A SURVEY OF ATLANTIS.

by

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Now that the technique of modern hydrography has made feasible the extension of accurate and correlated marine surveys farther and farther seaward, it is not beyond the realm of possibility that the modern hydrographer through such surveys may yet obtain evidence, beyond that of a circumstantial nature, that Atlantis was more than a figment of classic imagination. Today, beyond the Straits of Gibraltar, there exist traces of what conceivably could have been a continent of the not-distant geologic past when the waters of the oceans, as some geologists claim, were several thousand feet below their present level. The Atlantic Ridge (Fig. 1), bounded by the 2,000-fathom contour, extends the entire length of the Atlantic. The Azores, the surviving peaks of Atlantis, rise above the surface of the sea, and throughout the ridge are large areas inclosed within the 1000-fathom and the 1,500-fathom submarine contours.

An accurate, modern hydrographic survey of this well-defined ridge would indicate the character of the topography, whether definitely submarine or of a possibly subaerial erosive nature similar to that which is now known to exist along the continental slope of North America through surveys made during the past decade by the Coast and Geodetic Survey. If the topography of the ridge is shown by such a survey to be of a subaerial character, evidence would thus be furnished that during some geologic age the ridge was above the sea level of that period, evidence which would be more conclusive than any yet advanced of the existence of Atlantis.

At any rate, the survey would undoubtedly yield a wealth of information to the geologist in his interpretation of physiographic features and to the seismologist in his seismic studies. And from a definitely practical standpoint, as deep water fathometers come into general use, the characteristic features represented in this submarine mountain range would, when charted, prove of inestimable value to the navigator in fixing his position in thick weather when celestial objects were not available.

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From data now becoming available, it appears that the ocean basins had a geologic history similar to that of the continents now above the sea. A noted American geologist, the late A.C. Veatch, was of the opinion that the topography of the Atlantic Continental Slope, which has been uncovered by these recent surveys, showed definite stream erosion forms.

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If then we accept the theory that the topographic features on the Continental Slope are of a character that can be formed only by subaerial erosion, a comparison with the submarine topography discovered by a detailed survey of the Atlantic Ridge may indicate whether this submarine feature was subaerial during the same period as the Continental Slope.

Based on his studies of the North American Continental Slope and that of the Congo, Dr. VEATCH places the former sea level at approximately 12,000 feet below its present level, and from an interpretation of the silting of the Congo trench estimates the time of the return of the ocean to its present level at about 10,000 years ago. It is to be noted that this time approximates the legendary time of the destruction of Atlantis — about 11,500 years ago !

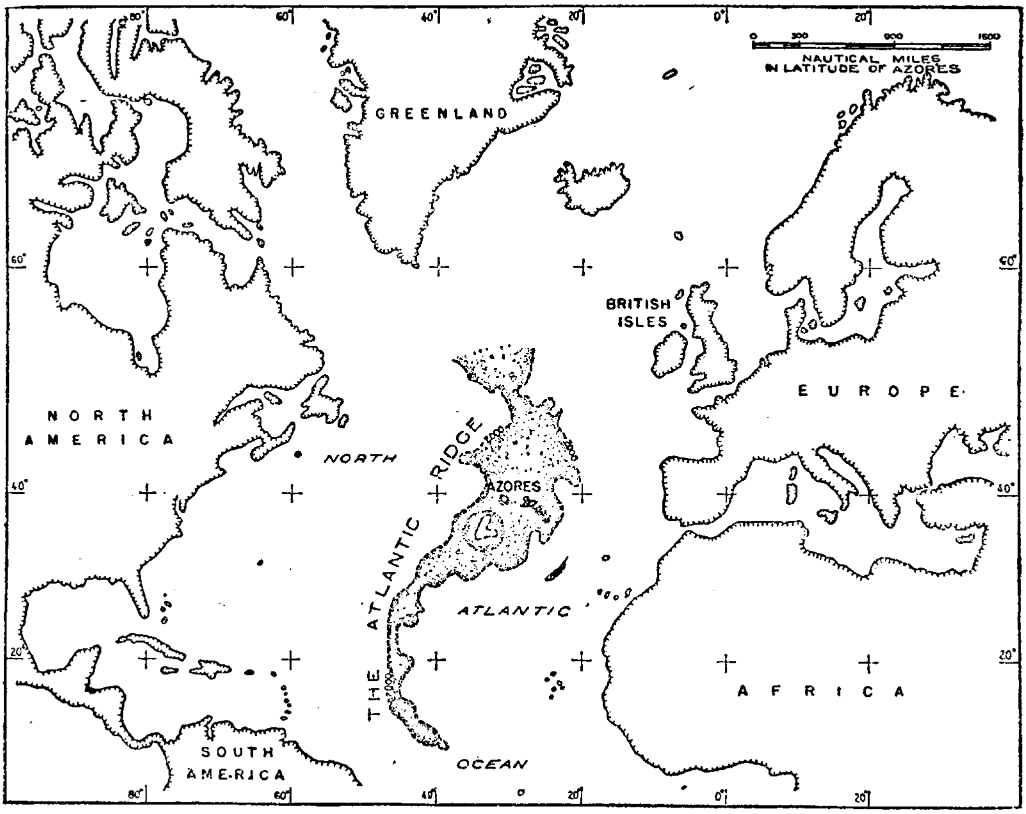

FIG. 1.

Several years ago Professor Richard M. FIELD, Chairman of the Commission on Continental and Oceanic Structure of the International Union of Geodesy and Geophysics, suggested to the author the desirability of a hydrographic survey of the Atlantic Ridge and inquired as to its feasibility. It is the purpose of this article to propose a modern hydrographic survey of the Ridge and to describe from the standpoint of a practical hydrographer tentative plans, including methods and technique, adequate for a survey as well controlled as those made in recent years over the continental shelves off the North American coasts. These proposed methods will be described in some detail since they not only indicate the feasibility of the project, but may be of assistance whenever such a survey is undertaken.

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Recently the author anchored a sono-radio buoy without difficulty in 400 fathoms of water for the control of sounding lines well offshore toward the middle of the Gulf of Mexico. Ordinary 3/8-inch wire cable was used. A modern survey vessel could, with equal facility, anchor sono-radio buoys on the Atlantic Ridge in from 1,000 to 2,000 fathoms. It would be necessary, of course, to provide at somewhat greater cost wire cable of smaller diameter, with about equal tensile strength. The buoys would remain in position except, of course, in the most severe storms and no greater risk of their loss or change in position would be occasioned than that attendant to the operation of the present system of control buoys in our offshore surveys.

Experiments, which appear to promise success, are now being carried on by the Coast and Geodetic Survey in anchoring sono-radio survey buoys in deep water, 1,000 to 2,000 fathoms. The anchors, from 750 to 1,000 pounds each, are made up of several old railroad car couplings at a cost of about two cents a pound. It is proposed to use a detaching apparatus so as to detach the anchor to facilitate retrieving the more expensive wire cable. The chief of the Division of Instruments of the Coast and Geodetic Survey, at the author's request, has devised such an apparatus which, by means of a 30- to 50-pound messenger, will detach the anchor. The apparatus will be attached to the anchor cable about 100 fathoms above the anchor to obviate either fouling with the anchor or tripping from contact with the bottom.

A wire anchor cable is being selected under the advice and specifications of a leading wire rope manufacturer. The problem involves the use of a high strength wire cord suitable for anchoring rather sizable buoys, the cord being used in lengths of 7,500 feet. The standard wire cord being considered for this service 3/16-inch aircraft stainless steel word in 7 × 7 construction. The breaking strength of this cord in stainless steel is 6,100 pounds.

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The methods and the equipment for the control of the sounding lines on the proposed survey of the waters of the Atlantic Ridge would be somewhat similar to those now being used on our offshore hydrographic surveys along the Atlantic and Gulf coasts, combined with radio acoustic triangulation methods similar to those used several years ago for controlling the Georges Bank survey. This radio acoustic triangulation for main control has been supplanted almost entirely in recent years by sea traverses measured by the tautwire apparatus. Such an apparatus, however, would not be entirely suitable for the deep water area on the Atlantic Ridge, but could be adapted, at slight extra expense, for measurement of the initial base line.

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The particular plateau of the Atlantic Ridge, selected for illustrating the feasibility of a similarly executed survey in much deeper water, lies 300 miles southwestward from the Azores (Fig. 1). It is covered by almost 1,000 fathoms of water. To start such a survey a base line about 8 miles long with a sono-radio buoy at each end would be measured by means of taut-wire apparatus near the middle of the plateau, as indicated by the heavy line (Fig. 2). As on the Georges Bank survey, the initial geographic position of one of the buoys at one end of the base would be determined by a series of star observations taken by sextant from the survey ship. The azimuth of the base would be determined by measuring simultaneously the vertical angle between the horizon and the sun and an inclined angle between the sun and the pair of buoys when on range from the ship's bridge (Fig. 5).

Taut-wire methods which heretofore have been limited to measurement of distances in shoal water, with the wire unsupported and sinking to the bottom, would require a slight change in technique in the greater depths on the Atlantic Ridge. For the measurement of this base the vessel would anchor the end of the piano wire of the taut-wire apparatus about 3 miles from one end of the base line and then steam directly for the buoy which marks that end. When within about a mile of the buoy and at about every 20 to 30 seconds thereafter, a small float of balsa or other light wood would be snapped onto the piano wire, which leads directly astern, by means of harness snap-hooks fastened to the wooden floats. With this method, at a ship's speed of 10 knots, the wire would be supported on the surface of the water by floats spaced at intervals of from 300 to 500 feet. Since the taut-wire apparatus applies a constant tension to the wire as it leads astern from the ship (about 30 pounds), an adequately accurate measurement of the distance between the two buoys of the base can be determined, provided, of course, the measurement is made on a calm day when there is little current or at a time when any wind-produced currents set nearly parallel to the direction of the base line, thus eliminating an excessive horizontal catenary. By this method the 8-mile base could be measured with an accuracy of at least 8 to 10 meters, almost one part in two thousand, a degree of accuracy quite adequate for a project in this location and in this depth of water.

The buoys marking the base line, as well as those marking the triangle vertices, naturally would swing in the current with a radius dependent upon the scope of anchor cable, which need not be greater, however, than 5 to 4, that is, about 1,250 fathoms of cable to each 1,000 fathoms of depth. In the limited area of such a survey all buoys would tend to swing to the same current direction. Since such a survey would be made on a scale of about 1: 2500,000, this radius of swing of the buoys would, of course, be negligible.

With this measurement of the base line completed, all data would now be available for starting a survey, the geographic position of one end of the base line determined by astronomic observations, the azimuth of the base determined by sextant angles between the sun and the base, and the length of base measured by means of the taut-wire apparatus.

Having the length, geographic position, and orientation of the base line, the survey can be readily expanded into a scheme of radio acoustic triangulation somewhat similar to the scheme used to control the Georges Bank survey previously referred to. The base line would be located near the western edge of the plateau so that the control could be expanded northward, eastward, and southward as indicated by broken lines (Fig. 2). This radio acoustic scheme of triangulation laid out over the area inclosed within the 1,000-fathom contour would furnish control for a modern radio acoustic survey of the entire area represented by stippling in Fig. 1, roughly a circle 270 miles in diameter and 57,000 square miles in area. An adequate hydrographic survey of this area, which of course is but a small section of the whole of the Atlantic Ridge, could be made by one surveying vessel in about four months during the summer season. With the knowledge and training obtained on the initial project, similar surveys would be readily extended with only slight variation in technique to the somewhat deeper waters of the remaining areas of the ridge.

A survey of the vast area comprising the Atlantic Ridge well merits the co-operation of leading maritime nations. Its cost would be comparatively small, less than that represented by a single day of a modern war, and the resulting data would be of inestimable value. The International Hydrographic Bureau at Monaco could well sponsor such an international project when the time becomes more propitious upon the termination of the differences which have arisen among nations. With the return of cordial international relations the nations of the earth might well consider the desirability of employing their combined navies in a hydrographic survey of this drowned continent of classic legend.