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1. IIOE Geological/Geophysical Atlas

The Second Meeting of the Editorial Committee for Bathymetry was held at the National Institute of Oceanography, Wormley, Surrey, U.K., and was attended by R. L. Fisher, V. L. Kanaev, A. S. Laughton and E. S. W. Simpson - with financial assistance from the Office of Oceanography, Unesco - so as to review, co-ordinate, and further the progress of:

- (a) the 1:5,000,000 bathymetric chart series
- (b) the special survey series
- (c) other related material for inclusion in the Atlas.

A. Status of contributions to 1:5,000,000 series charts

(cf. chart for areas to be circulated by Laughton)

(1) Area I (Laughton)

Compilation completed and contoured on 1:1,000,000 plotting sheets.

Reduced to 1:2,000,000 at 33°S.

Dot control complete.

Sheets in separate Admiralty plotting sheet areas (photo transparencies + paper copies).

Available for Udintsev end September 1968 after final adjustment.

Preliminary dyeline copies given to Kanaev.

Area Ia (Laughton)

As for Area I.

Area II (Kanaev)

Compilation, at large scale, not yet started.

To be based on previous chart together with new available data, at 1:2,000,000 and to fit with north margin of chart VI. (Fisher)

Available in September 1968.

Area III (Kanaev, Marova)

Kanaev to prepare new bathymetric chart using new data compiled by British Hydrographer for I.H.B. commitment. Hydrographer will supply 1:1,000,000 sheets upon application by letter from the Institute of Oceanology, Moscow.

Area IV (Fisher)

Compilation completed and contoured. Reduced to 1:2,000,000 at 33°S. Dot control incorporated. 1 sheet on transparent mylar handed to Kanaev.

Areas V, VI, VII (Fisher)

As for IV.

Area VIII (Fisher)

Compilation complete.

Initial contouring complete.

Dot chart complete (on 1:2,000,000) but not yet incorporated.

Completed reduced chart available approx. February 1969.

Area IX (Fisher)

Compilation completed and contoured up to March 1967, by T.W.C. Hilde.

Dot chart available but not yet incorporated.

Available complete approx. January 1969.

Area X (Simpson)

New contour charts will be prepared at 1:1,000,000 and photo reduced to 1:2,000,000 at 33°S. Dots for soundings to be included. New data from Vidal, Dampier, Anton Bruun, Ob cruises 2 and 3, Kurchatov 2, Conrad 11, copies of US H.O. plotting compilations (from Fisher), etc. to be obtained.

Available February 1969.

Area XI (Kanaev)

Compiled at 1:2,500,000 but post-1962 data not available from Australian sources. Recommend further efforts by Kanaev to obtain plotting sheet data from Australian Hydrographic Office.

- (2) The contributions to the 1:5,000,000 BM chart series should include all available data up to the time compilation. Certain data obtained later or still outstanding, should not be used for corrections of already compiled charts except in very special circumstances when significant new features have appeared. (e.g. cruise data not completely incorporated:- from Vidal (1967), Oceanographer (1967), Vityaz 40, 41 (1967), Argo (1968), Academician Kurchatov 2, (1967), Dampier (1967), Anton Bruun Cruises 2-9 (part only) (1963-64), Conrad 9 (part only) and other ships.)
- (3) Recommend that the final drafting (in Moscow) of all BM charts should be done at a scale of 1:2,000,000 (at 33°S.) i.e. at the scale of data submission, so that each dot representing a sounding can be separately drawn. The Editors realise that in some places the dots may merge to give a nearly continuous line: this is both acceptable and still indicative of sounding control.

- (4) No broken contour lines to be used. (Dot soundings only to indicate reliability.) All contour lines to be continuous.
- (5) Colour layering.
Recommend colour changes every 500 metres.
Special characteristic colour 0 - 200 metres.
- (6) Areas of special detailed survey to be shown on 1:5,000,000 series charts as outline polygons. The results of these surveys should be included in this series, and also reference be made to larger scale charts in Atlas. Within the box at 1:5,000,000 scale, no sounding dots to be shown. On enlarged polygon charts, sounding control must be shown.
- (7) Recommend that depths to be marked on 1:5,000,000 BM charts should be kept to a minimum, and the following have been suggested:-
- (a) Maximum depths over negative features:-
- Sunda Trench
 - Weber Deep
 - Chagos Trench
 - Amirante Trench
 - Mauritius Trench
 - Ob Trench
 - Diamantina Trench
 - Wheatley Deep
 - Alula-Fartak Trench
 - Red Sea central rift
 - Andaman Trench
 - Vema Trench
 - Natal Deep
 - Vityaz Trench
- (b) Minimum depths over positive features:-
To be limited to a few selected major isolated features.
Details to be decided at a later stage in chart production.

Spot depths to be provided (in the first instance) by authors of Areas I - XI.

- (8) The proper names to be included in 1:5,000,000 charts were discussed, and it was agreed that some features were named differently in different countries.

A chart (to be circulated later by Laughton) was prepared with names of principal features underlined in blue (as agreed by Fisher, Simpson and Laughton) and in red (for names already accepted by U.S.S.R.). The many names common to all are underlined in both blue and red.

These names include:-

- basins
- ridges
- plateaus
- trenches
- cones
- fracture zones

The names of smaller features (e.g., seamounts, small ridges, local deeps, rises, etc.) should be collected from the published literature and are to be discussed at a later meeting in relation to proofs of 1:5,000,000 BM charts.

B. Status of special area BM charts

- (1) Mauritius (Fisher)

(cf. Fisher, Johnson and Heezen paper 1967, Fig. 2)

- to be extended north to 19°S.

- available December 1968.

- (2) Amirante Trench (Fisher)

Cancel.

- (3) Gulf of Aden (Laughton)

Chart nearly complete at 1:1,000,000, contoured at 100 fathom intervals.

NIO to reduce to 1:2,000,000 and submit to Udintsev as 3 transparent

positives:-

- (a) contours
- (b) dot soundings
- (c) names and figures

Dyeline copy coloured to show depth intervals.

Available October 1968.

- (4) The Murray Ridge (Laughton)
Contours at 100 fms. interval from 1:1,000,000 draft contour charts.
Dyeline copies will be sent to Udintsev for redrafting in Moscow.
Dot control to be sent on separate 1:1,000,000 sheets.
Available December 1968.
- (5) Cambridge Area 4a and polygon K2-II (Kanaev)
Area 4a charts from AMSP 9 Pt. I:-
 Tracks Fig. 5A) to be combined.
 Contours Fig. 5B)
Polygon K2-II not yet complete.
Both areas to be combined into 1 diagram by Kanaev.
Available November 1968.
- (6) Fred Mount (Laughton)
Track chart Fig. 10.2) of Ph.D. thesis by F.J. Vine. Originals at
Contours Fig. 10.3) Cambridge (?). Refer to photos with Matthews.
Available October 1968.
- (7) Hot salty holes (Laughton)
Obtain from WHOI (Ross) if possible.
- (8) Red Sea (Laughton)
New contouring by Laughton finished at 1:1,000,000 at 100 fm. intervals
without dot control.
Dot control on separate sheet.
Will send dyeline copies for redrafting and compilation in Moscow.
Available October 1968.
- (9) Ganges and Indus Canyons (Laughton)
From Deep-Sea Research (Hayter 1960) or from Shepard and Dill 1966.
Tugela Canyon (Simpson)
Fair copy available - will be sent to Laughton.
- (10) USSR Polygons (Kanaev)
13 polygons in all.
10 completed and available.
3 in preparation.

- (11) St. Paul Is. (Fisher)
Use Fig. 5 from UMP Symposium (Ottawa 1966).
- (12) Area 4c (Laughton)
Use AMSP 9 Pt. I:-
 Tracks Fig. 6A.
 Contours Fig. 6B.
 To be combined photographically by Moscow.
- (13) Persian Gulf (Udintsev)
Situation unknown - Udintsev to contact Seibold direct.
- (14) Afanasi Nikitin Seamount (Kanaev)
Complete.
Contour interval 100 m.

C. Profiles

Recommend that the Atlas should contain:-

- (a) 2 or 3 long profiles across the whole Indian Ocean (100:1 vert. exagg.).
- (b) 20 - 30 representative profiles across main morphological features (37:1 vert. exagg.), including continental margins.

For distribution of profiles refer to sketch chart given to Kanaev.
Responsibility with Kanaev.

D. Track Charts

We confirm the desirability of including a chart at 1:20,000,000 of the tracks of ships participating in the IIOE.

To be prepared in Moscow and circulated for comment.

E. Index Chart

Recommend inclusion in the Atlas of an index chart to indicate areas contoured by different authors (i.e. Areas I - XI listed in A).

F. 1:20,000,000 Equal-Area Chart

This chart will be prepared in Moscow from the data for Areas I - XI when they have been compiled and submitted to the Editor. A draft of the equal-area chart should be sent to Simpson for the inclusion of additional data for the area south of 51° South.

N.B. Documents related to this report -
 (a) Chart of Areas I - XI
 (b) Chart showing proper names
- are not shown here.

2. IIOE Physical/Oceanographical Atlas

Report on the state of work (by Professor G. Dietrich)

In my capacity as a member of the Advisory Board for the IIOE Physical/Oceanographical Atlas, I stayed in Honolulu from 7 to 15 June 1968. Dr. Klaus Wyrтки is in charge of the preparation of the Atlas, and we discussed the work accomplished - covering the following topics:

1. Dr. Wyrтки was appointed by IOC to prepare the IIOE Atlas on 20 December 1965.
2. Up to now the U.S. National Science Foundation has put at his disposal a total of US\$ 270,000.
3. In 1965, the Data Centres estimated the total number of IIOE stations (1959-1965) to be about 7,000, but, by the end of 1967, this number had increased to 11,000.
4. The number of observations of t° and S°/oo is approximately 140,000, 70% of these together with O_2 values and 30% with information concerning phosphate and other nutrients.
5. Supporting conditions: The preparation in Honolulu was facilitated by several circumstances -
 - a) All original observations were already punched by NODC-Washington or by other institutions.
 - b) All station observations were interpolated for standard depths automatically at the Department of Oceanography at Honolulu.
 - c) All observational material has been stored on magnetic disc-files.
 - d) A computer (IBM 360) was on hand.
 - e) A plotter was available which transferred all observations automatically from the disc-file to maps with a scale of about 1:15 mill. First rough isolines were also interpolated and drawn.
 - f) The preparation of the meteorological IIOE Atlas is carried out by Dr. Ramage at the same building in Honolulu, and is nearly completed.
 - g) Dr. Wyrтки was assisted by Mr. B. Bennett (M.S.), who carried out the programme work, and Dr. W. Düing, who worked on the dynamical topography of the circulation caused by the monsoons.

6. State of the work in June 1968:

- a) The entire observational material has been examined.
- b) The drawing of the horizontal maps is in progress. The horizontal maps (t° , S°/∞ , and O_2) from the bottom to 600m are ready. Each map contains not only the isolines, but also the stations.
- c) The deeper horizons with only a small number of data contain the data of the single observations.
- d) In addition to the maps with the isolines, maps with the 5° mean values have been worked out for all horizons.
- e) The horizons of 0 to 400m are worked out in maps that take the seasons into consideration.
- f) Two longitudinal sections through the deep-sea basin are ready.
- g) Seven cross sections are in preparation; the upper 400m are worked out separately with consideration of the seasons.
- h) It is assumed that the final drawings for the Atlas will be ready for printing at the end of 1969.

7. Particular difficulties:

- a) Large areas of the Indian Ocean, especially south of $30^{\circ}S$, have stayed free from stations within the period 1959-1965, even when taking the older stations into consideration.
- b) There are seasons in which large parts of the main monsoon areas are without observations.
- c) In some parts it is rather dubious to draw isolines. In such cases of doubt the maps show the single observations.

8. It is planned:

- a) To publish the Atlas in colour-print in 1970.
- b) To publish monographs, which use the Atlas and the observational material for the interpretation of the oceanographical conditions in the Indian Ocean:
 - I. W. Dilling (Kiel, at present Honolulu) - The Monsoon Regime of the Currents in the Indian Ocean.
 - II. K. Wyrтки (Honolulu) - The Water Masses of the Indian Ocean.
 - III. The Variations of the Thermal Structure of the Indian Ocean.
 - IV. D. J. Rochford (Cronulla) - Chemical Data.

9. The question of financing the printing of the Atlas is still open. Calculations will become indicative at the beginning of 1969 when the final size of the Atlas will be known. One should carry out the procedure of printing in a similar way to that of the meteorological IIOE Atlas (Dr. Ramage). I would like to propose that Unesco agrees to purchase a number of copies for the institutions of the developing countries in the area of the Indian Ocean (approximately 200 copies at US\$ 25 = US\$ 5,000).

10. Altogether I had the impression that, under the initiative of Dr. Wyrcki and his experience in the treatment of voluminous observational material (monographic studies of the Indonesian, East Australian, and West Pacific waters), an optimal analysis of the records of the inhomogeneous material will be reached. The Atlas contains quite new results with regard to this ocean and meets our expectations in connection with the International Indian Ocean Expedition. However, the Atlas also makes it clear that there are still many open questions, and it therefore will be a valuable help in the preparation of future investigations in the Indian Ocean.

I should like to ask all institutions concerned not to relax in their efforts to support Dr. Wyrcki, so that the preparation of the Atlas can be finished soon and so that the final result will be comprehensive.