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Soundings in the Gulf of California and off the West Coast of Lower California in 1939

By

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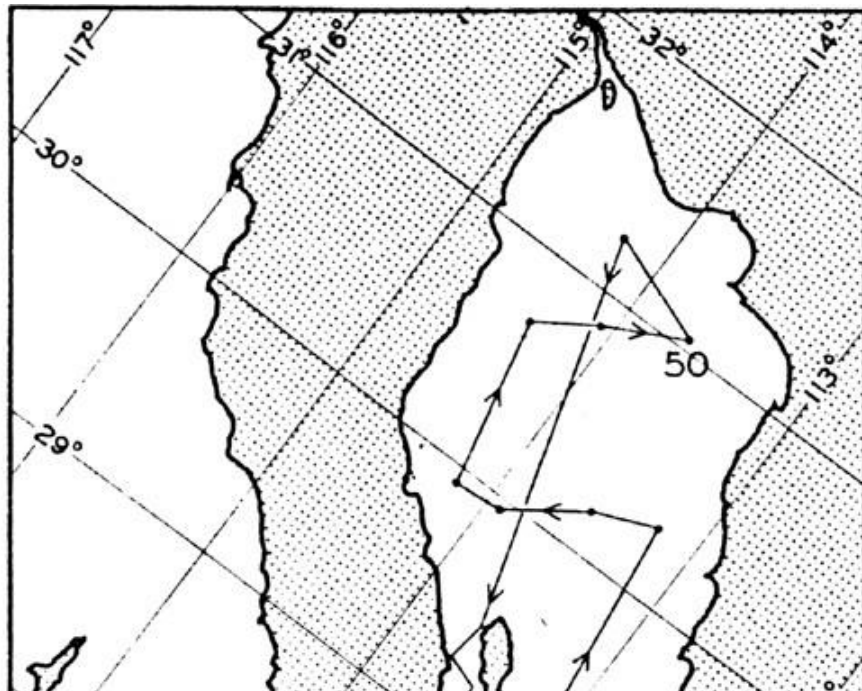
[From Records of Observations, Scripps Institution of Oceanography, Vol, 1, No. 2, "Oceanographic Observations of the Scripps Institution in 1939," issued May, 1943.]

The soundings dealt with here were taken on Cruises VII and VIII of the "E. W. Scripps." In the Gulf of California (table 10) the sounding lines mainly follow cross sections the locations of which were determined by the hydrographic program, but between these cross sections lines were run parallel to the coast line with minor detours for sounding purposes only (fig. 3). The Ballenas Channel was crossed and recrossed in an attempt to locate the maximum depth of the Ballenas Trench and the sill depth between the trench and the outer part of the Gulf.

It was planned to make soundings at intervals of one mile except where steep slopes were encountered along which soundings should be spaced more closely. This plan could not be entirely followed because the party on board the vessel was so small that occasionally no person could be detailed for the work, for which reason there exist a few gaps with intervals up to six miles between soundings. Where soundings were closely spaced, tabulations have been made only for distances of one-half mile, because the position of soundings could not be determined with sufficient accuracy to warrant communication of all values. However, for positions when profiles for geological purposes were being constructed, all soundings have been included.

The soundings were obtained by means of the Submarine Signal Company 710 Fathometer. Where the depth to the bottom was less than 250 fathoms, the flashing-light method was employed, and in water deeper than 1200-1400 fathoms, the sound method was generally used. In moderately deep water a combination method was employed of emitting the strong signal and receiving the echo by means of the flashing-light. This method necessitated a correction of 10 fathoms to the reading. The accuracy of the soundings in shallow water by the flashing-light method is about one fathom, whereas the probable error of soundings in water deeper than 1400 fathoms is not more than ± 10 fathoms. This accuracy could be improved by stopping the main engine during the short time needed for obtaining a sounding, but this was done only a few times in the course of the cruise in the Gulf. The accuracy obtained by the combination method which was employed at moderate depths is intermediate between the two which have been described.

The readings of the fathometer are based on a sound velocity of 800 fathoms per second. The uncorrected readings are published in the table, but curves 1 and 2 in figure 4 give the correction factors by means of which the readings in the Gulf and in the Ballenas Trench must be multiplied in order to find the depths corresponding



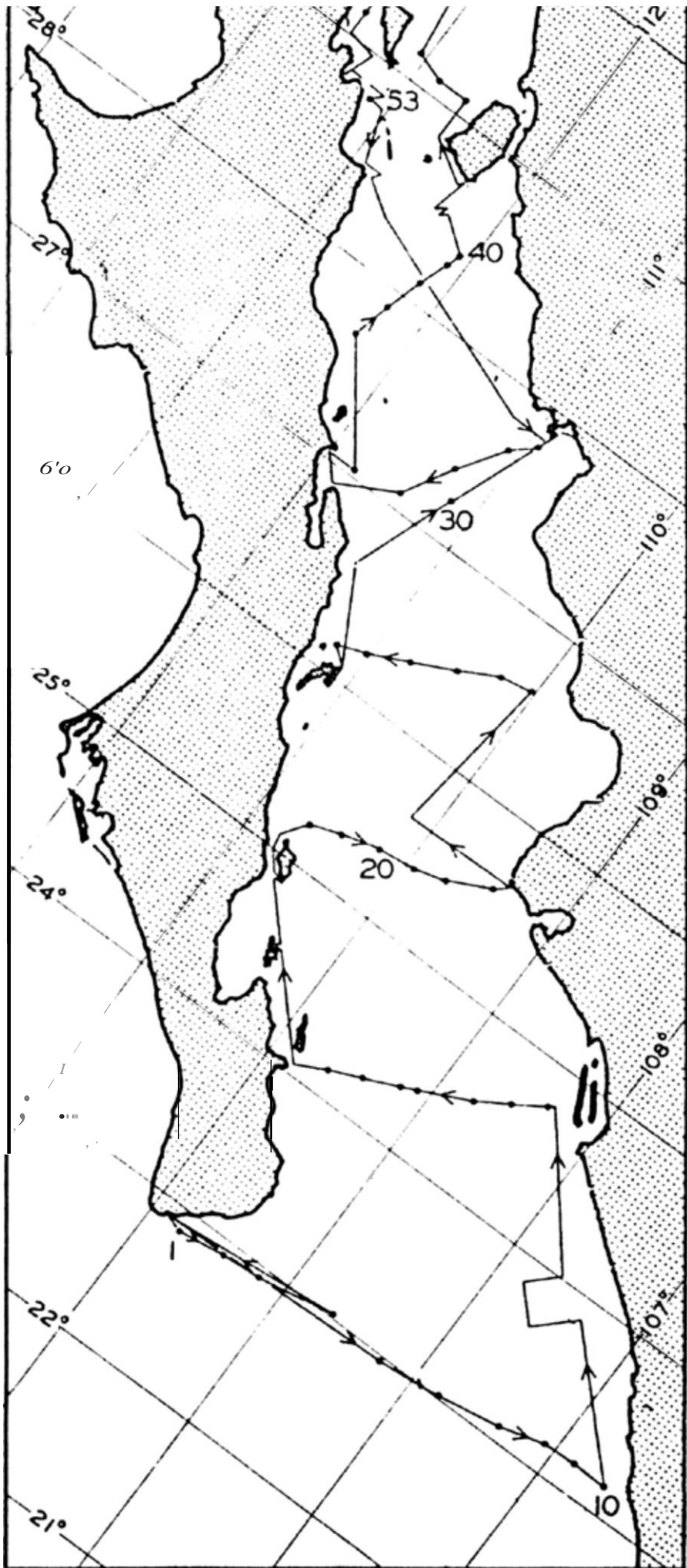


Figure 3.--Sounding lines in the Gulf of California in 1939. "E. W. Scripps" Cruise VII.

Figure 3.—Sounding lines in the Gulf of California in 1939. "E. W. Scripps" Cruise VII.

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to the true velocity of sound. No slope corrections were applied owing to uncertainty with respect to the exact positions at which soundings were made. In areas where such corrections are important, the positions must be known with extreme accuracy in order to lead to improved presentation of the submarine topography.

The location of the soundings was determined by means of astronomical fixes or by bearings on terrestrial objects and sextant angles between such objects, and by means of dead reckoning between fixes. The accuracy of the positions determined by fixes is probably not more than ± 1 mile regardless of whether they were obtained astronomically or by piloting, because the available charts of the Gulf are not very exact.

In order to determine the position of soundings at locations between fixes the following procedure was adopted. Enlarged charts of the Gulf were prepared on scales of 5 miles to an inch or of $2\frac{1}{2}$ miles to an inch. On these charts the fixes were plotted, the true distances

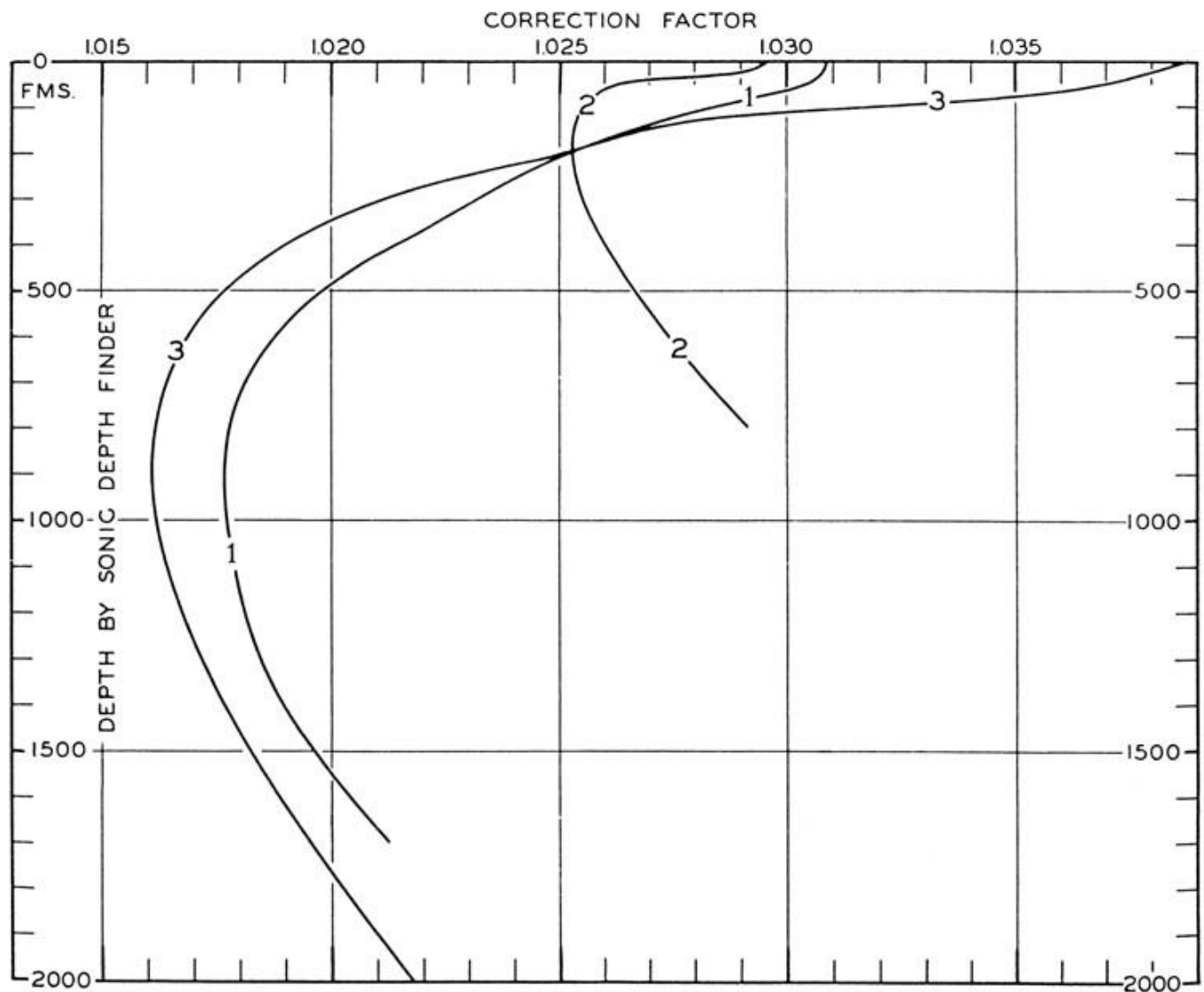


Figure 4.--Curves showing the correction factors by which the depths by sonic depth-finder must be multiplied in order to obtain the true depth. Curve 1 applies to the Gulf of California except Ballenas Trench, for which the corrections should be taken from curve 2. Curve 3 gives the corrections to be applied to soundings off the west coast of Lower California.

Figure 4.—Curves showing the correction factors by which the depths by sonic depth-finder must be multiplied in order to obtain the true depth.

Curve 1 applies to the Gulf of California except Ballenas Trench, for which the corrections should be taken from curve 2. Curve 3 gives the corrections to be applied to soundings off the west coast of Lower California.

between fixes were read off and compared to the distances according to readings of the ship's log. The locations of the soundings were spaced along the line between fixes by computing the ratio between the true distances and the distances by the log, and by multiplying the log distances from the first fix by this ratio. In following this procedure it was occasionally found that the ratio jumped from a low value to a high value or vice versa. This occurred particularly if hydrographic stations had been occupied and can probably be ascribed to the drift of the vessel when hove to at stations. Some knowledge of the drift at stations could be obtained from the station record and adjustments could be made which brought subsequent ratios into better agreement with each other. Where sounding lines crossed, the procedure could be checked and was found to give fairly satisfactory results. The accuracy of the positions determined in this manner is not greater, in general, than ± 2 miles, but because of the pioneering

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nature of the work errors up to 2 miles are not considered serious.

The soundings shown in table 10 give a fair idea of the depths along cross sections of the Gulf, but these cross sections are spaced at too great distances to give even a partially complete picture of the bottom topography. Information on this topography, particularly on the existence of depressions in the outer part of the Gulf, can be amplified by the results of the hydrographic observations (Revelle, G. S. A. Bull., 50:1929 [1939]).

The soundings off the west coast of Lower California are given in table 11. These are located along two lines running southwest at right angles to the coast and one connecting line running southeast and parallel to the coast at a distance of about 300 miles from the coast (chart 1). Soundings were taken less frequently than in the Gulf. The methods employed were similar except that in deep water the engine was always stopped when soundings were being taken, and these records should therefore be more accurate than the corresponding ones in the Gulf. The locations were determined by means of noon fixes and dead reckoning. The fixes were plotted on Hydrographic Office plotting sheets and the location of the soundings was determined by the same procedure followed when dealing with the soundings in the Gulf. The tabulated soundings are also based on a sound velocity of 800 fathoms per second but the curve marked 3 in figure 4 shows the factors by means of which the soundings should be multiplied in order to obtain the depth corresponding to the true sound velocity.

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By: Revelle, Roger, 1909-1991, creator

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