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J-G — LEG I.

CRUISE REPORT
CRUISE TR-41 (REYKJANES RIDGE I)
18 August -(1 October 1967) 14 SEPT. 1967
R/V TRIDENT

A 43-day cruise was made in the North Atlantic Ocean from 18 August to 1 October 1967. The cruise was devoted to a detailed geochemical, geological and geophysical study of a profile across the Reykjanes Ridge.

Leg 1 18 August-14 September. Halifax, Nova Scotia to Reykjavik, Iceland (28 days)
14-17 September 1967. Reykjavik

Leg 2 17 September-1 October. Reykjavik, Iceland to Narragansett, Rhode Island (15 days)

Scientific Party

Leg 1. Halifax, Nova Scotia - Reykjavik, Iceland

Dr. Jean-Guy Schilling (U.R.I.) Scientific co-leader, Geochemistry, volcanology

Dr. Dale Krause (U.R.I.) Scientific co-leader, Geology
Dr. James Moore (U.S.G.S., Menlo Park) Volcanology
Dr. Ki-iti Horai (M.I.T.) Geophysics
Mrs. Mary Chessman (M.I.T.) Geophysics
Miss Bonnie McGregor (U.R.I.) Geology
Karlis Muehlenbachs (Univ. of Chicago) Geochemistry
Robert Cooke (U.R.I.) Geochemistry
Thomas Johnston (U.R.I.) Geology
David Pope (U.R.I.) Geology
Arthur Buddington (U.R.I.) Oceanography
Timothy Kennard (U.R.I.) Oceanography

Leg II. Reykjavik, Iceland-Narragansett, Rhode Island

Dr. Gregory Webb (Univ. of Massachusetts) Geology
Miss Bonnie McGregor (U.R.I.) Geology
Thomas Johnston (U.R.I.) Geology
David Pope (U.R.I.) Geology
Arthur Buddington (U.R.I.) Oceanography
Timothy Kennard (U.R.I.) Oceanography

Ship Personnel

B. Collinson, Master
C. Sawyer, Chief Mate
N. Culeberly, 2nd Mate.
O.J. Palardy, Bos'n
M.C. Gilbert, Ordinary Seaman
R.A. Layfield, Ordinary Seaman
G.P. Robb, Ordinary Seaman
P.P. Neves, Steward
D. Valles, 2nd Cook
J. Evans, Radio Operator
H. Martin, Able Bodied Seaman
J. Fratus, Able Bodied Seaman
J. Stohlberg, Jr., Ordinary Seaman
A.L. Ellsworth, Ordinary Seaman
J. Symonds, Chief Engineer
D. Symonds, 1st Ass't Engineer
T. Densmore, 2nd Ass't Engineer
H. Ellsworth, Oiler
F.C. West, Oiler
G. Alves, Oiler

TR-041

Purpose, objective and method

A detailed dredging program with camera stations was undertaken along a profile across the crestal area of the Reykjanes Ridge (at 60°N) to gain direct information on the mechanism of sea floor spreading and to test the elegant Vine and Matthews hypothesis for the evolution of the sea floor (1). This site was chosen for the large amount of geophysical data already available (2).

Petrochemistry, age determinations (K-Ar, palagonite growth, etc.) magnetic properties and rare earth geochemistry of the dredged samples are being studied. In addition, a cooperative geochemical program was initiated including some 10 laboratories. Isotope fractionation studies of O^{18}/O^{16}, Sr^{87}/Sr^{86} and Pb^{207}/Pb^{206}; volatile abundances; electron-probe work and trace element determinations (U, Th, etc.) of the dredged samples will be undertaken. The program is coordinated by Dr. J-G. Schilling at U.R.I.

Heat flow measurements were made aboard the R/V TRIDENT by the G. Simmons' group at M.I.T.

In order to correlate the above data with the already available detailed geophysical data (magnetic gravity and seismic) for this part of the Reykjanes Ridge, a continuous depth, and total magnetic intensity, and seismic profiling measurements were made along this traverse. Operations on a second profile across the Ridge, some 150 km north, was started but time and weather limitations didn't permit its satisfactory completion.

Symmetrical variations about the axis of the ridge for all these parameters will be tested.

Preliminary results

1. Geology and Geophysics (D.C.Krause, J-G. Schilling and J.G. Moore)

The seismic profiler (air gun) was operated along the Nova-Scotian shelf, over the Cabot Trough and along the Newfoundland coast. Two profiles were made across the Reykjanes Ridge at the sampling locations. The Nova Scotia profile showed glacial erosion and post glacial deposition. The Cabot Trough profile showed nice folding and post-folding erosion and sedimentation. The Newfoundland profile revealed little of interest. The profiles along the Reykjanes Ridge showed 200-300 meters of sediment overlying a rough basement which in places protruded through the sediment. The traverses across the ridge showed a central irregular, sediment-free province with a central rift. This central province is flanked by a province of irregular basement covered by 200-300 meters of sediment, the basement sometimes protruding above the sediment. With the General Oceanics "garden hose" hydrophone, the R/V TRIDENT can profile at full speed (9.5 kt) over the shelf and 8.5 kt over depths of 1000-2000 m before water and noise becomes excessive.

The magnetic anomalies were easily correlated with the magnetic survey of the Reykjanes Ridge, copies of which were kindly furnished by M. Talwani. The field is laterally somewaht variable but not nearly so much as the topography.

The topography has a general trend parallel to the ridge, but any one feature seems to be only several times longer than wide. Some features are esentially round or oval, probable volcanoes. Where rock is exposed the slopes are very steep and irregular both in the central rift and on the flanks. In general, rock dredging brought up the basalt forming the rocks of the median valley. Contrarily, dredging of the protruding bedrock on the flanks brought up far less rock or none despite abundant evidence during dredging of rocky bottom, the implication being that the rock here is more massive (less jointed and fragmented)then in the central province.

Note: A table giving the dates of seismic profiling will be added later.

2. Petrology and Geochemistry (J-G. Schilling, D.C. Krause and J.G. Moore)

Numerous fresh basalts (pillows, pillow fragments, glassy crusts with pahoehoe flow structures) were dredged (6 hauls). These samples are limited to the relatively flat bottom of the median valley (< 10 km wide). Relative to the magnetic lineaments, the median valley, is located over the west half of the main positive axial magnetic anomaly A (2). Olivine and plagioclase feldspar phenocrysts are often present. Only a few of these samples have manganese coating. When present it is very thin. A very thin layer of palagonite alteration around the glassy rim is usually present (see below). Glacial erratics in the median valley are astonishingly rare for these northern latitudes. This may suggest a very young volcanic activity for this axial zone (supported by preliminary age estimates from palagonite growth, see below).

Immediately adjacent to the median valley or on the flanks altered pillow lavas and volcanic crust fragments were encountered on both NW and SW sides. Again manganese coatings are not too common. However, the palagonite growth is much more developed, suggesting an older age for the flanks. Angular slabs and blocks of metamorphosed basalts (greenstones?) were recovered on both flanks, particularly on the NW side (D-34 and D-35 over magnetic anomaly 2 (2). In one of them (D-34) disseminated flakes of native copper ($\lesssim$1%) was observed. A similar rock (with disseminated native copper) was recovered some 150 km north, on the second profile (61°22'N). Glacial erratics are also much more prominent on the flanks.

The petrochemistry, petrography, geochemistry and age dating of these rocks are at present under investigation.

3. Palagonite growth and vesicularity (J-G. Moore, J-G. Schilling and D.C. Krause)

Dr. J-G. Moore joined this cruise because of the remarkable opportunity that the hypothesis of Vine and Matthews provide for testing his ideas on the rate of palagonitization of submarine basalts (3).

If one assumes that statistically, lavas dredged from each of the bands of magnetic anomalies have an age corresponding to the Doell and Cox time scale (4), then the thickness of palagonite on submarine lavas, which have been in contact with the water column continuously since extrusion, should increase away from the ridge crest.

Several factors could reduce the apparent or real age of lavas away from the ridge, such as: 1) younger centers of volcanism off the ridge crest 2) flow or slumping of lavas from the ridge crest down the flanks over older anomaly bands 3) exposure of older anomaly bands 3) exposure of older covered flows to the water column in a slump scarp or fault scarp. However, these would all tend to produce a weathered ring thinner than that expected by the age of the band where the collection was made. Because of the limitation of fresh basalt to the median valley, possibilities 1) and 2) are eliminated. This provides a minimum age.

Preliminary results for 4 "so-called" fresh basalts from the median valley are tabulated below (based on 10 thin sections).

	Thickness of palagonite (in microns)*	Thickness of Mn coating (in microns)
D-18	300	30
D-20	60	-
D-21	100	-
D-22	60	-

*Time constant subject to revision is: 10 μ = 10 years
100 μ = 1000 years

Vesicularity may indicate depth of eruption. Clues on the past tectonic history of the ridge may possibly be gained by comparing "depth of eruptions" with depth of collection. Preliminary vesicularity results for the 4 above mentioned samples (based on 10 thin sections) are compared with those obtained on the submarine extension of the east rift zone of Kilauea, Hawaii, see Fig. 1.

Other factors than pressure alone, such as chemical composition, temperature of lavas etc., may control the amount and size of vesicles. However, it is noteworthy that the vesicularity for a given "depth of collection" are comparable for the two volcanic regions. Further remarks must await additional determinations and petrochemical data for the Reykjanes Ridge samples.

4. Magnetic properties of the dredged rock samples (J-G. Schilling, J. De Boer, and D.C. Krause)

These measurements are being carried out by Dr. Jelle De Boer at Wesleyan University. One large fresh pillow lava 20" x 12 x 12" was brought up by chance on the camera frame Station 20, D-19. The position of this sample is well over the central positive magnetic anomaly. Its top can be identified with relatively good confidence (±20°) from its shape, and settling of phenocrysts.

An attempt to determine its magnetic polarity was made (the position of this pillow relative to the gravitational field and magnetic field during eruption of this lava is sufficiently well known for this northern latitude where the horizontal component of the magnetic field is small.)

High and very stable remanent magnetization ($Jn = 7 \pm 2 \times 10^{-2}$ emu/cm^3) with normal polarity, and relatively low susceptibility ($5 \pm 1 \times 10^{-4}$ emu/cm^3) were obtained on this sample.

These results support the idea that the positive axial magnetic anomaly over the ridge is produced by normally magnetized material, much of which may be ponded lava flows.

Two or three other pillows from the flanks and the median valley may allow a similar study. In addition, the opaque mineralogy and other magnetic properties of these dredged rocks are under investigation.

5. Heat flow measurements (K. Horai and M. Chessman)

These measurements were made by Dr. K. Horai and Mrs. M. Chessman from G. Simmons' group at M.I.T.

Ten heat flow values were obtained on the crest of the Reykjanes Ridge near 60^oN and 30^oW. Temperature gradients were measured using the 'Ewing type' thermograd instrument modified at M.I.T. by Erickson and Smith. The instrument consists of the temperature recorder and six thermistors. Five of these are separated by 15 inches on the core barrel of a gravity corer. To measure the absolute water temperature, the sixth thermistor is mounted on the weight stand which remains above water. The recorder is attached to the cable about 15 meters above the weight stand. When three to four temperature probes penetrated the top 100 to 200 cm of the sediment, this was sufficient to define an unambiguous thermal gradient. In five cases four probes penetrated to give an especially good thermal gradient (Figure 2). Station #15 is based on the penetration of only two probes. The other four stations are based on the penetration of three probes. Thermal conductivity of the sediments was measured using needle probe method on shipboard after the sediments reached room temperature within three days of recovering the core. Mean thermal conductivity obtained by averaging reciprocally the thermal conductivities measured at every 10 cm on the relevant portion of the core was combined with thermal gradient to give the heat flow.

The results are summarized in Table 1 and Figure 2. All the heat flow stations are located on the crestal zone of the Reykjanes Ridge that is the northern extension of the mid-Atlantic ridge to the southwest of Iceland. In this crestal zone, heat flow values vary considerably, the lowest being $0.80\ \mu cal/cm^2 sec$ at station 8 and the highest $6.71\ \mu cal/cm^2 sec$ at station 10. The second highest value, $5.60\ \mu cal/cm^2 sec$, is found at station 28, some 26 miles west to station 10. Existence of high heat flow zone over station 28 is pronounced by two adjacent stations, 27 and 29, which are more than $3\ \mu cal/cm^2 sec$. These high heat flows are separated from the high at station 10 by two intermediate values, $1.47\ \mu cal/cm^2 sec$ at station 11 and $1.74\ \mu cal/cm^2 sec$ at station 26, indicating that the two narrow high heat flow zones are symmetrically located on both sides of the crestal axis. Heat flow at station 44, $3.55\ \mu cal/cm^2 sec$, located to the west of crestal axis should belong to one of these high heat flow zones. Average of the present 10 values on the crestal zone of the Reykjanes ridge is $2.89\ \mu cal/cm^2 sec$.

Corrections which ought to be considered but which were not carried out in this report are:

1. Effect of compactions of the core on conductivity. Cores were generally shorter than the penetration. Water pressure built up inside the barrel since the water outlet in the weight stand had a smaller diameter than the core barrel.

2. Topographical effects of the basins in which stations were taken. Possible sedimentation effects are believed small due to small deviation from straight line in thermal gradients.

Table 1

DREDGING STATIONS TR41

Station #	Dredge #	Latitude	Longitude	Date	Depth (m)
5	D-1	59°43'N	28°49'W	9/1/67	1070
Samples recovered - mud stone, corals, glass sponges, ang. erratics (anorthositic) 200 lbs ang. boulder (basaltic?)					
6	D-7	59°43'N	28°52'W	9/2/67	1225
Samples recovered - 1 gallon erratic cobbles, dead horn-corals and shells					
8	D-10	59°47.5'N	28°55'W	9/2/67	1800
Samples recovered - glass sponges, 3 lbs black pebbles					
8	D-11	59°47.5'N	28°55'W	9/2/67	2130
Samples recovered - 1 lb small pebbles, broken branching corals					
13	D-17	60°02.6'N	29°37.5'W	9/4/67	1070
Samples recovered - 1 gallon erratic cobbles, 1 gallon corals, mudstones, 1 foot diameter altered pillow					
14	D-18	59°59.5'N	29°32'W	9/4/67	1080
Samples recovered - 30 lbs fresh basalts (crust and slabs), few erratic cobbles, glass sponges					
20	D-19 (=C-9)	59°59.5'N	29°25.5'W	9/5/67	1340
Samples recovered - one large fresh pillow (12"x 18", 100 lbs)					
21	D-20	60°02'N	29°23'W	9/5/67	1050
Samples recovered - fragments of fresh pillow lava, volcanic glass, few erratics, gastropods, corals (solitary), glass sponges					
22	D-21	60°03'N	29°26'W	9/5/67	965
Samples recovered - 10 lbs fresh pillow lava fragments					
23	D-22	60°01'N	29°29'W	9/6/67	1020
Samples recovered - 50 lbs fresh basalt (plag. & oliv. phenocrysts)					
24	D-23	60°02.5'N	29°40'W	9/6/67	1125
Samples recovered - mainly branching corals - some horn corals, 2 fragments of altered pillow lava					

Table 1

DREDGING STATIONS TR41 (continued)

Station #	Dredge #	Latitude	Longitude	Date	Depth (m)
25	D-24	60°02.5'N	29°38'W	9/6/67	1245
Samples recovered - 10 lbs mud with glacial drift cobbles, corals, glass sponges					
30	D-29	60°11.5'N	30°03'W	9/7/67	1310
Samples recovered - none					
33	D-32	60°11.3'N	30°03.5'W	9/7/67	1435
Samples recovered - glacial drift cobbles, fragment vesicular basalt?					
34	D-33	60°11.5'N	30°03'W	9/7/67	1450
Samples recovered - glacial drift, cobbles and boulders (quarzite, gneiss), one fragment altered pillow lava, corals					
35	D-34	60°11'N	29°29'W	9/7/67	1250
Samples recovered - one large boulder mafic rock slabs of greenstone (with disseminated native copper)					
36	D-35	60°12.5'N	30°02'W	9/8/67	1225
Samples recovered - broken shells, coral, freshly broken fragments of mafic rock					
38	D-37	60°02'N	29°36'W	9/8/67	1200
Samples recovered - misc. sponges, branching and horn corals, sea urchins and other biological samples. One large altered pillow lava (120 lbs) and 5 lbs altered pillow lava fragments					
39	D-38	59°59.1'N	29°30.5'W	9/8/67	930
Samples recovered - 7 bags fresh pillow lavas and pillow lava fragments and glass crusts (one single erratic cobble)					
40	D-39	59°57.2'N	29°25'W	9/8/67	1100
Samples recovered - 500 lbs mud with sponge spicules and small shells					
41	D-40	59°55'N	29°20'W	9/8/67	1175
Samples recovered - branching and horn corals, few erratics, 3 lbs altered pillow lava fragments, 3 lbs greenstone?					
42	D-41	59°40.5'N	28°37.5'W	9/9/67	1315
Samples recovered - none					

Table 1

DREDGING STATIONS TR41 (continued)

Station #	Dredge #	Latitude	Longitude	Date	Depth (m)
43	D-43	61°39.5'N	28°00.5'W	9/10/67	990
Samples recovered - 7 bags crystalline and metamorphic rocks, large coquina stones, shells, sponges and bio-specimens					
45	D-45	61°23.5'N	27°24.5'W	9/10/67	970
Samples recovered - none					
46.	D-46	61°22'N	27°24'W	9/10/67	1805
Samples recovered - 60 lbs ang. boulder (greenstone) with disseminated native copper, altered pillow fragments, 1 gneiss boulder, corals and bio-specimen					

Table 2

CAMERA STATIONS TR41

<table>
<tr><th>Station #</th><th>Camera #</th><th>Latitude</th><th>Longitude</th><th>Date</th><th>Depth (m)</th></tr>
<tr><td>5</td><td>C-1</td><td>59°43'N</td><td>28°49'W</td><td>9/1/67</td><td>1282</td></tr>
<tr><td></td><td colspan="5">Sediments and numerous debris, some sponges, site of dredge D-1; over magnetic anomaly 2* (SE flank)</td></tr>
<tr><td>6</td><td>C-2</td><td>59°42'N</td><td>28°52.5'W</td><td>9/2/67</td><td>1300</td></tr>
<tr><td>10</td><td>C-3</td><td>59°52.5'N</td><td>29°08'W</td><td>9/4/67</td><td>1345</td></tr>
<tr><td></td><td colspan="5">Sediments and numerous sponges, site of heat flow H-14; over East edge of magnetic anomaly 1* (SE flank)</td></tr>
<tr><td>15</td><td>C-4</td><td>59°58.5'N</td><td>29°16'W</td><td>9/4/67</td><td>1250</td></tr>
<tr><td></td><td colspan="5">Sediments, abundant sponges; East edge of magnetic anomaly A*</td></tr>
<tr><td>16</td><td>C-5</td><td>59°56'N</td><td>29°22'W</td><td>9/4/67</td><td>1090</td></tr>
<tr><td></td><td colspan="5">Sediments, sponges and rock debris? between dredge sites D-39, D-40; over magnetic anomaly A*</td></tr>
<tr><td>17</td><td>C-6</td><td>59°56.5'N</td><td>29°24'W</td><td>9/5/67</td><td>1175</td></tr>
<tr><td></td><td colspan="5">Sediments, sponges and rock debris? between dredge sites D-39, D-40; over magnetic anomaly A*</td></tr>
<tr><td>18</td><td>C-7</td><td>59°58.5'N</td><td>29°28'W</td><td>9/5/67</td><td>1110</td></tr>
<tr><td></td><td colspan="5">Lava flow and patches of sediments with sponges; over center of magnetic anomaly A*</td></tr>
<tr><td>19</td><td>C-8</td><td>59°59.5'N</td><td>29°34'W</td><td>9/5/67</td><td>980</td></tr>
<tr><td></td><td colspan="5">Pillow lavas + freshly buried by sediments; over West edge of magnetic anomaly A*</td></tr>
<tr><td>20</td><td>C-9</td><td>59°59.5'N</td><td>29°25.5'W</td><td>9/5/67</td><td>950</td></tr>
<tr><td></td><td colspan="5">Color film; well developed and fresh pillow lava field, site of dredge D-19 (large pillow brought up on camera frame); over central part of magnetic anomaly A*</td></tr>
<tr><td>21</td><td>C-10</td><td>60°00'N</td><td>29°27'W</td><td>9/5/67</td><td>870</td></tr>
<tr><td></td><td colspan="5">Well developed and fresh pillow lava field between dredge site D-19 and D-22; over magnetic anomaly A*</td></tr>
</table>

Table 2

CAMERA STATIONS TR41 (continued)

Station #	Camera #	Latitude	Longitude	Date	Depth (m)
24	C-1	60°01'N	29°38'W	9/6/67	1045
25	C-12	60°03.5'N	29°38'W	9/6/67	1265
37	C-13	60°12.5'N	30°02'W	9/8/67	1440
	Sediments, recently buried bed rock? dredge site D-36; over East side magnetic anomaly 2* (NW flank)				
42	C-14	59°42'N	28°38'W	9/9/67	1405
	Sediments, coarse texture, few rock debris?, between dredge site D-41 and D-42; over magnetic anomaly 3* (SE flank)				

*1) J.R. Heirtzler, X. Le Pichon and J.G. Baron, Magnetic anomalies over the Reykjanes Ridge, Deep-Sea Research, 13, 427-443, 1966.

2) and more recent magnetic survey kindly made available by M. Talwani of Lamont Geological Observatory.

Table 3

CORING STATIONS TR41 (Gravity cores)

Station #	Core #	Latitude	Longitude	Date	Depth (m)	Core. Length (cm)
5	G-6	59°43'N	28°49'W	9/1/67	1093	50
	Core description - brown mud and siliceous spicules					
6	G-8	59°42'N	28°52.5'W	9/2/67	1390	55
	Core description - tan clay and sand					

TABLE 4 HEAT FLOW STATIONS TR41

Station #	Heat Flow #	Lat. (N)	Long. (W)	Date 1967	Core Length (cm)	Core Description	Water Depth (m)	Water Temp. at bottom (°C)	Thermal gradient (10^{-3} °C/cm)	Thermal Conductivity (10^{-3} cal/cm sec °C)	Heat Flow (10^{-6} cal/cm^2 sec)
1	H-1	54°16'	45°05'	8/25	216	buff mud & gravel	3598	-	-	-	-
1a	H-2	56°16'	45°05'	8/25	-	hit hard rock	3673	-	-	-	-
2	H-3	56°16'	41°36'	8/26	116	buff mud (foraminifera)	3180	-	-	-	-
3	H-4	58°31.5'	37°47.5'	8/27	18	-	2647	-	-	-	-
3a	H-5	58°27'	37°46'	8/27	79	buff mud & spicules (stiff) & ang. rock fragm.	2537	-	-	-	-
4a	H-6	59°37'	28°30'	9/1	90	blue-gray clay	1745	-	-	-	-
4b	H-7	59°37'	28°32'	9/1	122	tan clay ooze	1680*	3.44	0.66	1.88	1.24
7	H-9	59°44'	28°45'	9/3	151	blue-gray clay brown clay on top	1332	3.82	0.77	1.78	1.38
9	H-12	59°47.5'	28°58'	9/3	105	blue-gray & tan clay	1550	3.83	0.40	1.98	0.80
10	H-13	59°51.5'	28°07'	9/4	100	tan clay	1365	-	-	-	-
10	H-14	59°52.5'	29°08'	9/4	100	blue-gray clay	1365*	3.89	3.08	2.18	6.71
11	H-15	59°53'	29°16'	9/4	-	blue-gray clay	1225	4.02	0.61	2.40	1.47
12	H-16	59°55'	29°18'	9/4	107	blue-gray clay	1287*	-	-	-	-

TABLE 4 HEAT FLOW STATIONS TR41 (continued)

Station #	Heat Flow #	Lat. (N)	Long. (W)	Date 1967	Core Length (cm)	Core Description	Water Depth (m)	Water Temp. at bottom (°C)	Thermal gradient (10^{-3}°C/cm)	Thermal Conductivity (10^{-3}cal/ cm sec°C)	Heat Flow (10^{-6}cal/ cm sec)
26	H-25	60°02.5'	29°46'	9/6	102	blue-gray clay	1303	4.23	0.86	2.02	1.74
27	H-26	60°07'	29°46'	9/6	119	blue-gray & buff mud	1279	4.16	1.58	2.08	3.29
28	H-27	60°09.5'	29°51'	9/7	100	blue-gray & buff mud	1401	3.87	2.45	2.32	5.68
29	H-28	60°12.5'	30°04.5'	9/7	63	blue-gray & buff mud	1561	3.90	1.24	2.46	3.05
31	H-30	60°21'	30°20'	9/7	105	blue-gray & buff mud	1700	-	-	-	-
32	H-31	60°20'	30°20'	9/7	93	blue-gray & buff mud	1676	-	-	-	-
44	H-44	61°35'	27°48'	9/10	114	buff mud (foraminifera)	1500*	4.20	1.34	2.65	3.55

* These values have not been corrected from the PESR readings.

REFERENCES

1. F.J. Vine and D.H. Matthews, Magnetic anomalies over Oceanic Ridges. Nature 199, 947-949, 1963.

2. J.R. Heirtzler, X. Le Pichon and J.G. Baron, Magnetic anomalies over the Reykjanes Ridge, Deep-Sea Res. 13, 427-443, 1966.

3. J.G. Moore, Rate of palagonitization of submarine basalt adjacent to Hawaii, U.S. Geol. Surv. Prof. paper 550-D, 163-171, 1966.

4. A. Cox, R.R. Doell and G.B. Dalrymple, Reversals of the Earth's magnetic field, Science 144, 1537-1543, 1964.

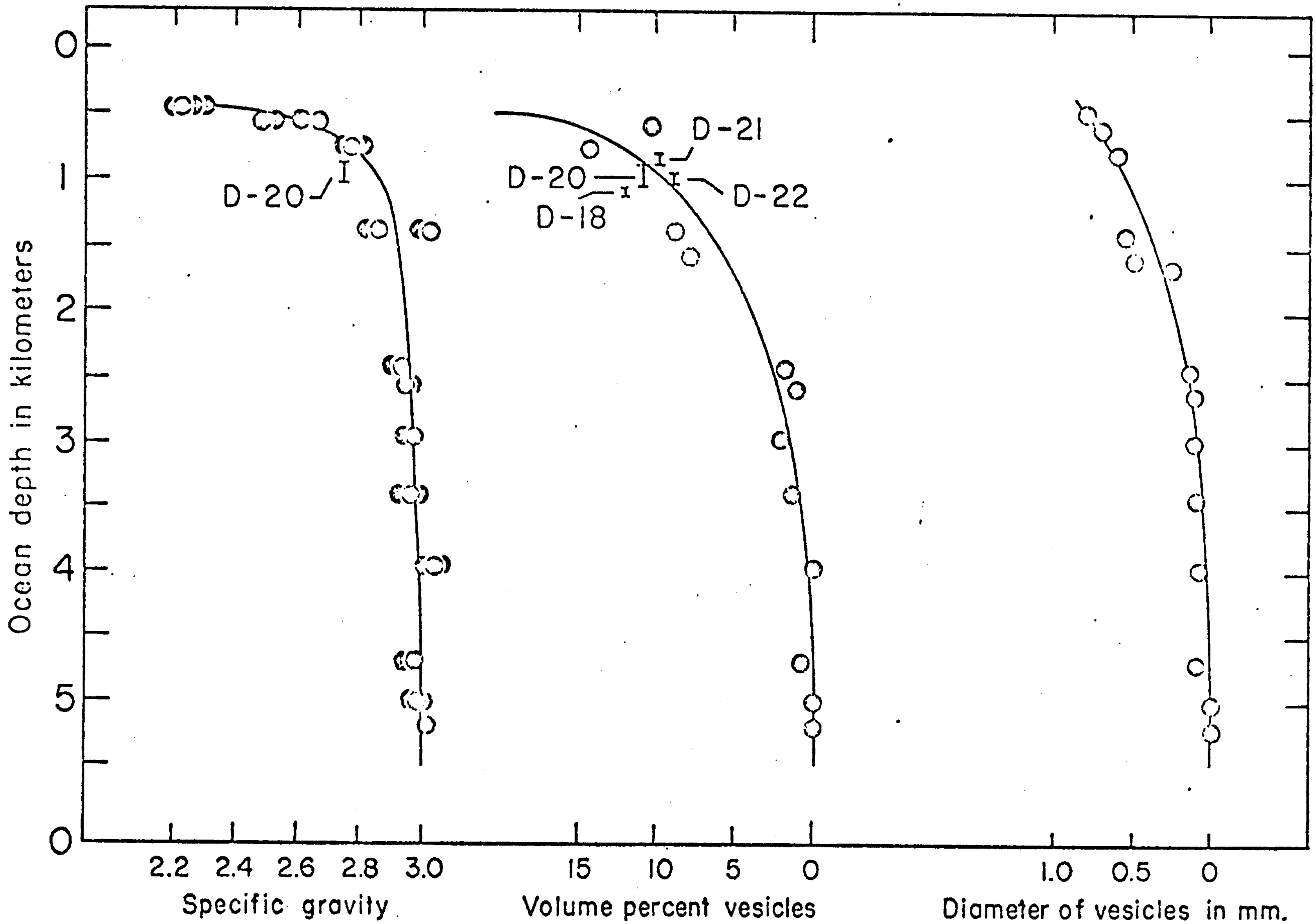
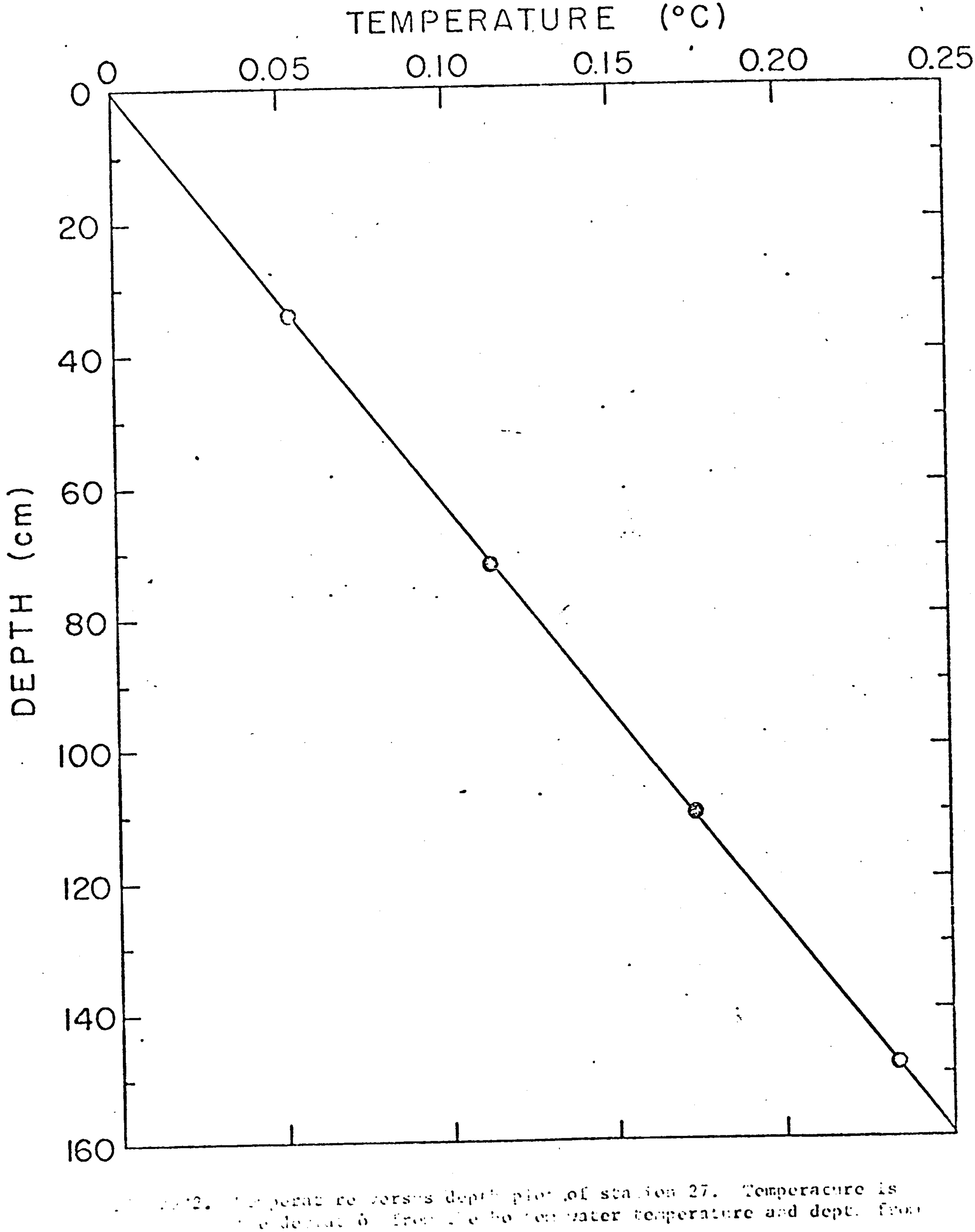


FIG 1. Preliminary results. Change in specific gravity, volume percent vesicles and average diameter of vesicles with depth for 4 samples dredged on the Reykjanes Ridge are compared with those obtained for basalts of the east rift zone of Kilauea (Hawaii)



...2. [illegible]perat[illegible]re versus depth plot of station 27. Temperature is [illegible] deviation from [illegible] bottom water temperature and depth from [illegible] top of the sediment.

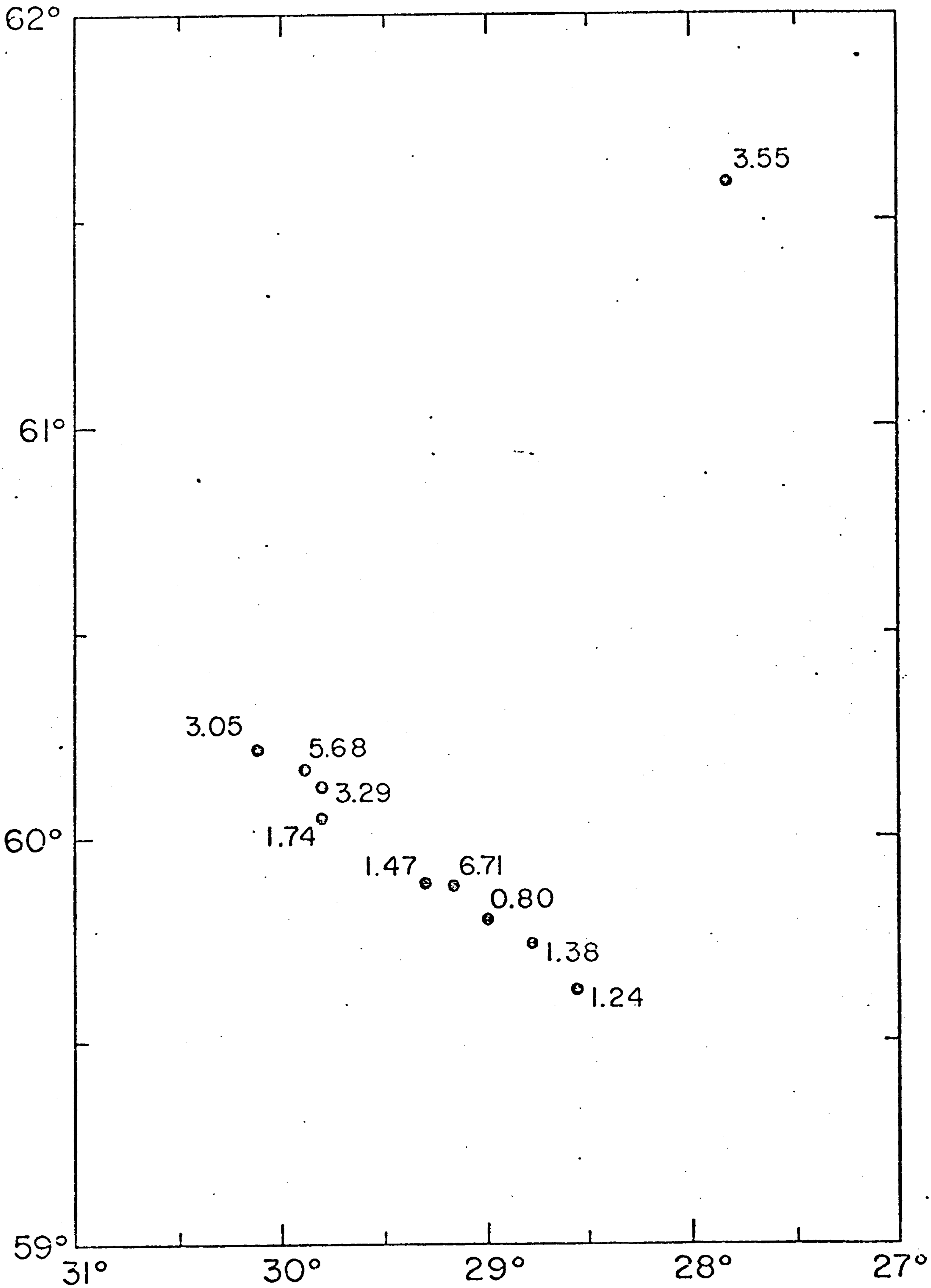
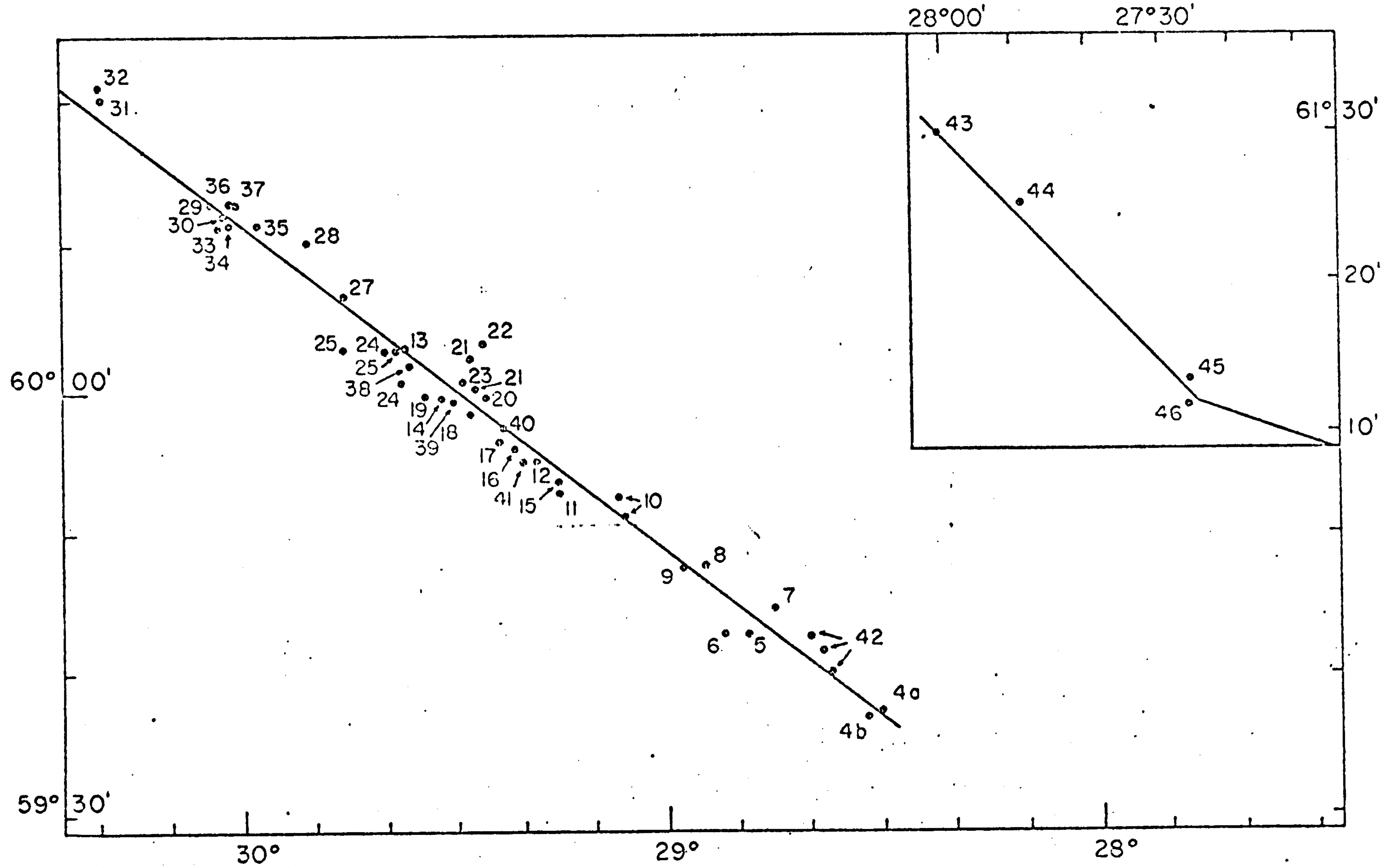


Figure 3. Map showing heat flow stations and heat flow values (in cal/cm^2 sec). Bathymetric contours are in meters.



28°00'
27°30'
61° 30'
20'
10'
43
44
45
46
60° 00'
59° 30'
30°
29°
28°
32
31
36 37
29
30
33
34
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41
15
12
11
10
9
8
7
6
5
42
4a
4b

(Taken from Bridge Log.)

TR-041 Leg II (WEBB)

Sept 17 — Oct 1, 1967

Reykjavik — Narragansett

Sept 17, 18, in Port.

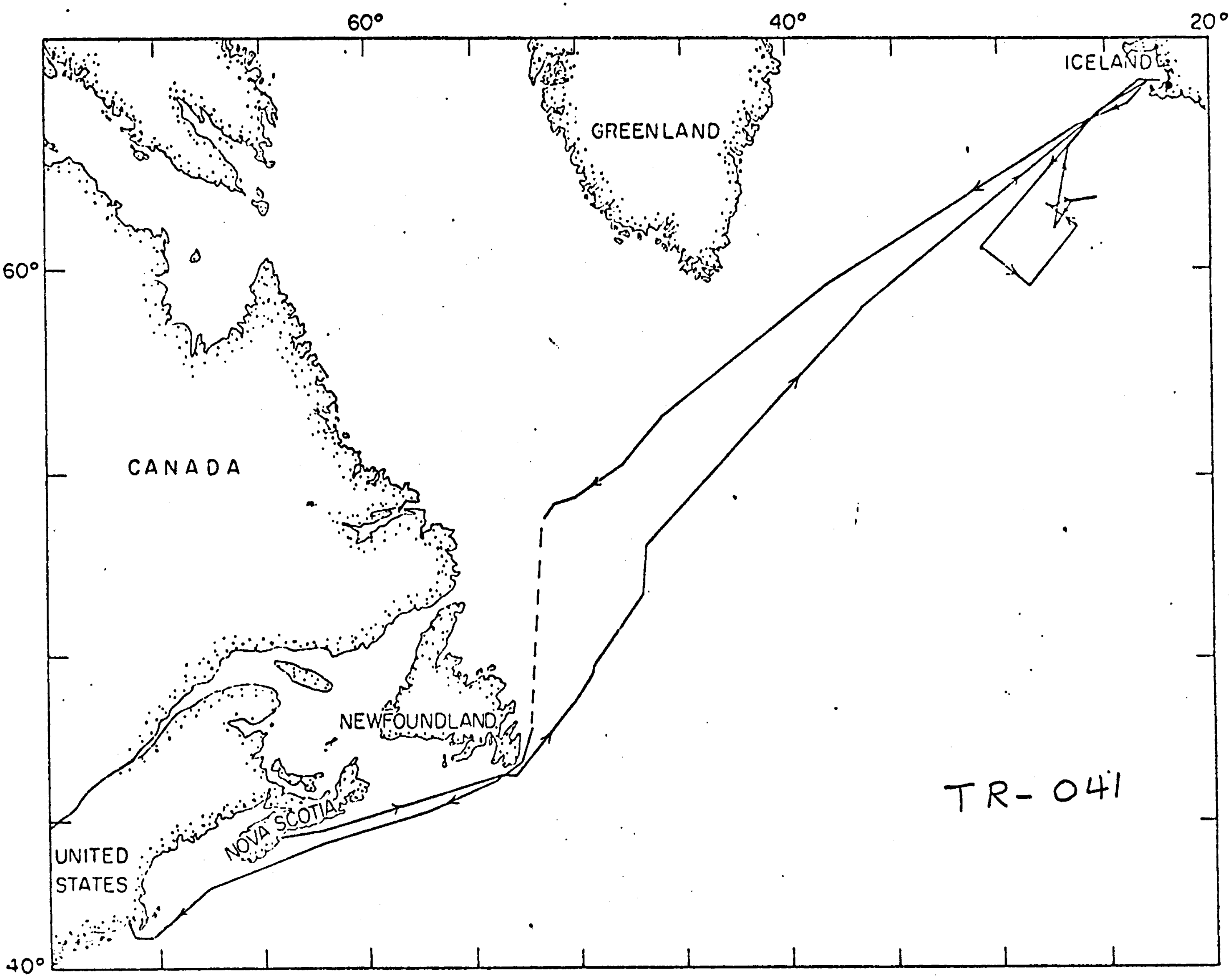
Sept 19. u/w 0415, streamed MAGNETOMETER

Sept 23, MAGNETOMETER being towed

Sept 25, 0000 PAR continues (obviously commenced earlier)
0559 c/s to 6K to repair PAR
~~Sept~~ 0700 u/w ~~with~~ streaming PAR; @ 1408 End PAR
2248 PAR repaired (obviously re-streamed earlier).

Sept 26, 0000 MAGNETOMETER and PAR being towed.
Sept 27 0000 MAGNETOMETER and PAR being towed.
Sept 28 0000 MAGNETOMETER and perhaps PAR? being towed
Sept 29 0000 MAGNETOMETER and perhaps PAR? being towed
Sept 30 0000 MAGNETOMETER and perhaps PAR? being towed
Oct 1 0000 MAGNETOMETER and perhaps PAR? being towed towards Gulf of Maine.

The cruise report does not incorporate Leg II of this cruise; the above is an attempted reconstruction from the bridge log, which obviously leaves much to be desired.


20°
40°
60°
60°
40°
ICELAND
GREENLAND
CANADA
NEWFOUNDLAND
NOVA SCOTIA
UNITED
STATES
TR- 041