

Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies



**IOC Editorial Board for the
International Bathymetric Chart
of the Caribbean Sea
and the Gulf of Mexico (IBCCA)**

Seventh Session

Aguascalientes, Ags., Mexico
9–11 November 1998

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UNESCO

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1. OPENING

The seventh session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA) was opened by the acting Chairperson, Ms Guadalupe López Chávez, at 10 a.m. on 9 November 1998 at the INEGI Headquarters, Aguascalientes, Ags., Mexico.

Ms Guadalupe López Chávez, Director-General of Geography at INEGI, representing Dr Carlos M. Jarque, President of INEGI, welcomed the participants and expressed her best wishes for the meeting and the participants' stay in the city of Aguascalientes and in Mexico. She stressed the importance of bringing this project to fruition for a better knowledge and well-organized use of the region's marine resources.

She then spoke on the organization of INEGI, its division into different directorates-general and the functions of each of them, and listed the various graphic and digital products produced by the Institute and its forecasts for the future.

She noted that the purpose of the session was to learn the progress made in the last two years in bathymetric compilations by each participating country in its area of responsibility in order to align activities with a view to completing the publication of the bathymetric mapping of the Caribbean Sea and the Gulf of Mexico on the scale of 1:1,000,000.

She also extended a welcome to Mr Olivier Parvillers, representing France, and Mr Michel Huet, representing IHO, who were participating for the first time as members of the Editorial Board. She regretted the absence of Lieutenant Edgar Parra, representing Venezuela, who had faxed a message of apology for being unable to attend the session.

A complete list of participants is contained in Annex II.

Dr Dmitri Travin, IOC Technical Secretary for Ocean Mapping, congratulated the staff of INEGI for their organization of the session and expressed his hopes for a successful meeting leading to further progress in ocean mapping.

2. ADOPTION OF THE AGENDA

Mr José Luis Frías Salazar, Vice-Chairperson of the Editorial Board, submitted the provisional agenda which had previously been sent to participants. The agenda was unanimously adopted and is contained in Annex I.

Mr Frías Salazar then proposed that Captain Juan Manuel Soltan Ospina, head of the Hydrographic Division of the Centro de Investigaciones Oceanográficas e Hidrográficas (CIOH) of Colombia as session Rapporteur. That proposal was unanimously adopted.

3. SUMMARY REPORT OF THE SIXTH SESSION OF THE IBCCA EDITORIAL BOARD

The Vice-Chairperson of the Board recapitulated the main items discussed and decisions taken at the sixth session of the Board, which had been held in Cartagena de Indias from 18 to 20 November 1996.

Mr Frías Salazar submitted for consideration by the Board two amendments to the Spanish text of the summary report, only one of which applies to the English text as follows:

“On page 4, paragraph 3, the date for completion of digitization should be 1997.”

The correction was approved.

4. PRESENT STATE OF THE PARTICIPATING COUNTRIES' COMPILATION OF THE IBCCA SHEETS IN THEIR RESPECTIVE AREAS OF RESPONSIBILITY

4.1 COSTA RICA

Mr Elizondo Solis, Assistant Director-General at the Instituto Geográfico Nacional (IGN) of Costa Rica, thanked INEGI for its kind hospitality and then gave an account of the follow-up to IBCCA activities in Costa Rica's areas of responsibility. IGN was making progress with computerization and training programmes with a view to the conduct of mapping activities; for example, members of its staff had attended courses at the Japan International Cooperation Agency (JICA) and in the United States (NIMA, National Imagery and Mapping Agency).

To date, it had not been possible to read the digital data dispatched by INEGI, and curves had been drawn manually on the basis of graphic data. The evaluation of some of the material revealed the great dispersion of data, which made it difficult to use the 1:250,000 scale established for the project.

He confirmed that the graphic data dispatched by INEGI would be used along with other sources necessary for compilation purposes. In that connection, Mr Frías Salazar requested that contact be maintained between the Costa Rican representative and the Chief Editor.

Of the 24 plotting sheets under the responsibility of Costa Rica, three from sheet 1-12 corresponded to the continent, and 20 sheets of bathymetric curves were being handed over at the current session. Sheet 21106 had however not yet been delivered by INEGI. As regards sheet 1-13, eight sheets had been assigned, three of which lacked data; five had been prepared, and would also be handed over at the current session. Data in areas where information was missing might be obtained from other sources, such as NIMA.

Mr Michel Huet, Assistant Cartographer at IHO (International Hydrographic Organization), offered on behalf of IHO to obtain the missing information from NIMA.

With regard to the compilation of names of undersea features, no work had been done so far in view of the fact that it was necessary to visualize the entire area. Mr Frías Salazar recommended the revision of GEBCO charts as a first step towards the compilation of names, the NOAA chart for the Caribbean and the cartography of other countries having territorial waters in that area.

Mr Elizondo Solis said that he would be grateful if the Chief Editor could provide him with a copy of the names proposed by Colombia for the areas of Nicaragua and Panama. The representative of Colombia, in liaison with the Chief Editor, undertook to provide a copy in due course.

Mr Michel Huet proposed the list of registered names of undersea features in the GEBCO dictionary of those names. Dr Dmitri Travin undertook to forward the dictionary to the Costa Rican representative.

4.2 CUBA

Mr Feitó Sarduy, Director of the Nautical Cartographic Agency of GEOCUBA, expressed his pleasure at meeting the participants in Mexico and his appreciation of the kindness and hospitality of the city of Aguascalientes. He commented on the results of the provisional sheets 1-07 and 1-08.

Those had been checked against the plastic copies of the originals received from Mexico in September and October 1998.

The copies contained no information on either geographical or undersea feature names.

Sheet No. 1-07

Checking was carried out by means of a painstaking comparison with the sheets prepared by EDIMAR on the scale 1:250,000, giving the following result:

- A transect is missing in the grid square at approximately 23°30'00N and 79°30'00W.
- The transect noted in the grid square with the approximate centre 22°30'00N and 84°30'00W is missing.
- The tracing of the Grand Cayman Island coastline is missing at the approximate coordinates 19°19'00N and 81°13'3"W.
- Transects are missing in the grid square at approximately 17°30'00N and 84°30'00W.
- The area covered by sheet 123-12 does not have complete information for checking the transects, but it can be seen that an area of transects is missing at approximately 19°30'00N and 79°30'00W.
- It is not possible to make a complete comparison of the area shown in sheet 150-08, since the copy supplied is incomplete.

Sheet 1-08

- This sheet was checked generally, since the reproductions of the area on the scale 1:500,000 were incomplete as regards basic bathymetry. It was, however, noted that the information was congruent and apparently complete.

Mr Feitó Sarduy said that INEGI would receive a list of names of the Scientific Coordinator, compilers and checkers of each of the above-mentioned sheets together with the georeference list of the geographical names of undersea features.

Mr Frías Salazar said that sheet 1-07 had been compiled on the scale 1:250,000 and sheet 1-08 on the scale 1:500,000. Observations had been dispatched to Mr Feitó Sarduy in April 1997 on the compilations of sheets 1-07 and 1-08, for checking and correction. In August 1997 Mr Feitó Sarduy had agreed that the Editor should make all the necessary changes requested. After correction, the Chief Editor began digitizing the sheets in August 1998. Graphic material had been prepared and the sheets sent to EDIMAR in Cuba for checking and validation. A copy had also been sent to NGDC (National Geophysical Data Center) for checking.

Dr Troy Holcombe, Director of the NGDC Marine Geology and Geophysics Division, proposed the inclusion of additional information to these sheets, received from the Cruiser Gloria on the scale 1:375,000 in the area of the Cayman depression. Mr Feitó Salduy welcomed this information and asked whether the information compiled by the research vessel Sea Ward Johnson in the reef areas of Cuba was available. Dr Holcombe said that he had no information on that subject.

In reply to Mr Michel Huet, who asked whether the next sheets to be published would be 1-07 and 1-08, Mr Frías Salazar said that some sheets would be ready for publication before the Cuban sheets.

4.3 FRANCE

Mr Olivier Parvillers, representing the French Naval Hydrographic and Oceanographic Service (SHOM), began by expressing his thanks for the invitation extended by Dr Dmitri Travin and the arrangements made by INEGI for the conduct of the session. He gave a brief account of the history of SHOM between 1720 and 1990, when a protocol had been signed between the Naval Chief of Staff and the Director-General for Defence on the subject of oceanographic projects. He displayed an organization chart on the various institutions in relation with SHOM and said that their responsibilities in regard to the content and layout of the report included the taking of hydrographical surveys, nautical mapping, investigation and development with a view to a better knowledge of the marine environment in order to meet both defence requirements and the development of navigation. He described their experience in the production of electronic naval charts (ENC), the management of the database in the S-57 format and the Radio Navigational Warnings system (NAVAREA).

With regard to International Bathymetric Chart (IBC) programmes, France was a member of five regional committees: IBCEA (International Bathymetric Chart of the Central Eastern Atlantic) (12 sheets), IBCCA (17 sheets), IBCWIO (International Bathymetric Chart of the Western Indian Ocean) (21 sheets), IBCWP (International Bathymetric Chart of the Western Pacific) (111 sheets, participation under discussion) and IBCM (International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series) (10 sheets). That work was programmed over the 1992-2000 period as follows: six IBCEA sheets between 2000 and 2001; two IBCCA sheets between 2001 and 2002; three IBCWIO sheets in cooperation with Madagascar over the years following the IBCWP and IBCM studies.

Mr Olivier Parvillers said that EPSHOM (Establishment of the French Naval Hydrographic and Oceanographic Service) had examined information available from the SHOM bathymetric database (BSDB) in comparison with the GEODAS (geophysical data system) information for the IBCCA area. Their conclusion was that BSDB contained less information than GEODAS.

He said that the content of the bathymetric database consisted of information from GEBCO, recent SHOM surveys and IFREMER (French Institute of Research and Exploitation of the Sea), through exchanges with other hydrographic services and some data from older surveys.

Mr Frías Salazar said that he would like to have information on the structure of the database so as to study the possibility of adapting it to the IBCCA proposals. Mr Olivier Parvillers said that he could obtain that information, and *a priori* it seemed that there would be no difficulty in adapting it.

4.4 COLOMBIA

Captain Soltau Ospina, Head of the Hydrographic Division of the Centro de Investigaciones Oceanográficas e Hidrográficas (CIOH), conveyed the cordial greetings of the Centre's Directorate and expressed appreciation of the hard work done by Dr Dmitri Travin to further the progress of the IBCCA project. He also invited the Director-General of Geography to convey his thanks to the INEGI staff for the very kind welcome he had received on his arrival in Mexico.

He began with an account of the CIOH organization and programmes in the oceanographic field, coastal zone management and marine pollution control through exchanges of data, the analysis and digital modelling of data and their interpretation and dissemination by means of digital electronic and printed information. He then described the organization of the Hydrographic Division, the projects being developed for 1998 with regard to hydrographic surveys, nautical mapping, both bathymetric and thematic, progress and tests in electronic mapping and international relations with IHO.

As regards IBCCA work, he handed over 21 graphic sheets with their respective overlays for the area of sheet 1-17; and described coordination in the previous year with the Chief Editor for the correction of observations in sheets 1-13 and 1-14, which had been completed satisfactorily. He would also provide data on proposals for undersea names in the Pacific Area on the basis of the geomorphological analysis conducted. He had dispatched the digital Caribbean sheets for 1998. To date, 12 print-outs were available and the 15 remaining ones would be dispatched in January 1999. Once digitization was completed, work would continue on the Pacific sheets, estimated to end in May 1999, thus making it possible for INEGI to speed up publication work.

Two sheets on the scale 1:800,000 in the Caribbean and three on the same scale in the Pacific had been drawn up in order to make a general analysis of the conformation of undersea features and check the quality of the compilation. Those checks had been satisfactory. Products derived from the geomorphological compilation and analysis included two books entitled *Geomorfología Submarina del Caribe Suroccidental y su relación con algunos aspectos de la tectónica regional* (Undersea geomorphology of the south-western Caribbean and its relation to some aspects of regional tectonics) and *Geoformas del Mar de Colombia* (Geoforms of the Colombian Sea); he would forward an early copy of those publications to each member of the Board.

He displayed the printed COL 1624 chart of the archipelago of San Andrés and Providencia on the scale 1:200,000, and the colour proofs of two charts corresponding to the coastal zones between Cartagena and Santa Marta. Both were digital.

Already dispatched to the Chief Editor were the proposed names of undersea features in the territorial waters of other countries, the compilation of which had been assigned to Colombia. Mr Frías Salazar said that those proposals had been sent to the authorities in Panama and Nicaragua with a request for their views; once their comments had been received, they would be forwarded to the GEBCO Subcommittee on Names.

4.5 UNITED STATES OF AMERICA

Ms Lisa Taylor (NGDC) reported on progress with the IBCCA sheets 1-01, 1-02 and 1-03. She thanked the Chief Editor, Ms Guadalupe López, Mr Frías Salazar and all the members of INEGI for their hospitality. Compilation of the sheets had been concluded and they had

been scanned and vectorized. Topography, transect sheets and marginal information had been dispatched to the Chief Editor for publication.

She described the data sources used for each sheet and the compilation methods employed. She noted some of the advantages of using technological advances, which had improved the ability to handle and display digital data. In particular, she described the three main types of software used by NGDC: Arc Info (Geographical Information System), Generic Mapping Tool (GMT) and Adobe Illustrator (Design Package).

She said that NGDC planned to produce colour bathymetric charts of the North of the Gulf of Mexico and North of the Bahamas with geomorphological material supplied by Texas A&M University. It also planned to produce a compact disc with the vectorized information and appropriate data in a fine-line network together with the geomorphology, which could render and load Raster images. She showed the participants three-dimensional colour relief images and a shaded model containing the bathymetry and topography of sheets 1-01, 1-02, 1-03 and 1-04. She also showed the characteristics of the compact disc containing data in a high resolution network on the east coast of the United States, which had been produced by NGDC.

5. PROGRESS REPORT ON ACTIVITIES BY THE CHIEF EDITOR

5.1 DIGITIZATION OF THE IBCCA SHEETS

Mr Frías Salazar noted the following observations on the digital and graphic files dispatched by the United States, Venezuela, Cuba, Colombia and Mexico (see table in Annex III).

5.1.1 United States of America

In August 1996, the Chief Editor had received from Ms Lisa Taylor via the Internet the NGDC digital files corresponding to the following sheets:

- Sheet 1-01, produced from scanning and vectorization of the compilations on the scale 1:500,000, equivalent to 100% of the area of the plotting sheet.
- Sheet 1-02, files produced from the scanning and vectorization of the compilations 1-021 and 1-023 on the scale 1:500,000 equivalent to 50% of the area of the plotting sheet. The remaining bathymetric measurements, sheets 1-022 and 1-024 were digitized in 1997 by INEGI.
- Sheet 1-03, are files produced from the scanning and vectorization of the compilations 1-031 and 1-032 on the scale 1:500,000, equivalent to 50% of the area of the plotting sheet. The remaining bathymetric measurements, sheets 1-033 and 1-034 were digitized in 1997 by INEGI.

The digitization by INEGI made use of the Arc/Info software.

The digital files produced were structured, linked and sent via the Internet to the NGDC compiler in the United States for checking as export files .E00.

Discrepancies were noted in the bathymetric measurements in the sheet linkages 1-01-1-05 and 1-02-1-06; also between 1-03 and the printed plotting sheet 1-04. In the latter case, it appeared that the discrepancies were due to the fact that sheet 1-03 had been compiled

from more recent information, thus producing a new, more up-to-date bathymetric configuration.

In February 1997, topographic information on Mexico was dispatched which corresponded to sheet 1-01.

All the sheet linkage problems were reviewed and adjustments made by NGDC, and the results sent back to the Chief Editor in October 1998.

At that session, the Chief Editor had received the information corresponding to the topographical areas covered by sheets 1-01, 1-02 and 1-03; also the graphic information on transect lines and marginal information pending dispatch of the package of undersea feature names.

INEGI had scanned and vectorized the printed sheets 1-04 and 1-09 on the scale 1:1,000,000 in 1996. Two packages had been produced, each containing: bathymetry, topography, hydrography, coastline, human settlements, transects, detailed survey zones, undersea feature names, toponymy and hypsometric information. That information had been dispatched in April 1997 to the INEGI Geographical Database and was being checked.

5.1.2 Venezuela

At the sixth session of the Editorial Board, Captain Perez Moreno, Director of Hydrography and Navigation at the Venezuela Naval College (DHN), delivered to Mr Frías Salazar the following digital sheets compiled by Venezuela:

- Sheet 1-14, digital files on the scale 1:500,000 of the IBH-14I, IBH-14II, IBH-14III compilations, equivalent to 50% of the area of the plotting sheet.
- Sheet 1-15, digital files on the scale 1:500,000 of the IBH-15I, IBH-15II, IBH-15III, IBH-15IV, IBH-15V, IBH-15VI compilations, equivalent to 100% of the area of the plotting sheet.

The digital information was contained in an 8mm tape produced from the E00 export files of Arc/Info identified as:

Bathymetry (isobaths and the relevant depth figures);

Transects;

Undersea feature names;

Coastline;

Topographical level curves;

Important elevations;

Hydrography;

Toponymy.

Note: The keys to the sheets on the scale 1:500,000 compiled by Venezuela do not correspond to the IBCCA keys and sheet divisions on that scale.

INEGI tried to download the information using different systems with the Arc/Info software, with the following results:

- (i) At the HP APOLLO workstation with the 5.01 version of Arc/Info it had not been possible to download the information since the computer used only an HP922452 cartridge, not an 8mm tape; it had therefore not been possible to access the information, owing to the different types of equipment.
- (ii) INEGI had tried to download the information following the instructions supplied: using the UNIX TAR command, it had received a "check sum" error message. It had then tried to download the information with different equipment at the SUN, HP and TEKTRONIX work stations. However, even with the change in the block parameters, the attempt had produced only empty files.

The Editor had sent a sheet in March 1997 to DHN, requesting the dispatch of the parametrical information used in producing the tape and the UNIX version to explore the possibility of accessing the files in the meantime. On 7 November, digital information under the responsibility of Venezuela was received by ftp for sheets 1-14 and 1-15 for analysis by the Chief Editor. During the current session, after various attempts, information was received by ftp from the INEGI server in Aguascalientes.

5.1.3 Mexico

In 1996, digitization had been completed of the 37 plotting sheets on a scale 1:250,000 covering the southern central part of the Gulf of Mexico, the Mexican Caribbean and the Gulf of Tehuantepec on the Pacific Ocean, corresponding to sheets 1-05 and 1-06. That had produced bathymetric data, the names of undersea features, transect lines and marginal information. Still outstanding was the incorporation of the topographical information in those sheets for the following year.

In 1997, work had begun on the digitization of 24 bathymetric plotting sheets on a scale 1:250,000 for the Pacific, corresponding to sheet 1-11. That had also produced bathymetric information, names of undersea features, transect lines and marginal information.

Topographical information for Central America was digitized for sheet 1-06 covering 85°-91° longitude W and 15°-18° latitude N, including part of the digital topographical information made available by INEGI.

The digital files produced have been structured and linked with the files of sheet 1-05.

With the reception of new information produced by surveys with multibeam equipment, various areas of the sheet had been updated and the sheet was in the process of checking and file restructuring. It would be sent to the INEGI Database in April 1999.

5.1.4 Cuba

With regard to the compilation of sheets 1-07 and 1-08 under the responsibility of Cuba, two mosaics had been produced by INEGI in 1996 on the scale 1:1,000,000 by photo-mechanical processes; to those had been added 24 sheets on the scale 1:250,000 for sheet 1-07 and four sheets on the scale 1:500,000 for sheet 1-08. It was not possible to vectorize those mosaics using the INEGI conversion equipment, which used LASER SCAN software, because there was a series of discrepancies in the information between compilation sheets.

During the sixth session of the Editorial Board, those observations had been noted and it had been agreed that they should be sent to the compiler for modification.

A list of observations corresponding to sheets 1-07 and 1-08 had been sent to EDIMAR in Cuba, authorizing the Editor to make the modifications before digitization. The Chief Editor had prepared a plotting sheet of sheets 1-07 and 1-08 in August 1998 and dispatched them to Mr Feitó Sarduy for validation and Dr Troy Holcombe for checking.

At the seventh session, Mr Feitó Sarduy delivered to INEGI the names of the scientific coordinator, compilers and checkers for each sheet, together with the geo-referenced list of the geographical names of geoforms and undersea features.

5.1.5 Colombia

In 1996, 28 compilation sheets on the scale 1:250,000 had been received from CIOH corresponding to IBCCA sheets 1-13 and 1-14.

INEGI had digitized 13 sheets on the scale 1:250,000 between September 1997 and the date of the session, including all the covers; still outstanding was the digitization of 15 sheets, the same as those still to be digitized by Colombia.

In April 1997, INEGI had received an official visit from two CIOH staff members, Lieutenant Soltau Ospina and Chief Petty Officer Díaz Prieto, who wished to obtain information on the Chief Editor's work procedures with regard to the checking and incorporation of compilations in accordance with the areas of responsibility of the participating countries, digital capture and computerized publishing, and the way in which the compilations delivered by Colombia to the Editor were jointly revised.

Also in April 1997, the CIOH Director had forwarded 22 proposals for undersea feature names corresponding to the compilations covering territorial waters of Panama and four proposals for compilation names covering the maritime areas of Nicaragua.

In September 1998, after checking the proposals and the geomorphological positions and descriptions, the Editor had dispatched to Mr Gutiérrez Huete, Director-General of the Instituto Nicaragüense de Estudios Territoriales (INETER), and to Mr Antonio Tejada, Director-General of the Panamanian Tommy Guardia Instituto Geográfico, the proposed names for undersea features, requesting them to study and approve them for their respective countries in order to continue with the registration formalities with the GEBCO Sub-Committee (reply pending).

At the current session, Lieutenant Soltau Ospina handed over to the Chief Editor 21 plotting sheets on the scale 1:250,000 corresponding to the compilations of sheet 1-17. Those sheets were to be digitized and delivered in compatible format by March 1999 at the latest.

5.2 PROGRESS IN THE EDITING AND PRINTING OF THE IBCCA PROJECT SHEETS

The IBCCA sheets 1-04 and 1-09 had been edited and printed:

- Sheet 1-09 had been edited in 1991 with a trial run of 200 copies. In August 1993 a final run was produced of 1,095 copies.

- Sheet 1-04 had been edited in July 1994 with a trial print run of 675 copies, the quality of which was not completely satisfactory. In September 1996 a further 250 copies had been reprinted.
- For editing, the traditional process of colour separation techniques had been used to obtain the original copies and printed colour proofs, checked and approved by the Editorial Board's scientific coordinator and members. That activity had been completed in INEGI in 1993.
- With the change of technology, a digital chart editing capacity had been obtained.

In 1994 changes had been made in the DGG printout, but it was still not possible to print large-format 95 x 125 cm sheets such as IBCCA produces.

Given that situation, the then Chairman of the Board had proposed in 1994 that printing should be in two parts with an overlapping of one degree, making use of INEGI's systems for the production of computerized charts so that the original prints would be generated by the processor in the 76 x 102 cm format. Dr Dmitri Travin would conduct the necessary consultations with a view to seeking IOC support for the printing of the sheets.

In view of the progress made in the digitization of IBCCA compilations and the conversion of files to the digital format for computerized publishing, the progress made in editing the IBCCA sheets can be shown as follows:

Progress 1998						
Computerized publishing					Printing	
Sheet No.	Digital capture	Database	Visual display	Colour test	Print originals	Printing
1-01	25%					
1-01	25%					
1-03	25%					
1-04	100%	100%			100%	100%
1-05	75%			75%		
1-06	75%					
1-07	100% being checked					
1-08	100% being checked					
1-09	100%	100%			100%	100%
1-10	0%					
1-11	100%					
1-12						
1-13	5%					
1-14	50%					
1-15	100%					
1-16	0%					
1-17	0%					

Mr Feitó Sarduy offered to print the IBCCA charts on request, which might be done by means of electrostatic plotting, from which each country might reproduce the information in digital format. That would avoid unnecessary expense and make it possible to provide and sell those charts to individual customers. It should be noted that no information was available regarding the level and numbers of potential users.

6. PROGRESS REPORT ON THE IBCCA DATABASE

Mr Feitó Sarduy thought that it would be useful to analyse the conversion of IBCCA bathymetrical data as required by IHO S-57; that would be in line with the overall efforts

being made by national hydrographic offices and was a process that could be conducted in parallel.

The use of IBCCA information based on S-57 would mean that in addition to the availability of a valuable database which could be easily updated, there would also be an opportunity to create new products and services derived from that information, such as, for example, the environmental and functional management of ports and bays.

Mr Michel Huet explained the advantages of using S-57 as a standard digital format for the transfer of ENC data. It was sufficiently complete and comprehensive to be very useful once it was functioning.

Mr Olivier Parvillers noted French experience in using S-57 for drawing up the world coastline on the scale 1:1,000,000, produced by SHOM in that format.

Ms Lisa Taylor requested Mr Michel Huet to forward the S-57 format to participants so that they might consider the advantages of using it for exchanges. Mr Feitó Sarduy explained that it was possible to work with other formats and subsequently convert to S-57 for exportation to other countries.

7. ADDITIONAL NEW PRODUCTS DERIVED FROM IBCCA

Mr Frías Salazar gave a computer presentation using Arc/Review software of a digital model in colour-shaded relief of the Gulf of Mexico obtained from IBCCA sheets 1-01, 1-02, 1-05 and 1-06 compiled by the United States and Mexico, with an overlay of vectoral and bathymetric information, transects and names of underwater features separately and for each sheet.

He said that the topographical information for Mexico had been obtained from the files of the digital relief model of the INEGI topographical chart on the scale 1:250,000.

He noted that the digital model was the most effective way of representing deep-sea morphology. It could be used to produce shaded colour relief charts derived from the analysis of shaded slopes.

In answer to a question by Ms Lisa Taylor on the resolution of the network for developing a DTM, Mr Frías Salazar said that for that presentation the resolution was 1 km.

8. CONSIDERATIONS ON PROJECTS OF GEOLOGICAL AND GEOPHYSICAL MAPS BASED ON THE IBCCA CHART

Dr Troy Holcombe noted experiments and recommendations on that subject and suggested that the starting-point might be the digitization of the existing charts of the Caribbean in relation to geological and geophysical parameters. Many of those charts were on scales covering the entire region, so that the data available could be divided among the various national zones. NGDC would provide Raster scanners for vectorization by other Board members. The vectorized products might be distributed as CDs or DVDs containing geographical information readers for layers associated with digital images. Databases would then be continuously updated from new flows of information and the results of recent investigations. He suggested making a start with the following charts: Westbrook Gravity of the Caribbean, Hall and Westbrook Residual Magnetic Anomalies of the Caribbean, and Holcombe Abyssal Plain Boundaries, Abyssal Plain Contours, and Sediment Types.

That approach would make possible the rapid flow and delivery of significant results. Acknowledgements of the authors of charts and their institutions, and also royalties, should be generous and widespread. The conditions specified by the Geological Society of America (GSA) for the digitization and use of its charts were that copyright should be recognized and royalties of US \$200 paid for each copy of the digitized version of each map.

The members of the Board were in agreement, and Captain Soltau Ospina suggested that work should continue on both of those lines, i.e. that digitization should proceed, but in conjunction with efforts by the national institutions responsible for the work to obtain new data which could improve the relevant knowledge of the Caribbean.

Mr Feitó Sarduy said that there were units in Cuba which had carried out geophysical and geological studies and that they were interested in knowing about the IBCCA-derived series. The approach suggested by Dr Troy Holcombe was highly efficient for the best possible conversion of data from the existing thematic charts into Raster form; and only such information would be vectorized as had been selected for its importance in the light of parameters which were being or could be defined.

Mr Olivier Parvillers explained that an extension of the IBCM regional bathymetric project was the result of a geological-geophysical series. SHOM had requested a possible contribution by French units to the conduct of geological-geophysical studies (magnetism and seismicity) of the IBCCA project. SHOM was not interested in this area, but French bodies might be. It had sent a proposal on that subject to the Director-General of the French Institute of Research and Exploitation of the Sea (IFREMER), the National Institute for the Sciences of the Universe (INSU), the Instituto Físico y Geológico (IFG) and the French Scientific Research Institute for Development through Cooperation (ORSTOM). To date, only INSU had replied, indicating its interest in the conduct of a campaign for a gravimetric, magnetic and seismic survey of the French West Indies.

Mr Michel Huet recommended the definition of parameters for digitization and the scale to be adopted. Dr Holcombe recommended studies on magnetic and gravimetric anomalies and seismicity on different scales.

The members of the Board approved the proposal by Dr Holcombe as a starting-point for compatibility tests on the Raster scan in preparation for digitization.

9. SALE AND DISTRIBUTION OF IBCCA PRODUCTS

Mr Feitó Sarduy said that, while it might be somewhat premature, thought should be given not only to the important matter of putting information on the Internet but also, at that stage, planning to include prices and distribution methods for the two sheets already printed and the other products envisaged, i.e. compact discs (CDs), posters, etc.

He suggested that at the end of that seventh session, work should begin on forecasting prices and distribution, always bearing particularly in mind the efforts made and the role played by INEGI in that project.

Dr Dmitri Travin proposed the production without delay of a CD on the information compiled by April 1999 so as to exhibit it at the next meeting of the IOC Consultative Group on Ocean Mapping and thus demonstrate the vast amount of work put into it by the participating countries. He noted that international resources would be sought to continue with the printing of the IBCCA sheets and production of IBCCA compact discs.

Mr Frías Salazar said that March 1999 would be the deadline for the reception of information to be included in the Mexican compact disc and that this would constitute the first digital edition of IBCCA work.

The members of the Board approved that proposal while stressing that it was important to achieve quality control.

Mr Michel Huet thought that US \$10 would be a suitable price for the plotting sheets. After brief discussion, the members of the Board approved that proposed price.

Dr Troy Holcombe offered the services of NGDC to prepare jointly with INEGI an IBCCA website early in 1999. The Board welcomed this proposal.

10. ELECTION OF CHAIRPERSON AND VICE-CHAIRPERSON OF THE BOARD

Dr Dmitri Travin recommended that Ms Guadalupe López be elected to the Chair in recognition of her extensive knowledge of mapping, her masterly conduct of the meeting as a replacement for Mr Lobo Zertuche and her helpfulness throughout the meeting. He likewise noted the successful management of affairs by the present Vice-Chairperson, Mr Frías Salazar and recommended that he be re-elected to that post.

The members of the Board were fully in agreement with those proposals; it was, however, agreed that, since Ms Guadalupe López had not yet been consulted, Mr Francisco Takaki, who had chaired the session, would later confirm her acceptance.

11. DATE AND PLACE OF THE NEXT SESSION - IBCCA-VIII

Dr Troy Holcombe proposed that the next session should be held at Boulder (Colorado, United States) and Mr Elizondo Solis proposed the alternative venue of San José (Costa Rica). Both those proposals were approved by the Board members, for the holding of the next session in September 2000.

12. OTHER BUSINESS

Ms Lisa Taylor proposed that a list of each country's commitments be drawn up before the end of the session.

Mr Feitó Sarduy undertook to do the following:

- Incorporate the digital information on the Cayman depression to be received by NGDC through the Chief Editor, and Rasterize and vectorize the information missing from sheets 1-07 and 1-08, to be taken from the chart of the Caribbean region which the Editor would send him.
- Thereafter, send the Editor all the digital files of the sheets under his responsibility for inclusion in the IBCCA editing programme.

Mr Olivier Parvillers undertook to make arrangements for the programming of activities to carry out the bathymetric compilation tasks in the areas of responsibility assigned to his country.

- He would send information on the SHOM bathymetric database to INEGI along with information available on sheets 1-14 and 1-15.

Mr Michel Huet said that his responsibilities included the following:

- Dispatching a copy of the list of undersea feature names for each area of responsibility of the participating countries.
- Dispatching the S-57 format to participants for their information and so that they might explore the possibility of its use for the IBCCA project.
- Establishing contact with NIMA to dispatch bathymetric information on Costa Rica.

Mr Frías Salazar listed the following commitments:

- Continuing the digitization of the sheets dispatched to INEGI.
- Printing proofs of the plotting sheets with full information.
- Dispatching to SHOM the data being received from Guadeloupe and Martinique.
- Dispatching a copy of the “Names of undersea features on the coasts of Nicaragua and Panama” proposed by Colombia, corresponding to sheet 1-12 to SCUFN (the GEBCO Sub-Committee on undersea feature names), for checking and approval.
- Producing the compact disc of digital sheets for presentation at the next meeting of IOC/CGOM.
- Dispatching to Cuba the information for sheets 1-07 and 1-08 with a view to their updating, depending on the information received on the Cayman depression.
- Informing Venezuela of the agreements reached at the current session and dispatching the corresponding observations and specifications to the files received.

Mr Francisco Takaki undertook to inform Ms Guadalupe López of her appointment as Chairperson of the Board and to back up her activities and those of Mr Frías Salazar.

Dr Dmitri Travin undertook to:

- (i) Check, translate into English and distribute the report of the session as soon as possible;
- (ii) Forward a copy of the GEBCO Dictionary of Undersea Feature Names to the Costa Rican representative;
- (iii) Negotiate international resources from IOC in support of the printing of the sheets and production of the IBCCA CDs.

Dr Troy Holcombe confirmed the following undertakings:

- (i) Contact NIMA to supplement the information on sheet 1-08;
- (ii) Complete the checking of sheet 1-08;
- (iii) Investigate the possibility of scanning the available Caribbean geological and geophysical sheets;

- (iv) Develop the IBCCA Web home page jointly with INEGI, on the basis of which an information booklet would be prepared on the project.

Ms Lisa Taylor confirmed support for the Costa Rican and French compilations.

Mr Elizondo Solis would undertake the following activities:

- (i) Dispatch the sheets compiled to the Chief Editor for updating;
- (ii) Develop the list of undersea feature names in agreement with the Central American agencies;
- (iii) Develop the transects of the Costa Rican sheets;
- (iv) Study the possibility of digitizing sheets under his responsibility before dispatching them to the Chief Editor;
- (v) Establish contact with NGDC for the updating of its sheets.

13. DISCUSSION AND ADOPTION OF THE SUMMARY REPORT

After reading and checking by all the participants, the Summary Report was unanimously adopted.

14. CLOSURE

The seventh session of the Editorial Board held at INEGI ended at 3.30 p.m. on 11 November 1998. The thanks of all the members for the hospitality received were placed on record, as was their commitment to act on the agreements recorded in the report.

ANNEX I

AGENDA

1. OPENING
2. ADOPTION OF THE AGENDA
3. SUMMARY REPORT OF THE SIXTH SESSION OF THE IBCCA EDITORIAL BOARD
4. PRESENT STATE OF PARTICIPATING COUNTRIES' COMPILATION OF THE IBCCA SHEETS IN THEIR RESPECTIVE AREAS OF RESPONSIBILITIES
 - 4.1 Costa Rica
 - 4.2 Cuba
 - 4.3 France
 - 4.4 Colombia
 - 4.5 United States of America
5. PROGRESS REPORT ON ACTIVITIES BY THE CHIEF EDITOR
 - 5.1 Digitization of IBCCA sheets
 - 5.2 Progress report on editing and printing of sheets for the IBCCA project
6. PROGRESS REPORT ON THE IBCCA DATABASE
7. ADDITIONAL NEW PRODUCTS DERIVED FROM IBCCA
8. CONSIDERATIONS ON PROJECTS OF GEOLOGICAL AND GEOPHYSICAL MAPS BASED ON THE IBCCA CHART
9. SALE AND DISTRIBUTION OF IBCCA PRODUCTS
10. ELECTION OF THE CHAIRPERSON AND VICE-CHAIRPERSON OF THE BOARD
11. DATE AND PLACE OF THE NEXT SESSION
12. OTHER BUSINESS
13. DISCUSSION AND APPROVAL OF THE SUMMARY REPORT
14. CLOSURE

ANNEX II

LIST OF PARTICIPANTS

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ANNEX III

PROGRESS REPORT BY THE CHIEF EDITOR

DIGITIZATION OF IBCCA SHEETS

A. INFORMATION RECEIVED IN DIGITAL FORMAT

The IBCCA Editor has received the following files in digital form:

SHEET No.	COMPILER	COMPILATION SCALE	DIGITAL	DATE	OBSERVATIONS	
					DELIVERED	MISSING
1-01	USA	1:500,000	Scanned and Vectorized	1996	Bathymetry and Coastal Line	Detailed sounding area. Topography Transects Human settlements Toponymy Names of undersea features
1-02	USA	1:500,000 (1-022, 1-024, 1-021, 1-23)	Scanned and Vectorized	1996	Bathymetry and Coastal Line	Detailed sounding area. Topography Transects Human settlements Toponymy Names of undersea features
1-03	USA	1:500,000 (1-031, 1-032)	Scanned and Vectorized	1996	Bathymetry and Coastal Line	Detailed sounding area. Topography Transects Human settlements Toponymy Names of undersea features

* 1-14	VENEZUELA	1:500,000 IBH-14I IBH-14II IBH-14III	Digitized	1996	Bathymetry Coastal Line Topography Transects Names of undersea features Hydrography	Nothing missing
* 1-15	VENEZUELA	1:500,000 IBH-15IV IBH-15V IBH-15VI IBH-15I IBH-15II IBH-15III	Digitized	1996	Bathymetry Coastal Line Topography Transects Names of undersea features Hydrography Toponymy Detailed sounding areas	Nothing missing

* It has not been possible to enter these files in the Editor's computers since the EXABITE 8mm tape is not machine-readable by SUN, HP and TEKTRONIX computers and workstations.

B. COMPILATIONS VECTORIZED BY THE INEGI CHIEF EDITOR:

SHEET No.	COMPILER	COMPILATION SCALE	DIGITAL	DATE	SUBJECTS COVERED
1-02	USA	1:500,000 (1-022, 1-024)	Digitized	1997	Bathymetry
1-03	USA	1:500,000 (1-033, 1-034)	Digitized	1997	Bathymetry
1-04	USA	1:1,000,000	Scanned and Vectorized	1997	Printed chart
1-05	MEXICO	1:250,000 (16 plotting sheets)	Digitized	1996	Bathymetry Transects Detailed sounding areas Names of undersea features

SHEET No.	COMPILER	COMPILATION SCALE	DIGITAL	DATE	SUBJECTS COVERED
1-06	MEXICO	1:250,000 (21 plotting sheets)	Digitized	1996	Bathymetry Coastal Line Topography of Central America Transects Detailed sounding areas Coastal Line Names of undersea features
1-07	CUBA	1:250,000 (24 plotting sheets)	Digitized	1997 1998	Bathymetry Coastal Line Topography Transects Names of undersea features Detailed sounding areas
1-08	CUBA	1:500,000 (1-081, 1-82 1-083, 1-084)	Digitized	1998	Bathymetry Coastal Line Toponymy Topography Transects Names of undersea features Detailed sounding areas
1-09	USA	1:1,000,000	Scanned and Vectorized	1997	Printed chart
1-11	MEXICO	1:250,000 (24 plotting sheets)	Digitized	1998	Bathymetry
1-13	COLOMBIA	1:250,000 (14 plotting sheets)	Digitized	1997 1998	Coastal Line Bathymetry Topography Transects Detailed sounding area Names of undersea features Toponymy

SHEET No.	COMPILER	COMPILATION SCALE	DIGITAL	DATE	SUBJECTS COVERED
1-14	COLOMBIA	1:250,000 (13 plotting sheets)	Digitized	1997 1998	Coastal Line Bathymetry Names of undersea features Topography Transects Toponymy

ANNEX IV

LIST OF ACRONYMS AND ABBREVIATIONS

BSDB	Bathymetric Database (SHOM)
CGOM	Consultative Group on Ocean Mapping (IOC)
CIOH	Centro de Investigaciones Oceanográficas e Hidrográficas (Colombia)
DHN	Division of Hydrography and Navigation of the Venezuelan Navy
ENC	Electronic Navigation Charts
EPSHOM	Establishment of the French Naval Hydrographic and Oceanographic Service (France)
GEBCO	General Bathymetric Chart of the Oceans (IOC/IHO)
GEODAS	Geophysical Data System
GMT	General Mapping Tool
GSA	Geological Society of America
IBCEA	International Bathymetric Chart of the Central Eastern Atlantic (IOC)
IBCM	International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Collections (IOC)
IBCWIO	International Bathymetric Chart of the Western Indian Ocean
IBCWP	International Bathymetric Chart of the Western Pacific
IFREMER	French Institute of Research and Exploitation of the Sea
IGN	Institut géographique national (France)
IHO	International Hydrographic Organization
INEGI	Instituto Nacional de Estadística, Geografía e Informática
INETER	Instituto Nicaragüense de Estudios Territoriales (Nicaragua)
INSU	National Institute for the Sciences of the Universe
IOC	Intergovernmental Oceanographic Commission
JICA	Japan International Cooperation Agency
NAVAREA	A geographical sea area established for the purpose of coordinating the transmission of Radio Navigational Warnings.
NGDC	National Geophysical Data Center (USA)
NIMA	National Imagery and Mapping Agency
NOAA	National Oceanic and Atmospheric Administration (USA)
NOS	National Ocean Service (USA)
SCUFN	Subcommittee on Undersea Feature Names (GEBCO)
SHOM	French Naval Hydrographic and Oceanographic Service (France)

In this Series, entitled

Reports of Meetings of Experts and Equivalent Bodies, which was initiated in 1984 and which is published in English only, unless otherwise specified, the reports of the following meetings have already been issued:

1. Third Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
2. Fourth Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
3. Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' (*Also printed in Spanish*)
4. First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
5. First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
6. First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
7. First Session of the Joint CCOP(SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
8. First Session of the IODE Group of Experts on Marine Information Management
9. Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
10. Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
11. First Session of the IOC Consultative Group on Ocean Mapping (*Also printed in French and Spanish*)
12. Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
13. Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
14. Third Session of the Group of Experts on Format Development
15. Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
16. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
17. Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration, Monaco, 1985
18. Second Session of the IOC Group of Experts on Effects of Pollutants
19. Primera Reunión del Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica, Aguascalientes, 1986 (*Spanish only*)
20. Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
21. Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
22. Second Session of the IODE Group of Experts on Marine Information Management, Moscow, 1986
23. First Session of the IOC Group of Experts on Marine Geology and Geophysics in the Western Pacific
24. Second Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources, Paris, 1987 (*Also printed in French and Spanish*)
25. Third Session of the IOC Group of Experts on Effects of Pollutants, Oslo, 1986
26. Eighth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration, Paris, 1987
27. Eleventh Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans, Paris, 1987 (*Also printed in French*)
28. Second Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources, Rome, 1987
29. First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials, Paris, 1987
30. First Session of the IOC-IBRE Group of Experts on Recruitment in Tropical Coastal Demersal Communities, Cartagena de Indias, 1987 (*Also printed in Spanish*)
31. Second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
32. Thirteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asia Tectonics and Resources, Bangkok, 1987
33. Second Session of the IOC Task Team on the Global Sea-Level Observing System
34. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets, Paris, 1987
35. Fourth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants, Paris, 1987
36. First Consultative Meeting on RNODCs and Climate Data Services, Wormley, 1988
37. Second Joint IOC-WMO Meeting of Experts on IGOSS-IODE Data Flow, Ottawa, 1988
38. Fourth Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources, Suva, 1988
39. Fourth Session of the IODE Group of Experts on Technical Aspects of Data Exchange, Ottawa, 1988
40. Fourteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources, Baguio City, 1988
41. Third Session of the IOC Consultative Group on Ocean Mapping, Bremerhaven, 1988
42. Sixth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño', Viña del Mar, 1988 (*Also printed in Spanish*)
43. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
44. Third Session of the IOC-UN(OALOS) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources, Bordeaux, 1989
45. Ninth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration, Villefranche-sur-Mer, 1988
46. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
47. Cancelled
48. Twelfth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans, Boulder, CO, 1989
49. Fifteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources, Bangkok, 1989
50. Third Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes, Hamburg, 1989
51. First Session of the IOC Group of Experts on the Global Sea-Level Observing System, Bidston, 1989
52. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean, Paris, 1989
53. First Session of the IOC Editorial Board for the International Chart of the Central Eastern Atlantic, Lagos, 1989 (*Also printed in French*)
54. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico, Caracas, 1990 (*Also printed in Spanish*)
55. Fifth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants, London
56. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
57. First Meeting of the IOC *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Area
58. Fourth Session of the IOC Consultative Group on Ocean Mapping
59. Second Session of the IOC-WMO/IGOSS Group of Experts on Operations and Technical Applications
60. Second Session of the IOC Group of Experts on the Global Sea-Level Observing System
61. UNEP-IOC-WMO Meeting of Experts on Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change
62. Third Session of the IOC-FAO Group of Experts on the Programme of Ocean Science in Relation to Living Resources
63. Second Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
64. Joint Meeting of the Group of Experts on Pollutants and the Group of Experts on Methods, Standards and Intercalibration
65. First Meeting of the Working Group on Oceanographic Co-operation in the ROPME Sea Area
66. Fifth Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series
67. Thirteenth Session of the IOC-IHO Joint Guiding Committee for the General Bathymetric Chart of the Oceans (*Also printed in French*)
68. International Meeting of Scientific and Technical Experts on Climate Change and Oceans
69. UNEP-IOC-WMO-IUCN Meeting of Experts on a Long-Term Global Monitoring System
70. Fourth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
71. ROPME-IOC Meeting of the Steering Committee on Oceanographic Co-operation in the ROPME Sea Area
72. Seventh Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' (*Spanish only*)
73. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (*Also printed in Spanish*)
74. UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs
75. Third Session of the IODE Group of Experts on Marine Information Management
76. Fifth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
77. ROPME-IOC Meeting of the Steering Committee for the Integrated Project Plan for the Coastal and Marine Environment of the ROPME Sea Area
78. Third Session of the IOC Group of Experts on the Global Sea-level Observing System
79. Third Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
80. Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
81. Fifth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes

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82. Second Meeting of the UNEP-IOC-ASPEI Global Task Team on the Implications of climate Change on Coral Reefs, Miami, FL, 1993
83. Seventh Session of the JSC Ocean Observing System Development Panel, Lisbon, 1993
84. Fourth Session of the IODE Group of Experts on Marine Information Management, Washington, D.C., 1993
85. Sixth Session of the IOC Editorial Board for the International Bathymetric chart of the Mediterranean and its Geological/Geophysical Series, Jerusalem, 1993
86. Fourth Session of the Joint IOC-JGOFS Panel on Carbon Dioxide, Plymouth, 1993
87. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Pacific, Tianjin, 1993
88. Eighth Session of the JSC Ocean Observing System Development Panel, Dartmouth, NS, 1993
89. Ninth Session of the JSC Ocean Observing System Development Panel, Melbourne, 1994
90. Sixth Session of the IODE Group of Experts on Technical Aspects of Data Exchange, Geneva, 1994
91. First Session of the IOC-FAO Group of Experts on OSLR for the IOCINCWIO Region, Mombasa, 1994
92. Fifth Session of the Joint IOC-JGOFS CO₂ Advisory Panel Meeting
93. Tenth Session of the JSC Ocean Observing System Development Panel, Paradise, TX, 1994
94. First Session of the Joint CMM-IGOSS-IODE Sub-group on Ocean Satellites and Remote Sensing, Paris, 1994
95. Third Session of the IOC Editorial Board for the International Chart of the Western Indian Ocean, Zanzibar, 1994
96. Fourth Session of the IOC Group of Experts on the Global Sea Level Observing System, Bordeaux, 1995
97. Joint Meeting of GEMSI and GEEP Core Groups, Bermuda, 1993
98. First Session of the Joint Scientific and Technical Committee for Global Ocean Observing System, Nantes, 1994
99. Second International Meeting of Scientific and Technical Experts on Climate Change and the Oceans, Valletta, 1994
100. First Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Western Pacific, Bali, 1994
101. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico, San José, 1994
102. Second Session of the Joint Scientific and Technical Committee for Global Ocean Observing System, Paris, 1995
103. Fifteenth Session of the Joint IOC-IHO Committee for the General Bathymetric Chart of the Oceans, Monaco, 1995
104. Fifth Session of the IOC Consultative Group on Ocean Mapping, Bremerhaven, 1995
105. Fifth Session of the IODE Group of Experts on Marine Information Management, Athens, 1996
106. IOC-NOAA *Ad hoc* Consultation on Marine Biodiversity, Paris, 1995
107. Sixth Joint IOC-WMO Meeting for Implementation of IGOS XBT Ship-of-Opportunity Programmes, Ottawa, 1995
108. Third Session of the Health of the Oceans (HOTO) Panel of the Joint Scientific and Technical Committee for GOOS, Bangkok, 1995
109. Second Session of the Strategy Subcommittee (SSC) of the IOC-WMO-UNEP Intergovernmental Committee for the Global Ocean Observing System
110. Third Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
111. First Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate, Baltimore, Md, 1997
112. Sixth Session of the Joint IOC-JGOFS CO₂ Advisory Panel Meeting, Mayaguez, 1996
113. First Meeting of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS)
114. Eighth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of "El Niño", Concepción, 1996 **(Spanish only)**
115. Second Session of the IOC Editorial Board of the International Bathymetric Chart of the Central Eastern Atlantic, Paris, 1996
(Also printed in French)
116. Tenth Session of the Offices Committee for the Joint IOC-IHO General Bathymetric Chart of the Oceans (GEBCO), USA, 1996
117. IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Fifth Session, USA, 1997
118. Joint Scientific Technical Committee for Global Ocean Observing System (J-GOOS), Fourth Session, USA, 1997
119. First Session of the Joint IOC-WMO IGOS Ship-of-Opportunity Programme Implementation Panel, South Africa, 1997
120. Report of Ocean Climate Time-Series Workshop, Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate, USA, 1997
121. IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS), Second Session, Thailand, 1997
122. First Session of the IOC-IUCN-NOAA *Ad hoc* Consultative Meeting on Large Marine Ecosystems (LME), France, 1997
123. Second Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), South Africa, 1997
124. Sixth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico, Colombia, 1996
(Also printed in Spanish)
125. Seventh Session of the IODE Group of Experts on Technical Aspects of Data Exchange, Ireland, 1997
126. IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), First Session, France, 1997
127. Second Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 1998
128. Sixth Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1997
129. Sixth Session of the Tropical Atmosphere - Ocean Array (TAO) Implementation Panel, United Kingdom, 1997
130. First Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), France, 1998
131. Fourth Session of the Health of the Oceans (HOTO) Panel of the Global Ocean Observing System (GOOS), Singapore, 1997
132. Sixteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), United Kingdom, 1997
133. First Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1998
134. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IOC/EB-IBCWO-IV/3), South Africa, 1997
135. Third Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), France, 1998
136. Seventh Session of the Joint IOC-JGOFS CO₂ Advisory Panel Meeting, Germany, 1997
137. Implementation of Global Ocean Observations for GOOS/GCOS, First Session, Australia, 1998
138. Implementation of Global Ocean Observations for GOOS/GCOS, Second Session, France, 1998
139. Second Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Brazil, 1998
140. Third Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS), China, 1998
141. Ninth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño', Ecuador, 1998 **(Spanish only)**
142. Seventh Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Croatia, 1998
143. Seventh Session of the Tropical Atmosphere-Ocean Array (TAO) Implementation Panel, Abidjan, Côte d'Ivoire, 1998
144. Sixth Session of the IODE Group of Experts on Marine Information Management (GEMIM), USA, 1999
145. Second Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), China, 1999
146. Third Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Ghana, 1999
147. Fourth Session of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC); Fourth Session of the WCRP CLIVAR Upper Ocean Panel (UOP); Special Joint Session of OOPC and UOP, USA, 1999
148. Second Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1999
149. Eighth Session of the Joint IOC-JGOFS CO₂ Advisory Panel Meeting, Japan, 1999
150. Fourth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS), Japan, 1999
151. Seventh Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1999
152. IOC Group of Experts on the Global Sea Level Observing System (GLOSS) Sixth Session, France, 1999
153. Seventeenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans, Canada, 1999
154. Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y el Golfo de México (IBCCA), Séptima Reunión, México, 1998
IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA), Seventh Session, Mexico, 1998