Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets

Second Session

Paris, 13-15 March 1986

Unesco

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IOC/EB-IBCM-II/3
Paris, 17 June 1986
English only

In this Series

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

- Third Meeting of the Central Editorial Board for the Geological/ Geophysical Atlases of the Atlantic and Pacific Oceans
- Fourth Meeting of the Central Editorial Board for the Geological/ Geophysical Atlases of the Atlantic and Pacific Oceans
- Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of «El Niño»
- First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in relation to Living Resources
- First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in relation to Non-Living Resources
- First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
- First Session of the Joint CCOP (SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
- First Session of the IODE Group of Experts on Marine Information Management
- Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Testonics and Resources
- Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
- First Session of the IOC Consultative Group on Ocean Mapping
- Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
- Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
- Third Session of the Group of Experts on Format Development of the Working Committee on International Oceanographic Data Exchange

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1. OPENING OF THE SESSION

The Session was opened by Professor C. Morelli, the Chairman of the Editorial Board. Dr. R.C. Griffiths, Assistant Secretary of IOC, welcomed the participants on behalf of the Secretary IOC.

Professors M. Gennesseaux and P.F. Burollet were introduced to the participants as new members of the Board.

The List of Participants is given in Annex II.

2. ADOPTION OF THE AGENDA

Captain Valchuk suggested inclusion in the Agenda of two new items - 'Consideration of the colour proof copy of the one-sheet version of the IBCM on the scale of 1:5 000 000' and also, 'Consideration of the Draft Specifications for the International Bathymetric Charts produced under IOC Regional Mapping Projects', - this draft was prepared by him at the request of the IOC Consultative Group on Ocean Mapping made at the First Session of the Group in April 1985.

The participants accepted these suggestions; the Agenda is attached as Annex I hereto.

3. STATE OF PREPARATION OF GEOLOGICAL AND GEOPHYSICAL OVERLAY SHEETS AND TECHNICAL REQUIREMENTS FOR THEM

3.1 MAGNETIC SHEETS

Dr. Galdeano (Institut de Physique du Globe, Université de Paris VI) was invited to present the state of progress with these sheets.

He stated that the western and central Mediterranean are covered by aeromagnetic surveys which he will reduce to the same level. For the eastern Mediterranean, Prof. Makris is known to hold some aeromagnetic material which he will be asked to supply.

The remainder of the Mediterranean is covered by sea measurements: the corresponding sheets (nos. 8, 9, 10) were presented by Dr. Kazakov (see section 2 of Annex III).

For the blank areas of North Africa, Dr. Galdeano will try to reduce the Magsat data to the surface magnetic values.

Estimated time for completion of the 10 sheets: beginning of 1988.

Dr. J.K. Hall stated that by this time he might be able to produce new sea magnetic data for the eastern Mediterranean.

Dr. K.E. Izdar agreed to contact the Institute of Mineral Research and Exploration and other centers in Turkey to try to obtain all available data for the Turkish area.

3.2 GRAVIMETRIC SHEETS

Dr. M. Sarrailh (Bureau gravimétrique international, Toulouse) presented, on behalf of Dr. Balmino, computer plots of the 6 sheets showing Bouguer anomalies for the western Mediterranean (see Annex VII); isoanomaly interval: 10 mgal. These sheets were approved after examination. They will be redrawn on transparent stable plastic by May 1986. Mr. D.P.D. Scott kindly offered to carry them to Leningrad in May 1986.

The draft legend for the IBCM Bouguer anomalies map was also kindly furnished by Dr. Sarrailh (see Annex VIII).

Professor P. Louis (Laboratoire de géophysique, Montpellier) will try to complete these sheets with the anomalies for North Africa, provided he can obtain the necessary permission. Alternatively, the BGI will complete the sheets with older data from its files.

The absence of Professor Makris did not allow examination of the sheets 4, 5, 9, 10 (eastern Mediterranean). It was decided that approval of these sheets would be made by correspondence after adjusting at common boundary with western Mediterranean sheets. BGI will send to Professor Makris a tape with the data. Expected time for these sheets to be in Leningrad: September 1986. If they arrive at this time, the examination of the colour proof copies of all the sheets could take place in September 1987.

3.3 SEISMICITY SHEETS

Professor J. Bonnin made a presentation of the state of progress in the field of instrumental seismicity. On the basis of the results of statistical analyses, data plotted on the seismicity "overlay sheet" have been accepted from various sources depending on their date of origin. From 1904 to 1963, data will be selected from a "historical file" compiled by the International Seismological Centre, with an attempt at assigning some sort of quality factor to each reported event. From 1975 on, data will be those of the European-Mediterranean Seismological Centre. Between 1964 and 1974, no decision has yet been made, but most probably the "principal determination" by EMSC will be used.

Three different types of symbols will indicate shallow, intermediate and deep earthquakes. Symbol size will reflect magnitude while colour will indicate quality of determination. Final seismicity files will be ready for plotting by the end of 1986. Final drawings will be produced by computer as soon as a decision has been made on the coastline to be used.

Professor J. Bonnin indicated that he had found appreciable divergences between the standard IGN coastline file and that on the IBCM. It was decided to establish an ad hoc Task Team to investigate this matter. Professor J. Bonnin kindly agreed to lead the Team. It was further agreed that:

(i) Professor J. Bonnin will send Captain S. Valchuk, via the IBCM Secretary, a set of IBCM tracing-paper sheets with the coastline depicted in accordance with IGN file;

(ii) Results of intercomparison will be forwarded, via the IBCM Secretary, to the members of the Task Team;

(iii) Coastline matters should not be allowed to delay plotting of epicentres.

Expected time for completion of all sheets: June 1987.

3.4 PLIO-QUATERNARY SHEETS

The late M. Winnock worked for many years preparing the Plio-Quaternary sheets for the whole Mediterranean. Unfortunately, most of his eastern Mediterranean work seems to have been lost.

Professors Gennesseaux and Burollet will complete the western Mediterranean data recovered in Pau, with new data and with the data for the Italian area and the Aegean Sea published by the CNRS's Geodynamic Project.

It is proposed that these sheets be presented on a background of IBCM Bathymetry, as a colour tinted contour map of the base Plio-Quaternary structural contours, with dark contours showing the Plio-Quaternary isopachs. Contour interval should be nominally 0,25 sec (250m).

The Editorial Board requested Dr. Kazakov and his colleagues to undertake the work for the eastern Mediterranean, in collaboration with Dr. J.K. Hall, for sheet no. 10.

Estimated date for completion of all sheets: end of 1988.

3.5 MESSINIAN SHEETS

Dr. O. Kazakov submitted for consideration sheets nos. 8, 9 and two versions of sheet 10 of the Messinian map. One of the two versions of sheet 10 was based on the commonly accepted view of Ross and Uchupi on the Messinian surface in the Nile fan region; the other reflected the opinion of Soviet scientists that horizon "M" in the Nile fan region, which is currently considered by the scientific community to be a Messinian surface, should actually be related to Tertiary or even to Mesozoic formation (see para. 1 of Annex III).

After intensive discussions concerning the problem of the base of the Messinian sediments, the Editorial Board decided not to prepare and print separate Messinian overlay sheets.

It further decided that the outline of the outcropping (subcropping) of evaporitic (including salt) sediments below the Pliocene/Quaternary would be inserted on the Plio-Quaternary Sheets.

The outline of the Messinian areas should be drawn as a broad line of a light colour (to be selected by the Chief Editor).

3.6 RECENT SEDIMENTATION SHEETS

A small group studied the draft of Sheet 10 and the draft Legend and Symbols of the "Recent Sedimentation Map of the Mediterranean Sea, Scale 1:1 million" (see Annex IV) and acknowledged the work of the Editors of the drafts (Drs. Emelyanov, Kouprine and Shimkus).

The following comments were made:

(i) According to Annex IV of document IOC/EB-IBCMOS-I/3, the use of the Wentworth Scale has been accepted;

(ii) Concerning Question 2 in the above Annex, the use of a triangular Grain-size diagram (modified SHEPARD diagram) is recommended, with the divisions of 10, 30 and 50% from each pole (sand, silt, clay), - see grain size diagram below.

(iii) The main grain size division should be indicated as follows:

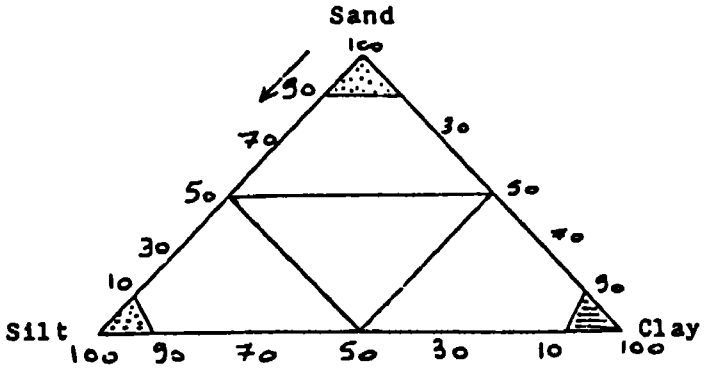
Grain in diameter in mm		0,002 V	0,63 V	2,0 V	
Name of the class	Clay	Silt	Sand	Gravel	

(iv) The change of the colour (yellow) of "thermogenic sediments" (i.e. oolites/ooides) to either <u>blue</u> (when $CaCo_3$ content is >50%) or <u>gray</u> (when terrigenous content is >50%, i.e. mainly non carbonate content). The symbol for oolites/ooides (spherulites) should appear wherever the content of these grains exceeds 10%.

(v) The isopachs of the Holocene ("Recent") should be differentiated into areas of "proved (measured) thickness" and "interpolated thickness". A special symbol should be used to indicate those stations where a radiocarbon (14_C) age was determined.

(vi) A general symbol (pattern) should be applied to these areas where "turbiditic sediments" were deposited during Holocene time.

(vii) The term "<u>Surface Sediments</u>" replacing "Recent" or "Holocene Sediments" should be applied to the heading of these Overlay Sheets, because of many uncertainties to place the boundary Holocene/Pleistocene in most Samples.



<u>Grain size diagram</u>

(viii) For genetic types of constituents, the symbols used in the ODP reports should be adopted.

4. PROBLEMS RELEVANT TO BATHYMETRY OF THE MEDITERRANEAN

4.1 DIGITIZATION OF THE IBCM BATHYMETRIC CONTOURS

The Chairman read out a cable he had received from Mr. Marc Lador, Vice-President, Petroconsultants S.A., in which he stated that the IBCM Bathymetric Contours have been digitized. Mr. Scott agreed to investigate availability of the tape and arrange for a copy to be sent to the Chairman of the GEBCO Sub-Committee on Digital Bathymetry, with a request that he investigate its compatibility with other digitized material being handled by the Sub-Committee.

4.2 STATE OF COMPILATION OF NEW BATHYMETRIC DATA

The IBCM Secretary informed the Session on action undertaken to obtain new bathymetric data, and submitted for consideration a diagram showing plotting sheets for which the Hydrographic Services of certain IHO Member States have accepted responsibility.

The Chief Editor informed the Session that the USSR Hydrographic Service has accepted responsibility for its zone of responsibility.

He indicated also that the process of compilation of data lacks a good organizational basis and suggested measures for improving the situation (see Annex VI).

Admiral Alfonso presented an Information Paper (see Annex V) showing that, at present, all plotting sheets at 1:250 000 for the Mediterranean are being kept up to date by Hydrographic Offices in the region.

After the discussion the Editorial Board decided:

(i) to request the views of the IHB Directing Committee regarding storage and interchange of new bathymetric data;

(ii) to ask the Secretary IOC to invite all Member States participating in the IBCM project to pass all bathymetric information from the Mediterranean which is in their possession, and which is suitable for inclusion in the IBCM, to the IBCM Secretary and to the Hydrographic Offices responsible for maintaining the various plotting sheets;*

(iii) to instruct the IBCM Secretary to summarize the results of this work, to outline possible future actions, and to report to the Editorial Board at its session in 1987.

It was recognized that some data were collected and archived in digital form, and consequently do not get incorporated into the 1:250 000 plotting sheets. The Permanent Secretary GEBCO reported that the GEBCO Sub-Committee on Digital Bathymetry was fully aware of this problem and was attempting to resolve it. It seems likely that an agreement will be concluded whereby a data centre in an IHO Member State will act as a World Data Centre for Digital Bathymetric Data on behalf of the International Hydrographic Organization. He hoped to be able to report on the outcome of these negotiations at the next meeting of the Editorial Board.

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* Dr. K.E. Izdar stated that he did not know the Turkish point of view on the subject of the IHB information given in Annex V about the areas of responsibility.

The representative of the IHO remarked that, when considering the role that the US National Geophysical Data Centre at Boulder, Colorado, might play in any future arrangement for the international exchange and management of digital sounding data, it should be noted that digitalization of bathymetric data and computer cartography have already been adopted by some hydrographic offices, and there is a general trend to exchange bathymetric data in digital form. Therefore, the IHO is exploring the feasibility of an agreement which would allow an IHO Member State to operate a World Data Centre on IHO's behalf.

4.3 PRESENTATION OF THE ONE-SHEET IBCM ON THE SCALE 1:5 000 000

Captain S. Valchuk presented the proof copy of 1:5 000 000 IBCM version. The Editorial Board considered and approved this proof copy. The Editorial Board expressed its appreciation to Capt. S. Valchuk for the excellent work that had been done and recommended that, for the printing, it would be desirable to enlarge the dimension of the title and legend of the chart and to do the same for the title "Black Sea" given in the inset. The inset plan showing Geographical Sub-divisions of the Mediterranean could be removed to provide more room for an enlarged title.

Some participants expressed the opinion that if the cost of this chart can be kept down to 2-3 US dollars, 5 000 copies in English may be sold. But as the real price of the chart has to be calculated, it was recommended that initially 1 000 copies be printed, bearing in mind that additional copies may be printed if necessary.

The Editorial Board appreciated the offer of Captain S. Valchuk to publish the chart in 1987.

Captain S. Valchuk informed the Session that in accordance with a previous decision of the Board, the Cartographic Department of the Hydrographic Service of the USSR has printed 400 copies of the IBCM booklet. An additional quantity of 100 copies with special overprint "To a contributor" were also printed. This Booklet is printed in five languages: English, French, Spanish, Russian and Arabic.

The Editorial Board recommended that 400 copies be dispatched through IOC channels, and that the IBCM Secretary dispatch to each participant a copy with the special overprint.

The Representative of the IHB informed the Session that the IHB will provide a new sentence updating the information regarding the IHO to replace the last sentence of the second paragraph of the Booklet for its next edition.

5. CONSIDERATION OF THE DRAFT LIST OF GEOGRAPHICAL NAMES OF UNDERSEA FEATURES SHOWN ON THE IBCM AND ON THE SMALL-SCALE IHO INTERNATIONAL CHARTS

This document had been dispatched by the Operational Unit in January to give participants the opportunity to examine it before the Session.

The Editorial Board discussed the document and approved it in principle, bearing in mind that some further corrections are needed. The Editorial Board requested the IBCM Secretary to consider all proposed corrections, to eliminate the discrepancies and to submit the corrected list to the Chairman CGOM.

The Chairman CGOM was invited to place the document before the GEBCO officers at their forthcoming meeting, with a suggestion that it be passed to the GEBCO Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features for review and comment.

6. CONSIDERATION OF THE DRAFT SPECIFICATIONS FOR INTERNATIONAL BATHYMETRIC CHARTS PRODUCED UNDER (IOC) REGIONAL MAPPING PROJECTS

The Draft Specifications, which were presented by the Chief Editor, had been prepared by the cartographers of the Head Department of Navigation and Oceanography of the USSR at the request of the IOC CGOM.

The Editorial Board considered the Draft Specifications, and with the concurrence of the Chief Editor made a few amendments thereto. It recommended their use as a Working Document by Editorial Boards of other IOC Regional Mapping Projects (see Annex X).

The Editorial Board expressed its appreciation to Captain S. Valchuk for a very useful job done, which will facilitate the implementation of other mapping projects.

7. ELECTION OF THE CHAIRMAN AND VICE-CHAIRMAN OF THE EDITORIAL BOARD

Professor C. Morelli was re-elected unanimously as Chairman and Professor J. Makris unanimously as Vice-Chairman of the Board.

8. DATE AND PLACE OF THE NEXT SESSION

Considering the state of preparation of the IBCM gravimetric maps, the Editorial Board found that it would be more appropriate to hold the next Session in September-October 1987 and requested the Secretary IOC to undertake necessary action for this.

The Editorial Board accepted with gratitude the kind invitation from the Chief Editor to hold the next Session in Leningrad, USSR.

9. APPROVAL OF THE SUMMARY REPORT

The Editorial Board considered the Draft Report prepared during the Session and made a number of amendments. It instructed the IBCM Secretary to send copies of the corrected Draft to participants for final approval.

ANNEX I

AGENDA

1. Opening of the Session

2. Adoption of the Agenda

3. State of preparation of geological and geophysical Overlay Sheets and technical requirements for them

   3.1 Magnetic sheets

   3.2 Gravimetric sheets

   3.3 Seismicity sheets

   3.4 Plio-Quaternary sheets

   3.5 Messinian sheets

   3.6 Recent Sedimentation sheets

4. Problems relevant to bathymetry of the Mediterranean

   4.1 Digitization of the IBCM bathymetric contours

   4.2 State of compilation of new bathymetric data

   4.3 Presentation of the one-sheet IBCM on the scale 1:5 000 000

5. Consideration of the draft List of Geographical Names of Undersea Features shown on the IBCM and on the small-scale IHO International Charts

6. Consideration of the draft Specifications for International Bathymetric Charts produced under (IOC) Regional Mapping Projects

7. Election of the Chairman and Vice-Chairman of the Editorial Board

8. Date and place of the next Session

9. Approval of the Summary Report

ANNEX II

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ANNEX III

COMMUNICATION OF DR. O. KAZAKOV

1. MESSINIAN MAP

The lists nos. 8, 9 and 10 of the Messinian Eastern Mediterranean map are submitted for consideration. The maps were based on Soviet scientists' investigations (profiles are given) and published seismic material. Contour interval of the maps varies from 250 to 500 m. Besides isolines, zones of basic tectonic faults and erosional channels presumably related to the Messinian period are shown on the maps. Seismic information processing shows that horizon "M" in the water area may be attributed to the base of Pliocene sedimentation rather than to the Messinian surface because Messinian evaporites may undergo pinching out. In future Messinian maps will present evaporites pinching out boundary and facies characteristics changes of the Upper Miocene formation. Two variants of the Messinian map are given in list no. 10. It is connected with the fact that the commonly identified horizon "M" in the Nile fan region (see Uchupi and Ross), by mistake as we suppose, is considered as the Messinian surface. In fact that horizon should be related to Tertiary or even to Mesozoic formation. We consider that the real Messinian horizon, as recorded on the seismic profiles in the Nile fan region, is shallower than that shown in the Uchupi and Ross profiles and that of the other scientists.

In this connection the first variant of the Messinian map uses the material from Uchupi and others and the second one is a new interpretation. The map of the second variant shows the Nile fan Messinian relief in better agreement with the bottom relief of the basin. Besides, thickness of the Pliocene Quaternary sedimentation in the second variant is characterized by smaller values than that on the Uchupi and Ross maps.

The list no. 9 of the map is hypothetical for lack of sufficient seismic information, thus the contour interval of the map is 500 m. Thickness of the Pliocene Quaternary formation over the larger part of the water area (see list no. 9) is rather small ($<$ 200 m) except for the Hellenic trench region, and observed horizon "M" on the profile generally is parallel to the sea floor as reflected in the isolines plotted in list no. 9. This made the construction of the Messinian map easier.

2. MAGNETIC MAP ΔTa

Lists nos. 8, 9, 10 of the Mediterranean magnetic map ΔTa are submitted for consideration (list no. 9 was represented earlier). The maps were plotted mainly from hydromagnetic studies during vessel cruises of the Soviet Enterprise Southern Production Association for Marine Geological Operations "Yuzhmorgeologiya" (survey routes are plotted). Isolines of magnetic anomalies are drawn in 50 ntl.

The normal field (IAF) of the epoch 1980 was used in the map plotting. Due to uneven distribution of hydromagnetic fields profile in the water area, additional published foreign materials were used for some lists of the map. For example, list no. 9 (the Aegean sea) was constructed under Morelli (1973). The magnetic map (list no. 10) was plotted under Soviet investigation information which included one of the working variants compiled from Cambridge observatory material and given to us by Dr. P.N. Kouprine. Anomalous magnetic field data also were marked in the surrounding area (see legend).

ANNEX IV

RECENT SEDIMENTATION MAP OF THE MEDITERRANEAN SEA

Scale: 1:1 000 000

LEGEND

General Considerations

Recent sediments are sediments of the upper layer of bedding deposits mainly of holocenic age. The thickness of the layer varies from 1 to 5 cm, sometimes approaching 10 cm. Ancient sedimentation outcroppings at the sea bottom are shown with the help of special symbols with indexes of a corresponding age. The recent sedimentation map should reflect the character of distribution of various sediments, their material composition and genesis.

A. Genetic Composition of Sediments

There is a practice to classify sediments and sedimentary rock on the basis of component's denomination i.e. according to a more than 50% content of any particular component. The analysis of factual data on recent sediments of the Mediterranean allows 4 genetic sedimentary groups to be derived on the basis of component's domination:

1. Terrigenous sediments (more than 50% of terrigenous material)
2. Biotic (carbonate) sediments (more than 50% of biogenic material)
3. Volcanic sediments (more than 50% of volcanic material)
4. Chemical sediments (more than 50% of chemogenic material).

These groups are shown with the help of different colours on the map. The bigger the percentage of a component - the deeper the colouring. If sediments contain less than 50% of some component, this admixture is depicted by means of symbols, specified for each component. We consider sediments to be pure if $\geq$90% of it is a material of one and the same genesis. There are not yet discovered in the Mediterranean biotic diatomic sediments (?). The additional symbols for the map will be invented in case of discovery of such sediments.

Chemical sediments of the Mediterranean are only of a carbonate type.

Terrigenous and biotic (carbonate) sediments predominate in the Mediterranean, and only small areas are covered by mixed terrigenous-volcanic and biotic-chemical sediments. This is the cause of a predominance of symbols for the two groups on the map.

Within each sedimentary group there are differentiated genetic types of sediments. Borders of different genetic types are shown by fine lines of a corresponding colour.

Terrigenous sediments are divided on the basis of their genesis between proper terrigenous (of river type, abrasive, etc.) and eolian. Special symbols are used for each type.

The group of biotic (carbonate) sediments can be divided into shallow-water and deep-water types of sediments. The shallow-water types include bioclastic sediments: shells, detrites, sands. Deep-water types (hemipelagic and pelagic) of biotic origin are characterized by a predominance of skeletons and shells (or their debris) of pelagic forms: coccolites, foraminifera, pteropoda, diatoms, etc.

Volcanic sediments are divided into pyroclastic (volcanic (volcanoclastic)) and hydrothermal. Special symbols are used to mark hydrothermal sediments.

The group of chemical sediments contain oolite and ooide spherulite sands and diagenic carbonate formations. They are also marked by special symbols.

Besides these four main groups, it is convenient to introduce a group of mixed sediments. This group includes, as a rule, sediments that contain three or more components in approximately equal proportions.

B. Granulometric Composition of Sediments

The legend for differentiation of granulometric types is based on the classification system of clastic sediments, proposed by C.K. Wentworth (1922), supplemented and modified later by a number of American geologists (W.F. Tanner, 1969). The name to a sediment is given according to a triangle diagram of R.L. Folk (1974), the most convenient for the purpose; ten granulometric types are discriminated with the help of the diagram. Granulometric composition data are computed with the help of a programme "Fraction". The programme transforms the data on grain-size analysis from the decimal system (used in the USSR) to a system based on C.K. Wentworth's classification. Cumulative curves have been used in the computations. Each sample is analyzed and given the name of a type according to Folk's diagram. All analytical data available to Soviet researchers are now stored in data banks. All data are computed and transferred to lists for plotting on the International Bathymetric Chart of the Mediterranean at a scale 1:1 000 000.

Graduality of transitions was shown upon drawing of isolines of a distribution of granulometric types of sediments, according to R.L. Folk's diagram. For example: clay may be a neighbour only to three types: sandy clay, sandy mud and mud; sand may have as neighbours only clayey sands, muddy sand and silty sand. Sandy mud may have neighbours of eight adjoining types excluding sand, and so on.

Granulometric composition is depicted by dots of different diameter and horizontal lines (dashed or undashed) of variable spacing. All symbols are of black colour.

C. Additional Symbols

Additional special symbols are used to depict material composition of sediments, for instance, terrigenous eolian, chemical oolite, coquina, foraminifera, coccolith, hydrothermal, pyroclastic, etc. Additional symbols are put over colouring to show assignation to a genetic group and type and also over dotting and dashing of black colour that show granulometric composition. Additional symbols are of different colours with the intensity that is much higher than the intensity of a background colouring that points out the genetic composition of sediments.

The genetic and material compositions are depicted by means of four different colours of different intensity (that depends on material concentration): gray colour corresponds to terrigenous sediments, blue to carbonate, red to volcanic, and yellow to chemical sediments.

As far as terrigenous and biotic sediments prevail in the Mediterranean - the dominating colours would be gray and blue. They will be bordered by an isoline of 50% content of terrigenous or biotic (carbonate) matter. The additional symbols will be used to depict sediments of a mixed type.

The age of sediments and rocks is written by commonly used geological indexes of a black colour.

The thickness of a holocene is depicted by a thin green line.

The name for each sediment type should contain in the first place an adjective or a noun, characterizing a predominant granulometric faction, in the second place an adjective showing a class of carbonate content (ferruginous, siliceous, manganous) and in the third place at the end, a word that reflects a predominance of a certain component of the sediment and, correspondingly, depicts a genetic type of the sediment.

E.M. Emelyanov

P.N. Kouprine

K.M. Shimkus

ANNEX V

IHO BATHYMETRIC PLOTTING SHEETS
AT 1:250 000 OF THE MEDITERRANEAN

(FORMERLY IBCM PLOTTING SHEETS AT 1:250 000)

1. The question of the keeping up to date of the 1:250 000 plotting sheets for the IBCM was on the agenda of the last meetings of the "GEBCO Officers" and of the "Editorial Committee for the IBCM and overlays (IOC)". From the discussions of these two groups, it appears that the Hydrographic Offices of Greece, Italy, Turkey, USSR and UK have already accepted responsibility for the keeping up to date of the plotting sheets established within the context of the IBCM. Only the areas covering the western part of the Mediterranean and the eastern part of the Ionian Sea were not yet placed under the responsibility of an IHO Hydrographic Office.

2. Furthermore, during its Assembly in March 1985, the Intergovernmental Oceanographic Commission (IOC) requested its Member States concerned with these two areas to participate in the present stage of the IBCM programme.

3. Considering the fact that the IHO is the "World Bathymetric Data Centre", the IHB Directing Committee feels that it would be more logical to have all the plotting sheets at 1:250 000 of the Mediterranean placed under the responsibility of the IHO. This is all the more desirable as the UK Hydrographic Department has officially informed the IHB that, since 1972, they have ceased to keep up to date the IHO 1:1M bathymetric plotting sheets of the Mediterranean, and proposed that they be replaced by the new bathymetric plotting sheets at 1:250 000.

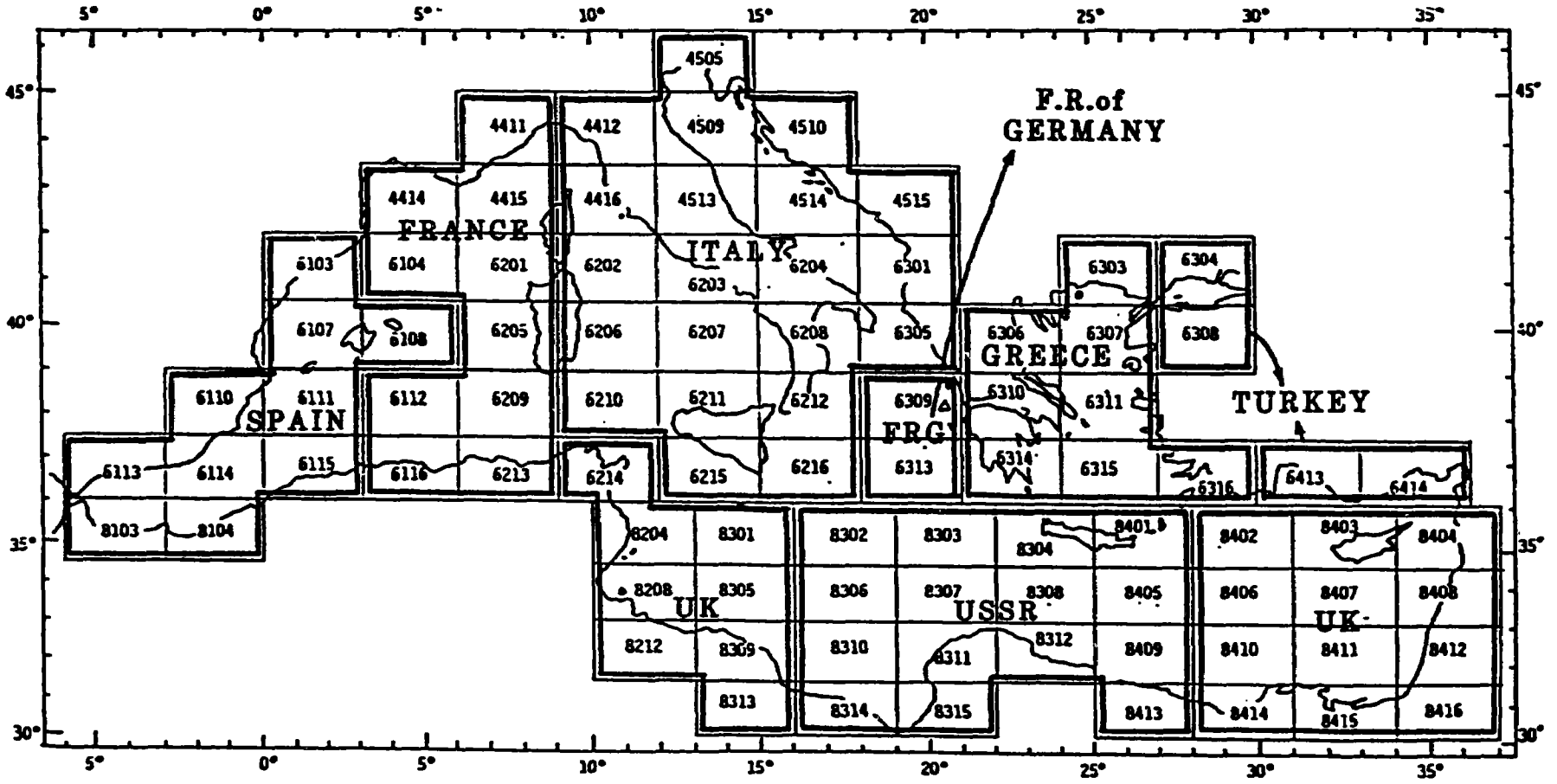
4. Consequently, the IHB has contacted the various IHO Member States directly concerned with these two areas of the Mediterranean, asking them to study the possibility of participating in this programme. The result of these consultations was very positive, thanks to the spirit of co-operation shown by the Member States concerned, and the IHB Directing Committee is pleased to inform that all the plotting sheets at 1:250 000 of the Mediterranean are now placed under the responsibility of the Hydrographic Offices of the IHO Member States.

5. The enclosed Index shows the description of the new areas of responsibility recently accepted by France, Federal Republic of Germany, Spain and UK, as well as the description of the previous IBCM areas of responsibility already accepted by Greece, Italy, Turkey, USSR and UK.

6. Subsequently, this Index will be inserted in the "Catalogue of IHO Bathymetric plotting sheets" published by the IHB.

INDEX FOR AREAS OF RESPONSIBILITY WITHIN THE MEDITERRANEAN SEA

(Bathymetric plotting sheets at 1:250 000)



ANNEX VI

MODERNIZATION OF PLOTTING SHEETS

(proposals of the Editor-in-Chief of the IBCM)

The idea of the modernization of plotting sheets is unconditionally advanced by itself. The Soviet Hydrographic Office is willing to participate in this process, but we think that, so far, it lacks a good organizational basis due to which our work has a somewhat spontaneous character.

It seems to us that, first of all, we should clearly define the purpose of modernizing the plotting sheet. Evidently, it is the preparation of the second edition of the IBCM.

Proceeding from this point it is necessary to determine when we shall be able to prepare the second edition. I think that it will not take place before we have completed the edition of six geological and geophysical maps. And these maps will apparently be issued in 8-10 years. Taking into account the present not very fast progress in obtaining knowledge on the bathymetry of the Mediterranean, we should expect the accumulation of sufficient new data to warrant the second edition.

Finally, it should be borne in mind that our work on the IBCM and geological and geophysical maps is not the principal activity of each of us and we are not able to give it as much attention as we should like to. In other words, we can do this work only periodically. But any recurrent work can yield good results only on the condition that it follows a strict system.

On the basis of the aforesaid, I should like to submit for the consideration of the Editorial Board the following proposals:

(i) To appoint at the present session co-ordinating States that should be responsible for the modernization of the sheets. The Soviet Hydrographic Office believes that there is every reason to maintain the distribution of responsibilities as it was with the production of the first edition of the IBCM. The IBCM Secretary should be requested to renew and distribute to all participants the scheme of the areas of responsibilities for the modernization.

(ii) It is necessary to specify the dates when we should be able to summarize the modernization results at the meetings of the Editorial Board. I think that it should be done not more than once every two or three years. It might be worthwhile summing up the results next in 1988, devoting the remaining time to active collection of the data.

By that time, the Hydrographic Service of the USSR will be able to modernize the plotting sheets covering its area of responsibility, provided that the data from all the participants in the project are received by the end of 1987. We, in turn, shall do our best to provide our colleagues in 1987 with all new information for their areas of resonsibility, which might be in our possession.

(iii) We believe that the following paragraphs should be included in the Editorial Board's decision:

a) to ask the IOC Executive Council and the IOC Secretary to invite all the participants in the IBCM project to pass all the bathymetric information on the Mediterranean which is in their possession and which is suitable for the IBCM, to the IBCM Secretary;

b) to request the IBCM Secretary to take active measures, both individually and through the IOC Executive Council, to obtain this information and to forward it without delay to the co-ordinators according to their areas of responsibility;

c) to receive, at the session of the Editorial Board in 1988, the reports of the IBCM Secretary and of the co-ordinators on the modernization of plotting sheets, to summarize the results of this work and to outline the possible future actions.

ANNEX VII

BGI PRESENTATION OF THE BOUGUER ANOMALY MAPS OF THE MEDITERRANEAN AREA (SCALE 1:1 000 000)

1. INTRODUCTION

After the last session of the Editorial Board for the IBCM, the preparation work of the Bouguer anomaly maps has been divided between the BGI and the "Institut für Geophysik", Hamburg; the BGI preparing the six western sheets of the area.

2. DATA

For land area, the data coverage from point measurements is relatively homogeneous, even if it must be complemented in some areas (Tunisia, Morocco) from Bouguer anomaly maps. But we have not the same situation for sea areas: surveys available in the BGI, in the most cases, do not correspond to a regular gridding; the adjustment of cruises is also a problem and for some of them the bathymetry is lacking.

To begin with, we have used a mean 6' X 10' free air anomaly file from "Institut für Erdmessung', Hannover (mainly digitized from Prof. Morelli, et al.'s maps for the West and Central part of the Mediterranean Sea). These values have been converted into Bouguer anomalies, by means of a 5' X 5' bathymetric data file, compiled by the U.S.N.O. Some problems have appeared: the smoothing, inherent in mean free air anomalies, was increased, with the use of the bathymetric file (itself resulting also from a smoothing by spline functions). The comparison with point values has shown also that merging of point and mean values would be very difficult, due to smoothing and bias errors.

Consequently, we have preferred to work on a homogeneous data set and to come back to the original maps of Prof. Morelli: we have digitized isanomals and after screening and the change of reference system (to GRS 67), we have merged the resulting data file with land data.

3. DATA PROCESSING

The whole data set (digitized and screened data, and points from digitized maps) have been interpolated, at the nodes of a 3' X 5' grid.

We have used the following method: we search the nearest gravity point inside each quadrant around the interpolation grid node, at least up to 0'3 degree. The weight of each point is a function of the distance to the grid node (A/d^3). This regular gridding is used by the contouring software (isanomal interval: 10 mgal).

During this step, we have eliminated erroneous data, most often isolated points, by means of an automated cartographic process.

The method of interpolation by weighing of point values produces a smoothing effect, notable when we compare contour lines, at sea, with "point" values issued from original isanomals. To produce a better restitution, we would need a contour specific interpolation algorithm, like for digital terrain modeling, at the moment in development at BGI.

M. SARRAILH

ANNEX VIII

IBCM BOUGUER ANOMALIES MAP

Provisional Legend

Presented by Dr. M. Sarrailh

These sheets have been prepared as overlay sheets to the 1:1 000 000 International Bathymetric Chart of the Mediterranean Sea

Compilation: sheets 1, 2, 3, 6, 7, 8: Bureau Gravimétrique International
sheets 4, 5, 9, 10: Institüt für Geophysik, University Hamburg

Contour interval: 10mgals

Reference System: GRS 67 - IGSN 71

Bouguer Correction: simple plateau correction with density = 2,679/cm^3

(red) : Positive anomalies

(blue) : Negative anomalies

(green) : Gravity point positions

ANNEX IX

COMMUNICATION OF THE EDITOR-IN-CHIEF

(Publishing Editor) at the Second Session
of the Editorial Board for IBCM and Overlay Sheets
(Paris, 13-15 March 1986)

Mr. Chairman,
Dear Members of the Editorial Board,
Dear Colleagues,

First of all, I should like to inform the Editorial Board on the fulfilment of the responsibilities we accepted at the first session in Lucerne, 20-22 October 1984.

These responsibilities were as follows:

a) to prepare and submit to the IBCM Secretary three sets of compilations of geological and geophysical details on stable transparent plastic;
b) to prepare a photo-reduced colour copy of the IBCM at 1:5 000 000;
c) to print the IBCM brochure in five languages.

The three sets of the above-mentioned transparencies were supplied to the IBCM Secretary in August 1985. Each set contains ten transparencies with contour, land topography and bathymetry. Together with the earlier prepared blank copies of the IBCM they will provide the compilation of the first three geological and geophysical maps. For the preparation of the three other maps we are ready to produce and supply to co-ordinators the required number of transparencies at any time. I think that we shall also have no difficulties in the preparation of a few more transparencies, which, as it has now turned out, are necessary for the co-ordinators of the first three maps.

Following the decision of the Editorial Board, the Soviet Hydrographic Service has printed a colour copy of the IBCM table version at 1:5 000 000 which is submitted for your consideration. According to the recommendations of the Editorial Board, this colour copy is prepared by means of photo-reduction without generalization (with omission, at your request, of the ship tracks only). As you can see for yourselves, this photo-reduction product does not fully comply with the existing cartographic standards. But it was the wish of the Editorial Board to have the map printed without any recompilation using direct photo-reduction, and we have done so accordingly. I ask you to look at this product, make your comments and state the required number of printed copies. If there are no substantial comments, the chart could be printed by the date agreed at the given session.

In addition to the above-mentioned colour copy, a new IBCM brochure is brought to the attention of the Editorial Board. Four hundred copies of this brochure are printed in five languages: English, French, Spanish, Russian and Arabic. As compared with the initial version, it is supplemented with an Arabic text, the scheme of the IBCM sheets and a short list of the book trade firms where the IBCM could be obtained. One hundred copies of the above run have the inscription "To a Contributor" overprinted on the title page and are intended for the presentation to the persons who contributed to the work on the IBCM. They will be supplied to the IBCM Secretary for further distribution to the regional co-ordinators.

Today, we should like to submit to the Editorial Board one more document - "The Draft Specifications for Bathymetric Charts Produced Under Regional Ocean Mapping Projects". These Draft Specifications have been prepared by the Soviet Hydrographic Office at the request of the IOC Consultative Group on Ocean Mapping. When drawing up this set of specifications, we attempted to use to the full the experience gained in our work on the IBCM. That is why we should appreciate very much the Editorial Board's preliminary consideration of it. If you approve, the set will be submitted to the IOC Consultative Group on Ocean Mapping for further use as intended.

Regarding the discharge of responsibilities, I should also like to express the concern of the Head Department of Navigation and Oceanography of the USSR on the delay in the execution of certain decisions of the previous session of the Editorial Board. I should remind you of the decisions taken at that session aimed at making our work more co-ordinated and effective. It was decided, in particular, that the co-ordinator of each sheet would prepare for consideration at the forthcoming session the technical requirements determining:

- elements of charting (parameters);
- units of measurement;
- intervals (spacing of isometric lines) or other principles of cartographic representation of data;
- symbols (specifications);
- legend, including an explanatory text, list of source materials, author attribution, etc.

It was expected that clear definition of these requirements and the approval of them by the Editorial Board would result in reaching perfect agreement on various stages of the preparation of the maps for their publication and printing. Unfortunately, today we do not see a willingness to consider these problems fully.

In this connection, I should like to remind the Board that, at the previous session, our proposal on the development of the schedule for submission of compilations for typographical and publishing work also met with no objections. This proposal has not yet been implemented either.

The Soviet party, being a publisher of the maps, is greatly concerned about the situation. We think that any delay in the solution of these problems could adversely affect our further activities. Moreover, having no initial data on the terms and amount of our future work, we cannot plan the required resources and authorization for typographical and publishing work. Therefore, I again ask the co-ordinators, the Editorial Board and the IBCM Secretary to identify, as soon as possible, the terms of placing at our disposal at least 2 or 3 sets of compilations that are the most advanced at this time and to

inform accordingly the Head Department of Navigation and Oceanography of the USSR Ministry of Defence.

There is one more comment directly connected with the submission of compilations. In 1984, inviting the Editorial Board to hold its Third Session in Leningrad, we thought that compilations for at least one of the six geological and geophysical maps would be ready in 1985. In that case we could prepare the appropriate colour copies in 1986 for the consideration of which we expected to attract relevant specialists in order to discuss with them the details of typographical and publishing work. That is why we thought it reasonable to convene the Third Session in Leningrad.

Judging from the existing situation our hopes have not yet been realized and there is no sense in holding the next session of the Editorial Board in Leningrad. At best, only compilations of some maps could evidently be considered at this session. It means that colour copies could be dealt with only at the Fourth Session. We think that it will not be before 1988.

In closing my communication, I should like to emphasize once more the positive attitude of the Head Department of Navigation and Oceanography of the Ministry of Defence of the USSR towards the International Bathymetric Chart of the Mediterranean Project and to inform the Editorial Board that, on our part, we shall make every possible effort to provide a prompt and high quality publication of the maps after we have received the compilations approved by the Editorial Board.

Thank you for your attention.

ANNEX X

SPECIFICATIONS FOR INTERNATIONAL BATHYMETRIC CHARTS
PRODUCED UNDER REGIONAL MAPPING PROJECTS

These Draft Specifications have been prepared by the Head Department of Navigation and Oceanography of the Ministry of Defence of the USSR.

This draft document has been studied and modified by the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets (IBCM), for use if necessary as a working document by Editorial Boards of other IOC Regional Ocean Mapping Projects. It will be submitted to the members of the Consultative Group on Ocean Mapping (CGOM) for approval by correspondence.

SECTION 100 - GENERAL

101 - Introduction

A. International Bathymetric Charts produced under Regional Mapping Projects are a continuation and further development of the General Bathymetric Chart of the Oceans (GEBCO), under the general guidance of the IOC Consultative Group on Ocean Mapping. These charts are prepared and published with the co-operation of volunteer Hydrographic Offices and/or groups of scientists from appropriate institutions.

B. For each bathymetric chart series, an Editorial Board will be established by the IOC Assembly or Executive Council, for the purpose of technical direction of its compilation and publication.

SECTION 200 - BASIC SPECIFICATIONS

201 - Projection

A. Sheets between latitudes 72°N and 72°S shall be shown on Mercator Projection using an agreed International Ellipsoid.

B. Polar sheets shall be prepared using the Polar Stereographic Projection.

202 - Scale

A scale of 1:1 000 000 at a reference parallel to be defined by the Editorial Board shall normally be used.

203 - Graticule

A. A scaled border of each sheet shall be shown subdivided into 1 minute increments of latitude and longitude.

B. Meridians and parallels shall be drawn every 2°.

C. Labelling of the graticule shall be every 1°.

D. The tropics of Capricorn and Cancer and the Polar Circles shall be shown.

204 - Size

The neat line size of each sheet shall not generally exceed 740 x 900 mm.

205 - Numbering

A. For each chart a consecutive sheet number shall be used as shown in an Assembly Diagram.

B. Sheet numbers shall be printed in 8 mm Arabic figures in the lower right-hand and top left-hand corner of each sheet.

206 - Dating

The date of the chart publication to be shown on each sheet shall be the date of going to press.

207 - Units of measurement

Depths and topographic heights shall be shown in metres. Depths should be corrected from the latest edition of the Echo-Sounding Correction Tables, published by the United Kingdom Hydrographic Department.

208 - Marginal information

A. All marginal information shall be in English (or bilingual if appropriate).

B. This shall include:

1. The general title of the chart.
2. Sheet number.
3. Projection, ellipsoid and scale (see 201, 202).
4. Unit of measurement used for depths and heights.
5. Code of colours used to portray hypsometry.
6. Code of colours used to portray bathymetry.
7. An index of areas and names of countries whose Hydrographic Offices or groups of scientists prepared plotting sheets for the sheet.
8. The names of scientific co-ordinators of the chart series and of scientists responsible for the scientific content of the sheet.
9. The logo of the Intergovernmental Oceanographic Commission (IOC) of Unesco.
10. Edition number and date of publication (see 206) followed by the statement:
"Published by the . . . . . (name of printer)
under the authority of the IOC (of Unesco)"
11. List of the sources of the data used (for the chart series).

SECTION 300 - TOPOGRAPHY

301 - For the land part, topographic maps shall be used.

302 - The best available agreed upon coastline shall be used. The coastline shall be shown as a firm line in black.

303 - A. Contours on land shall be at 200 m intervals.

B. The thicker lines shall be at 200, 1 000, 2 000, 3 000, etc., m intervals.

C. Additional contours which may be required by the data must be shown.

D. A colour change for hypsometry shall be used at the following intervals: 0-200, 200-1000, 1000-2000, 2000-3000, etc., m.

E. Glaciers shall be shown by contours or by symbols. The significant heights shall be shown.

304 - Hydrology of the land

On the chart shall be shown:

- rivers and channels whose length is more than 5 cm on the chart;
- lakes whose area is more than 2 cm^2 for separate ones and 1 cm^2 for each lake in a group of lakes;
- lagoons whose length is more than 1 cm on the chart.

305 - Cities and towns irrespective of their administrative rank.

306 - Boundaries and names of countries shall not be shown.

SECTION 400 - BATHYMETRY

401 - The 1:250 000 plotting sheets prepared by the participants in the Project, according to their zones of responsibility, shall form the basic bathymetric data to be used for the compilation of the chart.

The plotting sheets shall be prepared according to the Annex to these Specifications.

402 - Soundings

A. In order to indicate contour reliability, all soundings used shall be shown as dots representing discrete soundings or lines representing continuously sounded traverses. Areas of detailed surveys, where soundings are denser than can be conveniently shown, shall be indicated by numbered boxes referenced in the margin.

B. A sparse pattern of numerical soundings shall be shown to indicate maximum and minimum (and other significant) depths, where known, over major undersea features in such a way as not to detract from the paramount objective of indicating sea floor relief by means of contours.

C. The exact position of all numerical soundings shown shall be indicated by a dot. The depth shall be written as cartographically convenient against the dot using 1.5 mm sans-serif figures. Where space does not permit the juxtaposition of the figures they may be offset and linked by a fine line to the dot placed in the exact position.

403 - Depth contours and colours

A. Basic contours shall be at 200 m intervalls.

B. The 200 m contour line and all contours at 1000 m intervals shall be drawn using thick lines.

C. 20, 50 and 100 m contours, if necessary, shall be drawn using thin lines.

D. A colour change for the bathymetry shall be used at the following intervals: 0-200, 200-1000, 1000-2000, 2000-3000, etc., m.

SECTION 500 - NOMENCLATURE AND GEOGRAPHICAL NAMES

501 - A. A proposed list of names for inclusion on each sheet shall be forwarded to the GEBCO Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features, for guidance. In preparing this list account should be taken of the guidelines contained in the GEBCO publication "Standardization of Undersea Feature Names".

B. As a general policy, local names (cities, towns, mountain ranges, rivers, etc.) shall be in exact agreement with the form prescribed by the most authoritative national source. However, in those cases where the national names differ substantially from the normal English usage, the English version shall be shown alongside in parenthesis.

C. The nomenclature for undersea features shall be shown in the English language.

APPENDIX TO ANNEX X

RECOMMENDATIONS FOR PREPARATION OF PLOTTING SHEETS FOR INTERNATIONAL BATHYMETRIC CHARTS PRODUCED UNDER REGIONAL MAPPING PROJECTS

1. For plotting and contouring purposes the British Admiralty's plotting sheets for oceanic soundings should be utilized.

2. Soundings should be in metres corrected using the latest edition of the "Echo Sounding Correction Tables".

3. The position of the sounding should be the central point of the group of figures representing it. But the position may also be indicated by a dot with the sounding figure alongside, and if necessary, by a thin line drawn to connect the two.

4. The soundings figures should be inscribed across the track; the figures should be easily readable, the recommended average size being 1.5-2 mm in height.

5. The largest possible number of soundings should be shown on the plotting sheets so long as their clarity is not impaired. When soundings are very dense, the number may be reduced if care is taken not to eliminate the more important soundings: maxima and/or minima.

6. The margin of each plotting sheet should contain the following legend:

   "Compiled by .....
   "Last brought up to date on .....
   "Prepared under ..... (name of the appropriate Regional Mapping Project).

7. Each plotting sheet should be accompanied by two overlays:

   a) overlay contour lines with contouring made through each 100 metres, additional contours may be drawn through 50 and 10 metres, where warranted (on the shelf and abyssal plains);

   b) overlay source materials on which should be shown the following:
      - areas of soundings and position of isolated soundings with the appropriate legends required to indicate the source and the date of such soundings;
      - information on the method of navigation and its precision;
      - information on the type of the echosounder and its precision.

8. On each plotting sheet and overlay the date of completion of compilation should be indicated.