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)

Fifth Session

San José, Costa Rica
21-22 November 1994

UNESCO

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
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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
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17. Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
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 *(Spanish only)*
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22. Second Session of the IODE Group of Experts on Marine Information Management
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30. First Session of the IOCARIBE Group of Experts on Recruitment in Tropical Coastal Demersal Communities *(Also printed in Spanish)*
31. Second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
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36. First Consultative Meeting on RNODCs and Climate Data Services
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48. Twelfth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
49. Fifteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
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51. First Session of the IOC Group of Experts on the Global Sea-Level Observing System
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53. First Session of the IOC Editorial Board for the International Chart of the Central Eastern Atlantic *(Also printed in French)*
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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
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IOC/EB-IBCCA-V/3
Paris, 25 July 1995
English only

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1. OPENING OF THE SESSION

The fifth session of the Editorial Board of the IOC for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA) was opened by the Chief Editor, Mr Juan Lobo Zertuche, on 21 November 1994, at 8.20 am, in Colonial Room D of the Gran Hotel Costa Rica in San José, Costa Rica

In his opening address, the Chief Editor said that he was pleased that thanks to the hospitality of the Costa Ricans in their capital city, all the participants were going to be brought up to date on progress made with the project

Mr Fernando M Rudin welcomed participants on behalf of Costa Rica and the National Geographical Institute, he apologized for the absence of the Minister of Science and Technology Dr Roberto Robles who was not in Costa Rica at that time

Mr Dmitri Travin, Senior Assistant Secretary of the IOC for Ocean Mapping, then welcomed participants on behalf of the IOC Secretary, Dr Gunnar Kullenberg, he then thanked the Government of Costa Rica and colleagues from the National Geographical Institute for sponsoring the Fifth Session and for arranging excellent working conditions and accommodation for the participants

2. ADOPTION OF THE AGENDA

The Chief Editor submitted the proposed agenda (IOC/IBCCA-V/1 prov), which had been sent to participants before the meeting. It was adopted with some alterations as attached in Annex I

3. ADMINISTRATIVE ARRANGEMENTS AND DOCUMENTATION

Dr Travin said that the working documents had been mailed to members of the Board before the meeting, with the exception of Part II of the summary report of the Second Session of Officers held in Mexico City in February 1994

He confirmed that invitations to attend the session had been sent to all the members of the Editorial Board using the list in the possession of the IOC Secretariat

Mr. José L. Frias Salazar reported on changes in the membership of the Editorial Board, which had been brought to the notice of the IOC only after invitations had been sent out and replies received. He informed the session about the replacement of some of the members of the Editorial Board, welcomed the new members attending the session and thanked outgoing members of the Editorial Board for their contribution to the IBCCA project

After the agenda had been adopted and information provided on other aspects under this item, the meeting was asked to consider who should chair the Fifth Session of IBCCA and who would be its Rapporteur

Mr. Fernando M. Rudin Rodriguez proposed Mr. Juan Lobo Zertuche as Chairman. His proposal was unanimously approved

Mr. José L. Frias Salazar proposed that a representative of Costa Rica be asked to act as Rapporteur The meeting decided and agreed that these duties would be discharged by Mr. Eduardo Bedoya Benitez

4. SUBMISSION OF THE REPORT OF THE SECOND SESSION OF IBCCA OFFICIALS

Mr. José L. Frias Salazar informed participants that the Second Session of IBCCA Officiers had consisted of two meetings, one held in Boulder, Colorado, in December 1993 under the auspices of the National Oceanic and Atmospheric Administration (NOAA) at the National Geophysical Data Center (NGDC) of the

United States of America, and a second in Mexico City in February 1994 on the premises of the General Directorate for Geography at the Mexican Institute of Statistics, Geography and Information Technology (INEGI) because the Vice-Chairman of the Editorial Board, Dr. Angel Garcia Alvarez, had not been able to attend the Boulder meeting owing to difficulties in getting his visa processed (see Annex III).

He said that the meetings had been very useful in bringing participants up to date on progress in the compilations being conducted by the United States of America, Cuba and Mexico, given the advanced state of compilation work in their respective areas of responsibility and the need to review bathymetric contours on the margins between sheets. The situation regarding the eight names of undersea relief features that had not been included in the published version of sheet 1-04 had also been clarified, and 10 m isobaths had been put in on the Hatteras Abyssal Plain.

Lastly, some important decisions had been taken concerning: (i) the review and approval of compilations by the respective scientific co-ordinators in order to make the editor's work easier and to avoid duplication of editorial processes as much as possible; (ii) the IBCCA data base; and (iii) the activation of participation by France as the country responsible for sheets 1-10 and 1-16.

5. PROGRESS IN THE COMPILATION OF PLOTTING SHEETS FOR THE IBCCA PROJECT

Mr. Juan Lobo Zertuche invited the members of the IBCCA Editorial Board to give a progress report on the compilation of sheets in their areas of responsibility.

After greeting everyone present on behalf of Captain Juan Fung Riveron, President of the Cuban Institute of Hydrography, and Dr. Angel Garcia, Major Rolando Feitö Sarduy reported on progress in the compilation of sheets 1-07 and 1-08, for which Cuba is responsible. Work had been done with a view to the comprehensive rectification of the sheets originally compiled for 1-07 and 1-08 in line with the observations of the Chief Editor of the IBCCA and with due regard to other difficulties encountered by the person responsible for the sheets . The additional information had been received and work had been done to incorporate it. He added that further information was still being sought but said that in his opinion the information in areas of sheet 1-08 compiled on a scale of 1:500, 000 was insufficient. He concluded by saying that there was a commitment to complete the rectification during the first two months of 1995.

On behalf of Costa Rica, Professor Maria Diaz Andrade said that plotting sheets for his country's area of responsibility had been received, together with bathymetric information on magnetic tape, but problems had arisen because of the non-availability of hardware to do the calculations and the shortage of staff with experience in the area. As a result it had been recommended that (i) at least two technicians attend a training course at INEGI, Mexico, to upgrade their skills and knowledge to meet project requirements and (ii) the compilation be started by plotting the contours manually on the plotting sheets provided by Mexico.

Ms. Lisa A. Taylor gave a progress report on the compilation of sheets 1-01, 1-02 and 1-03, for which the United States is responsible. Sheet 1-09 had been compiled and printed. Sheet 1-04 had been compiled and a colour proof had been printed.

She showed a colour diagram to illustrate the specific information used to compile each sheet. The topographical information used consisted of digital data provided by the US Geological Survey and the contours of topographical maps of Mexico on a scale of 1:250,000. Higher quality data had been used for the bathymetric part, starting with multibeam contours from the US National Ocean Service, followed by industrial research-generated contours provided by Bill Bryant of Texas A and M University. Digital information was used as well as contours from the US National Ocean Service, on a scale of 1:250,000.

Digital trackline bathymetry obtained from industrial firms, academic institutions and government agencies had been used in the remaining areas.

Images from the Gloria II side scanning sonar had been used for zonal interpretation

Ms Taylor also reported that all the digital information had been plotted on a scale of 1.500,000 and the colouring showed different depths.

In areas where the information was problematical and sounding values illegible, colour changes serve as guides for selecting contour positions. Similarly, tracklines with navigational or other problems were shown in a different colour from that of the surrounding area, thus making it easier to recognize those errors

A second diagram was shown by Ms. Taylor to clarify the compilation status of sheets 1-01, 1-02 and 1-03 (see diagrams 1 and 2) As could be seen, three sheets would be ready for dispatch to Mexico at the end of 1995.

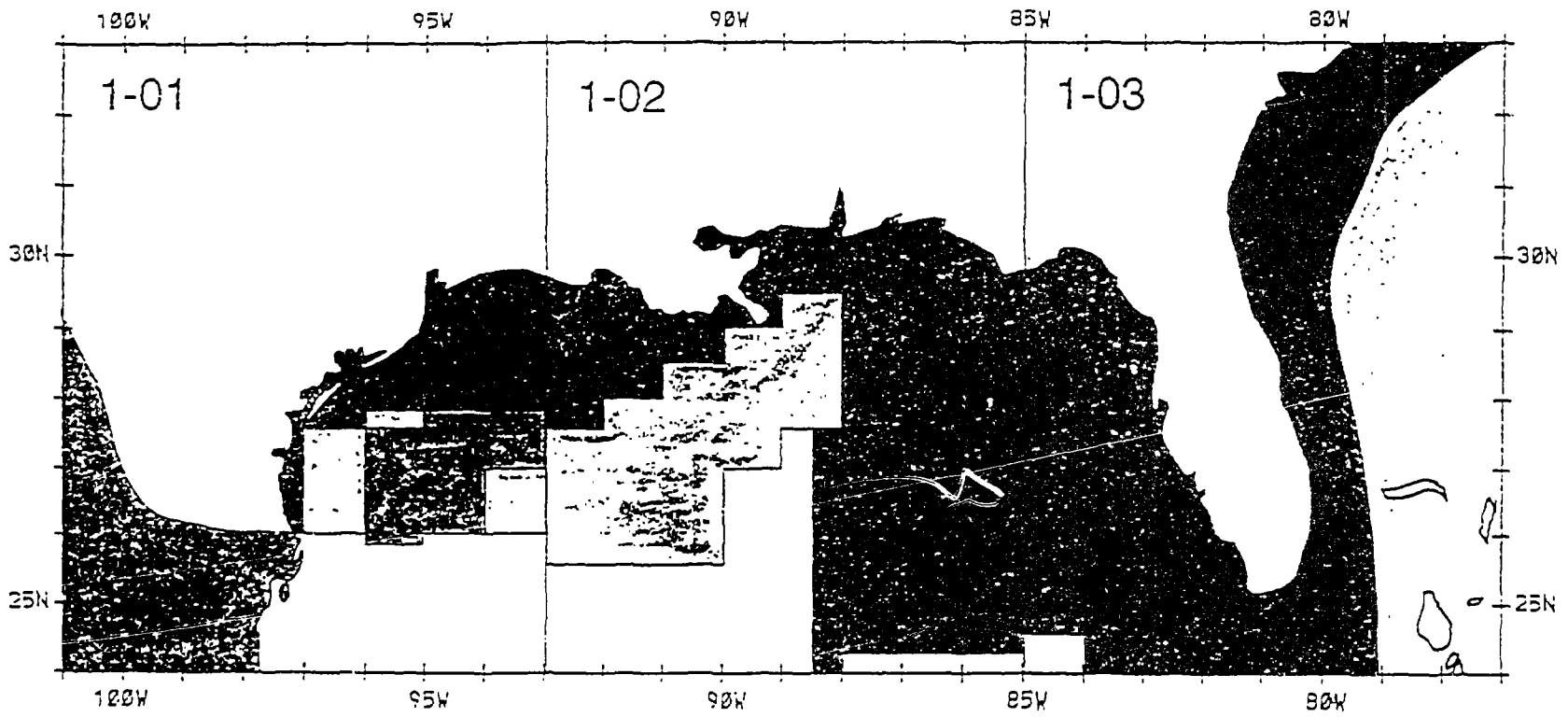
Lieutenant Juan M. Soltau Ospina and Mr. Jésus Diaz Prieto, a nautical cartographer, cordially greeted all the members of the board on behalf of Captain Orlando Malaver, Director of the Centre for Oceanographic and Hydrographic Research of Colombia (CIOH) and reported as follows on progress made in compilation and plans for the future:

Amount	Plate No. on a scale of 1:250,000	Status
4	15012-15013-15017-15008	Sent to Mexico in March 1993
3	18103-15020-15007	Submitted at the present session to the Chief Editor for revision
7	15116-18101-18106-18111-18102-15018-15117	To be submitted in the first half of 1995
6	15111-15112-21103-21104 21108-21109	Bathymetric information was not always concordant with Dr. Longdale's and Dr. Holcombe's work: other information was therefore being appraised and areas would be identified in which an information-gathering cruise would be required to confirm geographical features
11	24202-24203-24204-24205-24207-24208-24209-24212 24217-24218	Available information scanty. Information had been requested from the NGDC: if this was not enough, other resources would be used.
3	21110-21115-21114	Topographical information on Panama had been requested from the Chief Editor
4	27204-27205-27209-27210	Awaiting bathymetric information from Ecuador, which had been requested last year. Topographical data already received.

(See diagrams 1 and 2)

DIAGRAM 1

DATA COVERAGE FOR IBCCA SHEETS 1-01, 1-02 & 1-03



NOS MULTIBEAM CONTOURS

TRACKLINE BATHYMETRY

NOS SURVEYS AND/OR CONMAP CONTOURS

INDUSTRY SURVEYS

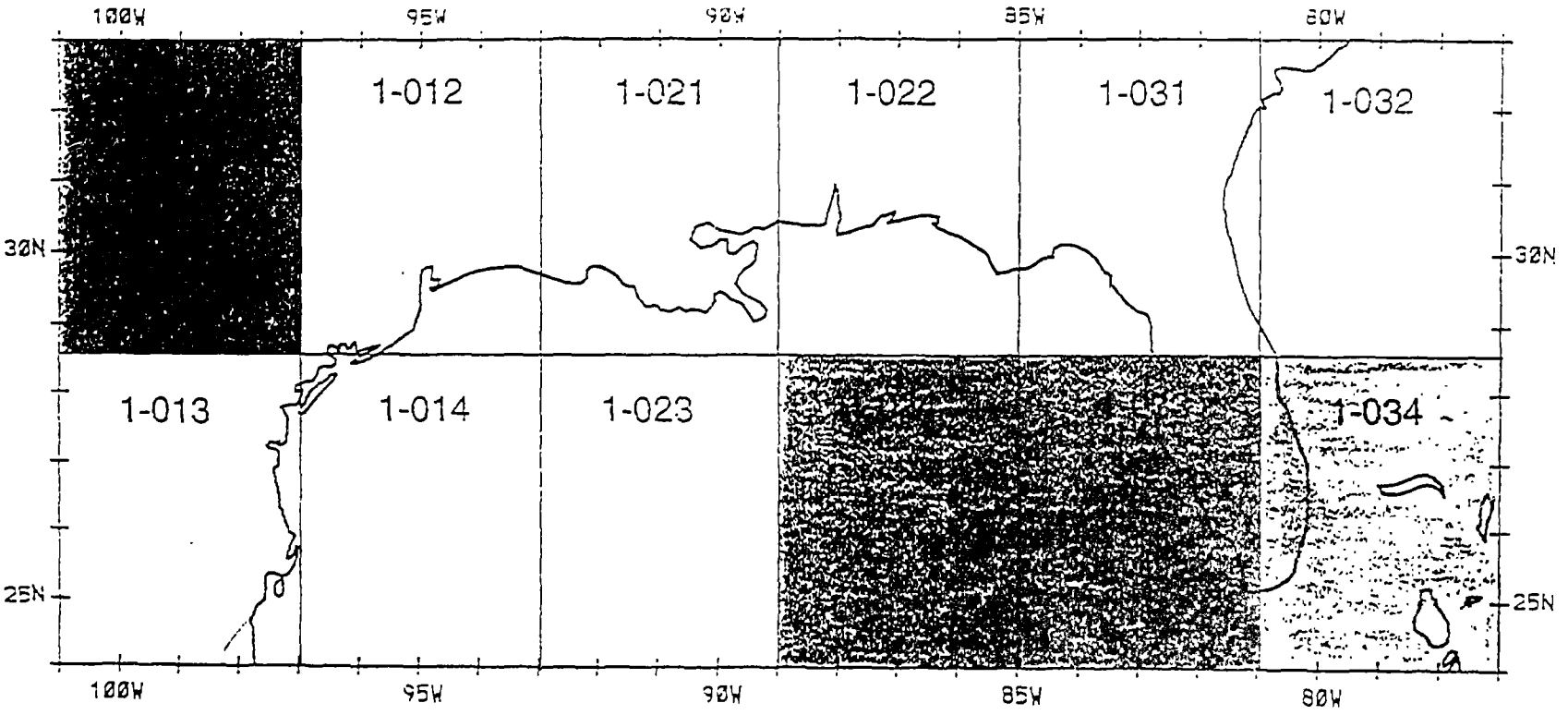
USGS 3-SECOND TOPOGRAPHY

MEXICO 1:250,000 TOPOGRAPHIC MAPS

DIAGRAM 2

2

BATHYMETRIC COMPILATION SHEET STATUS FOR IBCCA SHEETS 1-01, 1-02 & 1-03



IN PROGRESS

COMPLETE

COMPLETE EXCEPT BAHAMAS AREA

LAND ONLY

COMPLETE EXCEPT PORTION OF FLORIDA ESCARPMENT

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Colombia would continue its work on a scale of 1:250,000. Deep sea hydrographic surveys would be conducted next year for those areas in the Caribbean and the Pacific on which sufficient information was not available. ARC Providencia, an oceanographic and hydrographic ship belonging to the Colombian Navy would be used to do this work.

Mr. José L. Frias Salazar reported that the compilations for sheets 1-05 and 1-06, for which Mexico was responsible, had already been completed by INEGI and the work that was being done on the compilation of the northern part of sheet 1-11 on a scale of 1:500,000 was expected to be completed in the first half of 1995.

He said that on 12 July 1994, Rear Admiral Henry A. Sillie Delgado, Director of the Hydrography and Navigation Department in Venezuela had sent a DC 6150 cartridge containing sheet 1-15 and part of sheet 1-14, for which Venezuela was responsible, in digitized form obtained by applying the ARC INFO computer package available in his country's data centre.

He said that this information had been retrieved and plotted precisely in INEGI so that it could be reviewed by the Chief Editor, and that a list of general observations on those compilations had been drawn up and would be sent to Venezuela so that the necessary adjustments might be made to comply with project specifications.

Mr. José L. Frias Salazar said that this new form of delivery of compilations in a digital format had set a precedent which would make it possible for the Chief Editor to start work on the automation of the publication of the next sheets of the IBCCA project, in view of the current cartographic capabilities in Mexico in digital production

He showed the participants plotted material obtained from the digital data submitted by Mexico, for their information.

6. LACK OF RESPONSIBILITY FOR IBCCA SHEETS 1-10 AND 1-16

Pursuant to the discussions of the Second Session of Officers of the Editorial Board, the IOC Secretary, Dr. Gunnar Kullenberg, was asked to approach the Head of the Hydrographic Department of France to have a French representative appointed as a member of the IBCCA Editorial Board.

Given the desirability of French participation in the IBCCA project, the Board agreed to send another letter to the IOC expressing the desire for a favourable decision concerning France's membership of the IBCCA Board.

7. PROGRESS IN THE EDITING AND PRINTING OF SHEETS FOR THE IBCCA PROJECT (PRESENTATION OF CHART 1-04)

The Chief Editor's assistant reported that sheet 1-04, shown to participants at the session, had recently been printed. He also reported that 80 per cent of the work of editing sheet 1-06 had been done and 50 per cent for sheet 1-05, for the south of the Gulf of Mexico.

He then added that once the bathymetric lines had been reconciled with those of sheets 1-01 and 1-02 in agreement with the United States Scientific Co-ordinator, Dr. Troy Holcombe, the editorial work would be completed, and he hoped that it would end in the first few months of 1995 for sheet 1-06, and by mid-1995 for sheet 1-05.

He hoped that as a result of the progress reports and the delivery of compilations by the compilers, an updated programme would be drawn up for the IBCCA's editorial and printing activities.

8. PRESENTATION OF THE IBCCA DATA BASE

Major Rolando Feitó Sardiv, on behalf of Cuba, presented the project to set up the IBCCA data base proposed by Dr Angel Garcia at the Second Session of Officers Mr Jose L Frias Salazar described Mexico's efforts to set up a vector data base that would be used in editorial work on the remainder of the sheets for which it was responsible

Lieutenant Juan Soltau Ospina said that Colombia had not received advance texts of the proposals, but from what had been said at the session, they seemed very useful, in view of the trend towards global organization of these systems, requiring each member country to have its own base in a format that would permit exchanges with other countries

Ms Taylor said that Cuba's proposal had been reviewed by NGDC staff who had concluded that all the necessary information had been included The format was convertible to ASCII, which meant that it could be processed in different systems

She supported the suggestion that each country should try to submit the final compilation of the sheets in digital form and it should be submitted to Mexico in that form She added that if more than one country had an IBCCA data base, it was important to keep to formats that made it possible to exchange information

The Cuban delegate and the Mexican delegation made a long statement, to the effect that each country would set up its data base and experiment with the above-mentioned technology , and would seek standardization and a common language. It was thus agreed that both Mexico and Cuba would start work in this field, producing one sheet per country. It was suggested that Member countries should automate the production of IBCCA sheets

9. CONSIDERATIONS ON GEOPHYSICAL AND GEOLOGICAL SERIES BASED ON THE IBCCA CHART

After making some observations and comments on the possibilty of taking on work to prepare geological and geophysical maps based on the IBCCA, it was proposed that Member States should make an analysis of their available information and institutions with a view to committing themselves to this project

Mexico offered to review the information received on magnetic tape from NGDC so that any information of interest to the other countries could be passed on within 4 to 6 months

Countries would be required within that period of time to respond to the offer made here above

The United States submitted a list of specialists who had shown an interest in taking part in the project, which did not imply an undertaking to be in charge of it

For his part, Dr Dmitri Travin offered to submit information on European specialists who would be interested in taking part

10. OTHER BUSINESS

Mr Jose L Frias Salazar proposed that participants do their best to solve the communication problems that had arisen

The first suggestion was that receipt of every communication should be formally acknowledged

The Board requested that the necessary steps be taken to ensure that the National Geographical Institute of Costa Rica had a direct telephone line, since it had not hitherto been possible to communicate with it by

telephone

The addresses and telephone numbers of Board members were also revised, and a list drawn up (see Annex II).

11. ELECTION OF THE CHAIRMAN AND VICE-CHAIRMAN

In accordance with IOC procedures, the Chairman and Vice-Chairman of the Editorial Board were elected to serve during the period between sessions.

Major Rolando Feitö Sarduy of Cuba said that although he was not proposing a life appointment, he wished to nominate Mr. Juan Lobo Zertuche for that office in recognition of his co-ordinating skill and the great efforts he had made as Mexico's representative in the Chair.

The proposal was unanimously approved by members attending the Fifth Session.

Mr. Lobo Zertuche took the floor to thank participants for their acknowledgement of his country and for the trust they had placed in him. He took the opportunity to call on members to share the commitment to work and the unstinting efforts of Mr. Nestor Dutch Gary and thus ensure the project success. Use of the new technology should be introduced rapidly so as to comply with the commitment entered into and make the benefits of the project accessible to the rest of the world

Lieutenant Juan M. Soltau Ospina proposed Major Rolando Feitö Sarduy as Vice-Chairman, in view of Cuba's demonstrated ability to work in that capacity to take the project forward

There being no objection, the proposal was adopted unanimously.

Major Rolando Feitö Sarduy said that the appointment was an honour on two accounts: firstly because he would be replacing Mr. Angel Garcia Alvarez, also from Cuba, and secondly, for the immense significance of the post from the institutional point of view.

12. PLACE AND DATE OF THE SIXTH SESSION

The Chairman asked the delegates for suggestions regarding the place and date of the next session of the IBCCA's Editorial Board.

Lieutenant Juan M. Soltau Ospina transmitted a message from his country and from Vice Admiral Gilberto Roncancio, Director of DIMAR, and Captain Orlando Malaver, Director of CIOH, proposing Cartagena in Colombia as the seat of the next session of the Editorial Board.

It was agreed that Colombia should be the seat of the Sixth Session of the IBCCA's Editorial Board, and that the IOC Secretary would be informed of this.

Mr. José L. Frias Salazar proposed that in order to follow up agreements, keep abreast of technological changes and maintain unity among the participants, it would be better for sessions to be held once a year rather than every two years. This suggestion was well received and it was felt that a suitable date would be at the end of 1995 or early in 1996.

Dr. Travin undertook to approach the IOC Secretary with this suggestion and said that the Chairman of the Board would be informed of the results on this subject.

13. APPROVAL OF THE SUMMARY REPORT

The summary report was approved, with some amendments.

14. CLOSURE OF THE SESSION

Mr. Juan Lobo Zertuche, the Chief Editor, closed the Fifth Session of the IBCCA Editorial Board at 10.40 pm on 22 November 1994, thanking on behalf of the Board the National Geographical Institute, its Director, Mr Fernando M. Rudin Rodriguez, and all his team for making it possible for the session to be such a success.

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ANNEX II

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ANNEX III

RESULTADOS DE LA REUNION CON EL EDITOR PRINCIPAL COMO SEGUIMIENTO DE LA SEGUNDA SESION DE OFFICIALES DE IBCCA

Mexico D.F., Mexico, Febrero de 1994

Propuesta para la Base de Datos vectorial de Información Oceanográfica.

1. Introducción.

Los objetos reales se suponen inscritos en un sistema coordenado. señalando su posición, dimensiones y atributos gráficos.

2. Conjunto de datos.

La división en hojas esta de acuerdo al proyecto IBCCA.
El **conjunto de datos** vectoriales consiste de toda la información existente en las cartas.
Los **datos auxiliares**, de un conjunto de datos ofrecen una información relacionada con aspectos tales como método de compilación, proyección, etc.

3. Característica de los datos.

Para representar un rasgo (o fenómeno) geográfico particular, se usarán dos componentes:

Entidad (componente descriptivo no gráfico)
Representación geométrica (componente gráfico)

3.1. Entidad.

Es un concepto distinguible de lo que le rodea, acerca de la cual se requiere información.

Para nuestros propósitos, una entidad es la representación digital del componente descriptivo de un rasgo geográfico. Se le asocia un nombre con el fin de distinguirla de otras entidades (ejemplo : *canal, corriente de agua, curva de nivel batimétrico*, etc.)

Un **atributo** es una característica que califica y describe un àspecto de una entidad y su número puede ser variable. Por ejemplo para la entidad *corriente de agua*, serían: condición de la corriente, perenne, permanente, etc. Para la entidad *curva de nivel batimétrica*, los valores e los atributos son : tipo de curva (maestra, ordinaria, auxiliar, aproximada, depresión), valor de profundidad, rango de valores etc.)

Para representar un rasgo geográfico, se especifica un valor para cada atributo de la entidad. Un **valor de atributo** es una cantidad o cualidad específica. El conjunto de los valores que describen un rasgo geográfico particular, constituye una **ocurrencia de la entidad**. Para una ocurrencia de la entidad curva de nivel, los valores de los atributos son : *acotada o maestra, profundidad en metros, dominio de 500 a 100 mts.*

Con el propósito de distinguir las diferentes ocurrencias de una entidad en un conjunto de datos, se usa el atributo llamado **identificador**. El valor del identificador está dado por un número secuencial que se incrementa con cada ocurrencia.

3.2. Representación geométrica.

Constituye la representación digital del componente espacial de un rasgo geografico. Los conceptos definidos para entidad atributo, ocurrencia e identificador, se aplican tambien para la representación geométrica Sustentada en tres tipos diferentes de representación geométrica punto. linea y área. Cada entidad puede estar asociada con diferentes tipos de representación geométrica Por ejemplo, una *curva batimétrica* puede estar representada por una linea un *punto de profundidad* puede representarse por un punto

3.2.1. Punto.

Es la representación geométrica constituida por un solo par de coordenadas (X,Y).

Un punto posee entre otros atributos, un calificador de posición. Los valores permitidos para los calificadores de posición son : Definidos y Aproximados.

3.2.2. Línea.

Es la representación geométrica constituida por una serie de dos o más pares distintos de coordenadas (vértices) ligados secuencialmente. Una línea se usa para describir total o parcialmente la geometría de un rasgo geográfico. considerado como línea. También se usa la línea para delimitar áreas.

Una línea posee entre otros atributos, un calificador de posición. Los valores permitidos para los calificadores de posición de líneas son : Definida, Aproximada y Virtual.

3.2.3. Área.

Es la representación geométrica delimitada por una línea cerrada o serie de líneas que cierran. Un área se usa para describir geométricamente un rasgo geográfico considerado como una extensión o superficie. Un área puede ser simple o compleja. Un área compleja está constituida por líneas inclusivas y exclusivas. Una área puede ser adyacente o estar sobrepuesta a otras.

4. Estructura espacial de los datos.

4.1. Relaciones

Una relación es una asociación entre entidades.

Los datos vectoriales deben estar libres de cualquier inconsistencia espacial, tales como:
- Excesos o defectos en las uniones de líneas o de puntos con líneas
- Contornos de áreas no cerradas.

Para garantizar lo anterior, se definen dos tipo de relación **Conectar y Compartir**

4.1.1. Conectar.

Se da una relación de conectar entre ocurrencias de entidades, cuando y solo cuando se satisface la condición de :

- Que exista una interseccion planimétrica entre los rasgos geográficos involucrados.

Esta relación requiere que las ocurrencias de las entidades involucradas en la relación de conectar tengan las mismas coordenadas de sus ocurrencias de representación geométrica en el punto de conexión.

Una relación de conectar implica una terminación de las ocurrencias de representación geométrica de todas las ocurrencias de entidades presentes en el punto de conexión.

4.1.2. Compartir.

Se da una relación de compartir entre ocurrencias de entidades cuando y solo cuando se satisfacen la condición siguiente :

- Que los rasgos geográficos percibidos como líneas o áreas sean parcial o totalmente contiguos o coincidentes.

Esta relación de compartir implica conexión para todas las líneas que terminen en los extremos de la línea compartida.

Las palabras "contiguo" y "coincidente" se usan en un sentido amplio : se permite una cierta tolerancia. Por lo tanto, los rasgos geográficos localizados aparentemente en la misma posición planimétrica, sin exceder una tolerancia, deben ser parte de tal relación para cada una de las entidades representativas.

4.2. Integración de conjuntos de datos.

En el límite común (límite teórico) de conjuntos de datos de precisión equivalente, la continuidad espacial de rasgos geográficos se asegura cuando y solo cuando se satisfacen las condiciones :

- Las ocurrencias de las entidades que representan el mismo rasgo geográfico, se encuentran en cada uno de los conjuntos de datos adyacentes.

- Las ocurrencias de línea involucradas (una en cada uno de los conjuntos de datos adyacentes) están localizadas dentro de un intervalo de tolerancia predeterminado a lo largo del límite teórico de los conjuntos de datos.

Para una entidad que reúna las condiciones arriba mencionadas, las ocurrencias de representación geométrica lineal deben segmentarse del punto donde coinciden con el límite teórico de los conjuntos de datos. Las coordenadas del punto de continuidad en el límite teórico deben duplicarse en cada ocurrencia de línea involucrada (un par de coordenadas por cada conjunto de datos)

5. Aspectos generales.

Son los aspectos relacionados con los datos : precisión, resolución, tolerancias, datum, proyecciones cartográficas, sistemas de coordenadas y límites de los conjuntos de datos

5.1. Precisión.

Esta dada por la diferencia entre la posición de la representación geométrica asociada con una entidad, y la posición real del rasgo geográfico correspondiente, medido con respecto a la red geodésica.
En los datos auxiliares de los conjuntos de datos, se indica la precisión del método de compilación lo cual permitirá tener una idea de la calidad de los datos.

5.2. Resolución.

Especifica la unidad de medida más pequeña que se adopta para registrar datos, para los datos vectoriales se establece en un metro para los ejes X y Y.
Para representaciones geométricas lineales, la densidad de coordenadas debe ser suficiente para permitir curvas suaves a la escala de representación., mientras se respete la precisión y se evite una sobreabundancia de coordenadas.

5.3. Tolerancias.

Permite considerar que rasgos geográficos que coinciden aparentemente en el material fuente, compartan exactamente las mismas coordenadas. Esta consideración cartográfica depende de la resolución y escala.

6. Diccionario de datos.

En base a las consideraciones anteriores se elabora un Diccionario de Datos que contempla para cada entidad :

1. Nombre de la Entidad
2. Definición o descripción de la Entidad
3. Atributos
   - Fijos ó constantes.
   - Variables ó de excepción.
4. Restricciones de integridad
   - Combinaciones de atributos fijos y variables
   - Calificador autorizado de representacion(es) geométrica(s)
     - Definida ó
     - Aproximada ó
     - Virtual
5. Relaciones
   - Se especifica si conecta o comparte con otras entidades
6. Dimension(es) minima(s) para considerarlo
   - Punto : Superficie, ancho, largo
   - Línea : Superficie, ancho, largo
   - Área : Superficie, ancho, largo

Síntesis de la propuesta Cubana

Información Vectorial en formato DXF y ASCII :

TABLA 1

Num.	Descripción	Long	Dec	Valor(es)
1	Latitud	7	5	Coordenadas Geográficas GWS-84
2	Longitud	8	5	Coordenadas Geográficas GWS-84
3	Dato	1		1. Línea de Costa 2. Batimetria 3. Isolíneas 4. Nombres Geográficos 5. Cruceros
4	Para Dato = 1, 3 y 5 es decir Polilínea	1		1. Comienzo de la línea 2. Continuación de la línea

TABLA 2

Dato	Capa de Información	Objeto CAD	Long	Dec.
1	Línea de Costa	Polilínea	1	
2	Batimetría	Texto	6	1
3	Isolíneas	Polilínea	1	
4	Nombres Geográficos	Texto	50	
5	Cruceros	Polilínea	1	

Observaciones :

- Para las Polilíneas (Línea de costa, Isolíneas y Cruceros) indican con el campo num. 4 de la Tabla 1, la trayectoria de la línea (comienzo o fin de la línea).
- Para los Textos (Batimetría y Nombres Geográficos) lo ubican puntualmente.

De lo anterior :

- No se indican explícitamente las normas a emplear en cada tipo de línea respecto a grueso de la línea, color e intensidad.
- Para las Isolíneas, no se indica como manejar o representar las líneas auxiliares o de apoyo.
- No se considera información sobre tierra, (poblaciones, ríos, elevaciones, etc.)
- En los textos, al ubicar puntualmente el texto, no se consideran las geoformas que requieren "contornear" la tipografía para indicar : extensión y forma.

Síntesis de la propuesta Cubana

Información Alfanumérica en formato ASCII :

Entidad Hojas

Num	Descripción	Long	Dec	Valores
1	Codigo interno del Centro de Datos	8		
2	Identificador de la hoja	4		
3	Pais	2		Catálogo
4	Institucion	2		Catálogo
5	Escala	1		1 1: 1,000,000 2 1:500,000 3. 1:250,000
6	Latitud limite Superior (grados)	7	5	
7	Latitud limite Inferior (grados)	7	5	
8	Longitud limite Superior (grados)	8	5	
9	Longitud limite Inferior (grados)	8	5	
10	Fecha de creacion	6		

Entidad Crucero

Num	Descripción	Long	Dec	Valores
1	Código interno del Centro de Datos	7		
2	*Identificador del Crucero*	8		
3	Plataforma	2		Catálogo
4	Método de determinación de la posición	2		Catálogo
5	Fecha de inicio (YYMMDD)	6		
6	Fecha de fin (YYMMDD)	6		
7	Velocidad del sonido (metros/seg)	5		
8	DATUM o nivel de referencia	2		
9	Instrumentación Batimétrica	2		Catálogo

Entidad Batimetria

Num	Descripción	Long	Dec	Valores
1	Código interno del Centro de Datos	8		
2	*Identificador del Crucero*	8		
3	Corrección tiempo - zona	4	2	
4	Fecha (YYMMDD)	6		
5	Hora del dia	2		
6	Minutos	5	3	
7	Latitud (grados)	7	5	
8	Longitud (grados)	8	5	
9	Tipo de posición	1		1. Observado 2. Interpolado 3. No especificado
10	Tiempo de la señal (segundos)	6	4	
11	Batimetria corregida (metros)	6	1	
12	Corrección Batimétrica	2		
13	Tipo de Batimetria	1		
14	Control de la calidad	1		

Entidad Nombres Geográficos

Num	Descripción	Long	Dec	Valores
1	Codigo interno del Centro de Datos	8		
2	*Latitud (grados)*	7	5	
3	Longitud (grados)	8	5	
4	Nombre Geografico	40		

Y como **Catálogos Nomencladores** :

1. Catálogo de Paises
1. Catálogo de Instituciones
1. Catálogo de Métodos de determinación de la posición
1. Catálogo de Instrumentación
1. Catálogo de Plataformas

Observaciones :

- Entre las entidades descritas se asocian solo Crucero con Batimetria (Sondeos)
- Las entidades HOJAS y NOMBRES GEOGRÁFICOS, no mantienen asociación

82. Second Meeting of the UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs
83. Seventh Session of the JSC Ocean Observing System Development Panel
84. Fourth Session of the IODE Group of Experts on Marine Information Management
85. Sixth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series
86. Fourth Session of the Joint IOC-JGOFS Panel on Carbon Dioxide
87. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Pacific
88. Eighth Session of the JSC Ocean Observing System Development Panel
89. Ninth Session of the JSC Ocean Observing System Development Panel
90. Sixth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
91. First Session of the IOC-FAO Group of Experts on OSLR for the IOCINCWIO Region
92. Fifth Session of the Joint IOC-JGOFS CO_2 Advisory Panel Meeting
93. Tenth Session of the JSC Ocean Observing System Development Panel
94. First Session of the Joint CMM-IGOSS-IODE Sub-group on Ocean Satellites and Remote Sensing
95. Third Session of the IOC Editorial Board for the International Chart of the Western Indian Ocean
96. Fourth Session of the IOC Group of Experts on the Global Sea Level Observing System
97. Joint Meeting of GEMSI and GEEP Core Groups
98. First Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
99. Second International Meeting of Scientific and Technical Experts on Climate Change and the Oceans
100. First Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Western Pacific
101. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico