

" HYDROCEANOGRAPHY "

by C. F. ALBINI

I.H.B. Note. — In the article below Captain ALBINI illustrates a point of view which might be defined as conservative and one which several hydrographers probably do not share. The article may nevertheless be considered as a useful contribution to the study of the question of relations between oceanography and hydrography, one which is certainly of great current interest.

As the subject will be dealt with in detail at the next conference during discussion of the proposal that an oceanographic section should be formed within the Bureau, the Directing Committee feels that other comments on the subject would be useful and enlightening, so that most delegates may arrive at the conference fully informed in this connection and familiar with the arguments put forward by the defenders of various viewpoints.

It would be desirable, therefore, that those hydrographers with views on the matter transmit articles or correspondence to the Bureau in time for insertion in the *International Hydrographic Review* of January 1967, the last issue due to appear before the conference.

Until not very long ago — about ten years or so — almost all hydrographers considered hydrography and oceanography to be two basically separate activities, even if they did have certain points in common.

It was thought that though the field of the two activities was the same — namely, the sea — the investigations carried out by each were distinctly different, since their aims were not the same. That of hydrography was to supply mariners with the documents and information necessary to enable them to navigate in safety; the aims of oceanography were several: some of a practical nature (exploitation of the resources of the sea), others of a scientific nature, but none concerned with navigation. A rock, it was said, may be of interest to hydrography if it represents a danger to shipping; therefore, the hydrographer deals only with the depth and position of the rock, remaining indifferent to the stone of which it is composed, the vegetation which covers it and the fish which swim around it. Conversely, the oceanographer is interested in the geologic composition of the rock, its vegetation, its fish, but is indifferent to the concerns of mariners.

Similar arguments were held regarding most of the activities of oceanographers and hydrographers. It was allowed that spheres of common interest existed, such as, for instance, bathymetry, currents, tides, etc., but that since such questions were viewed from different angles in the two branches, observing methods, also, must be dissimilar.

These, then, were the widely-held views a little while ago, and few were the hydrographers who took a certain interest in oceanography. Such hydrographers, moreover, were not ready to divulge their opinions, since these were generally based on military considerations, which those concerned do not normally care to emphasize too openly.

About ten years ago, however, ideas began to change: voices which hitherto were heard tentatively suggesting the advantages of closer cooperation between oceanographers and hydrographers have become more numerous, and have above all lost all timidity, no longer restricting themselves to merely advocating cooperation, but even demanding that the two activities be amalgamated. The ideal solution, for such thinkers, would be for all hydrographic offices to undergo the metamorphosis completed by that of the United States and become oceanographic offices — or, at least, “hydroceanographic” offices.

I have the impression, however, that although these voices are becoming more and more numerous they do not constitute the majority, and most hydrographers hear them with a certain degree of perplexity. Indeed, hydrographers are bound to note that opinions have veered, although the facts at their base remain unchanged. Practically, with the same data on the problem as ten years ago we now arrive at quite opposite conclusions.

As one of these hydrographers, I was legitimately curious to know the reasons for this reversing of positions. Literature on this subject is not yet abundant, but includes two articles whose authors are among the most eminent of contemporary hydrographers, and who, proficient in oceanography also, are doubtless best placed for giving a conclusion in the matter. They are Ingénieur Hydrographe Général GOUGENHEIM and Commodore LANGERAAR (*). Both being fervent supporters of the idea that oceanography and hydrography should be combined, they have probably noted the most convincing arguments in favour of this point of view.

I read these articles very attentively, but I must admit that they have not converted me to the doctrine preached by their authors.

The article in the Dutch “Newsletter” was written with remarkable elegance and may be considered as a model of case-pleading, by reason of the unquestionable dialectic skill of its author; however, it failed to convince me, for the essence of the article lies in the development of the following statement: “Our knowledge of the sea is infinitely small. We work at sea knowing next to nothing about that medium.” Consequently we should make it our duty to carry out all the investigations and observations necessary for knowledge of the medium, and which come within the scope of oceanography.

In my opinion, if, admittedly, we know very little about the medium in which we work, we do know enough for the needs of hydrography, and when it is possible to carry out complete surveys we supply mariners with

(* Ingénieur Hydrographe Général A. GOUGENHEIM : *Oceanography and Hydrography : basic research and descriptive oceanography*. International Hydrographic Review, January 1965, p. 131.

Commodore W. LANGERAAR : *The influence of oceanography on hydrographic surveying*. Hydrographic newsletter published by the Netherlands Hydrographer, July 1965, p. 179.

all the basic information they require, without wasting precious time on speculations which are not likely to contribute any noticeable amendment of the data we place at seafarers' disposal.

It is true, for example, that temperature, salinity, and all other physical and chemical properties of sea water, as well as any circumstances likely to affect the propagation of ultrasonic waves through sea water, influence the measurement of depth recorded by echo sounders. But the methods currently employed: calibration of instruments, periodic checking with lead line, correction from British H.D. Tables 282, are quite adequate for the degree of accuracy required when sounding for a nautical chart, and I have not heard of any trouble arising from insufficiently fine precision in the correction of soundings.

The same may be said of several other kinds of investigation at sea, which are of great interest for oceanographic research but of no practical use to everyday navigation.

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Ingénieur Général GOUGENHEIM, on the other hand, does not mention in his article the necessity or even the utility of oceanographic investigations to the needs of hydrography itself. This leads one to think that he does not share Commodore LANGERAAR'S view concerning the need for hydrographers to become more familiar with the medium in which they work.

Ingénieur Général GOUGENHEIM develops another argument, with the clarity and Cartesian logic characteristic of all his statements, oral or written. As indicated in the title of the article, the author individualizes the two features of oceanographic activity: basic research and descriptive oceanography. Basic research work is the responsibility of scientists, whereas descriptive oceanography comprises methodical surveys at regular intervals over many years for the collection of all possible data on the chemistry, biology, physics, geology, etc. of the seas of the world.

After having made this distinction the author observes: "In view of their organization, equipment and staff, the oceanographic institutions are capable of conducting research in the various branches of oceanography. However, they do not appear able to cooperate effectively, with the necessary continuity and on the scale required, in extensive surveying schemes for which they perhaps do not feel themselves suited."

For this reason he proposes that it is up to hydrographic offices to assume the immense responsibility of systematic oceanographic surveying of all seas in addition to their own duties.

It is not, then, in the interests of hydrography that hydrographic offices should engage in oceanography, but in the interests of the latter; in other words, for the purpose of effecting the surveys that oceanographic institutions — created for that very purpose — are not able to carry out "with the necessary continuity and on the scale required".

In my opinion, assigning oceanographic surveys to hydrographic offices might, perhaps, be justifiable if hydrographers' work left them available

time. But when one considers to what degree worldwide hydrographic surveying is still inadequate, the thousands of dangers of doubtful existence or position that there has not yet been time to check, the thousands of kilometres of coast inadequately surveyed — or even not surveyed at all — one may wonder whether hydrographic offices have the right to expend a great deal of their ability on a task which, if extremely useful to humanity, has practically nothing to do with their basic purpose.

I will admit that during surveys the hydrographer is in a position to make oceanographic observations taking up little of his time which are very useful to oceanographers, and it would be a pity not to make the most of the opportunity to do oceanography a service which requires little effort. But systematic surveys of the oceans would be a different matter, often obliging surveying vessels to leave their usual operational areas to go and study, for instance, gravity in mid-ocean, or the seasonal distribution of biomasses, during which time ships would be foundering on ill-defined shoals.

Certainly, some oceanographic data are of interest also to hydrographers, and vice-versa. In such cases, an exchange of information is beneficial to both. Depths and currents concern both hydrographers and oceanographers : an exchange of observations will be made; the same applies to tidal observations; to water density; to irregularities which may prove to exist in the propagation of ultrasonic waves through different layers of sea water, and so on. Personally, I doubt whether such irregularities can have any noticeable practical influence on the results of hydrographic surveys, or at least on those of them which are important to surface navigation. But in any case the oceanographer taking the recordings will communicate his findings to the hydrographer, who will make the best use of them, as he has done with so many discoveries and studies achieved in other domains, such as astronomy, geodesy, geophysics, radioelectricity, electronics, and so on, without hydrographers having been asked to assume responsibility for any part of the research work incurred. In these connections, the hydrographer has chosen from amongst the material that other sciences put at his disposal those aspects which are of interest to him and has applied and, if necessary, developed them, but only within the strictly-defined limits of the end he is pursuing, and not for purposes belonging to other branches of science.

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In conclusion, I should like to lay down the following points which I consider should form the basis of relations between oceanographers and hydrographers :

- 1 — The combining of the two activities into a single one would be a mistake, since investigations carried out by oceanographers and hydrographers differ greatly and only coincide in very limited areas.
- 2 — Cooperation between oceanographers and hydrographers is indispensable, but must be restricted to an exchange of information and data and to the operations described in paragraphs 3 and 4 below.

- 3 — Hydrographers should include in the programmes of their survey missions the carrying out of oceanographic observations, the collection of data and the taking of samples, provided such operations do not hinder or delay their surveys — or, at least, that any delay involved is very slight. In order to be in a position to carry out such work, hydrographic surveyors should receive sufficient oceanographic training. Moreover, it would be advisable to carry oceanographic experts aboard hydrographic vessels in an advisory capacity.
- 4 — Oceanographers should make the most of their expeditions in waters reputed to contain dangers of doubtful existence or position to investigate these; again, provided this does not hinder or greatly delay their oceanographic surveys. To assist in the search for such dangers, hydrographic offices should supply oceanographic vessels with detailed directions and, if possible, place a hydrographer at their disposal in an advisory capacity.
- 5 — If oceanographic institutions lack staff who are able to carry out methodical surveys with the necessary discipline, self-denial and patience, they have only to send them for instruction within the hydrographic offices, where they would receive a professional and psychological training to fit them for the task.

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In this article I have not dealt with one aspect of the question which is, however, important : that is the value of a certain amount of oceanographic knowledge for military operations, and particularly for submarine operations, which, it may be anticipated, will assume an increasingly important role in military Staff planning.

But that would be to stray from the domain of hydrography, whose role is to guarantee the safety of peaceful navigation for the shipping of all nations, and to enter a domain where cooperation can no longer be hoped for since secrecy is the order of the day.

It is possible that certain hydrographic offices, in their capacity of government bodies, may be made responsible for investigations and observations useful for submarine navigation, but the results of such work would be communicated only to their Staff Offices and there would be no question of publishing them. This, then, is work which would long remain inaccessible both to oceanographers and hydrographers.

I should not like to end without pointing out that among the opinions I have expressed there are probably inaccuracies and errors, as always happens when discussing matters as complex as the question of relations between oceanography — a new activity in an eager state of progression (as Ingénieur GOUGENHEIM describes it) — and hydrography, an old activity, methodical, meticulous and conscientious. But as I have so far heard only voices in favour of a more or less closely-knit union of the two activities, it seemed to me that a note of opposition might be useful in livening up the discussion so that from it may emerge the most suitable definition of the relationship between oceanography and hydrography; one which best serves the interests of each.