

These final results of the soundings differ somewhat from those which are given in Volume I, where all the corrections and the discussion of the crude results were not so complete. The same applies to the list of soundings given in Vol. IV. These differences, which sometimes exceed 100 m. (54.7 fms.), are easily explained and show the inevitable uncertainty which must exist with regard to the true depth; they are none the less vexatious and troublesome in the volumes of a single publication when the enormous mass of this material has to be exploited.

Vol. II is completed by an appended volume containing the morphological profiles of all the *Meteor's* tracks; these extremely curious profiles show us the very uneven bottom of the ocean, often as much so as in the most confused mountain ranges, so that sometimes its representation by contour lines is almost impossible. Here is a new fact for geological theories and a very important one, which can only be verified and developed by a minute examination of comparatively restricted fields, where the greatest difficulty consists in obtaining a few datum positions well enough fixed to enable the soundings to be located with great accuracy.

P. V.

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## METHODEN ZUM STUDIUM DER MEERESSTRÖMUNGEN.

(METHODS OF STUDYING SEA CURRENTS).

by

HERMANN THORADE, Hamburg, 1933.

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This book, one of a series of manuals on biological methods of work, has an essentially practical object — to describe the various experimental methods of studying sea currents. This is one of the most important and most difficult parts of oceanographic science; it is of interest both to seamen and oceanographers and we owe the author a debt of thanks for collating, with a high degree of skill, the information to be found in the most recent works, which have been particularly numerous during the last twenty years and an excellent list of which is given at the end of the volume.

The work is divided into three parts. The first contains a description of the methods of observation: floats or drifting ships, investigation into the origin of the water from its physical or chemical properties, screw or paddle apparatus, and pendulum apparatus. The descriptions are very precise, and illustrated by numerous figures; (several of the more important of these appliances have been described in the *Hydrographic Review*). One chapter is devoted to obtaining a fixed position in deep water; information on this subject has already been presented to readers of the *Hydrographic Review* in the article in *Hydrographic Review* No. 17 compiled by the Commanding Officer of the *Meteor*.

The second part deals with the method of making use of the observations, an extremely delicate utilisation of data where the causes of error are often of the same order as the phenomenon to be found; the latter, in some regions, being almost as variable as the wind itself. Thus recourse has been had to a method of representation based on statistics and averages: (it is surprising not to find mention of MAURY'S name). But the charts so produced are not too easy to interpret, and this has led to a representation — much more striking — by lines of currents and fields of currents. By this method an image is obtained into which the theoretical ideas of the author have of necessity entered in regard to the choice between the statistical results, but which is as clear, scientific and accurate as our still imperfect knowledge of the phenomenon permits. The authors of these charts generally use a special symbol to take the statistical figures into account by indicating the constancy of the current and present a bird's eye view which has the great advantage of being in agreement with the laws of hydrodynamics. (See *Hydrographic Review* No. 15, pp. 233 and 240).

The third part is a rapid study of the causes which produce currents. On this subject of dynamic oceanography we have already noted, in the 13th number of the *Hydrographic Review*, the important work by Prof. Dr. A. DEFANT which was published in 1929.

H. THORADE examines in turn the influence of the wind and of friction, the effect of turbulence, the deflecting force of the earth's rotation, and the different kinds of currents, classified according to their causes — impulse currents, gradient currents, currents at various depths and the influence of the bottom — besides the use of temperature and salinity measurements for obtaining fields of force and fields of pressure; from which recent theories allow the direction and strength of the current at each point to be deduced. These temperature and salinity measurements, much easier to make than direct current measurements, have in certain cases (Newfoundland Banks) produced very interesting results which have been largely confirmed by experience. The author concludes, however, that numerous observations are still necessary definitely to confirm these theories.

Our only criticism of this excellent book is that it is a pity that the absence of an index makes reference somewhat difficult.

P. V.

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## THE DEVELOPMENT OF OUR CONCEPTION OF THE GULF STREAM SYSTEM.

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Mr. C. O'D. ISELIN, of the WOODS HOLE OCEANOGRAPHIC INSTITUTION, Massachusetts, U.S.A., has written a paper entitled *The Development of our Conception of the Gulf Stream System*, which appears in the *Transactions of the American Geophysical Union, Fourteenth Annual Meeting*, April 27, 28, 29, 1933, Washington, D.C., (page 226). In this article he discusses the nature of the problem of the Gulf Stream in physical oceanography. Mr. ISELIN begins by pointing out that the question of terminology is of some importance, for the expression "Gulf Stream" is never quite clearly defined by the various authors who use it, and who apply it indiscriminately to the different parts of the sectors over which this vast current extends. Observing that the historical name should be retained to designate this vast river of warm water which flows out of the Gulf of Mexico, along the Eastern coast of the United States, towards the tail of the Grand Banks and thence to Europe and the Arctic, the author proposes to use the expression "Gulf Stream System" to denote the whole of the current including the branches.

After an historical review of the different conceptions which have given birth to the terms "North Atlantic Drift" and "Atlantic Current", the author states that the atlases have a tendency to exaggerate the breadth of the part that can properly be considered to be a current from an oceanographic point of view. The charts, in fact, usually show the sum of the permanent currents and the prevailing drift. In conclusion the author states that, logically, it is justifiable to split the Gulf Stream System into three parts on the basis of the structure of the current when examined in cross-section, and that historically there is good precedent for calling these the Florida Current, the Gulf Stream and the Atlantic Current. The latter is branched and the courses of all its branches have not yet been worked out, as their flow is masked by the shallow North Atlantic Drift.

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## TIDES AND COASTAL CURRENTS DEVELOPED BY TROPICAL CYCLONES.

by

ISAAC MONROE CLINE

(WEATHER BUREAU OFFICE, NEW ORLEANS, LA., DEC. 1931).

(From an article in the *Monthly Weather Review*, Vol. 61, No. 2, Feb. 1933, pp. 36-38:

U. S. Weather Bureau, Washington, D. C.).

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The greatest damage caused by tropical cyclones is due to the tides developed by them: 45,000 persons were drowned at Calcutta on 5th October 1864 by a storm tide of 16 feet; 100,000 others were drowned in the Ganges delta on 31st October 1876 by a similar tide which brought the water from 10 to nearly 50 feet above normal. Great loss of life from such tides has occurred also in more recent years.