SCHILLING TR-101

ASAF ASHRAF

Core Laboratory
Graduate School of Oceanography
University of Rhode Island

CRUISE REPORT
TR-101 (REYKJANES II)
17 July - 29 July 1971
R/V TRIDENT

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SCHEDULE

A 12-day cruise was undertaken over the Reykjanes Ridge crest in the North Atlantic from 60°N to the southeast most tip of Iceland near 63°50'N. The cruise was devoted to a detailed rock sampling by extensive dredging and a marine geological-geophysical investigation of the ridge crest extension over the southeast Icelandic shelf.

SCIENTIFIC PARTY

Dr. Jean-Guy Schilling	URI	chief scientist	USA
Dr. Yoshio Oji	URI	volcanologist	Japan
Dr. David Gottfried	USGS	geochemist	USA
Sigurdur Steinthorsson	Univ. of Iceland	geologist	Iceland
Thomas H. Johnston	URI	geologist	USA
Diane Wolf	URI	geologist	USA
Mrs. Dorothy Hansen	URI	technician	USA
Kip Barkley	URI	ocean engineer	USA
Richard Plumb	Wesleyan Univ.	geophysicist	USA
James Cullen	Wesleyan Univ.	geologist	USA
Marc Weishan	URI	marine technician	USA
Jeffrey Parker	URI	marine technician	USA

SHIP'S COMPANY

Terry Hansen, master
Robert Reusswig, chief mate
David LaCasse, second mate
Kenneth Du Friend, bos'n
Omar Palardy, AB seaman
Michael Santarsieae, AB seaman
Frederick Russell, AB seaman
Barry McGuire, ordinary seaman
Anthony Russo, ordinary seaman
David Morgan, radio operator
John M. Ball, steward
Herman Beard, second cook
Theodore Gelinas, chief engineer
Theodore Rebelowski, first engineer
Theodore Surrette, second engineer
Neal E. Hovey, oiler
Thomas Rosebach, oiler
Edward Midgett, oiler-electrician

OPERATIONS

The objective of this cruise was to study in detail the most recent rift volcanism (post glacial) and its variations along the crest of the Reykjanes from 60°N (our previous 1967 survey with R/V TRIDENT Cruise 41) to the Reykjanes Peninsula, southwest of Iceland. This region offers a unique opportunity to follow fissure-type tholeiitic volcanic activity occurring along a submarine ridge system (the Reykjanes Ridge) up to a subaerial region of the same type of volcanic activity (i.e. Reykjanes Peninsula/southwest Iceland). Particular attention was paid to the transition zone (i.e. at the limit of southwest Iceland platform or shelf). For this purpose an extensive suite of fresh post

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glacial volcanic rocks was successfully dredged along the ridge axis. The stations are spaced approximately every 20 minutes of latitude from 60°N (the loci of our previous sampling across the ridge, R/V TRIDENT, Cruise 41) up to 62°N, and every 7-8 minutes of latitude from 62°N up 63°32'N. Thirty-one successful dredge hauls, 2 gravity cores and 2 camera stations were undertaken, see Figure 1 and Table 1 for dredge haul location and description, respectively.

Geophysical surveys were also conducted, using echo-sounding (Alpine PESR and EDO echo-sounder), magnetometry (modified various station magnetometer), and seismic profiling (Modified Bolt Assoc. 5 in^3 in air gun, WHOI-type 200-element hydrophone, standard electronics and a Raytheon PFR recorder). Profiles were concentrated particularly over the southeast Iceland submarine platform and its southeastern edge, over and across the extension of Reykjanes Ridge axis. See Figure 1 for location of the profiles.

Navigation was conducted by satellite Navigator (Magnovox MX706CA) and cross-checked by LORAN-A (Sperry). Satellite fixes were also obtained at regular intervals during a 24 hour period while docked in Reykjavik Harbour, for precision and accuracy estimation.

Preliminary Results

The extension of the Reykjanes Ridge axis over the submerged Iceland platform appears on the sub-bottom profiles as narrow graben like structures, modified by abundant post glacial volcanic activity, as evident from dredging. Sediment collapse are apparent from the record. Evidence for small subaerial volcanic centers of activity at shallow depths, directly southwest of the Reykjanes Peninsula, followed by subsidence and submergence, is clearly indicated. This is evident from well rounded lava boulders of uniform composition, dredged from the top of small seamounts at depths below where wave action can presently be active. Also the record shows that the ridge axis and center of recent volcanic activity over the submerged Iceland platform appears to be displaced toward the east, presumably by a series of small en echelon faults, as also suggested from magnetic data by Talwani's group in Lamont. Vesiculation appears to increase rapidly at shallow depth. This phenomena, related to solubility of gases in the magma, and thus viscosity as well, appears to coincide and is possibly related in part to the anomalous build up of the Iceland platform over the Mid-Atlantic Ridge.

Detailed petrological, geochemical (trace and volatile element contents, isotopic abundances, etc) and rock magnetic studies will be conducted on this extensive and unique rock collection. Subaerial rift lavas were also collected on the Reykjanes Peninsula.

These laboratory studies and results will be related to other geophysical parameters such as crustal structure and thickness, tectonics, prevailing thermal regimes and magnetic surveys, which are well documented in this region.

Inferences on how physical and dynamical conditions in the crust and upper mantle affect the chemistry and mode of volcanic eruptions should be obtained. These studies should also shed light on the origin of the anomalous build up of the Iceland platform over the Mid-Atlantic Ridge system.

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TABLE 1. SAMPLING STATIONS

Station No.	Type	Latitude (uncorrected)	Longitude (uncorrected)	Date 1971	Depth range	Operator	Results
1	Dredge	62°35.6'N	25°27.5'W	19 July	620-615	Schilling	small fresh pillow lava, pillow fragment and glassy crust.
2	Dredge	62°37.4'N	25°26'W	19 July	650-615	Johnston	fresh highly vesicular pillow lava fragments with glassy rims, live branching coral.
3	Dredge	62°47.5'N	25°09.6'W	19 July	665-575	Johnston	fresh pillow lava and pillow fragments, solitary and branching coral, siliceous sponges, starfish, shells.
4	Camera	62°47.5'N	25°09.6'W	19 July	650-560	Weishan	
5	Dredge	62°54.4'N	24°53'W	19 July	555-455	Schilling	large pillow and pillow lava fragments, mudstone and tuff? granite erratics, biologic specimen.
6	Dredge	62°59.7'N	24°41.9'W	20 July	450-350	Schilling	250 kg highly vesicular pillows and pillow lava fragments, one block with columnar jointing.
7	Dredge	63°04.6'N	24°29.8'W	20 July	265-365	Johnston	100 kg fresh pillow lava fragments with glass, coral.
8	Camera	63°05.4'N	24°25'W	20 July	360-292	Weishan	
9	Dredge	63°16.4'N	24°19'W	20 July	180-150	Johnston	black mud and biological fragments.
10	Dredge	63°16.6'N	24°14.6'W	20 July	175-148	Johnston	fresh pillow lava fragments with glass rim.

TABLE 1. (continued)

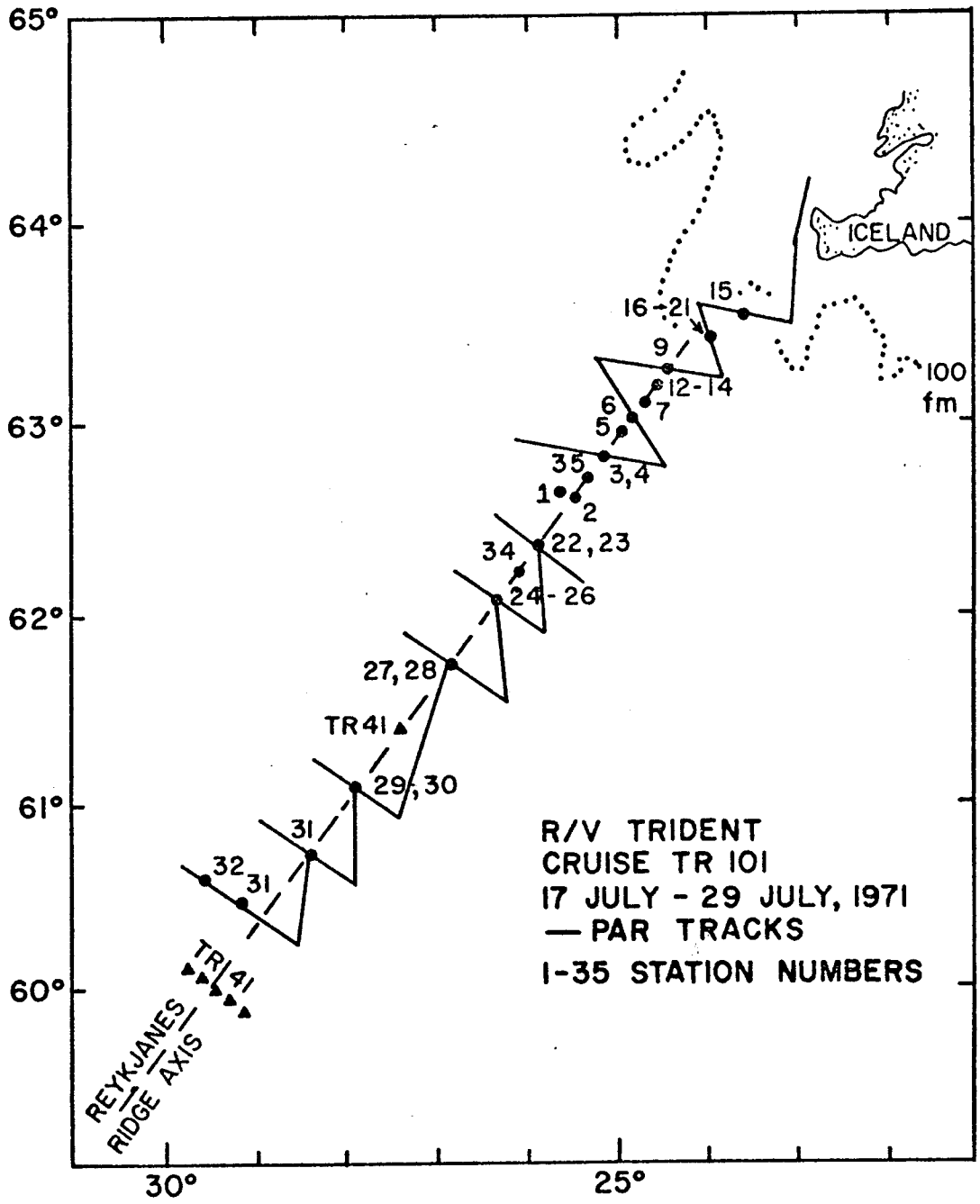
Station No.	Type	Latitude (uncorrected)	Longitude (uncorrected)	Date 1971	Depth range	Operator	Results
11	Dredge	63°16.3'N	24°12.4'W	20 July	50-100	Johnston	pillow lava fragments, scor (samples rounded by wave action).
12	Dredge	63°12.9'N	24°16.0'W	21 July	315-200	Schilling	fresh lava with reddish oxidation stains from lower part, rounded basalts, cobbl from upper terrace. (260m)
13	Core	63°10.5'N	24°24.1'W	21 July	310	Weishan	dark green mud and aa lava fragments.
14	Dredge	63°11.2'N	24°27.6'W	21 July	335-355	Schilling	highly vesicular basalt sintered type with reddish oxidation stains.
15	Dredge	63°34.7'N	23°42.2'W	21 July	100-65	Johnston	highly vesicular sintered basalt with some glass.
16	Dredge	63°27.9'N	23°52.4'W	21 July	65-55	Johnston	dense basalt boulder and cobbles, indurated tuff cobbles, vesicular basalt cobble.
17	Dredge	63°28.1'N	23°51.2'W	21 July	55-25	Schilling	3 boulders, 1 diabasic, 2 reddish brown vesicular bas top of seamount.
18	Dredge	63°28.1'N	23°51.2'W	21 July	46-40	Schilling	fresh, black vesicular bas cobbles and pebbles - top seamount.
19	Dredge	63°28.2'N	23°48.2'W	21 July	140-70	Johnston	2 small fragmentsof basalt flank of seamount.

TABLE 1. (continued)

Station No.	Type	Latitude (uncorrected)	Longitude (uncorrected)	Date 1971	Depth range	Operator	Results
20	Core	63°29.6'N	23°39'W	21 July	183	Weishan	black mud and 2 gm basalt fragment.
21	Dredge	63°27.7'N	23°45.6'W	21 July	205-185	Schilling	black mud and shells.
22	Dredge	62°22.4'N	25°50.7'W	22 July	690-740	Johnston	large pillow lava, 100 kg, and pillow fragments and roapy crust with fresh glass.
23	Dredge	62°21.3'N	25°46.8'W	22 July	675-640	Gottfried	pillow basalt fragments and biologic samples.
24	Dredge	62°05'N	26°17.8'W	23 July	720-653	Schilling	two large pillows rimmed with glass, pillow lava fragments, and fresh angular & massive lava.
25	Dredge	62°06.6'N	26°21.8'W	23 July	720-645	Schilling	abundant erratics (wide range of petrological types), small pillow fragments, baked ooze and breccia.
26	Dredge	62°07.4'N	26°21'W	23 July	650-570	Johnston	200 kg of weathered yellowish pillow fragments, diabase and glacial erratics.
27	Dredge	61°44'N	26°52.9'W	24 July	605-595	Johnston	pillow lava fragments, indurated ooze, siliceous sponges.
28	Camera	61°44'N	26°54'W	24 July	655-701	Parker	
29	Dredge	61°05.9'N	27°52.7'W	25 July	855-765	Schilling	2 large pillow lava, 2 smalle ones, slabs.

TABLE 1. (continued)

Station No.	Type	Latitude (uncorrected)	Longitude (uncorrected)	Date 1971	Depth range	Operator	Results
30	Dredge	61°05.9'N	27°54.2'W	25 July	825-760	Schilling	100 kg pillow lava fragments, 1 large diabase block, 1 small erratic.
31	Dredge	60°44'N	28°25.4'W	25 July	714-705	Johnston	fresh pillow lava fragments, palagonite crust, baked clay fragments.
32	Dredge	60°37'N	29°29.4'W	26 July	1380-1100	Schilling	weathered yellowish pillow lava fragments, angular diabase slabs, erratics of varied petrological types, indurated ooze, corals.
33	Dredge	60°27.4'N	28°53.1'W	26 July	950-895	Johnston	weathered basalt, glacial erratics.
34	Dredge	62°16.1'N	26°08.4'W	28 July	550-450	Johnston	1 large pillow fragment, small pillow lava fragments.
35	Dredge	62°42'N	25°12.3'W	28 July	650-510	Johnston	fresh vesicular pillow lava fragments and glassy crust.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