

SURVEY OF THE ANTON DOHRN SEAMOUNT

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(Author's summary of an article published in the *Deutsche Hydrographische Zeitschrift*, Hamburg, Vol. 13, No. 1, 1960, p. 24).

As a result of a survey made by the fishery research vessel *Anton Dohrn* comprising 10 sounding profiles, the following report was made on the exploration of a submarine peak hitherto unknown which was found in the trough between Rockall and St. Kilda. A depth chart (fig. 1) which summarizes the survey results is included in this paper.

On its homeward voyage from the second expedition in the Polarfront programme, the surveying vessel *Gauss* discovered, on 22 September 1958, an unknown submarine elevation between the Rockall plateau and St. Kilda (see reference No. 2). While all the charts gave depths of more than 2 000 metres, a depth of only 600 metres was recorded above the peak. The bottom profile, taken by means of an electro-acoustic sounder, showed the elevation to have a base width of approximately 30 nautical miles. The width of the summit of the elevation was approximately 20 nautical miles (see reference No. 3).

The fishery research vessel *Anton Dohrn* was entrusted with the making of a detailed survey of the elevation by a relay of soundings. The survey, carried out systematically between 18 and 19 April 1959, enabled a topographic reproduction of the submarine peak to be obtained. An echo sounder manufactured by Dr. FAHRENTHOLZ of Kiel was used for the survey. As the sounder was constantly under observation, errors due to variations in the speed of the stylus could be almost completely eliminated. Ten rotations were made in 98.6 seconds with an accuracy of ± 0.2 second. The depths were measured with a sound velocity of 1 500 metres per second. After installing a voltage stabilizer, it could be expected to obtain frequency fluctuations of the 50-cycle alternating current not exceeding 0.1 cycle per second, and an accuracy of 0.2 % in the readings of the oscillator indicator. A survey depth of 2 000 metres would therefore have an optimum accuracy of ± 5 metres. Such accuracy was not obtained. The soundings were combined with exact position determinations, the position fixing being made by means of Loran. The reading of the Loran values took place at 15 to 30 minute intervals. As a basic chart, a section of the British Loran chart No. 5313, on the scale 1/500 000 was used, as well as the NE Atlantic

chain with the Skuvanes, Vik (1L5) and Mangersta (1L6) transmitters. A section of the German chart 964 FC was also used. The regions bounded by the parallels 57°-58° N and the meridians 10°-12° W were adjusted to

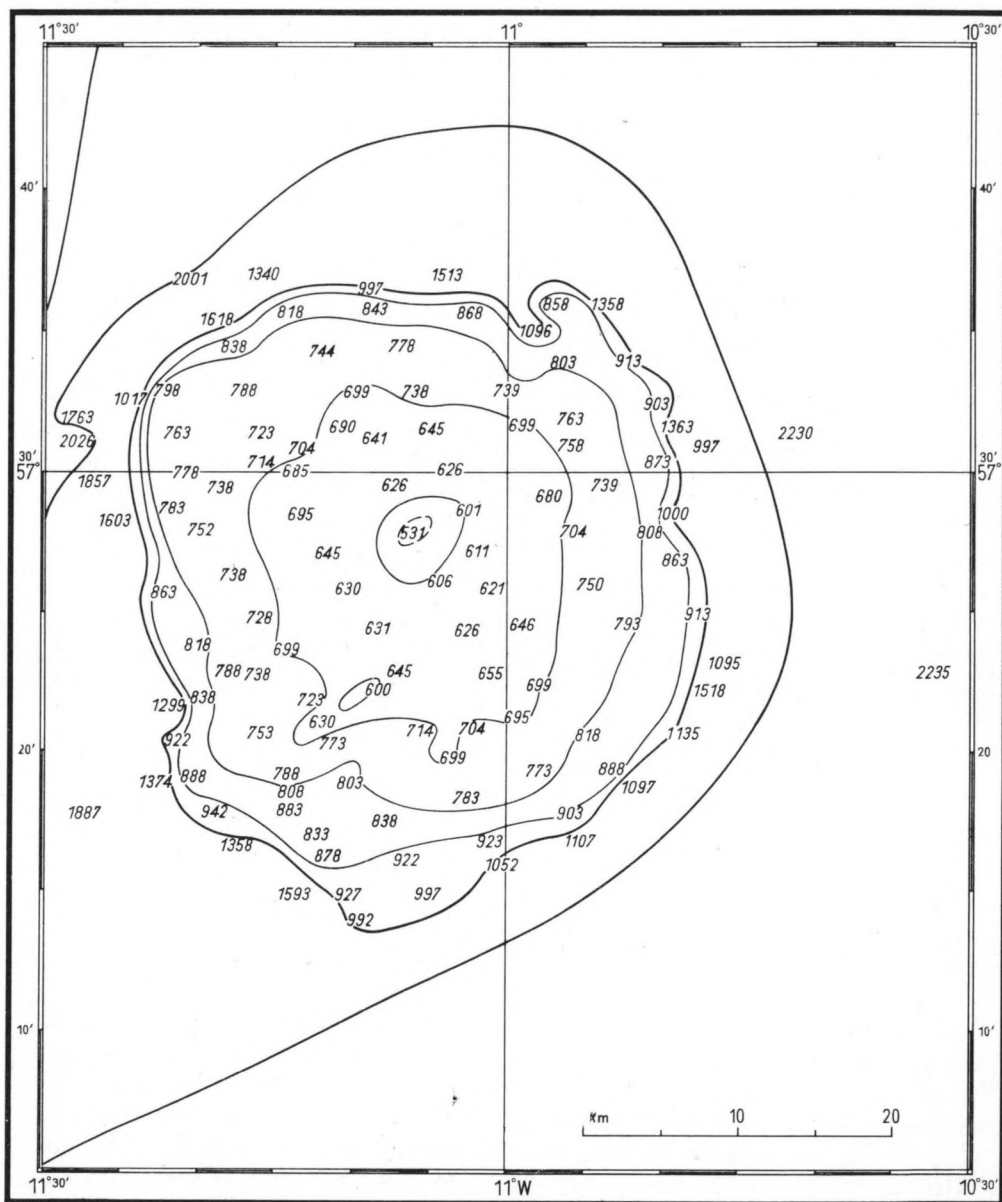


FIG. 1. — Bathymetric chart of the *Anton Dohrn* Seamount (referred to as *Anton Dohrn Kuppe* in German charts).
Contour interval 600 to 1 000 m : 100 m.
Scale 1/500 000

a scale of 1/250 000. The depth chart (fig. 1) was produced at the scale 1/200 000 and was reproduced with a 1/2.5 reduction. Echograms obtained represent a total track of 265 nautical miles. The soundings were accom-

panied by 224 position determinations. The sounding results, corrected to the local sound velocity (see reference No. 5) were transferred to the depth chart. The bottom profile between the continental shelf and the Rockall bank (fig. 3) is based on echogram readings made every five or ten minutes between hydrographic stations 3189 and 3193. The course followed is illustrated in figure 2 (profile C). The echograms of profiles A and B (fig. 2) are reproduced in figures 4 and 5.

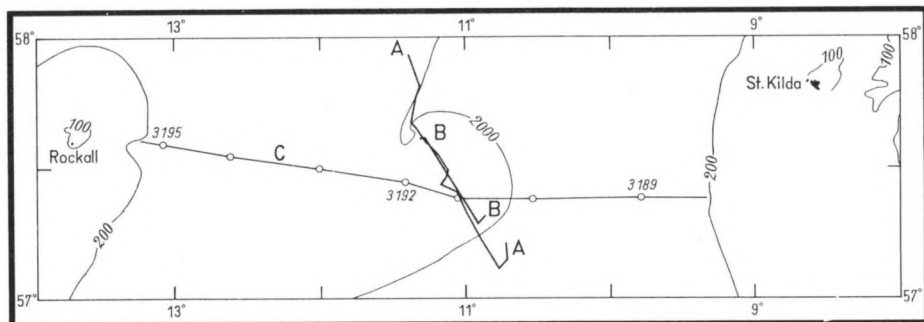


FIG. 2. — Position of the bottom profiles (A-, B- and C- profiles) between Rockall Bank and the edge of the continental shelf to the west of the Hebrides.

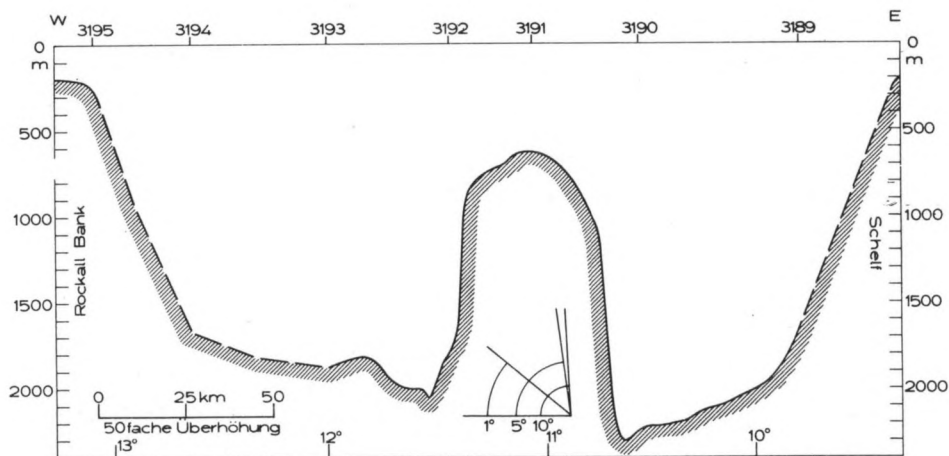


FIG. 3. — Submarine peak in the trough between Rockall and St. Kilda (fig. 2, C- profile).

Vertical scale exaggerated 50 times.

Numbers along the top of the figure are the numbers of hydrographic stations.

The *Anton Dohrn* was on its way to Icelandic waters and, for lack of time, could only make ten sounding profiles of the submarine peak. Whilst the course of the 1000-metre depth contour line was systematically examined, a similar study of the 2000-metre contour line had to be given up. Since the survey region is affected by one of the strongest currents in

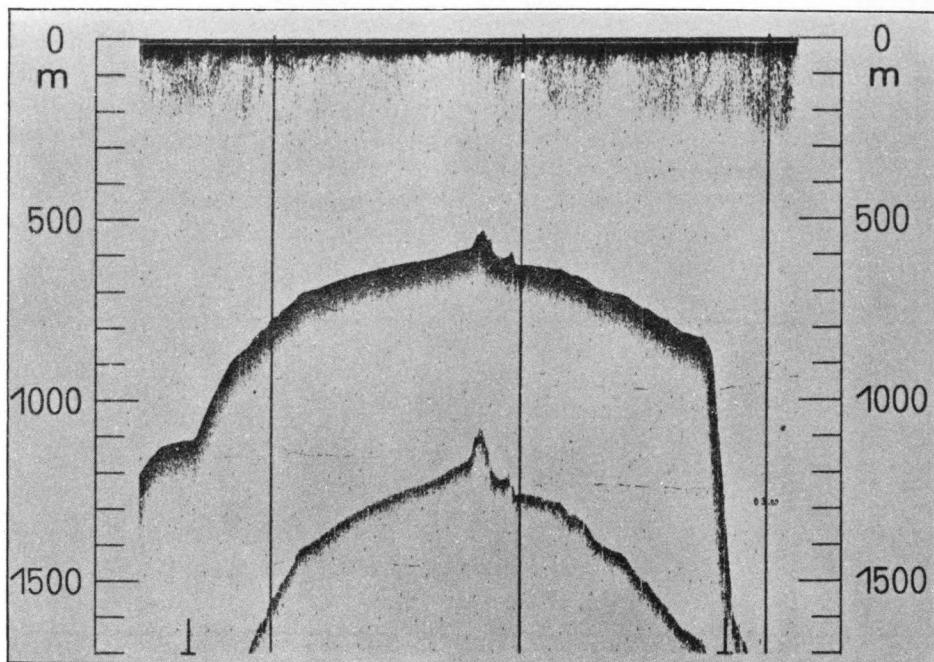


FIG. 4. — Section of an echogram (Fahrentholz sounder) of 19 April 1959.

The profile (fig. 2, B-profile) survey relays over the highest elevation of the peak. Time: 0025 GMT to 0255 GMT. Left hand limit corresponds to $\varphi = 57^{\circ}19' N$, $G = 10^{\circ}52' W$; right hand limit corresponds to $\varphi = 57^{\circ}37' N$, $G = 11^{\circ}17' W$. Vertical lines represent time intervals; ship's speed: 10 knots. The short vertical lines at the base of the echogram represent the range covered. Position of the highest elevation: $\varphi = 57^{\circ}28' N$, $G = 11^{\circ}5.5' W$.

Height of the original registration: 63 cm.

the Atlantic, errors in the three longitudinal sections and in the seven transverse sections could not be avoided owing to the strong drift. On its homeward voyage from the International Overflow Programme of the Iceland-Faroe ridge in June 1960, the *Anton Dohrn* resumed the survey of 1959. The changes recorded in 1960 and the work carried out are unimportant and are not worth mentioning in the depth chart (fig. 1). The echogram of the profile A (fig. 5) was obtained during this survey. It is an exceptionally good sketch of the topography (see reference No. 1).

There is but little to be added to the figures regarding the results of the survey. At 170 km from Rockall a submarine peak with steep sides was located, rising about 1 600 metres from the base of the trough between the Rockall bank and the British continental shelf. The elevation has an almost flat summit plateau. In the echogram (fig. 4) two rock needles can be seen in the middle of the plateau. The larger rock needle extends above the 600-metre depth line by approximately 70 metres. In 1959, a granite resembling porphyry was collected by means of a bottom trawl, and although these rocks need not necessarily be of local origin and could have been transported there by the ice drift during the pleistocene period, one is inclined to attribute to the submarine peak the same formation as that of Rockall. The rock of the latter, according to the results of the investigations carried out by J.W. JUDD in 1897, has a granite-porphry structure.

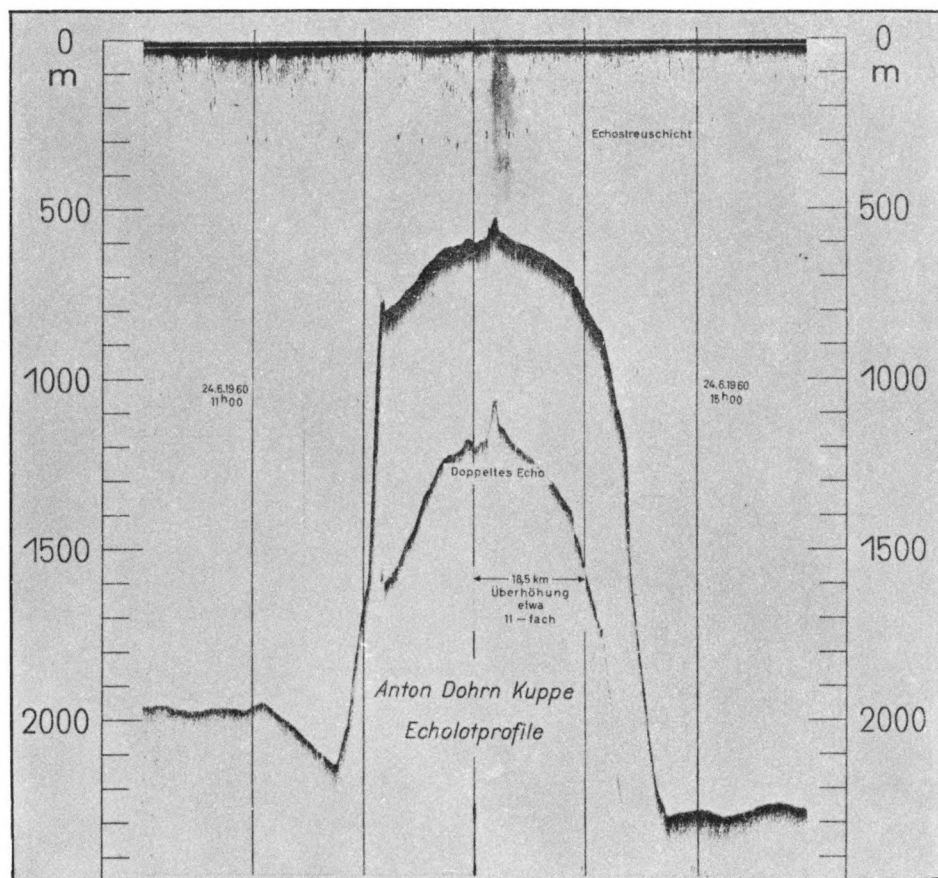


FIG. 5. — Section of an echogram (Fahrentholz sounder) of 24 June 1960.

Profile course illustrated in fig. 2 (A-profile). Time : 1000 GMT to 1600 GMT

Left hand limit : $\varphi = 57^{\circ}56' N$; $G = 11^{\circ}23' W$.

Right hand limit : $\varphi = 57^{\circ}13' N$; $G = 11^{\circ}43' W$.

Vertical lines : time intervals; ship's speed : 10 knots.

Height of the original registration : 63 cm.

Echogram obtained by G. DIETRICH, 1960.

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