Fisheries Projects; Fort-de-France, Martinique, 28 November-2 December 1977.	E, F, S	31	Third International Workshop on Marine Geoscience; Heidelberg, 19-24 July 1982.	E, F, S	49	AGU-IOC-WMO-CPPS Chapman Conference: An International Symposium on 'El Niño'; Guayaquil, Ecuador, 27-31 October 1986.	E
13	Report of the IOCARIBE Workshop on Environmental Geology of the Caribbean Coastal Area; Port of Spain, Trinidad, 16-18 January 1978.	E, S	32	UNU/IOC/UNESCO Workshop on International Co-operation in the Development of Marine Science, and the Transfer of Technology in the context of the New Ocean Regime; Paris, France, 27 September-1 October 1982.	E, F, S	50	CCALR-IOC Scientific Seminar on Antarctic Ocean Variability and its Influence on Marine Living Resources, particularly Krill (organized in collaboration with SCAR and SCOR); Paris, France, 2-6 June 1987	E
14	IOC/FAO/WHO/UNEP International Workshop on Marine Pollution in the Gulf of Guinea and Adjacent Areas; Abidjan, Côte d'Ivoire, 2-9 May 1978	E, F	33	Workshop on the IREP Component of the IOC Programme on Ocean Science in Relation to Living Resources (OSLR); Halifax, 26-30 September 1983.	E	51	CCOP/SOPAC-IOC Workshop on Coastal Processes in the South Pacific Island Nations; Lae, Papua-New Guinea, 1-8 October 1987.	E
15	CPPS/FAO/IOC/UNEP International Workshop on Marine Pollution in the South-East Pacific; Santiago de Chile, 6-10 November 1978.	E (out of stock)	34	IOC Workshop on Regional Co-operation in Marine Science in the Central Eastern Atlantic (Western Africa); Tenerife, 12-17 December, 1963.	E, F, S	52	SCOR-IOC-UNESCO Symposium on Vertical Motion in the Equatorial Upper Ocean and its Effects upon Living Resources and the Atmosphere; Paris, France, 6-10 May 1985.	E
16	Workshop on the Western Pacific, Tokyo, 19-20 February 1979.	E, F, R	35	CCOP/SOPAC-IOC-UNU Workshop on Basic Geo-scientific Marine Research Required for Assessment of Minerals and Hydrocarbons in the South Pacific; Suva, Fiji, 3-7 October 1983.	E	53	IOC Workshop on the Biological Effects of Pollutants; Oslo, 11-29 August 1986.	E
17	Joint IOC/WMO Workshop on Oceanographic Products and the IGOS Data Processing and Services System (IDPSS); Moscow, 9-11 April 1979.	E	36	IOC/FAO Workshop on the Improved Uses of Research Vessels; Lisbon, Portugal, 28 May-2 June 1984.	E	54	Workshop on Sea-Level Measurements in Hostile Conditions; Bidston, UK, 28-31 March 1988.	E
17 suppl.	Papers submitted to the Joint IOC/WMO Seminar on Oceanographic Products and the IGOS Data Processing and Services System; Moscow, 2-6 April 1979.	E	36 Suppl.	Papers submitted to the IOC/FAO Workshop on the Improved Uses of Research Vessels; Lisbon, 28 May-2 June 1984	E	55	IBCCA Workshop on Data Sources and Compilation, Boulder, Colorado, 18-19 July 1988.	E
18	IOC/UNESCO Workshop on Syllabus for Training Marine Technicians; Miami, U.S.A., 22-26 May 1978 (UNESCO reports in marine sciences, No. 4 published by the Division of Marine Sciences, UNESCO)	E (out of stock), F, S (out of stock), R	37	IOC/UNESCO Workshop on Regional Co-operation in Marine Science in the Central Indian Ocean and Adjacent Seas and Gulfs; Colombo, 8-13 July 1985.	E	56	IOC-FAO Workshop on Recruitment of Penaeid Prawns in the Indo-West Pacific Region (PREP); Cleveland, Australia, 24-30 July 1988.	E
19	IOC Workshop on Marine Science Syllabus for Secondary Schools; Llantwit Major, Wales, U.K.,	E (out of stock), S, R, Ar	38	IOC/ROPME/UNEP Symposium on Fate and Fluxes of Oil Pollutants in the Kuwait Action Plan Region; Basrah, Iraq, 8-12 January 1984.	E	57	IOC Workshop on International Co-operation in the Study of Red Tides and Ocean Blooms; Takamatsu, Japan, 16-17 November 1987.	E
			39	CCOP (SOPAC)-IOC-IFREMER-ORSTOM Workshop on the Uses of Submersibles and Remotely Operated Vehicles in the South Pacific; Suva, Fiji,	E	58 Suppl.	International Workshop on the Technical Aspects of the Tsunami Warning System; Novosibirsk, USSR, 4-5 August 1989.	E
						58	Second International Workshop on the Technical Aspects of Tsunami Warning Systems, Tsunami Analysis, Preparedness,	E

No.	Title	Languages	No.	Title	Languages	No.	Title	Languages
59	Observation and Instrumentation. Submitted Papers; Novosibirsk, USSR, 4-5 August 1989. IOC-UNEP Regional Workshop to Review Priorities for Marine Pollution Monitoring Research, Control and Abatement in the Wider Caribbean; San José, Costa Rica, 24-30 August 1989.	E, F, S	83	Meeting for the Organization of an International Conference on Coastal Change; Bordeaux, France, 30 September-2 October 1992. IOC Workshop on Donor Collaboration in the Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region; Brussels, Belgium, 12-13 October 1992.	E	103	Liège, Belgium, 5-9 May 1994. IOC Workshop on GIS Applications in the Coastal Zone Management of Small Island Developing States; Barbados, 20-22 April 1994.	E
60	IOC Workshop to Define IOCARIBE-TRODERP proposals; Caracas, Venezuela, 12-16 September 1989.	E	84	Workshop on Atlantic Ocean Climate Variability; Moscow, Russian Federation, 13-17 July 1992.	E	104	Workshop on Integrated Coastal Management; Dartmouth, Canada, 19-20 September 1994.	E
61	Second IOC Workshop on the Biological Effects of Pollutants; Bermuda, 10 September-2 October 1988.	E	85	IOC Workshop on Coastal Oceanography in Relation to Integrated Coastal Zone Management; Kona, Hawaii, 1-5 June 1992.	E	105	BORDOMER 95: Conference on Coastal Change; Bordeaux, France, 6-10 February 1995.	E
62	Second Workshop of Participants in the Joint FAO-IOC-WHO-IAEA-UNEP Project on Monitoring of Pollution in the Marine Environment of the West and Central African Region; Accra, Ghana, 13-17 June 1988.	E	86	International Workshop on the Black Sea; Varna, Bulgaria, 30 September - 4 October 1991.	E	105 Suppl.	Conference on Coastal Change: Proceedings; Bordeaux, France, 6-10 February 1995.	E
63	IOC/WESTPAC Workshop on Co-operative Study of the Continental Shelf Circulation in the Western Pacific; Bangkok, Thailand, 31 October-3 November 1989.	E	87	Taller de trabajo sobre efectos biológicos del fenómeno «El Niño» en ecosistemas costeros del Pacífico Sudeste; Santa Cruz, Galápagos, Ecuador, 5-14 de octubre de 1989.	S only (summary in E, F, S)	106	IOC/WESTPAC Workshop on the Paleographic Map; Bali, Indonesia, 20-21 October 1994.	E
64	Second IOC-FAO Workshop on Recruitment of Penaeid Prawns in the Indo-West Pacific Region (PREP); Phuket, Thailand, 25-31 September 1989.	E	88	IOC-CEC-ICSU-ICES Regional Workshop for Member States of Eastern and Northern Europe (GODAR Project); Obninsk, Russia, 17-20 May 1993.	E	107	IOC-ICSU-NIO-NOAA Regional Workshop for Member States of the Indian Ocean - GODAR-III; Dona Paula, Goa, India, 6-9 December 1994.	E
65	Second IOC Workshop on Sardine/Anchovy Recruitment Project (SARP) in the Southwest Atlantic; Montevideo, Uruguay, 21-23 August 1989.	E	89	IOC-ICSEM Workshop on Ocean Sciences in Non-Living Resources; Perpignan, France, 15-20 October 1990.	E	108	UNESCO-IHP-IOC-IAEA Workshop on Sea-Level Rise and the Multidisciplinary Studies of Environmental Processes in the Caspian Sea Region; Paris, France, 9-12 May 1995.	E
66	IOC ad hoc Expert Consultation on Sardine/Anchovy Recruitment Programme; La Jolla, California, U.S.A., 1989.	E	90	IOC Seminar on Integrated Coastal Management; New Orleans, U.S.A., 17-18 July 1993.	E	108 Suppl.	UNESCO-IHP-IOC-IAEA Workshop on Sea-Level Rise and the Multidisciplinary Studies of Environmental Processes in the Caspian Sea Region; Submitted Papers; Paris, France, 9-12 May 1995.	E
67	Interdisciplinary Seminar on Research Problems in the IOCARIBE Region; Caracas, Venezuela, 28 November-1 December 1989.	E (out of stock)	91	Hydroblack'91 CTD Intercalibration Workshop; Woods Hole, U.S.A., 1-10 December 1991.	E	109	First IOC-UNEP CEPOL Symposium; San José, Costa Rica, 14-15 April 1993.	E
68	International Workshop on Marine Acoustics; Beijing, China, 26-30 March 1990.	E	92	Réunion de travail IOCEA-OSNLR sur le Projet « Budgets sédimentaires le long de la côte occidentale d'Afrique » Abidjan, Côte d'Ivoire, 26-28 juin 1991.	E	110	IOC-ICSU-CEC regional Workshop for Member States of the Mediterranean - GODAR-IV (Global Oceanographic Data Archeology and Rescue Project) Foundation for International Studies, University of Malta, Valletta, Malta, 25-28 April 1995.	E
69	IOC-SCAR Workshop on Sea-Level Measurements in the Antarctica; Leningrad, USSR, 28-31 May 1990.	E	93	IOC-UNEP Workshop on Impacts of Sea-Level Rise due to Global Warming. Dhaka, Bangladesh, 16-19 November 1992.	E	111	Chapman Conference on the Circulation of the Intra-Americas Sea; La Parguera, Puerto Rico, 22-26 January 1995.	E
69 Suppl.	IOC-SCAR Workshop on Sea-Level Measurements in the Antarctica; Submitted Papers; Leningrad, USSR, 28-31 May 1990.	E	94	BMTC-IOC-POLARMAR International Workshop on Training Requirements in the Field of Eutrophication in Semi-enclosed Seas and Harmful Algal Blooms, Bremerhaven, Germany, 29 September-3 October 1992.	E	112	IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials (GESREM) Workshop; Miami, U.S.A., 7-8 December 1993.	E
70	IOC-SAREC-UNEP-FAO-IAEA-WHO Workshop on Regional Aspects of Marine Pollution; Mauritius, 29 October - 9 November 1990.	E	95	SAREC-IOC Workshop on Donor Collaboration in the Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region; Brussels, Belgium, 23-25 November 1993.	E	113	IOC Regional Workshop on Marine Debris and Waste Management in the Gulf of Guinea; Lagos, Nigeria, 14-16 December 1994.	E
71	IOC-FAO Workshop on the Identification of Penaeid Prawn Larvae and Postlarvae; Cleveland, Australia, 23-28 September 1990.	E	96	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Zanzibar, United Republic of Tanzania, 17-21 January 1994.	E	114	International Workshop on Integrated Coastal Zone Management (ICZM) Karachi, Pakistan, 10-14 October 1994.	E
72	IOC/WESTPAC Scientific Steering Group Meeting on Co-Operative Study of the Continental Shelf Circulation in the Western Pacific; Kuala Lumpur, Malaysia, 9-11 October 1990.	E	96 Suppl.	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Submitted Papers 1. Coastal Erosion; Zanzibar, United Republic of Tanzania 17-21 January 1994.	E	115	IOC/GLOSS-IAPSO Workshop on Sea Level Variability and Southern Ocean Dynamics; Bordeaux, France, 31 January 1995.	E
73	Expert Consultation for the IOC Programme on Coastal Ocean Advanced Science and Technology Study; Liège, Belgium, 11-13 May 1991.	E	96 Suppl.	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Submitted Papers 2. Sea Level; Zanzibar, United Republic of Tanzania 17-21 January 1994.	E	116	IOC/WESTPAC International Scientific Symposium on Sustainability of Marine Environment: Review of the WESTPAC Programme, with Particular Reference to ICAM, Bali, Indonesia, 22-26 November 1994.	E
74	IOC-UNEP Review Meeting on Oceanographic Processes of Transport and Distribution of Pollutants in the Sea; Zagreb, Yugoslavia, 15-18 May 1989.	E	97	IOC Workshop on Small Island Oceanography in Relation to Sustainable Economic Development and Coastal Area Management of Small Island Developing States; Fort-de-France, Martinique, 8-10 November, 1993.	E	117	Joint IOC-CIDA-Sida (SAREC) Workshop on the Benefits of Improved Relationships between International Development Agencies, the IOC and other Multilateral Inter-governmental Organizations in the Delivery of Ocean, Marine Affairs and Fisheries Programmes; Sidney B.C., Canada, 26-28 September 1995.	E
75	IOC-SCOR Workshop on Global Ocean Ecosystem Dynamics; Solomons, Maryland, U.S.A., 29 April-2 May 1991.	E	98	CoMSBlack '92A Physical and Chemical Intercalibration Workshop; Erdemli, Turkey, 15-29 January 1993.	E	118	IOC-UNEP-NOAA-Sea Grant Fourth Caribbean Marine Debris Workshop; La Romana, Santo Domingo, 21-24 August 1995.	E
76	IOC/WESTPAC Scientific Symposium on Marine Science and Management of Marine Areas of the Western Pacific; Penang, Malaysia, 2-6 December 1991.	E	99	IOC-SAREC Field Study Exercise on Nutrients in Tropical Marine Waters; Mombasa, Kenya, 5-15 April 1994.	E	119	IOC Workshop on Ocean Colour Data Requirements and Utilization; Sydney B.C., Canada, 21-22 September 1995.	E
77	IOC-SAREC-KMFRI Regional Workshop on Causes and Consequences of Sea-Level Changes on the Western Indian Ocean Coasts and Islands; Mombasa, Kenya, 24-28 June 1991.	E	100	IOC-SOA-NOAA Regional Workshop for Member States of the Western Pacific - GODAR-II (Global Oceanographic Data Archeology and Rescue Project); Tianjin, China, 8-11 March 1994.	E	120	International Training Workshop on Integrated Coastal Management; Tampa, Florida, U.S.A., 15-17 July 1995.	E
78	IOC-CEC-ICES-WMO-ICSU Ocean Climate Data Workshop Goddard Space Flight Center; Greenbelt, Maryland, U.S.A., 18-21 February 1992.	E	101	IOC Regional Science Planning Workshop on Harmful Algal Blooms; Montevideo, Uruguay, 15-17 June 1994.	E	121	Atelier régional IOC-CERESCOR sur la gestion intégrée des zones littorales (ICAM), Conakry, Guinée, 18-22 décembre 1995.	F
79	IOC/WESTPAC Workshop on River Inputs of Nutrients to the Marine Environment in the WESTPAC Region; Penang, Malaysia, 26-29 November 1991.	E	102	First IOC Workshop on Coastal Ocean Advanced Science and Technology Study (COASTS);	E	122	IOC-EU-BSH-NOAA-(WDC-A) International Workshop on Oceanographic Biological and Chemical Data Management, Hamburg, Germany, 20-23 May 1996.	E
80	IOC-SCOR Workshop on Programme Development for Harmful Algae Blooms; Newport, U.S.A., 2-3 November 1991.	E			E	123	Second IOC Regional Science Planning Workshop on Harmful Algal Blooms in South America; Mar del Plata, Argentina, 30 October-1 November 1995.	E, S
81	Joint IAPSO-IOC Workshop on Sea Level Measurements and Quality Control; Paris, France, 12-13 October 1992.	E			E	124	GLOBEC-IOC-SAHFOS-MBA Workshop on the Analysis of Time Series with Particular Reference to the Continuous Plankton Recorder Survey; Plymouth, U.K., 4-7 May 1993.	E
82	BORDOMER 92: International Convention on Rational Use of Coastal Zones. A Preparatory	E			E	125	Atelier sous-régional de la COI sur les ressources marines vivantes du Golfe de Guinée; Cotonou, Bénin, 1-4 juillet 1996.	E

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126	IOC-UNEP-PERSGA-ACOPS-IUCN Workshop on Oceanographic Input to Integrated Coastal Zone Management in the Red Sea and Gulf of Aden, Jeddah, Saudi Arabia, 8 October 1995.	E		Workshop on Atmospheric Inputs of Pollutants to the Marine Environment Qingdao, China, 24-26 June 1998		187	Geological and Biological Processes at deep-sea European Margins and Oceanic Basins, Bologna, Italy, 2-6 February 2003	E
127	IOC Regional Workshop for Member States of the Caribbean and South America GODAR-V (Global Oceanographic Data Archeology and Rescue Project); Cartagena de Indias, Colombia, 8-11 October 1996.	E	154	IOC-Sida-Flanders-SFRI Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA project) Capetown, South Africa, 30 November-11 December 1998.	E	188	Proceedings of 'The Ocean Colour Data' Symposium, Brussels, Belgium, 25-27 November 2002	E
128	Atelier IOC-Banque Mondiale-Sida/SAREC-ONE sur la Gestion Intégrée des Zones Côtières ; Nosy Bé, Madagascar, 14-18 octobre 1996.	E	155	Science of the Mediterranean Sea and its applications UNESCO, Paris 29-31 July 1997	E	189	Workshop for the Formulation of a Draft Project on Integrated Coastal Management (ICM) in Latin America and the Caribbean (LAC), Cartagena, Colombia, 23-25 October 2003	E F <i>(electronic copy only)</i>
129	Gas and Fluids in Marine Sediments, Amsterdam, the Netherlands; 27-29 January 1997.	E	156	IOC-LUC-KMFRI Workshop on RECOSCIX-WIO in the Year 2000 and Beyond, Mombasa, Kenya, 12-16 April 1999	E		Taller de Formulación de un Anteproyecto de Manejo Costero Integrado (MCI) en América Latina y el Caribe (ALC), Cartagena, Colombia, 23-25 de Octubre de 2003	
130	Atelier régional de la COI sur l'océanographie côtière et la gestion de la zone côtière ;Moroni, RFI des Comores, 16-19 décembre 1996.	E	157	'98 IOC-KMI International Workshop on Integrated Coastal Management (ICM), Seoul, Republic of Korea 16-18 April 1998	E	190	First ODINCARSA Planning Workshop for Caribbean Islands, Christchurch, Barbados, 15-18 December 2003	E <i>(electronic copy only)</i>
131	GOOS Coastal Module Planning Workshop; Miami, USA, 24-28 February 1997	E	158	The IOCARIBE Users and the Global Ocean Observing System (GOOS) Capacity Building Workshop, San José, Costa Rica, 22-24 April 1999	E	191	North Atlantic and Labrador Sea Margin Architecture and Sedimentary Processes — International Conference and Twelfth Post-cruise Meeting of the Training-through-research Programme, Copenhagen, Denmark, 29-31 January 2004	E
132	Third IOC-FANSA Workshop; Punta-Arenas, Chile, 28-30 July 1997	S/E	159	Oceanic Fronts and Related Phenomena (Konstantin Fedorov Memorial Symposium) — Proceedings, Pushkin, Russian Federation, 18-22 May 1998	E	192	Regional Workshop on Coral Reefs Monitoring and Management in the ROPME Sea Area, Iran I.R., 14-17 December 2003	E <i>(under preparation)</i>
133	Joint IOC-CIESM Training Workshop on Sea-level Observations and Analysis for the Countries of the Mediterranean and Black Seas; Birkenhead, U.K., 16-27 June 1997.	E	160	Under preparation		193	Workshop on New Technical Developments in Sea and Land Level Observing Systems, Paris, France, 14-16 October 2003	E <i>(electronic copy only)</i>
134	IOC/WESTPAC-CCOP Workshop on Paleogeographic Mapping (Holocene Optimum); Shanghai, China, 27-29 May 1997	E	161	Under preparation		194	IOC/ROPME Planning Meeting for the Ocean Data and Information Network for the Central Indian Ocean Region	E <i>(under preparation)</i>
135	Regional Workshop on Integrated Coastal Zone Management; Chabahar, Iran; February 1996.	E	162	Workshop report on the Transports and Linkages of the Intra-american Sea (IAS), Cozumel, Mexico, 1-5 November 1997	E	195	Workshop on Indicators of Stress in the Marine Benthos, Torregrande-Oristano, Italy, 8-9 October 2004	E
136	IOC Regional Workshop for Member States of Western Africa (GODAR-VI); Accra, Ghana, 22-25 April 1997.	E	163	Under preparation		196	International Coordination Meeting for the Development of a Tsunami Warning and Mitigation System for the Indian Ocean within a Global Framework, Paris, France, 3-8 March 2005	E
137	GOOS Planning Workshop for Living Marine Resources, Dartmouth, USA; 1-5 March 1996.	E	164	IOC-Sida-Flanders-MCM Third Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA Project), Cape Town, South Africa, 29 November - 11 December 1999	E	197	Geosphere-Biosphere Coupling Processes: The TTR Interdisciplinary Approach Towards Studies of the European and North African Margins; International Conference and Post-cruise Meeting of the Training-Through-Research Programme, Morocco, 2-5 February 2005	E
138	Gestión de Sistemas Oceanográficos del Pacífico Oriental; Concepción, Chile, 9-16 de abril de 1996.	S	165	An African Conference on Sustainable Integrated Management; Proceedings of the Workshops, An Integrated Approach, (PACSCOM), Maputo, Mozambique, 18-25 July 1998	E, F	198	Second International Coordination Meeting for the Development of a Tsunami Warning and Mitigation System for the Indian Ocean, Grand Baie, Mauritius, 14-16 April 2005	E
139	Sistemas Oceanográficos del Atlántico Sudoccidental. Taller, TEMA;Furg, Rio Grande, Brasil, 3-11 de noviembre de 1997	S	166	IOC-SOA International Workshop on Coastal Megacities: Challenges of Growing Urbanization of the World's Coastal Areas; Hangzhou, P. R. China, 27 -30 September 1999	E	199	International Conference for the Establishment of a Tsunami and Coastal Hazards Warning System for the Caribbean and Adjacent Regions, Mexico, 1-3 June 2005	E
140	IOC Workshop on GOOS Capacity Building for the Mediterranean Region; Valletta, Malta, 26-29 November 1997.	E	167	IOC-Flanders First ODINAFRICA-II Planning Workshop, Dakar, Senegal, 2-4 May 2000	E	200	Lagoons and Coastal Wetlands in the Global Change Context: Impacts and Management Issues — Proceedings of the International Conference, Venice, 26-28 April 2004 (<i>ICAM Dossier N° 3</i>)	E
141	IOC/WESTPAC Workshop on Co-operative Study in the Gulf of Thailand: A Science Plan; Bangkok, Thailand, 25-28 February 1997.	E	168	Geological Processes on European Continental Margins: International Conference and Eight Post-cruise Meeting of the Training-Through-Research Programme, Granada, Spain, 31 January - 3 February 2000	E	201	Geological processes on deep-water European margins - International Conference and 15th Anniversary Post-cruise Meeting of the Training-Through-Research Programme, Moscow/Zvenigorod, Russian Federation, 29 January-4 February 2006	E
142	Pelagic Biogeography ICoPB II. Proceedings of the 2nd International Conference. Final Report of SCOR/IOC Working Group 93; Noordwijkerhout, The Netherlands, 9-14 July 1995.	E	169	International Conference on the International Oceanographic Data & Information Exchange in the Western Pacific (IODE-WESTPAC) 1999, ICWIP '99, Langkawi, Malaysia, 1-4 November 1999	<i>under preparation</i>	202	Proceedings of 'Ocean Biodiversity Informatics': an international conference on marine biodiversity data management Hamburg, Germany, 29 November-1 December 2004	E
143	Geosphere-biosphere coupling: Carbonate Mud Mounds and Cold Water Reefs; Gent, Belgium, 7-11 February 1998.	E	170	IOCARIBE-GODAR-I Cartagena, Colombia, February 2000	<i>under preparation</i>	203	IOC-Flanders Planning Workshop for the formulation of a regional Pilot Project on Integrated Coastal Area Management in Latin America, Cartagena de Indias, Colombia, 16-18 January 2007	E <i>(electronic copy only)</i>
144	IOC-SOPAC Workshop Report on Pacific Regional Global Ocean Observing Systems; Suva, Fiji, 13-17 February 1998.	E	171	Ocean Circulation Science derived from the Atlantic, Indian and Arctic Sea Level Networks, Toulouse, France, 10-11 May 1999 (<i>Under preparation</i>)	E	204	Geo-marine Research along European Continental Margins, International Conference and Post-cruise Meeting of the Training-through-research Programme, Bremen, Germany, 29 January-1 February 2007	E
145	IOC-Black Sea Regional Committee Workshop: 'Black Sea Fluxes' Istanbul, Turkey, 10-12 June 1997.	E	172	The Benefits of the Implementation of the GOOS in the Mediterranean Region, Rabat, Morocco, 1-3 November 1999	E, F	205	IODE/ICAM Workshop on the development of the Caribbean marine atlas (CMA), United Nations House, Bridgetown, Barbados, 8-10 October 2007	E <i>(electronic copy only)</i>
146	Taller Internacional sobre Formacion de Capacidades para el Manejo de las Costas y los Océanos en le Gran Caribe. La Habana, - Cuba, 7-10 de Julio de 1998 / International Workshop on Management Capacity-Building for Coasts and Oceans in the Wider Caribbean, Havana, Cuba, 7-10 July 1998	S/E	173	IOC-SOPAC Regional Workshop on Coastal Global Ocean Observing System (GOOS) for the Pacific Region, Apia, Samoa, 16-17 August 2000	E	206	IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards, Ostend, Belgium, 21-25 January 2008	<i>(Under preparation)</i>
147	IOC-SOA International Training Workshop on the Intregation of Marine Sciences into the Process of Integrated Coastal Management, Dalian, China, 19-24 May 1997.	E	174	Geological Processes on Deep-water European Margins, Moscow-Mozhenka, 28 Jan.-2 Feb. 2001	E	207	SCOR/IODE Workshop on Data Publishing, Ostend, Belgium, 17-18 June 2008	<i>(Under preparation)</i>
148	IOC/WESTPAC International Scientific Symposium - Role of Ocean Sciences for Sustainable Development Okinawa, Japan, 2-7 February 1998.	E	175	MedGLOSS Workshop and Coordination Meeting for the Pilot Monitoring Network System of Systematic Sea Level Measurements in the Mediterranean and Black Seas, Haifa, Israel, 15-17 May 2000 (<i>Under preparation</i>)	E	208	JCOMM Technical Workshop on Wave Measurements from Buoy, New York, USA, 2-3 October 2008 (IOC-WMO publication)	<i>(Under preparation)</i>
149	Workshops on Marine Debris & Waste Management in the Gulf of Guinea, 1995-97.	E	176	International Conference on the Geosphere/Biosphere/ Hydrosphere Coupling Process, Fluid Escape Structures and Tectonics at Continental Margins and Ocean Ridges, International Conference & Tenth Post-cruise Meeting of the Training-through-Research Programme, Aveiro, Portugal, 30 January-2 February 2002 (<i>Under preparation</i>)	E			
150	First IOCARIBE-ANCA Workshop Havana, Cuba, 29 June-1 July 1998.	E	177	Under preparation				
151	Taller Pluridisciplinario TEMA sobre Redes del Gran Caribe en Gestión Integrada de Areas Costeras Cartagena de Indias, Colombia, 7-12 de septiembre de 1998.	S	178	Under preparation				
152	Workshop on Data for Sustainable Integrated Coastal Management (SICOM) Maputo, Mozambique, 18-22 July 1998	E	179	Under preparation				
153	IOC/WESTPAC-Sida (SAREC)	E	180	Abstracts of Presentations at Workshops during the 7 th session of the IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Honolulu, USA, 23-27 April 2001 (<i>Under preparation</i>)				
			181	Under preparation				
			182	Under preparation				
			183	Under preparation				
			184	Under preparation				
			185	Under preparation				
			186	Under preparation				
			186	Under preparation				

No.	Title	Languages
209	Collaboration between IOC and OBIS towards the Long-term Management Archival and Accessibility of Ocean Biogeographic Data, Ostend, Belgium, 24–26 November 2008	<i>(Under preparation)</i>
210	Ocean Carbon Observations from Ships of Opportunity and Repeat Hydrographic Sections (IOCCP Reports, 1), Paris, France, 13–15 January 2003	E <i>(electronic copy only)</i>
211	Ocean Surface pCO ₂ Data Integration and Database Development (IOCCP Reports, 2), Tsukuba, Japan, 14–17 January 2004	E <i>(electronic copy only)</i>