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FIFTY YEARS AGO....

Concern of Hydrographic Offices about doubtful hydrographic data is evidenced by the following extract from a paper which appeared in the *Hydrographic Review* of November 1932.

"MEASURES FOR THE SETTLEMENT OF REPORTS OF DOUBTFUL DANGERS IN THE OCEAN

by G.W. LITTLEHALES
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This discussion bears a relationship to Special Publication No.20 of the International Hydrographic Bureau, entitled "General List, arranged by Oceans, of Shoals of Doubtful Existence and of Shoals the Positions of which are Doubtful or Approximate", especially with regard to those instances in which the shoal is located in the open ocean and must, therefore, be the culmination near the surface of the sea of a submerged mountainous formation. The International Hydrographic Bureau has been diligent in setting forth the present state of information respecting these dangers to navigation, often including an estimate of the degree of doubt or approximation to be attributed to the assigned geographical position and the nature of the evidence upon which the validity of the report is to be received, and, furthermore, stating the surveys and searches which have occasionally cleared away the doubt of existence by establishing definite geographical location of the danger and thus narrowing, from the preceding extended state, the tract where the exercise of caution is demanded in navigation. Other instances there are in which searching examination has disproved the existence of the reported danger, and yet others which remain in a state of inconclusiveness because of the evidence bearing upon the discovery and the nature of the operations which have been conducted in search of them.

There is little chance of finding a reported shoal in the open ocean by directing the course of the searching vessel to the geographical position assigned in the report and endeavouring to rediscover the shoal by passing in its vicinity with lookouts posted aloft or with a sounding-line suspended in the depths. Unsuccessful proceedings of this kind have sometimes been cited as evidence in disproof, and it is, therefore, of interest to arrive at an estimate of the expectation that would thus be justified".

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An interesting experiment carried out in the 1930s to determine the velocity of sound in sea water was described in the *Hydrographic Review* of November 1932.

"DETERMINATION OF VELOCITY OF SOUND IN SEA WATER IN CAPE COD BAY

(Extract from the *Bulletin of the Association of Field Engineers* of the U.S. Coast and Geodetic Survey, No.4, December 1931, p. 88)

I. TEST LINE FIXED FROM SHORE OBJECTS

by G.D. COWIE, H. & G. Engineer, U.S.C. & G. Survey

The velocity of sound in sea water was determined in Cape Cod Bay in the latter part of September, 1930, by the following method : One ship, the *Oceanographer*, fired the bombs while cruising near the eastern shore of Cape Cod Bay. She determined her position by sextant fixes on triangulation stations on shore each time a bomb was fired. The observers took their angles over the spot where the bomb was dropped. The other ship, the *Lydonia*, acted as hydrophone station, while anchored near the western shore of Cape Cod Bay. She determined her position by sextant fixes on triangulation stations on shore each time she recorded the explosion of a bomb. The position of the hydrophone was determined, at each bomb explosion, by measured angles and distances from the spot on the ship where sextant angles were taken to the magnetophone.

The *Oceanographer* plotted the positions of the bombs on a 1/20,000 scale projection, constructed on an aluminium sheet, and a point *A*, was assumed near the average position of the bombs. The *Lydonia* computed the positions of the hydrophone and a point, *B*, was assumed near the average position. The distance between points *A* and *B* was computed. The component of the difference between each position and the assumed position *A* or *B* along the line between *A* and *B* was determined and added to or subtracted from the line *A* - *B* for each bomb distance. Each distance divided by the elapsed time in seconds gave the velocity per second. The average of all good values was 1 474.6 metres per second.

Temperatures and salinities were measured at both ends of the line and averaged. Using the mean temperatures and salinities, the theoretical bottom velocity is 1 481.7 metres per second. This is 7.1 metres per second greater than the test velocity.

Using the means of temperatures and salinities at each end of the line, however, does not take into consideration the fact that the temperatures are lower in the deeper water between the two ships. During the tests taken in the fall of 1931 along the same line, temperatures and salinities were taken all along the line while the tests were in progress. The temperatures at the ends of the lines were about the same as those of the previous year. An average of all the temperatures along the line gave a temperature 2.6 °C lower than the means of the temperatures at the ends of the lines. Applying a correction of − 1.73 °C, determined by using a bottom temperature curve averaged from the 1931 curves, to the means of the temperatures at the ends of the line for the 1930 test gives a theoretical bottom velocity of 1 475,0 metres per second. This is 0.4 metres greater than the test velocity".

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