J. Geophys. 47, 125–131, 1980

Journal of Geophysics

Gravity and Height Variations During the Present Rifting Episode in Northern Iceland

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Abstract. In 1975, a rifting episode started in the neovolcanic zone of northern Iceland, consisting of a succession of slow inflation periods and rapid subsidence events, which is still going on. The center of activity is situated below the Krafla caldera, and the rifting process is affecting the 80-km-long fissure swarm associated with this central volcano. Gravity and height variations associated with this process have been investigated by re-observing profiles earlier established in the Námafjall and in the Gjástikki area, situated nearly 10 km south and north of Krafla respectively, as well as by the re-observation of a number of gravity stations in the northern part of the fissure zone, in 1976, 1977, and 1978. By repeated observations with 2 or 3 LaCoste-Romberg gravity meters, the accuracy obtained in each gravity survey is of the order of $\pm 10 \times 10^{-8}$ ms^{-2}. In the profiles crossing the fissure zones, a rate of gravity increase of more than 100×10^{-8} ms^{-2}/a has been found in the central part, while gravity at the flanks decreases at the same order. These variations are correlated with subsidence and elevation rates of the order of 0.5 m/a.

Key words: Icelandic rift zone – Recent gravity and height variations – Precise gravity measurements.

1. Introduction

Repeated gravity measurements in areas of earthquake and volcanic activity are an information source about the mass displacements occurring especially in the vertical direction. Among other regions, northern Iceland is an outstanding area of investigation into this problem, especially since 1975, when a rifting episode started there. Continuing former gravity surveys in this region, the Institut für Theoretische Geodäsie, Universität Hannover, carried out gravity and height measurements along three profiles in the area of current activity, in the years 1976–1978. After a short description of the present rifting episode, the gravity and height measurements are presented and the resulting variations discussed.

The neovolcanic zone in Iceland represents a supramarine part of the axial rift zone of the Mid-Atlantic Ridge and thus the plate boundary between the American and the Eurasian tectonic plates (for a detailed description, see e.g., Pálmason and Saemundsson, 1974). In northern Iceland, this zone has a north-south direction and a width of 50 to 80 km. In the east and west it is bordered by Pleistocene basalts followed by Tertiary plateau basalt, which form the larger part of Iceland. Volcanic and earthquake activity of the neovolcanic zone is restricted to a few north-south striking fissure swarms of several kilometers width; one of them is the Krafla-swarm, which passes through the caldera of the Krafla volcano (Fig. 1, Björnsson et al., 1977). Since the extensive volcanic and tectonic events in the Krafla-Námafjall area between 1724 und 1729, this fissure swarm has been inactive until 1975. On December 20, 1975, a basaltic eruption occurred at Leirhnjúkur in the Krafla caldera, associated with an intense earthquake swarm and significant ground movements. This opened the current period of activity, which forms a rifting episode within the kinematic processes at a constructive plate boundary (Björnsson, 1976). The activity center is below the Krafla caldera, where the ground undergoes slow uplift movements (maximum ~ 7 mm/d in the center) over some months, interrupted by short subsidence (maximum ~ 2 m) pulses of a few days duration. The latter are accompanied by earthquake and thermal activity, fissure formation and vertical ground movements along the Krafla

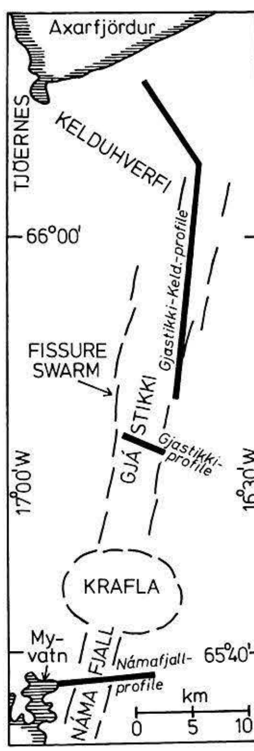

Fig. 1. Location of gravity profiles observed in northern Iceland between 1965 and 1978

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fissure zone at different locations during the single pulses. This rifting process is very carefully monitored by the Icelandic scientists, employing a broad spectrum of different observation methods, which include levelling, tilt and gravity measurements (Björnsson, 1976; Björnsson et al., 1977; 1978).

In the region in question, high precision gravity measurements have been carried out since more than 10 years by the Institut für Theoretische Geodäsie, Technische Universität Hannover. They form the basis for the comparison with the more recent observations.

2. Gravity Measurements in the Rift Zone

Gravity measurements in the neovolcanic zone of northern Iceland started in 1938, when Schleusener (1943) established 40 gravity stations, in order to investigate the regional gravity field and by later repetition measurements, its variation with time. Re-observations had been taken up in 1964 and were continued in 1965, 1967, 1970, 1971, and 1975, now employing LaCoste-Romberg (LCR) gravity meters. As the result we now have

- a monumented high-precision ($\pm 10 \times 10^{-8}$ ms^{-2})[1] *gravity profile* crossing the neovolcanic zone in *west-east-direction* ($\phi \sim 65°40'$) and covering about 50 km of the adjoining Pleistocene and Tertiary basalt zones (profile length ~150 km, average station spacing 1 km). This profile has been observed in 1965, 1970/1971, and 1975. The comparison of the results revealed for this epoch a gravity increase in the neovolcanic zone relative to the basalt zones, reaching +7 .8 $\times 10^{-8}$ ms^{-2}/a. The maximum gradient of variation occurred in the Myvatn-Námafjall part of the profile, which is part of the Krafla fissure swarm (see Fig. 1); Schleusener and Torge (1971), Torge and Drewes (1977a);
- a *regional gravity control* of about 1000 stations ($\pm 20...30 \times 10^{-8}$ ms ^{2}) covering the neovolcanic zone and the adjoining older basalt zones between 65°30–66°10′ N and 18°10′–15° W, observed between 1964 and 1970; Schleusener et al. (1976);
- *gravity profiles* (± 20 30×10^{-8} ms ^{2}) across *local geological structures,* including the monumented profile crossing the *Gjástikki* fissure zone (observed 1965), about 10 km north of the Krafla caldera, Schleusener (1974).

In order to investigate the gravity influence of mass displacements connected with the present rifting process, repeated gravity and, partly, also height measurements have been carried out at different locations of the Krafla fissure swarm, in 1976, 1977, and 1978.

The surveys were concentrated on three *profiles,* see Fig. 1

- the Námafjall-profile (length ~8 km), part of the west-east profile situated nearly 10 km south of the Krafla caldera,
- the Gjástikki profile (length ~3 km),
- the Gjástikki-Kelduhverfi profile (length ~30 km).

The Námafjall- and the Gjástikki-profiles cross the Krafla fissure zone, while the Gjástikki-Kelduhverfi profile follows this zone. Details are given in Table 1 From the adjustments of the different epochs *r.m.s. errors of one observed gravity difference* have been derived and are given in Table 2. Linear drift factors, obtained from the adjustments, do not exceed 1 2×10^{-8} ms^{-2}/h and are hardly significant.

The *gravity datum* in the single epochs is given by the gravity value at the base station Akureyri 60932 (western edge of the west-east profile) to which the gravity profiles have been connected via intermediate base stations. This value ($g = 982{,}348.39 \times 10^{-5}$ ms^{-2}, Potsdam gravity system with $g = 981{,}277.30 \times 10^{-5}$ ms^{-2} Hannover 21629 A) has been kept fixed since 1965, as the frequent control to the station Hannover (via Reykjavik) did not reveal a significant gravity change there. The results of the gravity measurements between Hannover and Iceland, in 1976, 1977, and 1978, are given in Annex 1 Linear *calibration factors* for the instruments have been derived in the scale of the International Gravity Standardization Net 1971 (IGSN71) by a gravity survey along a special calibration line established 1975 in Norway, at the Iceland gravity range. The calibration factor for LCR G 298 has been determined from the gravity difference Hannover-Akureyri, measured 1975 simultaneously with LCR 79, 85, 87, and 298 (Torge and Drewes, 1977a). Due to the installation of a new long lever with welded pivot in LCR G 79 (November 1976) the calibration changed. The value for 1978 was derived from the D14 measurements carried out simultaneously. The calibration factors are given in Table 3.

Tidal reductions have been calculated using the Cartwright-Tayler-Edden development and regional tidal parameters for the main waves, which were determined 1975 at the temporary gravimetric earth tide station Laugaskoli, near the west-east profile (Torge and Wenzel, 1976).

From the adjustments, *r.m.s. errors* of the final *gravity values* at the single epochs, referring to the base station Akureyri, are

Table 1. Statistics of gravity observations

Epoch	Observation period	Number of stations	LCR gravity meters	Observations per station
Námafjall-profile				
1975	23.7.–28.7.	9	G79, G85 G87, D14	4
1976	6.8.– 7.8.	14	G79, G85	2
1977	8.8.–16.8.	18	G298, D14	4
1978	24.7.–28.7.	19	G79, D14	6
Gjástikki-profile				
1976	10.8.	10	D14	1
1977	9.8.–15.8.	16	G298, D14	2···3
1978	30.7.– 1.8.	14	G79, D14	4
Gjástikki-Kelduhverfi-profile				
1976	4.8.–6.8.	12	D14	1
1978	26.7.–2.8.	12	G79, D14	2

Table 2. R.m.s. errors of single observed gravity differences

Observed gravity difference: r.m.s. error (10^{-8} ms^{-2})				
Epoch	G79	G85	G298	D14
1976	±14	±14	–	±31
1977	–	–	±16	±13
1978	±15	–	–	±12

[1] 1×10^{-8} ms^{-2} = 1 µgal, 1×10^{-5} ms^{-2} = 1 mgal

Table 3. Calibration factors of gravimeters used

G 79 (1976)	1.00055 ± 0.00007
G 79 (1978)	1.00069 ± 0.00005
G 85	0.99988 ± 0.00010
G298	1.00098 ± 0.00002
D 14	1.00031 ± 0.00009

Table 4. R.m.s. errors of final gravity values in single epochs

Adjusted gravity: r.m.s. error (10^{-8} ms^{-2})			
Profile	1976	1977	1978
Námafjall	±3···16	± 6···10	±8···12
Gjástikki	±20	±10···16	±8·· 15
Gjást.-Keld.	±20	–	±9···17

obtained (Table 4). We may conclude that in each profile a relative accuracy, with respect to the other profile stations, of $\pm 10 \times 10^{-8}$ ms^{-2} has been achieved.

As in the previous epochs, the *heights* of the gravity stations in the *Námafjall-profile* have been determined by geometric levelling in 1976···1978, simultaneously with the gravity measurements. A Zeiss Ni2 automatic level has been used, and the readings were controlled by double turning points (1976) or by forth and back levelling. From the misclosures obtained in 1977 and 1978, the r.m.s. error of the heights, referring to the height datum of the corresponding epoch, is estimated to be ±0.01 to 0.02 m.

The *height datum* is

1976: profile station no. 110, about 20 km west of the starting point of the Námafjall profil, connected to it by geometric levelling. The height of this station, which according to the 1976 survey is not affected by the present activity, is given in the height system introduced by Spickernagel (1966),

- 1977· the heights of the bench marks of the precise levelling 1976 along the profile Akureyri-Grimsstadir, carried out by Prof. Spickernagel, Leoben, Austria, and kindly made available to us before final publication,
- 1978: the height of the bench mark HP 302 in the eastern part of the profile which according to the 1978 gravity survey should not have significantly changed between 1977 and 1978.

Height determination in the *Gjástikki profile* has been carried out in 1978, by geometric levelling and (at one steep slope) by trigonometric levelling, simultaneously with the gravity measurements. The relative accuracy within the profile is estimated to be ±0.01 to 0.02 m.

The height datum was derived from the 1977 height of station no. 82544, situated at the northwestern end of the profile. The station heights 1977 have been determined by the Institut für Vermessungskunde, Technische Universität Braunschweig (Professor Möller), between August 8 and 11, 1977, and kindly put at our disposal before publication.

The results of the gravity and height measurements are given in Annexes 2–4.

3. Comparison of the Gravity and Height Observations 1976–1978

The gravity and height variations with time observed along the *Námafjall profile* are given in Fig. 2 (Δg and ΔH). Reference epoch for all observations is 1965, when gravity and height measurements started.

The straight lines connecting the observed point differences have been drawn for clarity only and have no physical meaning (this is valid also for Figs. 3–5). The changes at the additional

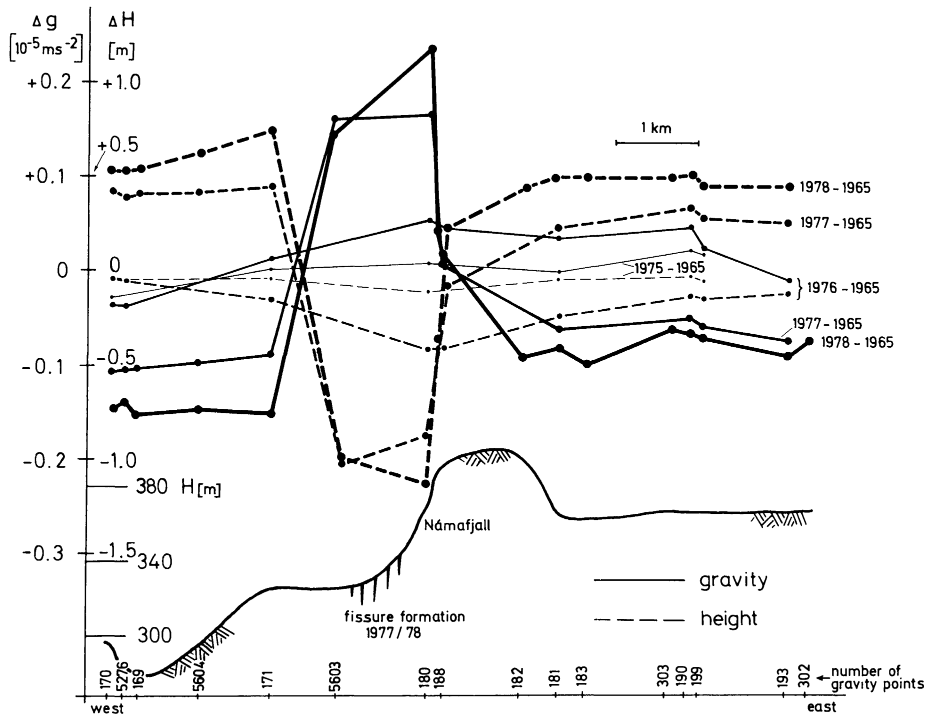

Fig. 2. *Námafjall gravity profile,* northern Iceland: *Gravity and height variations between 1975 and 1978,* referred to epoch 1965. Additional intermediate values interpolated from previous epoch, assuming linear behaviour of variations. Height datum 1978 fitted to gravity datum in western part of profile

stations, established in the periods following the reference epoch, have been fitted to the previous variation curves by adding them the to corresponding straight lines (this is valid also for Fig. 3).

The *comparison 1975–1965* indicates a small gravity increase ($+20$ to $30\times10^{-8}\,ms^{-2}$) west of Námafjall, correlated with a few centimeters ground subsidence. The rifting process which started in December 1975 affected the profile stations more strongly. For *1976–1975* we find that gravity decreased slightly at the western (lake Myvatn) and the eastern border of the profile ($\sim-10\times10^{-8}\,ms^{-2}$). It increased at the western edge of Námafjall (maximum $+40$ to $50\times10^{-8}\,ms^{-2}$) in connection with a subsidence of -0.3 m. For *1977–1976* the continuing activity in the Krafla area led to a considerable gravity decrease in the western part of the profile (-70 to $100\times10^{-8}\,ms^{-2}$), correlated with a rise of $+0.3$ to 0.5 m. The same is true for the eastern part of the profile (-30 to $100\times10^{-8}\,ms^{-2}$, $+0.3$ to 0.4 m). Since 1977 fissure formation and thermal activity occurred at the western edge of Námafjall, giving a maximum gravity increase of $+110$ to $130\times10^{-8}\,ms^{-2}$ and a corresponding subsidence of 0.5 to 0.8 m. Between *1978 and 1977* these tendencies continued, although with smaller magnitude. Gravity decrease in the western part of the profile amounted to 30 to $60\times10^{-8}\,ms^{-2}$, and in the eastern part to 10 to $50\times10^{-8}\,ms^{-2}$, the corresponding uplifts were 0.1 to 0.3 m and 0.2 to 0.3 m, respectively. The gravity increase west of Námafjall reduced to $70\times10^{-8}\,ms^{-2}$, and the subsidence to 0.3 m. H. Spickernagel (1980) could not detect these local height variations, as his stations were destroyed in this region.

In the comparison 1978–1977, the height datum 1978 has been changed no longer assuming that station no. HP 302 did not vary between 1977 and 1978. For station no. 5276, at the western edge of the profile, the gravity change of $-35\times10^{-8}\,ms^{-2}$ has been converted into a height change of $+0.18$ m with the gravity/height factor $-0.2\times10^{-5}\,ms^{-2}/m$. By this transformation, an average conversion factor of $-0.2\times10^{-5}\,ms^{-2}/m$ has been obtained for the profile. This Bouguer-type relation (density 2.6 g/cm^3) has been found also from the comparison 1977–1976.

Figure 3 gives the gravity variations along the *Gjástikki profile*, referred to the first observation epoch 1965. The gravity decrease at the flanks is even more pronounced than in the Námafjall profile with a similar magnitude in different comparisons (NW: 60 to $100\times10^{-8}\,ms^{-2}/a$, SE: 100 to $170\times10^{-8}\,ms^{-2}/a$). A small zone of the central part, with new fissures and thermal activity since 1977/1978, shows a gravity increase of 50 to $110\times10^{-8}\,ms^{-2}/a$. Transforming these values into height varia-

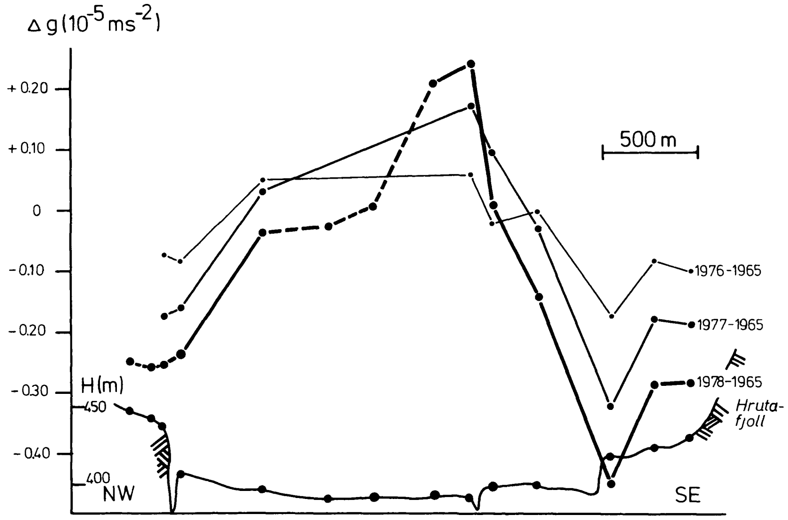

Fig. 3. *Gjástikki gravity profile,* northern Iceland: *Gravity variations between 1965 and 1978,* referred to epoch 1965. Additional intermediate values interpolated from previous epoch, assuming linear behavious of variations

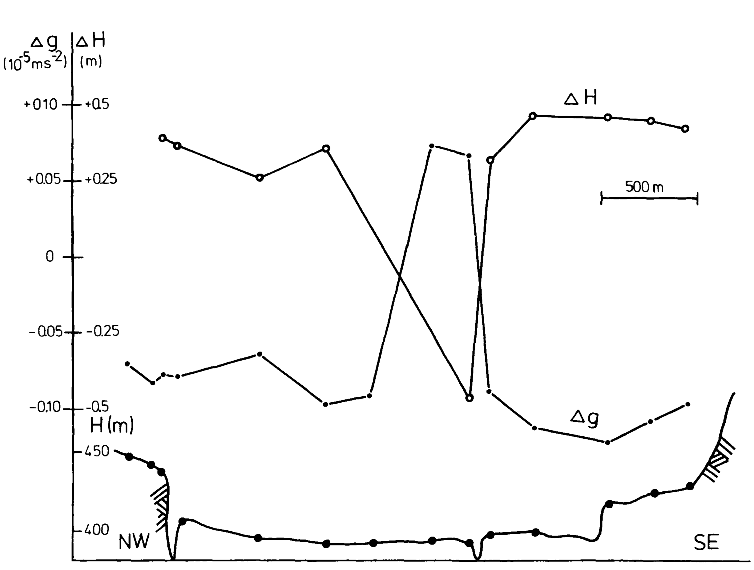

Fig. 4. *Gjástikki gravity profile,* northern Iceland. *Gravity and height variations 1978–1977.* Height datum 1978 fitted to gravity datum in northwestern profile part. Heights 1977 from Geodetic Institute, Technische Universität Braunschweig

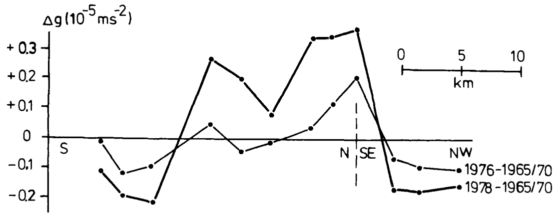

Fig. 5. *Gjástikki-Kelduhverfi gravity profile,* northern Iceland: *Gravity variations between 1965/1970* and 1978, referred to epoch 1965/1970

tions with the factor of -0.2×10^{-5} ms^{-2}/m, we obtain for 1978–1977 a maximum subsidence relative to the flanks of 0.80 m (NW) and 0.97 m (SE), respectively. This is in good agreement with the height variation directly observed (Fig. 4) of -0.83 m and -0.93 m, respectively.

The height datum 1978 has been corrected, since according to the gravity variations all profile stations had changed, between 1977 and 1978. For station no. 544 (NW edge of the profile) the gravity variation of -77×10^{-8} ms^{-2} was transformed into a height change of $+0.39$ m

The gravity variations along the *Gjástikki-Kelduhverfi profile* are given in Fig. 5. They refer to the inactive epoch 1965/1970, when the regional gravity stations in north Iceland had been established. There is a significant gravity variation of different sign along the profile, of magnitudes $\pm 200 \times 10^{-8}$ ms^{-2}/a and more with three areas of gravity decrease and two of gravity increase (corresponding to uplift and subsidence). Dimensions are 5 to 10 km.

4. Conclusions

From gravity and height measurements in the Krafla fissure swarm, carried out during the current rifting episode, and from the comparison with previous observations we conclude that

- a slight gravity increase south of the Krafla caldera occurred before the beginning of the present episode, possibly a precursor of the later activity;
- activated areas south and north of Krafla are characterized by gravity decrease and uplift at the flanks, and by gravity increase and subsidence in narrow central zones;
- the magnitude of the observed variations in gravity and height reaches the order of $\pm 100 \times 10^{-8}$ ms^{-2}/a and ± 0.5 m/a, respectively;
- the gravity/height relationship corresponds approximately to a Bouguer-type factor, although with some scattering;
- with a stable gravity datum an uncontrolled height datum can be corrected,
- activated areas along the fissure swarm show gravity variations of $\pm 200 \times 10^{-8}$ ms^{-2}/a and more;
- individual regions of the fissure swarm have generally changed height and gravity without change in sense during the whole observation period from 1975 to 1978 revealing some kind of continuity;
- according to the 1978 survey, the period of activity is still in progress.

These results, and hopefully also future observations, will contribute to the understanding of the mass movements in time and space which are related to the present rifting episode.

Acknowledgements. The authors thank the National Research Council of Iceland for the permission to carry out the gravity surveys in northern Iceland. For fruitful discussions they are grateful to Dr Axel Björnsson and Dr. Gudmundur Pálmason, National Energy Authority, and to Dr. Eysteinn Tryggvason, Nordic Volcanological Institute, Reykjavik. They are much obliged to Professor Dr. S. Heitz, Geodätisches Institut, Technische Universität Berlin, for lending the LCR-Gravity meter no. 85, and to Professor Dr. D. Möller, Institut für Vermessungskunde, Technische Universität Braunschweig, and Professor Dr. H. Spickernagel, Institut für Markscheide- und Bergschadenkunde, Montanuniversität Leoben, for making available the height values 1977 of the Gjástikki and Námafjall profil. Calculations have been carried out at the CDC 73/76 of the Regional Computing Centre of Lower Saxony. Beside the authors, the following persons participated in the field surveys: W. Adolf (1976, 1978), H. Drewes, H. Lehrke, G. Terwey (1976), A. Weise (1976, 1978). The authors are very grateful to Deutsche Forschungsgemeinschaft for generous financial support.

Annex 1. Gravity connection Hannover – Reykjavik – Akureyri 1976–1978[a]

No.	Instrument	Observer	Station	No.	Date	Time (UT)	Reading	Manufacturer's scale	Tidal correction	Corrected mgal-value
1	G 79	Drewes	Hannover	21629A	31.7.76	5.02	4555.648	4723.165	−0.037	4723.128
2	G 79	Drewes	Reykjavik	21941L	31.7.76	17.47	5519.455	5723.621	−0.058	5723.563
3	G 79	Drewes	Akureyri	60932	31.7.76	20.46	5586.979	5793.701	−0.095	5793.606
4	G 85	Lehrke	Hannover	21629A	31.7.76	5.02	4661.090	4826.626	−0.037	4826.589
5	G 85	Lehrke	Reykjavik	21941L	31.7.76	17.28	5626.248	5827.665	−0.054	5827.611
6	G 85	Lehrke	Akureyri	60932	31.7.76	20.32	5693.856	5897.765	−0.093	5897.672
7	G 79	Drewes	Akureyri	60932	18.8.76	13.35	5586.964	5793.686	−0.042	5793.644
8	G 79	Drewes	Reykjavik	21941L	18.8.76	16.28	5519.478	5723.645	−0.065	5723.590
9	G 85	Lehrke	Akureyri	60932	18.8.76	13.22	5693.915	5897.826	−0.040	5897.786
10	G 85	Lehrke	Reykjavik	21941L	18.8.76	16.14	5626.332	5827.752	−0.062	5827.690
11	G 79	Drewes	Reykjavik	21941L	21.8.76	4.14	5519.522	5723.691	−0.067	5723.624
12	G 79	Drewes	Keflavik	21941K	21.8.76	6.39	5515.731	5719.756	−0.030	5719.726
13	G 79	Drewes	Hannover	21629A	21.8.76	17.22	4555.787	4723.310	−0.086	4723.224
14	G 85	Lehrke	Reykjavik	21941L	21.8.76	4.07	5626.390	5827.812	−0.067	5827.745
15	G 85	Lehrke	Keflavik	21941K	21.8.76	6.28	5622.559	5823.840	−0.033	5823.807
16	G 85	Lehrke	Hannover	21629A	21.8.76	17.22	4661.263	4826.805	−0.086	4826.719

Annex 1 (Continued)

No.	Instrument	Observer	Station	No.	Date	Time (UT)	Reading	Manufacturer's scale	Tidal correction	Corrected mgal-value
17	G298	Kanngieser	Hannover	21629A	6.8.77	5.33	4731.240	5005.818	+0.015	5005.833
18	G298	Kanngieser	Keflavik	21941K	6.8.77	14.34	5672.207	6002.048	−0.051	6001.997
19	G298	Kanngieser	Reykjavik	21941L	6.8.77	20.01	5675.921	6005.978	−0.072	6005.906
20	G298	Kanngieser	Akureyri	60932	6.8.77	22.21	5742.114	6076.034	−0.085	6075.949
21	D 14	Lehrke	Reykjavik	21941L	6.8.77	20.06	25.033	27.887	−0.072	27.815
22	D 14	Lehrke	Akureyri	60932	6.8.77	22.37	87.958	97.985	−0.085	97.900
23	G298	Kanngieser	Keflavik	21941K	20.8.77	5.52	5672.436	6002.290	−0.019	6002.271
24	G298	Kanngieser	Hannover	21629A	20.8.77	15.30	4731.580	5006.178	−0.023	5006.155
25	G 79	Lehrke	Hannover	21629A	22.7.78	5.26	4621.897	4791.935	−0.095	4791.840
26	G 79	Lehrke	Keflavik	21941K	23.7.78	8.05	5582.121	5788.659	−0.084	5788.575
27	G 79	Lehrke	Reykjavik	21941L	23.7.78	10.44	5585.855	5792.535	−0.068	5792.467
28	G 79	Lehrke	Akureyri	60932	23.7.78	13.02	5653.311	5862.541	−0.034	5862.507
29	D 14	Kanngieser	Reykjavik	21941L	23.7.78	10.48	43.372	48.316	−0.067	48.249
30	D 14	Kanngieser	Akureyri	60932	23.7.78	12.47	106.226	118.336	−0.038	118.298
31	G 79	Lehrke	Akureyri	60932	5.8.78	7.57	5653.735	5862.981	−0.073	5862.908
32	G 79	Lehrke	Reykjavik	21941L	5.8.78	11.10	5586.181	5792.873	−0.024	5792.849
33	G 79	Lehrke	Keflavik	21941K	5.8.78	14.05	5582.385	5788.933	+0.010	5788.943
34	G 79	Lehrke	Hannover	21629A	5.8.78	22.33	4622.300	4792.354	−0.045	4792.309
35	D 14	Kanngieser	Akureyri	60932	5.8.78	7.37	106.726	118.893	−0.075	118.818
36	D 14	Kanngieser	Reykjavik	21941L	5.8.78	10.56	43.781	48.772	−0.028	48.744

[a] The results of the gravity measurements in 1975 are given in Torge and Drewes (1977a)

Annex 2. Gravity and height values 1976, 1977, and 1978 along the Námafjall profile[a]

Station no.	ϕ (°)	λ west (°)	g (1976) (10^{-5} ms^{-2})	g (1977) (10^{-5} ms^{-2})	g (1978) (10^{-5} ms^{-2})	H (1976) (m)	H (1977) (m)	H (1978) (m)
			982···	982···	982··			
60932	65.676	18.098	348.390	348.390	348.390			
93	65.720	17.365	353.560	353.565	353.547			
143	65.569	17.045	285.583	285.555	285.551	287.52	287.62	
170	65.679	16.927	292.447	292.373	292.334	295.66	296.06	295.98
5276	65.706	16.923	297.109	297.040	297.005	284.16	284.53	284.49
169	65.701	16.920	298.128	298.060	298.012	279.03	279.41	279.37
5604	65.699	16.904	294.568	294.483	294.434	294.66	295.09	295.10
171	65.698	16.886	289.260	289.158	289.096	321.02	321.54	321.64
5603	65.694	16.869	289.169	289.300	289.286	320.23	319.40	319.24
307[b]	65.694	16.863		287.718	287.640		325.76	325.56
180	65.700	16.846	279.977	280.089	280.157	363.94	363.43	362.98
306	65.704	16.841		274.782	274.729		389.44	389.54
188	65.695	16.840	282.574	282.538	282.504	349.33	349.58	349.69
182	65.709	16.819		274.046	273.993		349.00	394.12
181	65.706	16.812	282.121	282.028	282.005	358.96	359.38	359.45
115	65.706	16.812	282.134		282.013	358.89	359.31	359.38
183	65.708	16.803		281.623	281.586		361.93	361.98
303	65.709	16.781		282.001	281.992		358.60	358.62
190	65.715	16.778	281 723	281.631	281.616	359.00	359.35	359.37
199	65.713	16.776	281.450	281.365	281.356	359.26	359.61	359.62
193	65.717	16.752	282.294	282.229	282.214	358.60	358.90	358.90
302	65.716	16.748		282.078	282.077		359.22	359.22
234	65.640	16.371	276.833	276.801	276.817			
263	65.644	16.118	276.109		276.098			

[a] The gravity and height values before 1976 are given in Torge and Drewes (1977a)
[b] The thermal activity around this station changed strongly between 1977 and 1978, resulting in an extremely anomalous gravity/height coefficient

Annex 3. Gravity and height values along the Gjástikki profile

Station no.	φ (°)	λ west (°)	g (1965/70) (10^{-5} ms^{-2})	g (1976) (10^{-5} ms^{-2})	g (1977) (10^{-5} ms^{-2})	g (1978) (10^{-5} ms^{-2})	H (1978) (m)
			982···	982··	982··	982···	
82061	65.830	16.731			281.811	281.716	430.45
82561	65.830	16.731	281.95	281.85	281.764		
82591	65.831	16.735	285.73	285.65	285.548		
82592	65.831	16.735			285.277	285.170	421.98
82558	65.832	16.741	286.64	286.47	286.315	286.194	416.90
82556	65.834	16.750	290.18	290.18	290.148	290.036	401.46
82554	65.834	16.754	290.78	290.76	290.877	290.790	398.59
82553	65.835	16.756	292.89	292.95	293.059	293.126	388.73
82552	65.836	16.760			293.067	293.139	389.11
82550	65.838	16.764			293.319	293.229	392.32
82549	65.839	16.769			293.785	293.689	391.14
82548	65.840	16.780	293.36	293.41	293.389	293.324	394.07
82545	65.842	16.788	290.33	290.25	290.172	290.094	406.59
82544	65.842	16.790	283.82	283.75	283.643	283.566	434.50
82539	65.842	16.791			284.282	284.200	434.47
82538	65.842	16.793			283.540	283.470	438.13

Annex 4. Gravity values along the Gjástikki-Kelduhverfi profile

Station no.	φ (°)	λ west (°)	g (1965/70) (10^{-5} ms^{-2})	g (1976) (10^{-5} ms^{-2})	g (1977) (10^{-5} ms^{-2})	g (1978) (10^{-5} ms^{-2})
			982···	982···	982··	982···
82284	65.868	16.700	291.41	291.40	291.363	291.301
82285	65.885	16.674	298.48	298.37		298.289
82286	65.904	16.678	307.44	307.35		307.235
82289	65.948	16.662	335.39	335.44		335.663
82290	65.971	16.660	345.83	345.79		346.027
82291	65.992	16.655	360.33	360.32		360.414
82293	66.022	16.637	382.10	382.14		382.446
82294	66.040	16.627	389.07	389.19		389.407
82295	66.056	16.643	389.20	389.41		389.569
81296	66.074	16.689	397.76	397.70		397.603
81297	66.076	16.716	397.37	397.33		397.202
81298	66.099	16.689	398.90	398.81		398.726
81299	66.123	16.730	404.54	404.44		404.394
81300	66.123	16.730				404.300

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Received March 1, 1979; Revised Version May 16, 1979