

## A STUDY OF THE CIRCULATION OF THE WESTERN NORTH ATLANTIC

by

C. O'D. ISELIN

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The Massachusetts Institute of Technology and the Woods Hole Oceanographic Institution have just published a study of the circulation of water in the north-west Atlantic, in their Vol. IV N° 4. This study is based on the work of the *Atlantis*, which made a number of measurements of temperature and salinity in these localities. The author describes the instruments used and emphasizes the importance of using both protected and unprotected thermometers, which method alone furnishes accurate knowledge of the depth of the observations.

The first part deals with the triangle *Bermuda-Nova-Scotia-Chesapeake-Bay*. Along the rhumb-line joining the Bermudas with these two points numerous observations were made, allowing one to follow the seasonal variations in salinity and in temperature — variations which are in general in close agreement and from which the currents may be deduced. These characteristics of the sea water are found to be clearly distinct in the continental waters, the slope waters, the Gulf Stream and the Sargasso Sea; they are studied here in detail. The position of the axis of the Gulf Stream is found to be approximately fixed but the width of the band of swift current varies considerably.

In the second part is a report on other observations of the *Atlantis* in the North Atlantic, especially in the vicinity of the thirtieth and the fortieth meridians. This permits the author to continue his study of the circulation in more extensive portions of the Atlantic. A chart showing the depths of the isotherm of 10° is useful in permitting one to follow the layers which are most influenced by the effect of the broad features of the circulatory system.

Thus we are led to the study of what the author terms the *Gulf Stream System* (See Hydrographic Review, Vol. XI, N° 1, p. 140). He makes a distinction between the Florida Current, from the Straits of Florida to a point off Cape Hatteras, where the current ceases to follow the continental slope: the Gulf Stream proper, between Cape Hatteras and the region to the eastward of the Grand Banks where the stream commences to fork: and finally the *North Atlantic Current*.

In order to fix the lateral limits of these currents he adopts a limiting value of 10 cm. per second. This boundary is more sharply defined on the left of the stream than on the right where the lines of equal velocity separate more rapidly. In the North-East Atlantic the traces of the branches of the North Atlantic Current are often masked by the wide-spread variable current due to the wind which is known as the "Atlantic Drift Current". The most western branch of the North Atlantic Current, which is probably the strongest, is relatively shallow and probably follows a fluctuating course: a fact which permits us to speak of the "transgressions of the Atlantic waters". (See Hydrographic Review, Vol. XII N° 2, p. 146).

Figure 48 gives us in diagrammatic form the sources and the pattern of the Gulf Stream system throughout the entire North Atlantic Ocean.

The last section deals with the Sargasso Sea and its water circulation. The author frequently alludes to the work of Dr. Wüst and A. DEFANT, — of such great importance in the study of the circulation of the oceanic waters, — explains the slow movements of the surface waters of the Central Atlantic, in accordance with the observations on salinity and temperature made by the *Atlantis*, by the variations to which these factors are subjected and by the contrary frictional effect of the wind which turns in a clockwise direction. The conditions acting upon the surface waters are found to be so complex that further observations will be necessary. At moderate depths we encounter the contrary effects of the penetration of the Mediterranean waters and the intermediate sub-antarctic layers.

A very complete bibliography concludes this interesting volume.

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