

GeoGravGOCE

***Geoid and Gravity Field Modelling by
GOCE Satellite Gradients
and Terrestrial Data***

WP 2: Satellite and local data collection

TSK2200: Local gravity and GNSS/Levelling data collection

DELIVERABLE

***DL2210: Report on the performed gravity and GNSS campaigns and
data processing***

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Abstract

This report focuses on the measurement campaigns for the collection of all available local gravity data needed for the Greece-wide geoid evaluation. A detailed description is provided for the gravity data collection that will be used in the frame of the project, including the origin of the raw data, the processing methodology, the accuracy estimates and the corresponding statistical calculations. Finally, all the aforementioned data refer to the wider region close to AUT1 EUREF station in a radius of 100 km.

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Acronyms

AUTH	Aristotle University Thessaloniki
BM	Benchmark
CORS	Continuously Operating Reference Station
DL	Deliverable
EUREF	EUropean REference Frame
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hz	Hertz
IHRF	International Height Reference Frame
IHRS	International Height Reference System
M	minutes
MAC	Master Auxiliary Concept
NMEA	National Marine Electronics Association
RTC	Real Time Clock
S	seconds
STD	Standard Deviation
UTC	Universal Time Coordinated
VRS	Virtual Reference Station

1.

Gravity & GNSS/Levelling Data

1.1 Outline of the deliverable

This report focuses on the measurement campaigns for the collection of collocated local gravity and GNSS/Levelling data needed for the Greece-wide geoid evaluation as well as for the potential determination at the AUT1 GNSS CORS station, which serves as fundamental point of the IHR5/IHRF. A detailed description is provided for the gravity data collection procedure, the processing methodology, determination of accuracy estimates and the corresponding statistical calculations. All aforementioned data refer to the wider region close to AUT1 EUREF station within a 100 km radius.

1.2 Instrumentation and measurement organization

During the second month of the GeoGravGOCE project, measurement campaigns in order to collect GNSS and gravity data at selected sites for the GeoGravGOCE project realization have started. The gravity and GNSS measurement campaigns started on February 18, 2020. High precision gravimetric surveys are essential in applications in geodesy, geodynamics, studies of landslides, and in other sciences. The accuracy is related to the quality of the gravimeter that is used and the techniques for the processing of the measurements. Within GeoGravGOCE, one of the most accepted and widespread gravimeters for gravity surveys, namely the CG-5 relative gravity meter by Scintrex Ltd., is used (Yushkin, 2011). CG-5 is an automated gravity meter with a measurement range of over 8000 mGal, a standard resolution of 0.001 mGal (1 μ Gal) and a standard deviation that is less than 5 μ Gal. One of the main advantages of CG5 is the stable operating environment which results in the estimation of long low drift and is calculated around 0.02 mGal/day (CG-5-Manual-Ver_8). The low drift enables CG-5 to be used for various detailed field investigations and large scale regional or geodetic surveys. Moreover, another advantage of CG-5 is that it is easy to use by simply pressing a button, while the time used for a simple measurement is defined by the user. The measurement given by the instrument is an averaged series of 6 Hz samples, the readings are displayed in mGal and the data are stored in the instrument's internal memory. All CG-5 sensors are integrated into a single compact unit, which acts as a carrying case and eliminates the need for packing and unpacking the sensor between readings. Moreover, there is a mounting system available which sets the CG-5 onto the tripod and further increases the instrument stability (Figure 1). Additionally, the vacuum chamber, where the sensor of CG-5 is placed, protects it from changes in temperature and atmospheric pressure. All the aforementioned characteristics of the CG-5 improves the efficiency in gravity monitoring and decrease noise from various sources.



Figure 1: The CG-5 relative gravimeter of GravLab.

The CG-5 uses a GPS receiver that allows the user to read the grid reference point for station position and also sets Real Time Clock (RTC) to the UTC. However, as it is non-differential, it should not be used for accurate elevation readings. In order to obtain the accurate position of the measurement a dual frequency GNSS receiver Topcon Hiper V was used additionally (Figure 2). The positioning accuracy in RTK mode is 10 mm+1ppm for the horizontal and 15 mm + 1 ppm for the vertical position. Two different RTK network techniques are used in order to obtain positioning measurements of high accuracy, Virtual Reference Station (VRS) technique and Master Auxiliary Concept (MAC). In first concept, a new virtual station is established few meters from the rover's position by observations of at least three stations belonging to a network of reference stations. Rover sends its position to a server in National Marine Electronics Association (NMEA) format and receives corrections transmitted by the control center to obtain the current fixed position. In MAC the concept is different. Rover receives the corrections in a very compact form and in order to reduce the data, only a master station send coordinates and corrections while for other network stations corrections are sent slowly if the are not dispersive and in a high rate in case of dispersive corrections. A cell composed of three clusters (subset of network stations) sent the master auxiliary corrections.



Figure 2: The Topcon GNSS receiver.

The CG-5 relative gravimeter provides an easy-to-use graphic interface for entering and updating calibrations while computations for parameters related to calibration are performed and stored automatically. As already mentioned, the read time was set at 60 s for each observation set and a start delay was set to 5 s, in order to have enough time for the observer to remove away from the measuring point and allow time for the ground around the meter to settle prior to measurement (Sugihara, 2004; Pumphrey, 2014). For reference points, three or five sets of observations were taken at each station in order to remove blunders and to gain more accurate measurements (Nishijima et al., 2016).

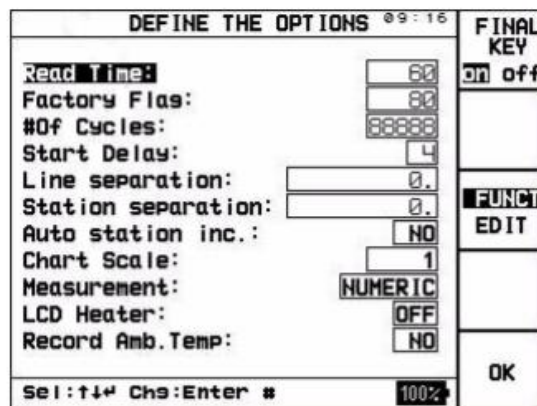


Figure 3: The CG-5 measurement options.

Before starting the measurements, the survey parameters, correction and filters for the measurements have to be set (Lederer, 2009). In CG-5, the following parameters for corrections and filters can be arranged:

- Tide Correction
- Continuous Tilt Correction
- Auto Rejection Filter
- Terrain Correction
- Seismic Filter

For the tide correction, the standard earth tide correction is generated using the latitude, longitude and difference between UTC and time zone of the measurement, while for the tilt correction a

continuous compensation performed by the gravimeter at a rate of 6 Hz to account for minor variances in vertical tilt during a reading on unstable ground. Moreover, an automatic rejection of high frequency noise is adopted by rejecting the measurements with noise six times greater than the standard deviation. Finally, corrections for terrain effects can be applied, while the seismic filter eliminates low frequency noise caused by background seismicity or earthquakes. Within our study, no terrain corrections have been applied to the acquired gravity measurements, since they will be modelled within DL5110 with more advanced approximation methods.

Three control points with known absolute gravity values have been chosen as reference points to conduct the GeoGravGOCE gravity survey. Absolute gravity measurements have been conducted in the past by the Hellenic Military Geographical Service in two stations (Polygyros and Nikiti), while for the other control point which is located at the AUTH seismological station, and is used as the starting and closing reference station for these campaigns, an absolute gravity value was measured by Gravlab team using an absolute A10 gravimeter (#027) (Figure 4).



Figure 4: The seismological reference station of AUTH.

As a result, absolute gravity values for various locations have been determined by using the seismological absolute reference point and measuring relative gravity between this and the new point sites. The value of absolute gravity at seismological station is $980269570.13 \mu\text{Gal}$. Since the start of the project, measurement campaigns have been carried out on the dates presented on Table 1. The time gap between the second and the third campaign is due to current circumstances and the subsequent Covid-19 restrictions. In the Figures and Tables below, the raw measurements, their processing, the locations of the measuring points and the final absolute gravity values will be presented.

1.3 Gravity and GNSS campaigns

First day – 18.02.2020

During the first day of the campaign a new gravity reference station has been established in Moudania city, in order to have for each consecutive densification campaign a control start and end point so as to determine the non-linear drift component of the instrument. Moudania is around 60 km from the AUTH seismological station, 40 km from Nikiti and 30 km from Polygyros gravity stations. At each base station, a repeat set of three 60 s measurements has been conducted starting from the seismological station, then measurements were conducted in Moudania, Poluguros, Nikiti, Moudania and again at the seismological station, in order to calculate the daily drift. At each point, the instrument was mounted on a special tripod and before starting the data acquisition a 5 m relaxation time was set in order to allow for the observer to move away from the station and thus obtain better accuracy. This is so because during long and intensive surveys and after the instrument has been under constant movement, non-linear drift can occur and the measurement error increases. The causes of this irregular instrument behavior are vibrations and bumps during transport, carrying, and installation of the gravimeter. Thus, in order to prolong the time when the gravimeter operates within the expected error budget, it is necessary to pay constant attention to creating suitable conditions in all the involved transportation media. In Table 2, the gravity measurements for the first day are presented. After calculating the difference between the start and end measurements at seismological station, the non-linear (nl) drift per day was 0.137550 mGal and it was applied analogously to all measurements.

Table 1: Dates of Gravity Measurement Campaigns

Campaign	Date	Campaign	Date
1 st	18-02-2020	7 th	07-09-2020
2 nd	19-02-2020	8 th	09-09-2020
3 rd	03-06-2020	9 th	10-09-2020
4 th	05-06-2020	10 th	11-09-2020
5 th	21-07-2020	11 th	09-10-2020
6 th	22-07-2020	12 th	16-10-2020

As it can be noticed from Table 2, at Poluguros and Nikiti stations, a large number of measurements have been rejected in two sets due to strong wind, while for the second set at Moudania station, the measuring time was doubled in order to obtain better accuracy. On the other hand, the stable location, the room temperature and pressure at the seismological station resulted in a std of ~0.010 mGal in both sets of measurements. In Figure 7 and Figure 8, the locations of the newly establishment gravity reference points during the 1st day are depicted.



Figure 5: The reference station in Moudania.



Figure 6: Nikiti reference station (right) and Poluguros reference station (left)



Figure 7: Seismological Station and AUTH gravity locations.

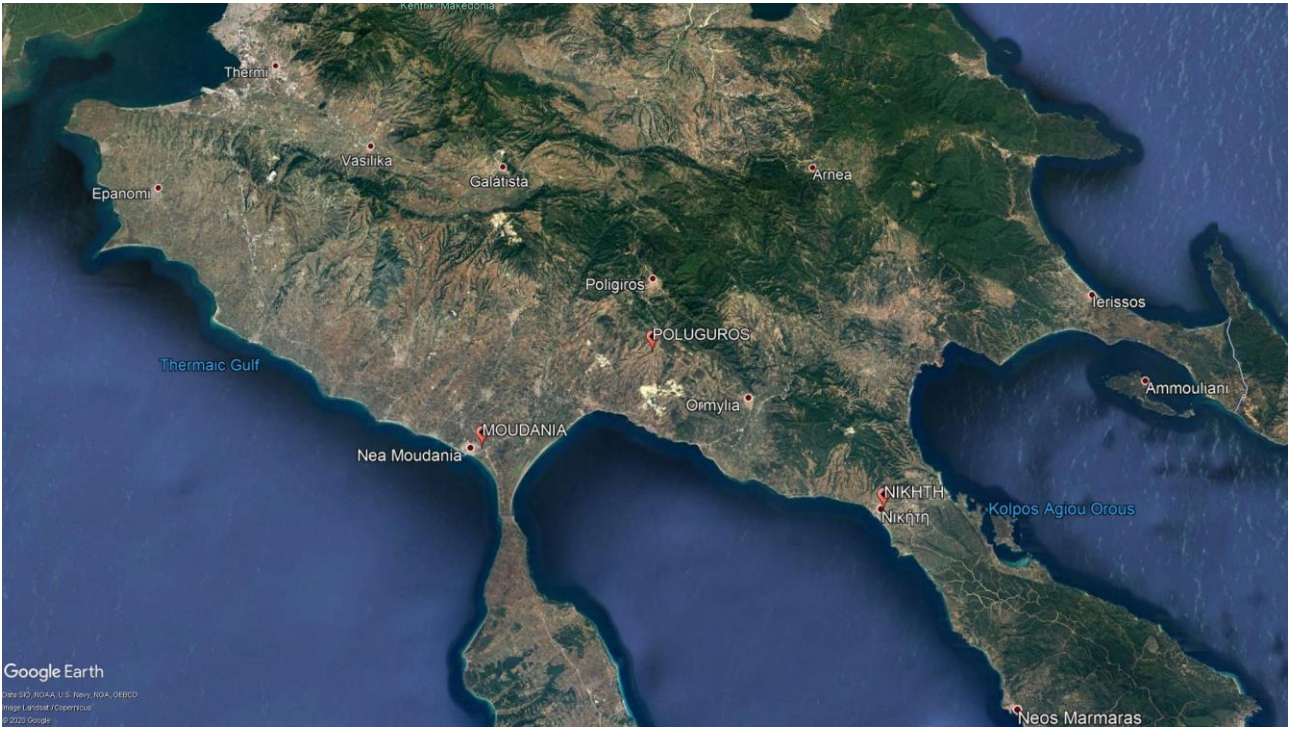


Figure 8: Moudania, Polygyros and Nikiti gravity locations

Table 2: Gravity measurements during the 1st day.

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
seismological station	4683.616		0.010		0					
	4683.617	4683.616	0.013	0.010	7					
	4683.615		0.007		0					
moudania	4648.252		0.033		0					
	4648.258	4648.256	0.034	0.035	0					
	4648.258		0.037		0	-35.360	0.006486	-35.353	980234216.95	37.58
poluguros	4638.459		0.011		18					
	4638.459	4638.459	0.012	0.010	0					
	4638.458		0.008		38	-9.797	0.009978	-9.787	980259782.77	17.81
nikhth	4634.451		0.023		30					
	4634.455	4634.455	0.015	0.021	16					
	4634.458		0.025		0	-49.161	0.014145	-49.147	980220423.27	25.52
moudania	4648.238		0.049		0					
	4648.241		0.045		0					
	4648.24	4648.240	0.050	0.043	0	-35.376	0.019301	-35.356	980234213.93	44.91
	4648.242		0.038		0					
	4648.24		0.040		0					
	4648.24		0.033		0					
seismological station	4683.589		0.010		0					
	4683.59	4683.591	0.011	0.010	4					
	4683.594		0.010		0	-0.025	0.024667	0.000	980269570.13	17.81

During the second day, a gravity campaign from Thessaloniki to Souroti, a small town 25 km from Thessaloniki, was conducted. During this campaign, 26 relative gravity sites have been measured. The distance between successive points was around $\sim 1\text{km}$ and, as it can be observed from Figure 9, many points are situated close to the road with heavy traffic as they reside within the limits of the city of Thessaloniki. The measuring time at each site was 60 s, while there was no relaxing time due to the small distance and time gap between successive measurements.

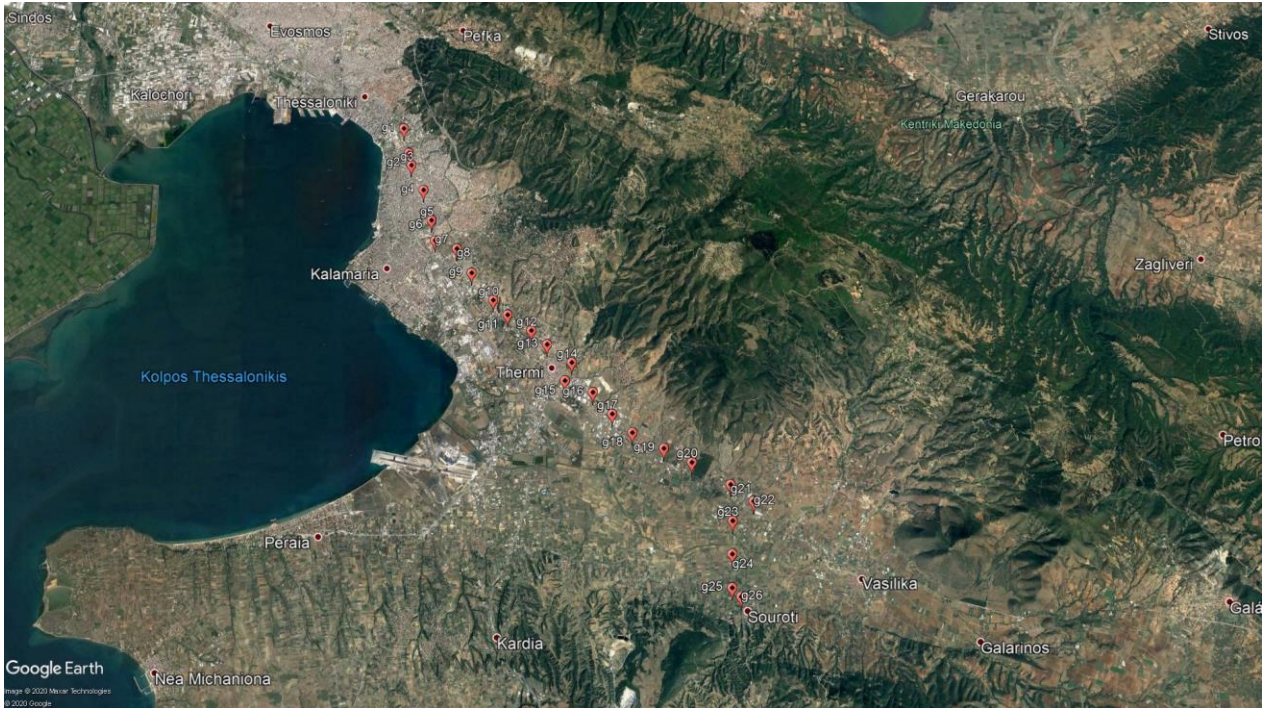


Figure 9: Point locations of the campaign of the 2nd day

In **Error! Reference source not found.**, relative gravity measurements for the second day are presented. As it was already mentioned, many points reside within small distance from heavy traffic roads and that resulted in rejecting two digit number of measurements at some locations. The gravity measurements at the reference stations of the seismological station and Moudania had only 7 measurements rejected during all 3 sets. Additionally, the drift per day was -0.336624 mGal and it was applied to all relative gravity measurements.

The third day of gravity and GNSS measurements started almost four months later due to Covid-19 restrictions. The measurements settings were the same with those of day 2 carrying out 60 measurements at each location. Relative measurements started close to Souroti and moved to Agios Antonios, Kato Scholari and finally to Lakkoma. At the seismological station 5 mi occupation time was set at the start and at the end of the day, while a new reference station was founded at AUTH (Figure 11). The measuring points between the aforementioned villages were close to the regional road network, however, due to limited traffic conditions, only few measurements, within each 60 s occupation interval, have been rejected. The non-linear drift per day was 1.251978 mGal and it was applied to all relative gravity measurements.

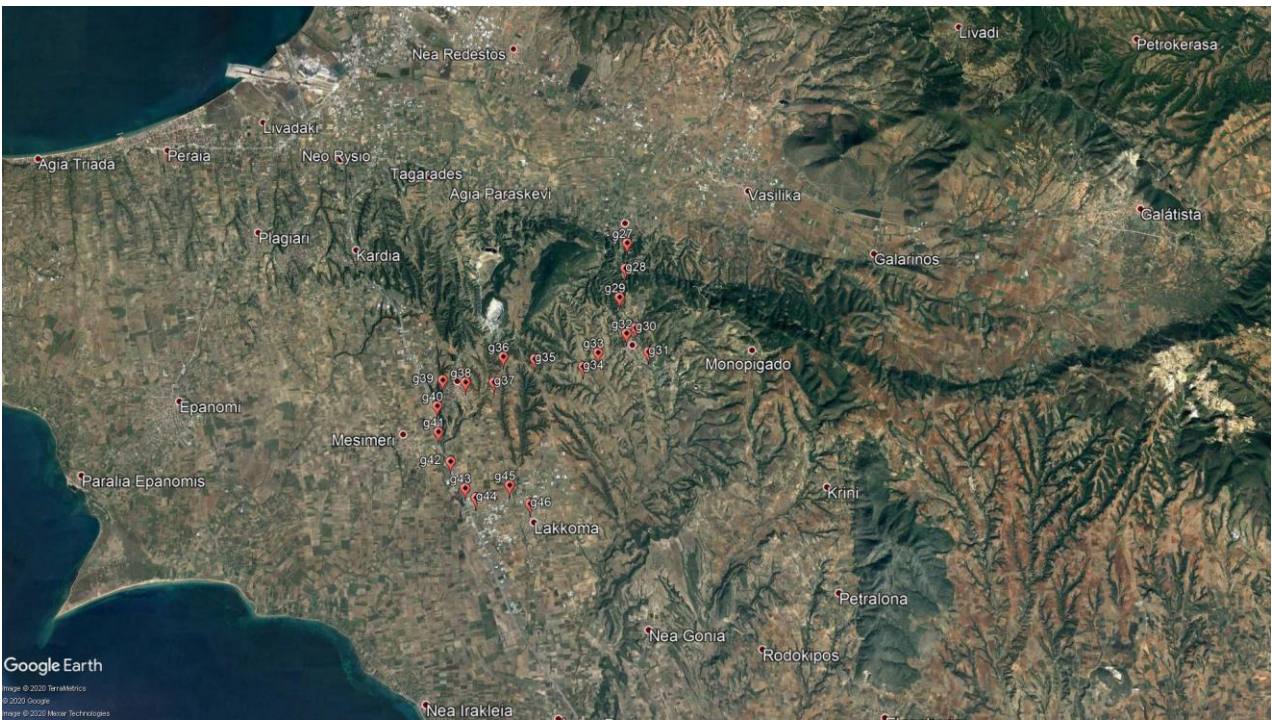


Figure 10: Point locations of the campaign of the 3rd day

During day 4, relative gravity measurements started again from Thessaloniki, reaching the village of Mesimeri and then Moudania. Up until Mesimeri, the points every 1 km have been recorded and then from Mesimeri to Moudania the distance between them was 5 km, as they are more than 50 km apart from the main reference point of AUT1. Thirty new relative gravity points were founded, while the campaign was based again at the fundamental reference point at the AUTH seismological station. At the seismological station, two sets of three-minute occupation were made, at the Faculty of Engineering primary BM one set of three-minute measurements were carried out, while at all other points the observation time was 60 s. The majority of the new sites were close to the regional road but light traffic didn't intervene to the majority of the measurements. It was noticed that the average std of measurements was ~ 0.044 mGal.



Figure 11: The AUTH Faculty of Engineering reference station.



Figure 12: Point locations of the campaign of the 4th day.

During the fifth day, 23 new site points were founded. The route followed started from Vasilika to Monopigado, from Monopigado to Agios Antonios and finally to Lakoma. These points are situated in mountainous areas which resulted in lower std (~ 0.021 mGal) for the acquired gravity measurements, hence of higher quality. The location of the new sites resulted in gravity measurements of high precision along with a small number of rejected values. From this day and on, the reference point used to determine the daily non-linear drift was that at the Faculty of Engineering of AUTH, as it was noticed from various campaigns that the gravity difference between the fundamental point at the AUTH seismological station and the latter was noticeably small, i.e., $6.60 \mu\text{Gal}$, only. The non-linear drift per day was 1.179215 mGal and it was applied to all points.

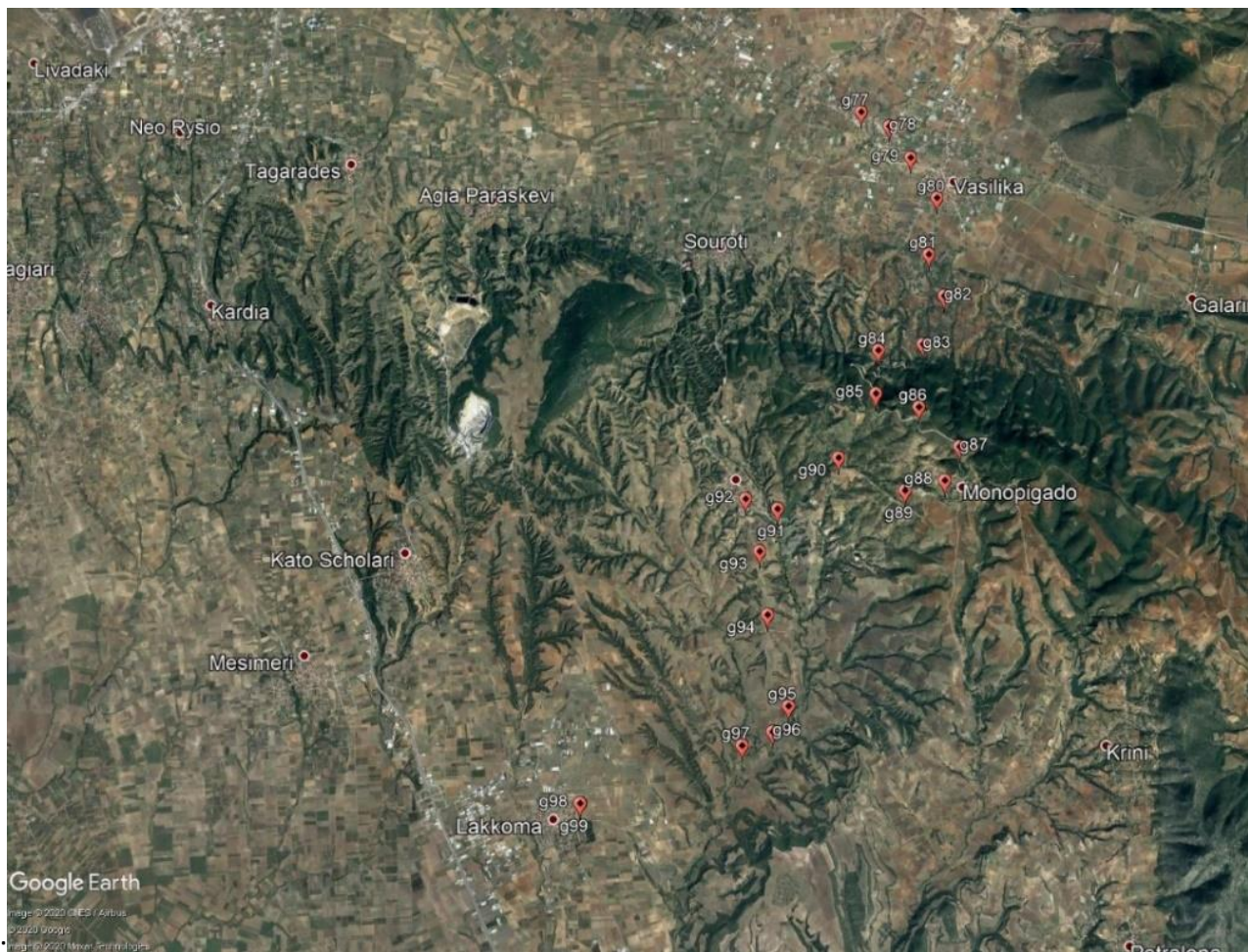


Figure 13: Point locations for the campaign of the 5th day.

During the sixth day, the campaign proceeded from Monopigado to Petralona, Petralona to Nea Triglia and then to the reference station at Moudania. At this campaign gravity measurements in 30 points were conducted, however significant variations were observed in some points and hence high std were determined. At first glance, these values were attributed to the geodynamic peculiarity of the region, however as time passed it was noticed that the std reached again small values. Hence, after reaching the reference station in Moudania, the previously recorded values with high standard deviations were re-observed. Before reaching AUTH, four more measurements were conducted closed to Lakoma in order to fill-in a small gap during the fifth day of the campaign. The drift per day was 1.004884 mGal and it was applied to all points.

Table 3: Gravity values in Moudania reference station and differences per day (μGal)

g_{MOUDANIA}	18/2/2020	19/2/2020	3/6/2020	5/6/2020	21/7/2020	22/7/2020	7/9/2020	9/9/2020	10/9/2020
18/2/2020	980234213.93	980234204.87	980234184.18	980234220.61	980234254.90	980234384.52	980234286.89	980234267.56	980234263.5
19/2/2020		9.06	29.75	-6.68	-40.97	-170.59	-72.96	-53.63	-49.62
3/6/2020			20.70	-15.74	-50.03	-179.65	-82.01	-62.69	-58.68
5/6/2020				-36.44	-70.72	-200.35	-102.71	-83.39	-79.37
21/7/2020					-34.29	-163.91	-66.27	-46.95	-42.94
22/7/2020						-129.62	-31.99	-12.66	-8.65
7/9/2020							97.64	116.96	120.97
9/9/2020								19.32	23.34
10/9/2020									4.02

Table 4: Gravity measurements during the 2nd day.

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μGal]	std [μGal]
seismological station	4683.665		0.009		0					
	4683.662		0.006		0					
	4683.662	4683.663	0.008	0.008	3					
g1	4688.87	4688.870	0.195	0.195	59	5.207	-0.00579	5.201	980274771.34	195.43
g2	4686.373	4686.373	0.03	0.030	16	2.710	-0.00864	2.701	980272271.49	32.70
g3	4685.396	4685.396	0.065	0.065	11	1.733	-0.01191	1.721	980271291.22	66.29
g4	4681.323	4681.323	0.076	0.076	7	-2.340	-0.0152	-2.355	980267214.93	77.10
g5	4675.262	4675.262	0.02	0.024	5					
g6						-8.401	-0.018	-8.419	980261151.41	27.30
g7	4664.213	4664.213	0.035	0.035	1	-19.450	-0.01998	-19.470	980250100.15	37.34
g8	4661.113	4661.113	0.049	0.049	24	-22.550	-0.02186	-22.572	980246998.27	50.70
g9	4655.887	4655.887	0.024	0.024	1	-27.776	-0.02369	-27.800	980241770.44	27.30

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g10	4655.113	4655.113	0.018	0.018	8	-28.550	-0.02624	-28.576	980240993.89	22.20
g11	4651.488	4651.488	0.015	0.015	3	-32.175	-0.02878	-32.204	980237366.35	19.85
g12	4653.18	4653.180	0.059	0.059	25	-30.483	-0.03244	-30.515	980239054.69	60.42
g13	4652.861	4652.861	0.033	0.033	11	-30.802	-0.03464	-30.837	980238733.49	35.47
g14	4654.93	4654.930	0.018	0.018	3	-28.733	-0.03801	-28.771	980240799.12	22.20
g15	4651.167	4651.167	0.046	0.046	9	-32.496	-0.04024	-32.536	980237033.89	47.80
g16	4651.623	4651.623	0.018	0.018	0	-32.040	-0.04185	-32.082	980237488.28	22.20
g17	4652.163	4652.163	0.033	0.033	13	-31.500	-0.04342	-31.543	980238026.71	35.47
g18	4650.199	4650.199	0.036	0.036	23	-33.464	-0.04519	-33.509	980236060.94	38.28
g19	4651.809	4651.809	0.084	0.084	0	-31.854	-0.04681	-31.901	980237669.32	85.00
g20	4652.222	4652.222	0.015	0.015	32	-31.441	-0.04945	-31.490	980238079.68	19.85
g21	4647.181	4647.181	0.025	0.025	14	-36.482	-0.05148	-36.533	980233036.65	28.18
g22	4643.08	4643.080	0.021	0.021	9	-40.583	-0.05392	-40.637	980228933.21	24.70
g23	4640.233	4640.233	0.048	0.048	4	-43.430	-0.05598	-43.486	980226084.15	49.73
g24	4632.211	4632.211	0.017	0.017	3	-51.452	-0.05843	-51.510	980218059.70	21.40
g25	4625.616	4625.616	0.016	0.016	18	-58.047	-0.06085	-58.108	980211462.28	20.62
g26	4624.9	4624.900	0.028	0.028	19	-58.763	-0.06262	-58.826	980210744.51	30.87
moudania	4648.371		0.037		0					
	4648.373		0.036		0					
	4648.373	4648.372	0.035	0.036	0	-35.291	-0.07459	-35.365	980234204.87	38.28
seismological station	4683.751		0.005		0					
	4683.751		0.006		0					
	4683.753	4683.752	0.006	0.006	4	0.089	-0.08867	0.000	980269570.13	14.18

Table 5: Gravity measurements during the 3rd day

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
SS	4689.325	4689.328	0.006	0.006	0					
	4689.327		0.006		0					
	4689.327		0.005		0					
	4689.33		0.009		0					
	4689.329		0.005		0					
	4689.33		0.006		0					
AUTH	4695.925	4695.926	0.015	0.012	17	6.598	0.019345	6.617	980276187.48	16.86
	4695.927		0.008		0					
	4695.926		0.012		3					
g27	4615.214	4615.214	0.012	0.012	28	-74.114	0.060548	-74.053	980195516.68	17.10
g28	4600.183	4600.183	0.017	0.017	5	-89.145	0.089331	-89.056	980180514.46	20.91
g29	4595.319	4595.319	0.019	0.019	6	-94.009	0.1015	-93.908	980175662.63	22.57
g30	4607.343	4607.343	0.013	0.013	0	-81.985	0.109187	-81.876	980187694.32	17.81
g31	4612.065	4612.065	0.024	0.024	0	-77.263	0.113569	-77.149	980192420.70	26.91
g32	4600.971	4600.971	0.033	0.033	15	-88.357	0.121118	-88.236	980181334.25	35.17
g33	4606.776	4606.776	0.023	0.023	2	-82.552	0.126252	-82.426	980187144.38	26.02
g34	4606.552	4606.552	0.025	0.025	1	-82.776	0.130796	-82.645	980186924.93	27.81
g35	4597.442	4597.442	0.025	0.025	20	-91.886	0.136255	-91.750	980177820.38	27.81
g36	4600.283	4600.283	0.035	0.035	3	-89.045	0.140449	-88.905	980180665.58	37.06
g37	4603.731	4603.731	0.027	0.027	0	-85.597	0.147811	-85.449	980184120.94	29.62
g38	4601.091	4601.091	0.055	0.055	2	-88.237	0.154596	-88.082	980181487.73	56.33
g39	4605.411	4605.411	0.03	0.030	1	-83.917	0.164424	-83.753	980185817.55	32.38
g40	4606.643	4606.643	0.045	0.045	19	-82.685	0.178672	-82.506	980187063.80	46.62
g41	4610.862	4610.862	0.043	0.043	0	-78.466	0.182691	-78.283	980191286.82	44.69
g42	4612.325	4612.325	0.05	0.050	0	-77.003	0.188825	-76.814	980192755.96	51.46
g43	4608.926	4608.926	0.065	0.065	0	-80.402	0.193358	-80.209	980189361.49	66.13

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	nl drift		g [μ Gal]	std [μ Gal]	
						δg [mGal]	cor. [mGal]			
g44	4608.782	4608.780	0.083	0.108	12	-35.625	0.199	-35.426	980234144.423	108.187
	4608.778		0.132		5					
g45	4613.328	4613.328	0.061	0.061	2	-76.000	0.204888	-75.795	980193775.02	62.20
g46	4613.275	4613.275	0.039	0.039	0	-76.053	0.208932	-75.844	980193726.06	40.86
MOUDANIA	4653.705	4653.703	0.052	0.047	0	-35.625	0.238712	-35.386	980234184.18	48.87
	4653.701		0.044		0					
	4653.704		0.046		0					
SS	4689.022	4689.023	0.009	0.007	0	-0.305	0.304667	0	980269570.13	13.80
	4689.023		0.006		0					
	4689.024		0.006		0					
	4689.024		0.006		0					
	4689.023		0.007		0					
	4689.024		0.005		0					

Table 6: Gravity measurements during the 4th day

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	nl drift		g [μ Gal]	std [μ Gal]	
						δg [mGal]	cor. [mGal]			
SS	4689.486	4689.488	0.008	0.008	0					
	4689.489		0.009		0					
	4689.49		0.006		0					
AUTH	4696.07	4696.073	0.02	0.014	7	6.585	0.014234	6.599	980276169.36	18.86
	4696.075		0.011		0					
	4696.075		0.01		2					
g47	4688.657	4688.657	0.04	0.040	6	-0.831	0.030674	-0.801	980268769.47	42.06

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g48	4688.604	4688.604	0.044	0.044	2	-0.884	0.034314	-0.850	980268720.11	45.88
g49	4679.157	4679.2	0.137	0.122	0	-10.331	0.0102	-10.321	980259249.46	122.69
	4679.158		0.107		4					
g50	4673.147	4673.147	0.025	0.025	0	-16.341	0.044743	-16.297	980253273.54	28.18
g51	4666.29	4666.29	0.031	0.031	9	-23.198	0.050673	-23.148	980246422.47	33.62
g52	4665.436	4665.436	0.028	0.028	0	-24.052	0.055133	-23.997	980245572.93	30.87
g53	4665.212	4665.212	0.02	0.020	2	-24.276	0.059813	-24.217	980245353.61	23.85
g54	4660.952	4660.952	0.022	0.022	0	-28.536	0.063863	-28.472	980241097.66	25.55
g55	4662.609	4662.609	0.03	0.030	10	-26.879	0.067693	-26.812	980242758.49	32.70
g56	4662.46	4662.46	0.038	0.038	4	-27.028	0.072653	-26.956	980242614.45	40.16
g57	4658.451	4658.451	0.035	0.035	3	-31.037	0.076643	-30.961	980238609.44	37.34
g58	4657.081	4657.081	0.036	0.036	9	-32.407	0.080993	-32.326	980237243.79	38.28
g59	4656.287	4656.287	0.035	0.035	6	-33.201	0.084913	-33.116	980236453.71	37.34
g60	4655.162	4655.162	0.093	0.093	3	-34.326	0.091503	-34.235	980235335.30	93.90
g61	4654.197	4654.197	0.053	0.053	1	-35.291	0.095703	-35.196	980234374.50	54.57
g62	4652.982	4652.982	0.07	0.070	6	-36.506	0.100243	-36.406	980233164.04	71.20
g63	4649.82	4649.82	0.104	0.104	6	-39.668	0.108443	-39.560	980230010.24	104.81
g64	4646.253	4646.253	0.067	0.067	16	-43.235	0.112083	-43.123	980226446.88	68.25
g65	4643.49	4643.49	0.069	0.069	0	-45.998	0.116713	-45.882	980223688.51	70.21
g66	4631.144	4631.144	0.038	0.038	2	-58.344	0.121903	-58.222	980211347.70	40.16
g67	4619.732	4619.732	0.033	0.033	5	-69.756	0.127503	-69.629	980199941.30	35.47
g68	4606.362	4606.362	0.058	0.058	15	-83.126	0.132583	-82.994	980186576.38	59.44
g69	4596.462	4596.462	0.037	0.037	0	-93.026	0.137413	-92.889	980176681.21	39.22
g70	4597.937	4597.937	0.043	0.043	7	-91.551	0.143903	-91.407	980178162.70	44.92
g71	4603.218	4603.218	0.037	0.037	0	-86.270	0.157863	-86.112	980183457.66	39.22
g72	4610.238	4610.238	0.055	0.055	3	-79.250	0.168733	-79.082	980190488.53	56.52

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g73	4614.121	4614.121	0.08	0.080	7	-75.367	0.176313	-75.191	980194379.11	81.05
g74	4614.432	4614.432	0.08	0.080	7	-75.056	0.183633	-74.873	980194697.43	81.05
g75	4621.872	4621.872	0.075	0.075	6	-67.616	0.190563	-67.426	980202144.36	76.12
g76	4630.593	4630.593	0.051	0.051	17	-58.895	0.195053	-58.700	980210869.85	52.63
MOUDANIA	4653.858		0.046		0					
	4653.861	4653.859	0.054	0.047	0	-35.630	0.280149	-35.350	980234220.61	49.09
	4653.857		0.042		2					
AUTH	4695.726		0.019		6					
	4695.726	4695.725	0.023	0.018	7	6.237	0.340613	6.577	980276147.41	21.93
	4695.723		0.011		1					
SS	4689.131		0.008		0					
	4689.13	4689.131	0.011	0.009	0	-0.358	0.357667	0.000	980269570.13	15.81
	4689.131		0.008		0					

Table 7: Gravity measurements during the 5th day

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
AUTH	4698.216		0.008		2					
	4698.216		0.013		6					
	4698.22	4698.218	0.008	0.010	0					
	4698.216		0.013		0					
	4698.22		0.006		0					

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	nl drift		δg cor. [mGal]	g [μ Gal]	std [μ Gal]
						δg [mGal]	[mGal]			
g77	4647.3	4647.3	0.069	0.069	35	-50.893	0.0325	-50.860	980218710.03	70.45
g78	4646.964	4646.964	0.04	0.040	14	-51.254	0.040202	-51.213	980218356.73	42.45
g79	4645.006	4645.006	0.024	0.024	19	-53.212	0.048433	-53.163	980216406.96	27.90
g80	4641.261	4641.261	0.032	0.032	5	-56.957	0.054293	-56.902	980212667.82	35.02
g81	4635.908	4635.908	0.013	0.013	0	-62.310	0.061003	-62.249	980207321.53	19.27
g82	4627.651	4627.651	0.011	0.011	5	-70.567	0.066074	-70.501	980199069.60	17.98
g83	4615.265	4615.265	0.018	0.018	15	-82.953	0.076133	-82.876	980186693.66	22.94
g84	4608.373	4608.373	0.012	0.012	2	-89.845	0.092488	-89.752	980179818.02	18.61
g85	4582.275	4582.275	0.022	0.022	2	-115.943	0.10112	-115.841	980153728.65	26.20
g86	4570.011	4570.011	0.006	0.006	0	-128.207	0.106356	-128.100	980141469.89	15.44
g87	4567.124	4567.124	0.01	0.010	0	-131.094	0.111179	-130.982	980138587.71	17.39
g88	4578.841	4578.841	0.012	0.012	5	-119.377	0.11836	-119.258	980150311.89	18.61
g89	4585.648	4585.648	0.017	0.017	0	-112.570	0.135317	-112.434	980157135.85	22.17
g90	4598.635	4598.635	0.01	0.010	17	-99.583	0.139881	-99.443	980170127.41	17.39
g91	4616.146	4616.146	0.008	0.008	0	-82.072	0.144692	-81.927	980187643.22	16.32
g92	4606.88	4606.88	0.01	0.010	0	-91.338	0.161803	-91.176	980178394.33	17.39
g93	4606.769	4606.769	0.021	0.021	6	-91.449	0.167604	-91.281	980178289.13	25.37
g94	4610.634	4610.634	0.022	0.022	2	-87.584	0.172498	-87.411	980182159.03	26.20
g95	4617.109	4617.109	0.023	0.023	12	-81.109	0.18758	-80.921	980188649.11	27.04
g96	4621.528	4621.528	0.02	0.020	3	-76.690	0.201507	-76.488	980193082.04	24.54
g97	4620.974	4620.974	0.034	0.034	5	-77.244	0.209231	-77.034	980192535.76	36.86
g98	4621.888	4621.888	0.067	0.067	3	-76.330	0.216176	-76.113	980193456.71	68.49
g99	4613.879	4613.879	0.048	0.048	5	-84.339	0.261564	-84.077	980185493.09	50.06
MOUDANIA	4655.997		0.045		0					
	4655.996		0.041		0					
	4655.997	4655.997	0.04	0.041	0	-42.221	0.297481	-41.924	980227646.61	43.21

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
	4655.996		0.04		0					
	4655.997		0.038		0					
AUTH	4697.861		0.013		3					
	4697.862		0.011		0					
	4697.863	4697.864	0.013	0.018	6	-0.3538	0.3538	0	980269570.13	23.10
	4697.864		0.029		11					
	4697.869		0.025		3					



Figure 14: Point locations of the campaign of the 6th day

During the seventh day of the campaign, an additional reference station was established within the AUTH campus, close to the main building of the School of Rural and Surveying Engineering, further away from Egnatia avenue in order to minimize the inference of heavy road traffic. This point was also connected with the seismological station before starting the measurement campaign to Halkidiki regions. This new point is very close to the previous one, but it is located at a more “quiet” site with minimum car disturbance (Figure 15). The connection acquired with the fundamental point (AUTH) at the entrance of the parking lot is within 0.4-3.46 μGal , in terms of the daily differences.



Figure 15: New reference point inside the AUTH campus.

Table 8: Gravity values in AUTH1 newly established reference station and differences per day (μGal) with respect to the fundamental AUTH station. Units: [μGal]

g_{AUTH1}	07-09-20	09-09-20	10-09-20	11-09-20	09-10-20	16-10-20
07-09-20	980276290.50	980276289.25	980276287.70	980276287.04	980276287.04	980276290.91
09-09-20		1.25	2.80	3.46	3.46	-0.41
10-09-20			1.55	2.21	2.21	-1.66
11-09-20				0.66	0.66	-3.20
09-10-20					0.00	-3.86
16-10-20						-3.86

Table 9: Gravity measurements during the 6th day.

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μGal]	std [μGal]
AUTH	4698.194		0.01		9					
	4698.193		0.013		14					
	4698.195	4698.195	0.016	0.016	5					
	4698.194		0.014		7					
	4698.197		0.029		10					
g100	4572.422	4572.422	0.012	0.012	0	-125.773	0.044145	-125.728	980150449.96	22.87
g101	4564.07	4564.070	0.019	0.019	3	-134.125	0.054676	-134.070	980142108.50	27.21
g102	4572.337	4572.337	0.024	0.024	11	-125.858	0.058906	-125.799	980150379.73	30.91
g103	4580.872	4580.872	0.039	0.039	6	-117.323	0.063278	-117.259	980158919.10	43.59

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g104	4597.539	4597.539	0.019	0.019	1	-100.656	0.069588	-100.586	980175592.41	27.21
g105	4593.109	4593.109	0.026	0.026	23	-105.086	0.073799	-105.012	980171166.62	32.48
g106	4591.229	4591.229	0.014	0.014	0	-106.966	0.079527	-106.886	980169292.35	23.98
g107	4582.819	4582.819	0.014	0.014	15	-115.376	0.083315	-115.292	980160886.13	23.98
g108	4587.521	4587.521	0.171	0.171	0	-110.674	0.088781	-110.585	980165593.60	172.11
g109	4593.291	4593.291	0.229	0.229	0	-104.904	0.096127	-104.807	980171370.95	229.83
g110	4599.71	4599.710	0.235	0.235	0	-98.485	0.101885	-98.383	980177795.70	235.81
g111	4599.656	4599.656	0.171	0.171	0	-98.539	0.104407	-98.434	980177744.23	172.11
g112	4604.269	4604.269	0.993	0.993	0	-93.926	0.111371	-93.814	980182364.19	993.19
g113	4608.026	4608.026	1.434	1.434	0	-90.169	0.116928	-90.052	980186126.75	1434.13
MOUDANIA	4656.261		0.105		0					
	4656.253		0.123		0					
	4656.258	4656.259	0.052	0.097	0	-41.935	0.141504	-41.794	980234384.52	98.94
	4656.265		0.106		0					
	4656.259		0.099		0					
MOUDANIA	4656.239		0.098		0					
	4656.249		0.087		0					
	4656.232	4656.238	0.075	0.0754	0	-41.956	0.148297	-41.808	980234370.32	77.87
	4656.238		0.064		0					
	4656.233		0.053		0					
g114	4654.03	4654.030	0.06	0.06	0	-44.165	0.16052	-44.004	980232174.34	63.08
g115	4647.942	4647.942	0.115	0.115	0	-50.253	0.177101	-50.075	980226102.92	116.64
g116	4631.622	4631.622	0.119	0.119	0	-66.573	0.186235	-66.386	980209792.05	120.58
g117	4618.227	4618.227	0.068	0.068	15	-79.968	0.192727	-79.775	980196403.55	70.73
g118	4617.664	4617.664	0.04	0.04	1	-80.531	0.198465	-80.332	980195846.28	44.49
g119	4618.749	4618.749	0.033	0.033	1	-79.446	0.206886	-79.239	980196939.70	38.32

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	nl drift				
						δg [mGal]	cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g120	4618.811	4618.811	0.013	0.013	0	-79.384	0.211488	-79.172	980197006.31	23.41
g121	4612.604	4612.604	0.025	0.025	5	-85.591	0.216512	-85.374	980190804.33	31.69
g122	4606.626	4606.626	0.02	0.02	0	-91.569	0.220813	-91.348	980184830.63	27.91
g123	4599.095	4599.095	0.017	0.017	0	-99.100	0.226008	-98.874	980177304.83	25.85
g124	4593.153	4593.153	0.014	0.014	7	-105.042	0.230711	-104.811	980171367.53	23.98
g125	4586.216	4586.216	0.014	0.014	6	-111.979	0.237635	-111.741	980164437.45	23.98
g126	4582.338	4582.338	0.019	0.019	7	-115.857	0.244398	-115.612	980160566.22	27.21
g127	4612.731	4612.731	0.022	0.022	0	-85.464	0.266576	-85.197	980190981.39	29.38
g128	4612.027	4612.027	0.03	0.03	7	-86.168	0.271479	-85.896	980190282.30	35.77
g129	4609.82	4609.820	0.023	0.023	2	-88.375	0.279398	-88.095	980188083.22	30.14
g130	4601.641	4601.641	0.041	0.041	0	-96.554	0.284513	-96.269	980179909.33	45.39
AUTH	4697.884		0.051		4					
	4697.88		0.051		2					
	4697.882		0.041		0					
	4697.88		0.055		12					
	4697.879		0.073		3					
	4697.873	4697.880	0.038	0.0403	22	-0.315	0.3148	0.000	980276178.42	44.76
	4697.882		0.022		5					
	4697.877		0.014		1					
	4697.881		0.018		3					
	4697.88		0.04		2					

Table 10: Gravity measurements during the 7th day

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
AUTH	4699.174		0.019		19					
	4699.18		0.019		7					
	4699.182	4699.18	0.011	0.018	5					
	4699.182		0.022		10					
	4699.181		0.018		2					
AUTH_1	4699.295		0.008		2					
	4699.295		0.026		21					
	4699.293	4699.295	0.022	0.017	25	0.115	0.001095	0.116	980276294.91	27.02
	4699.294		0.017		15					
	4699.299		0.014		15					
Seismological station	4692.613		0.011		0					
	4692.614	4692.614	0.005	0.007	0	-6.566	0.005061	-6.561	980269617.68	21.82
	4692.615		0.005		0					
g131	4625.844	4625.844	0.048	0.048	6	-73.336	0.012503	-73.323	980202855.12	52.26
g132	4623.474	4623.474	0.048	0.048	2	-75.706	0.013793	-75.692	980200486.41	52.26
g133	4625.779	4625.779	0.048	0.048	3	-73.401	0.015383	-73.385	980202793.00	52.26
g134	4624.264	4624.264	0.056	0.056	16	-74.916	0.016207	-74.900	980201278.83	59.69
g135	4624.496	4624.496	0.04	0.040	14	-74.684	0.018941	-74.665	980201513.56	45.02
g136	4615.893	4615.893	0.038	0.038	4	-83.287	0.019722	-83.267	980192911.34	43.26
g137	4624.483	4624.483	0.028	0.028	0	-74.697	0.020512	-74.676	980201502.13	34.80
g138	4620.724	4620.724	0.047	0.047	14	-78.456	0.02153	-78.434	980197744.15	51.34
g139	4609.664	4609.664	0.019	0.019	0	-89.516	0.022125	-89.494	980186684.74	28.07
g140	4605.598	4605.598	0.017	0.017	1	-93.582	0.023022	-93.559	980182619.64	26.76

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g141	4598.926	4598.926	0.023	0.023	0	100.254	0.024102	-100.230	980175948.72	30.92
g142	4594.313	4594.313	0.015	0.015	1	104.867	0.025018	-104.842	980171336.64	25.54
g143	4591.635	4591.635	0.02	0.020	0	107.545	0.02586	-107.519	980168659.48	28.76
g144	4593.775	4593.775	0.028	0.028	0	105.405	0.027017	-105.378	980170800.64	34.80
g145	4600.286	4600.286	0.019	0.019	0	-98.894	0.027879	-98.866	980177312.50	28.07
g146	4604.278	4604.278	0.027	0.027	8	-94.902	0.028665	-94.873	980181305.28	34.00
g147	4606.708	4606.708	0.014	0.014	9	-92.472	0.02962	-92.442	980183736.24	24.96
g148	4604.878	4604.878	0.022	0.022	6	-94.302	0.03053	-94.271	980181907.15	30.18
g149	4596.077	4596.077	0.028	0.028	6	103.103	0.031635	-103.071	980173107.25	34.80
g150	4615.236	4615.236	0.019	0.019	12	-83.944	0.033316	-83.910	980192267.94	28.07
g151	4620.08	4620.08	0.038	0.038	20	-79.100	0.034075	-79.066	980197112.69	43.26
g152	4622.778	4622.778	0.03	0.030	6	-76.402	0.034727	-76.367	980199811.35	36.43
g153	4625.692	4625.692	0.019	0.019	4	-73.488	0.036083	-73.452	980202726.70	28.07
g154	4614.699	4614.699	0.02	0.020	16	-84.481	0.036798	-84.444	980191734.42	28.76
g155	4619.852	4619.852	0.03	0.030	4	-79.328	0.037411	-79.290	980196888.03	36.43
MOUDANIA	4657.24		0.033		0					
	4657.251		0.021		0					
	4657.257		0.018		0					
	4657.239	4657.246	0.016	0.022	0	-41.934	0.042766	-41.892	980234286.89	30.31
	4657.242		0.025		7					
4657.244		0.02		0						
Seismological station	4692.541		0.009		0					
	4692.542	4692.542	0.004	0.006	0	-6.637	0.050674	-6.587	980269591.63	21.61

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
	4692.544		0.006		0					
AUTH1	4699.233		0.02		2					
	4699.235	4699.235	0.032	0.024	39	0.056	0.052134	0.108	980276286.09	31.92
	4699.238		0.021		11					
AUTH	4699.125		0.021		5					
	4699.128	4699.127	0.011	0.022	1	-0.053	0.0528	0.000	980276178.42	30.18
	4699.128		0.034		8					

Table 11: Gravity measurements during the 8th day

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
AUTH	4699.142		0.03		3					
	4699.141	4699.142	0.01	0.016	0					
	4699.144		0.008		2					
AUTH1	4699.256		0.013		8					
	4699.255	4699.256	0.007	0.009	0	0.113	-0.00088	0.112	980276290.87	22.54
	4699.256		0.007		0					
g156	4699.722	4699.722	0.021	0.021	5	0.580	-0.00184	0.578	980276756.25	29.46
g157	4697.369	4697.369	0.027	0.027	1	-1.773	-0.00257	-1.776	980274402.52	34.00
g158	4691.386	4691.386	0.106	0.106	15	-7.756	-0.00300	-7.759	980268419.09	108.00
g159	4686.16	4686.16	0.055	0.055	7	-12.982	-0.00346	-12.986	980263192.63	58.75
g160	4681.019	4681.019	0.03	0.030	16	-18.123	-0.00391	-18.127	980258051.18	36.43
g161	4674.243	4674.243	0.026	0.026	1	-24.899	-0.00438	-24.904	980251274.71	33.21

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ			δg cor. [mGal]	g [μ Gal]	std [μ Gal]
						δg [mGal]	nl drift cor. [mGal]			
g162	4671.11	4671.11	0.026	0.026	5	-28.032	-0.00479	-28.037	980248141.29	33.21
g163	4671.138	4671.138	0.015	0.015	12	-28.004	-0.00521	-28.010	980248168.87	25.54
g164	4669.7	4669.7	0.022	0.022	0	-29.442	-0.00568	-29.448	980246730.41	30.18
g165	4668.996	4668.996	0.039	0.039	10	-30.146	-0.00611	-30.152	980246025.98	44.14
g166	4665.575	4665.575	0.023	0.023	0	-33.567	-0.00667	-33.574	980242604.42	30.92
g167	4662.968	4662.968	0.025	0.025	0	-36.174	-0.00715	-36.181	980239996.93	32.44
g168	4659.215	4659.215	0.046	0.046	1	-39.927	-0.00778	-39.935	980236243.31	50.43
g169	4656.911	4656.911	0.071	0.071	5	-42.231	-0.00838	-42.240	980233938.71	73.95
g170	4654.248	4654.248	0.06	0.060	8	-44.894	-0.00879	-44.903	980231275.30	63.46
g171	4652.477	4652.477	0.054	0.054	0	-46.665	-0.00940	-46.675	980229503.69	57.82
g172	4650.634	4650.634	0.055	0.055	6	-48.508	-0.00988	-48.518	980227660.20	58.75
g173	4648.335	4648.335	0.042	0.042	1	-50.807	-0.01037	-50.818	980225360.72	46.81
g174	4647.988	4647.988	0.04	0.040	0	-51.154	-0.01090	-51.165	980225013.18	45.02
g175	4648.522	4648.522	0.045	0.045	2	-50.620	-0.01149	-50.632	980225546.60	49.52
g176	4648.916	4648.916	0.05	0.050	0	-50.226	-0.01266	-50.239	980225939.42	54.10
g177	4648.839	4648.839	0.045	0.045	0	-50.303	-0.01321	-50.317	980225861.87	49.52
g178	4649.057	4649.057	0.051	0.051	0	-50.085	-0.01373	-50.099	980226079.36	55.03
g179	4647.857	4647.857	0.048	0.048	0	-51.285	-0.01411	-51.299	980224878.98	52.26
g180	4640.584	4640.584	0.054	0.054	1	-58.558	-0.01462	-58.573	980217605.47	57.82
g181	4634.041	4634.041	0.057	0.057	0	-65.101	-0.01537	-65.117	980211061.71	60.63
g182	4634.405	4634.405	0.08	0.080	0	-64.737	-0.01615	-64.753	980211424.94	82.63
g183	4642.164	4642.164	0.065	0.065	0	-56.978	-0.01792	-56.996	980219182.16	68.21
g184	4642.062	4642.062	0.056	0.056	0	-57.080	-0.01902	-57.099	980219079.07	59.69
g185	4638.085	4638.085	0.072	0.072	0	-61.057	-0.01656	-61.074	980215104.52	74.91
g186	4625.941	4625.941	0.115	0.115	0	-73.201	-0.02430	-73.226	980202952.79	116.84
g187	4626.252	4626.252	0.12	0.120	0	-72.890	-0.02507	-72.915	980203263.02	121.77
g188	4626.289	4626.289	0.147	0.147	0	-72.853	-0.02568	-72.879	980203299.41	148.45

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ			δg cor. [mGal]	g [μ Gal]	std [μ Gal]
						δg [mGal]	nl drift cor. [mGal]			
g189	4624.727	4624.727	0.144	0.144	0	-74.415	-0.02626	-74.442	980201736.82	145.48
g190	4627.463	4627.463	0.122	0.122	2	-71.679	-0.02710	-71.706	980204471.99	123.74
g191	4627.761	4627.761	0.101	0.101	0	-71.381	-0.02894	-71.410	980204768.14	103.09
g192	4627.902	4627.902	0.097	0.097	3	-71.240	-0.02955	-71.270	980204908.54	99.18
g193	4627.133	4627.133	0.098	0.098	0	-72.009	-0.03080	-72.040	980204138.28	100.16
g194	4625.358	4625.358	0.085	0.085	0	-73.784	-0.03141	-73.816	980202362.68	87.48
g195	4625.108	4625.108	0.073	0.073	0	-74.034	-0.03208	-74.066	980202112.00	75.87
g196	4627.759	4627.759	0.098	0.098	4	-71.383	-0.03253	-71.416	980204762.55	100.16
g197	4627.068	4627.068	0.066	0.066	0	-72.074	-0.03347	-72.108	980204070.61	69.16
MOUDANIA	4657.268		0.033		0					
	4657.267		0.035		0					
	4657.263		0.039		0					
	4657.27	4657.268	0.031	0.036	0	-41.875	-0.03602	-41.911	980234267.56	41.80
	4657.268		0.034		0					
	4657.269		0.046		0					
AUTH1	4699.291		0.029		26					
	4699.294	4699.293	0.021	0.023	0	0.151	-0.04179	0.109	980276287.63	30.92
	4699.295		0.019		21					
AUTH	4699.189		0.025		8					
	4699.179	4699.185	0.025	0.026	2	0.042	-0.04233	0.000	980276178.42	33.47
	4699.186		0.029		4					

During this campaign, gravity measurements at 25 new points were conducted along a profile section in vertical direction to that of the previous campaign. We moved from Nea Irakleia which is close to sea, to Krini a small village with altitude close to 300 m and then moved again to the sea towards Nea Kalikrateia. The difference between the initial and final measurement in AUTH point was only 52.8 μGal resulting in 0.179144 mGal non-linear daily drift correction at the other sites.

On September 9th, 2020, gravity measurements were carried out in two parallel profile sections as well as along a third and short section extended in vertical direction to the previous ones. The first small parallel traverse started from Thermi and ended in Kato Sxolari and it is composed of 14 points occupied every 1 km. Then, the next traverse started from Peraia and after 10 km and 10 new points reached Angeloxori. Finally, the survey crew moved back to Peraia and reached Nea Irakleia measuring relative gravity at 25 new sites. Despite the large number of points measured and the long and intensive survey, the closing daily difference at the fundamental point in AUTH was only -0.10628 mGal, while the average std of all measurements was 0.052 mGal.



Figure 16: Point locations during the campaign of the 7th day

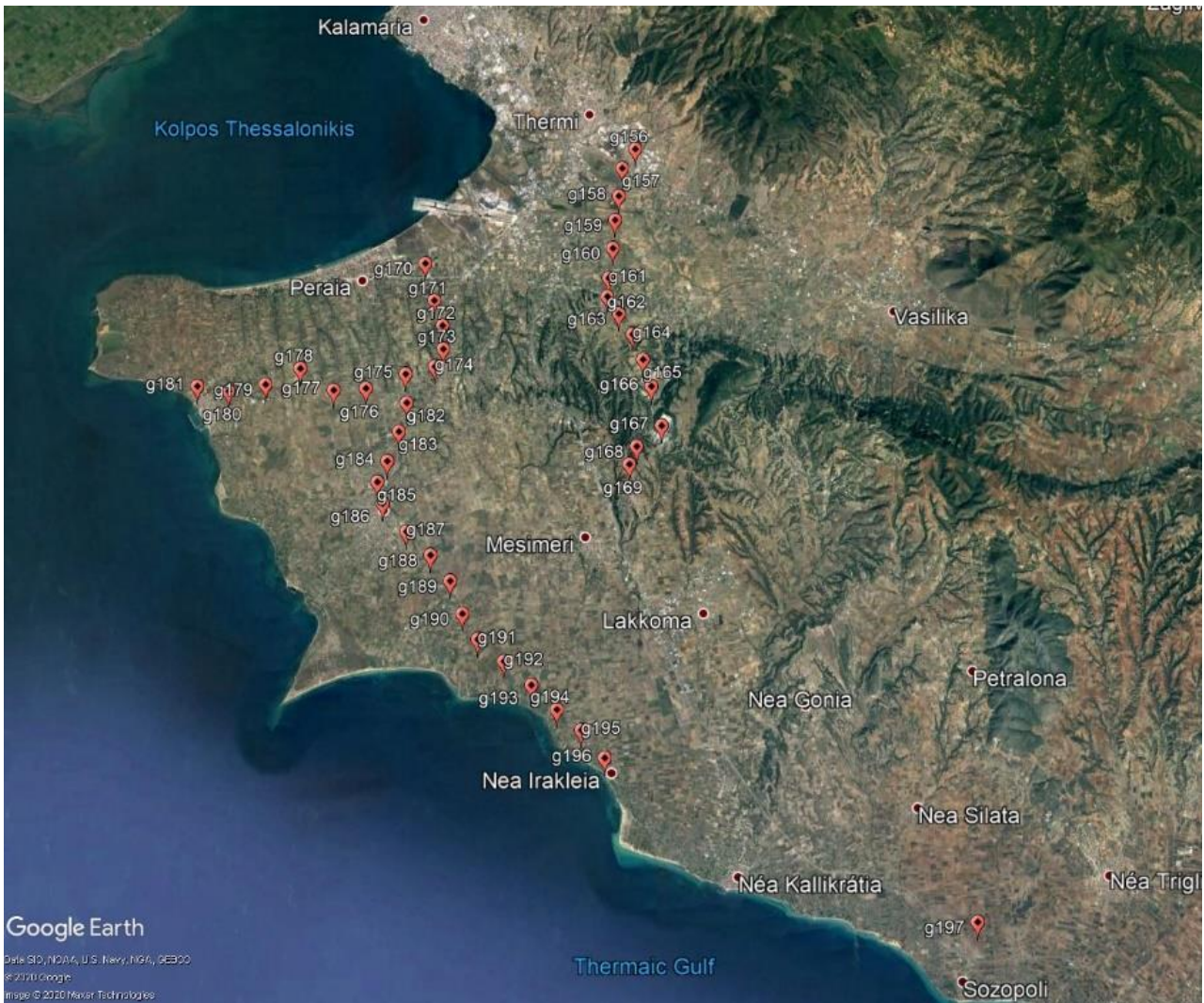


Figure 17: Point locations during the campaign of the 8th day

On September 10th, 2020, the 9th day of the gravity acquisition took place. This day was the one with the largest number of observations aiming at filling gaps and constructing a more-or-less homogeneous point distribution in the East to South-East wider area around the AUT1 reference station. 61 new points were measured in three different regions. 14 points are located from Triadi to Kato Sxolari, 27 from Peraia to Nea Michaniona and to Nea Iraklia while 20 more points are in places close to Nea Triglia, Nea Flogita and Paralia Dionisiou (Figure 18). The duration of the gravity survey was ~11 hours, starting at 6.45 from the AUTH reference point and arriving back at 17:30. Due to point locations, i.e. close to roads with light traffic, the average number of rejected measurements was less than five and the difference between the starting and ending observations at the reference point was -53.33 μGal only.



Figure 18: Point locations during the campaign of the 9th day

The 10th day of the gravity campaign aimed at creating a highly-varying topography section along the main mountain in the area of Thessaloniki, which is Chortiatis. This is important for any gravity and geoid determination work, as the topographic effects to the geoid are influenced highly from these major topographic masses. The campaign crosses Chortiatis, as it starts from Thermi and arrives at Vasiloudi after Peristera and Ardameri. A large part of this survey was at dirt road and its varying topography can be seen by the variation in orthometric heights, which start from ~40 m, reach ~680 meters at Chortiatis and then fall at ~110 m close to lake Koroneia. The fact that the main part of the campaign was up in the mountain resulted in a std of ~0.015 mGal only at 40 points. The good quality of the measurements of this campaign is also reflected at the closing error that was 13.67 μ Gal, only. Finally, the non-linear drift was 0.045637 mGal only and was applied to every station.

Table 12: Gravity measurements during the 9th day

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
AUTH	4699.166		0.015		8					
	4699.166	4699.167	0.014	0.013	5					
	4699.168		0.01		10					
AUTH1	4699.271		0.009		0					
	4699.274	4699.272	0.008	0.008	0	0.106	0.000606	0.105	980276283.48	18.67
	4699.272		0.008		0					
g198	4659.934	4659.934	0.015	0.015	0	-39.233	0.003202	-39.236	980236942.55	22.46
g199	4658.288	4658.288	0.037	0.037	3	-40.879	0.004492	-40.883	980235295.26	40.60
g200	4654.848	4654.848	0.058	0.058	1	-44.319	0.005415	-44.324	980231854.34	60.36
g201	4651.479	4651.479	0.037	0.037	1	-47.688	0.005901	-47.694	980228484.85	40.60
g202	4647.676	4647.676	0.034	0.034	2	-51.491	0.006468	-51.497	980224681.28	37.88
g203	4645.243	4645.243	0.023	0.023	0	-53.924	0.007100	-53.931	980222247.65	28.43
g204	4643.965	4643.965	0.021	0.021	3	-55.202	0.008393	-55.210	980220968.36	26.84

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g205	4631.029	4631.029	0.024	0.024	22	-68.138	0.009035	-68.147	980208031.72	29.24
g206	4623.535	4623.535	0.014	0.014	0	-75.632	0.009742	-75.641	980200537.01	21.80
g207	4618.746	4618.746	0.016	0.016	4	-80.421	0.010306	-80.431	980195747.45	23.14
g208	4616.709	4616.709	0.019	0.019	21	-82.458	0.010992	-82.469	980193709.76	25.30
g209	4606.658	4606.658	0.014	0.014	0	-92.509	0.011540	-92.520	980183658.21	21.80
g210	4603.292	4603.292	0.024	0.024	4	-95.875	0.011993	-95.887	980180291.76	29.24
g211	4601.722	4601.722	0.035	0.035	2	-97.445	0.012490	-97.457	980178721.26	38.78
g212	4647.297	4647.297	0.043	0.043	5	-51.870	0.015399	-51.885	980224293.35	46.13
g213	4634.476	4634.476	0.031	0.031	2	-64.691	0.015955	-64.707	980211471.80	35.22
g214	4624.116	4624.116	0.038	0.038	1	-75.051	0.016427	-75.067	980201111.33	41.51
g215	4617.744	4617.744	0.052	0.052	2	-81.423	0.017146	-81.440	980194738.61	54.62
g216	4610.35	4610.35	0.035	0.035	7	-88.817	0.017837	-88.835	980187343.92	38.78
g217	4614.672	4614.672	0.065	0.065	18	-84.495	0.018369	-84.513	980191665.38	67.11
g218	4616.38	4616.38	0.036	0.036	0	-82.787	0.019108	-82.806	980193372.64	39.69
g219	4617.433	4617.433	0.042	0.042	0	-81.734	0.019867	-81.754	980194424.89	45.20

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g220	4616.342	4616.342	0.046	0.046	0	-82.825	0.020614	-82.845	980193333.14	48.94
g221	4621.886	4621.886	0.052	0.052	12	-77.281	0.021075	-77.302	980198876.68	54.62
g222	4628.672	4628.672	0.072	0.072	4	-70.495	0.021583	-70.516	980205662.17	73.91
g223	4639.472	4639.472	0.05	0.050	0	-59.695	0.022271	-59.717	980216461.48	52.72
g224	4622.088	4622.088	0.056	0.056	1	-77.079	0.024046	-77.103	980199075.71	58.44
g225	4625.086	4625.086	0.072	0.072	24	-74.081	0.024775	-74.105	980202072.98	73.91
g226	4626.927	4626.927	0.068	0.068	10	-72.240	0.025472	-72.265	980203913.28	70.02
g227	4626.075	4626.075	0.039	0.039	0	-73.092	0.025943	-73.118	980203060.81	42.43
g228	4624.043	4624.043	0.042	0.042	1	-75.124	0.026926	-75.151	980201027.83	45.20
g229	4620.213	4620.213	0.056	0.056	1	-78.954	0.027460	-78.981	980197197.29	58.44
g230	4623.496	4623.496	0.074	0.074	24	-75.671	0.027889	-75.699	980200479.86	75.86
g231	4625.825	4625.825	0.055	0.055	1	-73.342	0.028304	-73.370	980202808.45	57.48
g232	4625.229	4625.229	0.05	0.050	8	-73.938	0.028782	-73.966	980202211.97	52.72
g233	4624.749	4624.749	0.068	0.068	5	-74.418	0.029207	-74.447	980201731.55	70.02
g234	4626.493	4626.493	0.055	0.055	0	-72.674	0.029617	-72.703	980203475.14	57.48

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g235	4626.24	4626.24	0.05	0.050	1	-72.927	0.030202	-72.957	980203221.55	52.72
g236	4624.501	4624.501	0.029	0.029	0	-74.666	0.030886	-74.697	980201481.87	33.47
g237	4625.459	4625.459	0.044	0.044	2	-73.708	0.031432	-73.739	980202439.32	47.07
g238	4626.954	4626.954	0.057	0.057	3	-72.213	0.031904	-72.245	980203933.85	59.40
g239	4626.24	4626.24	0.042	0.042	3	-72.927	0.034242	-72.961	980203217.51	45.20
g240	4627.343	4627.343	0.026	0.026	0	-71.824	0.035039	-71.859	980204319.71	30.91
g241	4627.716	4627.716	0.02	0.020	0	-71.451	0.035594	-71.486	980204692.16	26.06
g242	4624.72	4624.72	0.021	0.021	3	-74.447	0.036232	-74.483	980201695.52	26.84
g243	4621.713	4621.713	0.028	0.028	1	-77.454	0.036847	-77.491	980198687.91	32.61
g244	4625.691	4625.691	0.03	0.030	6	-73.476	0.037649	-73.513	980202665.10	34.34
g245	4630.948	4630.948	0.029	0.029	4	-68.219	0.038076	-68.257	980207921.68	33.47
g246	4634.1	4634.1	0.029	0.029	2	-65.067	0.038474	-65.105	980211073.28	33.47
g247	4633.457	4633.457	0.068	0.068	21	-65.710	0.038961	-65.749	980210429.79	70.02
g248	4633.2	4633.2	0.056	0.056	5	-65.967	0.039379	-66.006	980210172.37	58.44

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g249	4635.318	4635.318	0.038	0.038	6	-63.849	0.039887	-63.889	980212289.87	41.51
g250	4638.208	4638.208	0.033	0.033	1	-60.959	0.040290	-60.999	980215179.46	36.99
g251	4636.749	4636.749	0.037	0.037	7	-62.418	0.040832	-62.458	980213719.92	40.60
g252	4644.936	4644.936	0.044	0.044	4	-54.231	0.041354	-54.272	980221906.40	47.07
g253	4646.833	4646.833	0.062	0.062	9	-52.334	0.041742	-52.375	980223803.01	64.21
g254	4650.507	4650.507	0.044	0.044	21	-48.660	0.042315	-48.702	980227476.44	47.07
g255	4652.141	4652.141	0.034	0.034	2	-47.026	0.042813	-47.068	980229109.94	37.88
g256	4653.979	4653.979	0.038	0.038	5	-45.188	0.043328	-45.231	980230947.42	41.51
g257	4654.352	4654.352	0.021	0.021	1	-44.815	0.043805	-44.858	980231319.95	26.84
g258	4655.622	4655.622	0.022	0.022	13	-43.545	0.044213	-43.589	980232589.54	27.63
MOUDANIA	4657.299		0.019		0					
	4657.297	4657.297	0.023	0.020	0	-41.870	0.045204	-41.915	980234263.55	26.32
	4657.295		0.019		0					
AUTH	4699.332		0.024		24					
	4699.334	4699.333	0.013	0.020	0	0.166	0.052828	0.114	980276291.92	26.06
	4699.333		0.023		4					
AUTH1	4699.215		0.015		7					

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
	4699.223	4699.22	0.015	0.015	0	0.053	0.053333	0.000	980276178.42	22.46
	4699.222		0.015		6					

Table 13: Gravity measurements during the 10th day

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
AUTH	4699.217		0.021		3					
	4699.217	4699.218	0.012	0.015	0					
	4699.219		0.013		5					
AUTH_1	4699.33		0.029		0					
	4699.33	4699.327	0.005	0.014	0	0.109	0.000608	0.110	980276288.36	23.47
	4699.321		0.009		0					
g259	4664.836	4664.836	0.012	0.012	0	-34.382	0.001618	-34.380	980241798.37	22.12
g260	4659.814	4659.814	0.01	0.010	10	-39.404	0.001873	-39.402	980236776.63	21.10
g261	4658.527	4658.527	0.011	0.011	1	-40.691	0.002154	-40.689	980193517.38	21.60
g262	4661.371	4661.371	0.012	0.012	0	-37.847	0.002414	-37.844	980196361.64	22.12
g263	4659.446	4659.446	0.016	0.016	24	-39.772	0.002605	-39.769	980194436.84	24.52
g264	4660.878	4660.878	0.012	0.012	21	-38.340	0.002796	-38.337	980195869.03	22.12
g265	4662.2	4662.200	0.021	0.021	16	-37.018	0.003031	-37.015	980197191.26	28.04
g266	4655.381	4655.381	0.011	0.011	0	-43.837	0.0032	-43.833	980190372.43	21.60
g267	4655.613	4655.613	0.01	0.010	17	-43.605	0.003472	-43.601	980190604.70	21.10
g268	4655.993	4655.993	0.03	0.030	11	-43.225	0.003861	-43.221	980190985.09	35.29
g269	4656.062	4656.062	0.014	0.014	26	-43.156	0.004035	-43.152	980191054.27	23.27
g270	4653.901	4653.901	0.013	0.013	0	-45.317	0.004252	-45.312	980188893.48	22.68

g271	4654.22	4654.220	0.01	0.010	0	-44.998	0.004485	-44.993	980189212.72	21.10
g272	4654.658	4654.658	0.012	0.012	0	-44.560	0.00469	-44.555	980189650.92	22.12
g273	4658.767	4658.767	0.016	0.016	7	-40.451	0.004868	-40.446	980193760.10	24.52
g274	4657.705	4657.705	0.023	0.023	29	-41.513	0.005034	-41.508	980192698.26	29.57
g275	4643.39	4643.390	0.011	0.011	6	-55.828	0.00522	-55.822	980178383.45	21.60
g276	4627.374	4627.374	0.011	0.011	2	-71.844	0.005429	-71.838	980162367.66	21.60
g277	4615.893	4615.893	0.008	0.008	0	-83.325	0.005602	-83.319	980150886.83	20.23
g278	4602.833	4602.833	0.009	0.009	0	-96.385	0.005785	-96.379	980137827.02	20.65
g279	4587.722	4587.722	0.01	0.010	0	-111.496	0.005983	-111.490	980122716.21	21.10
g280	4575.396	4575.396	0.027	0.027	23	-123.822	0.006207	-123.815	980110390.44	32.78
g281	4555.286	4555.286	0.008	0.008	0	-143.932	0.006638	-143.925	980090280.87	20.23
g282	4554.599	4554.599	0.016	0.016	0	-144.619	0.006922	-144.612	980089594.15	24.52
g283	4548.436	4548.436	0.016	0.016	0	-150.782	0.007239	-150.774	980083431.47	24.52
g284	4560.757	4560.757	0.013	0.013	8	-138.461	0.007557	-138.453	980095752.79	22.68
g285	4573.93	4573.930	0.011	0.011	0	-125.288	0.007864	-125.280	980108926.09	21.60
g286	4589.841	4589.841	0.011	0.011	0	-109.377	0.008225	-109.368	980124837.46	21.60
g287	4603.608	4603.608	0.014	0.014	0	-95.610	0.008475	-95.601	980138604.71	23.27
g288	4615.04	4615.040	0.018	0.018	0	-84.178	0.008869	-84.169	980150037.10	25.87
g289	4604.12	4604.120	0.018	0.018	2	-95.098	0.009098	-95.089	980139117.33	25.87
g290	4613.289	4613.289	0.017	0.017	2	-85.929	0.009759	-85.919	980148286.99	25.19
g291	4620.481	4620.481	0.025	0.025	12	-78.737	0.009929	-78.727	980155479.16	31.15
g292	4626.544	4626.544	0.017	0.017	5	-72.674	0.010178	-72.663	980161542.41	25.19
g293	4641.315	4641.315	0.017	0.017	0	-57.903	0.01037	-57.892	980176313.60	25.19
g294	4644	4644.000	0.039	0.039	15	-55.218	0.010537	-55.207	980178998.77	43.20
AUTH_1	4699.31		0.013		7					
	4699.313	4699.312	0.012	0.013	0	0.094	0.013475	0.107	980276285.73	22.40
AUTH	4699.198		0.021		11					
	4699.207	4699.204	0.02	0.022	7	-0.014	0.013667	0.000	980276178.42	28.54
	4699.207		0.024		8					

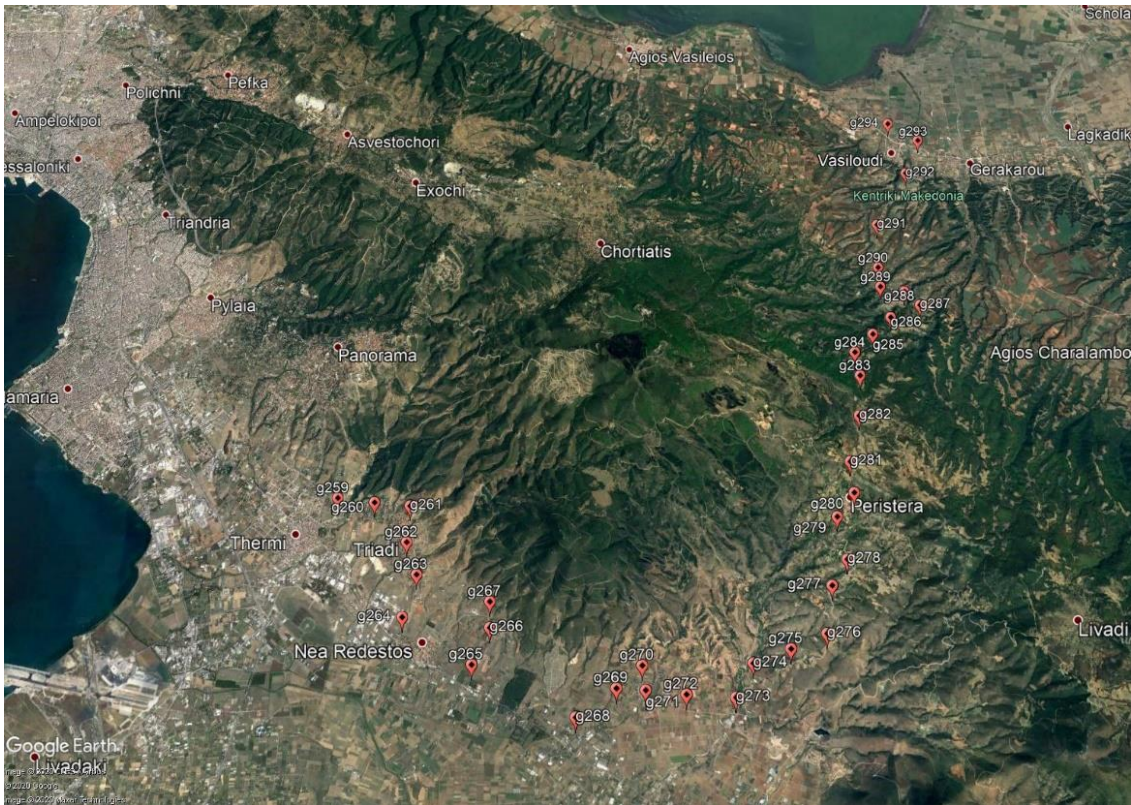


Figure 19: Point locations during the 10th day

The gravity and GNSS campaign to collect data within 100 km distance from the AUT1 CORS station, to serve as fundamental point for potential determination, concluded with two more days of measurements during October 9th and October 16th, 2020. Both started from lowland regions around Thessaloniki and concluded in mountainous Halkidiki. The first one started from Vasilika, then to Galatista, close to Agios Prodromos, passed through Polygyros and reaching the village of Ormylia (Figure 20). The average value for the orthometric height of the points was ~345 m with a maximum of 632 meters and a minimum of ~22 meters. 48 points were measured and the average std was ~0.031 mGal. The difference between starting and the closing measurements at AUTH was 79.4 μ Gal after 9.5 h of surveying while the daily non-linear drift correction was -0.202306 mGal.

The last day started from lake Koroneia and the village Agios Vasileios. Then, it went through the villages of Vasiloudi and Gerakarou, and continued moving onward to mountainous Thessaloniki and the villages of Zagliveri and Adam. Then it passed to the regional unit of Halkidiki and the villages of Doumpia, Sana, Geroplastanos, Paleochora before closing the survey in Arnea. 52 new gravity points were established in this survey each at a densification distance of ~1km across regional roads. A total number of 52 gravity and GNSS densification points have been measured, with orthometric heights ranging from 91.501 m to 638.847 m. The misclosure at the fundamental AUTH gravity reference point was 0.045 mGal resulting a non-linear drift of -0.91343 mGal/day, which was distributed to the traverse densification points.

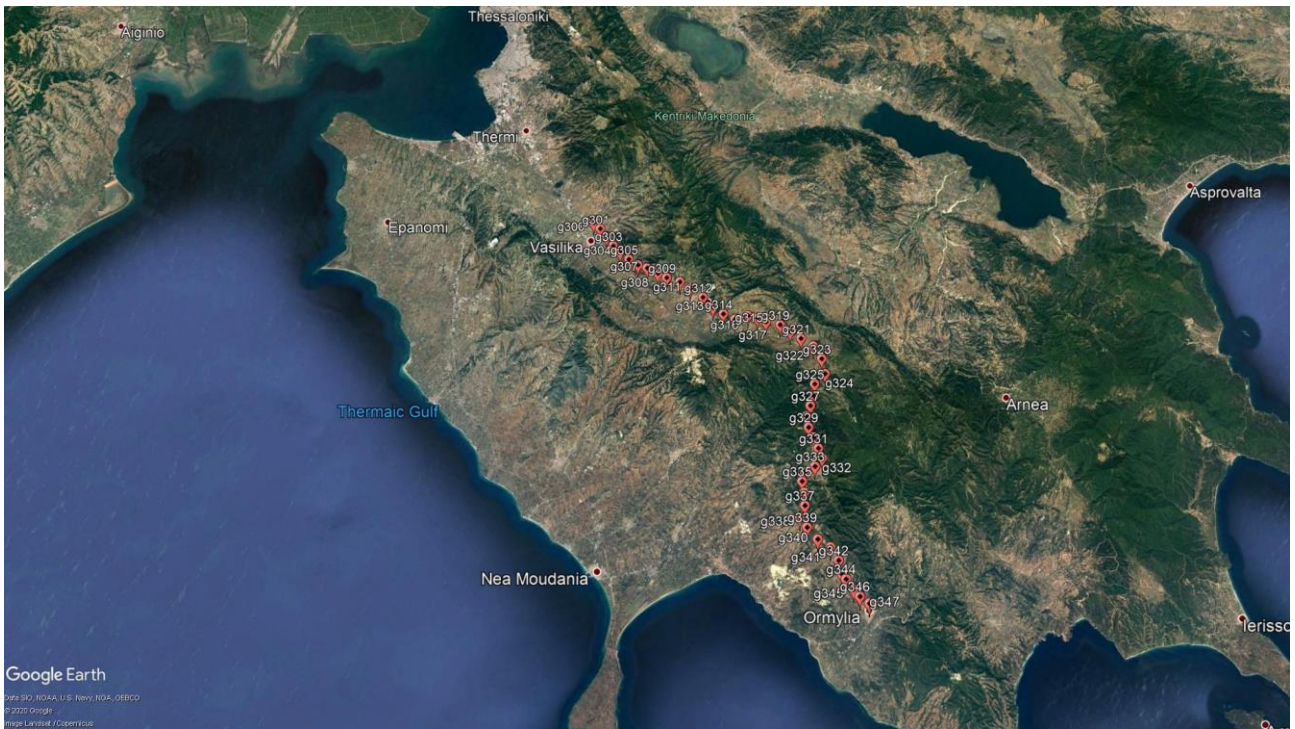


Figure 20: Point locations during the 11th day

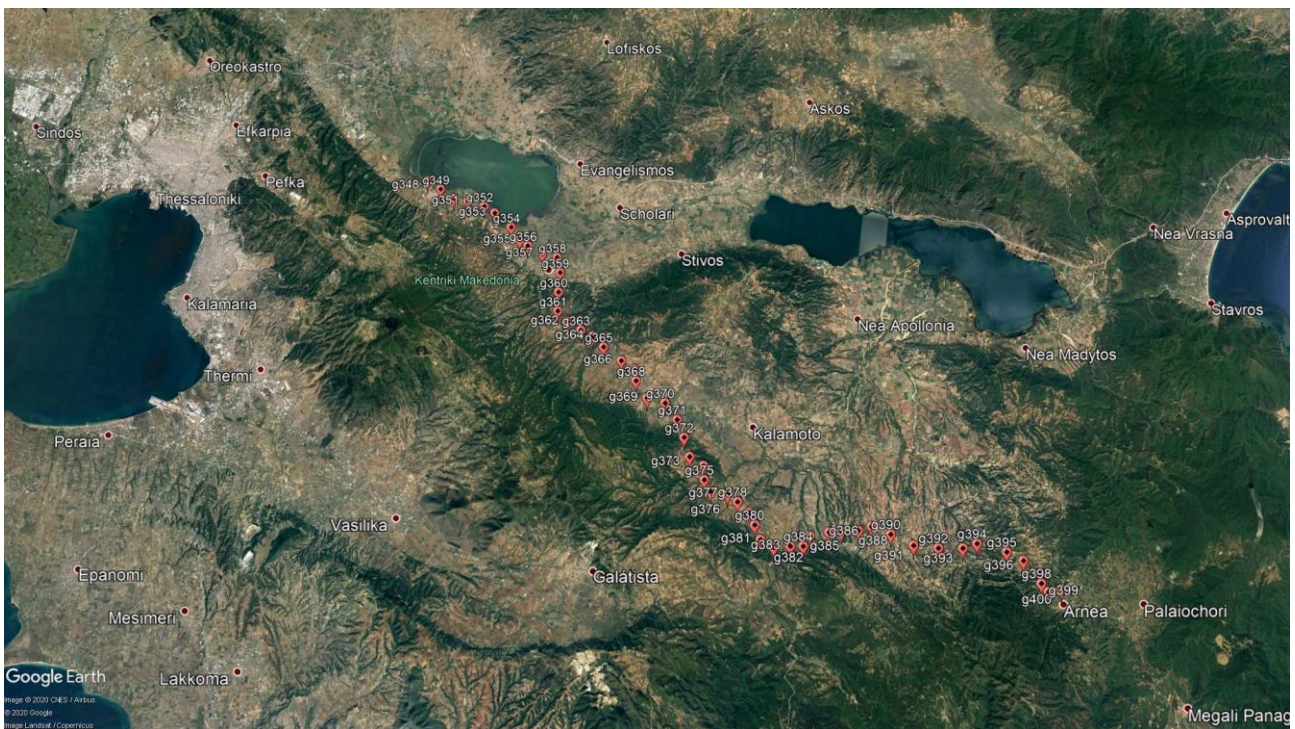


Figure 21: Point locations during the 12th day

Table 14: Gravity measurements during the 11th day.

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
AUTH	4699.741		0.021		2					
	4699.744		0.02		0					
	4699.744	4699.74	0.018	0.025	0					
	4699.744		0.042		37					
	4699.744		0.022		1					
AUTH1	4699.853		0.024		2					
	4699.854		0.024		2					
	4699.854	4699.86	0.022	0.028	2	0.112	-0.001186	0.110	980276288.83	38.72
	4699.856		0.034		0					
	4699.858		0.036		17					
g295	4651.979	4651.98	0.067	0.067	20	-47.764	-0.007030	-47.771	980228406.99	72.14
g296	4655.369	4655.37	0.072	0.072	23	-44.374	-0.008373	-44.383	980231795.65	76.81
g297	4656.865	4656.87	0.082	0.082	36	-42.878	-0.009092	-42.887	980233290.93	86.25
g298	4655.485	4655.49	0.067	0.067	36	-44.258	-0.009933	-44.268	980231910.09	72.14
g299	4653.2	4653.20	0.032	0.032	6	-46.543	-0.010647	-46.554	980229624.37	41.71
g300	4649.233	4649.23	0.041	0.041	3	-50.510	-0.011651	-50.522	980225656.37	48.95
g301	4644.76	4644.76	0.039	0.039	2	-54.983	-0.012527	-54.996	980221182.49	47.29
g302	4642.427	4642.43	0.022	0.022	9	-57.316	-0.013162	-57.330	980218848.86	34.63
g303	4633.727	4633.73	0.046	0.046	2	-66.016	-0.013963	-66.030	980210148.06	53.21
g304	4625.402	4625.40	0.027	0.027	5	-74.341	-0.027502	-74.369	980201809.52	38.01
g305	4614.708	4614.71	0.02	0.020	0	-85.035	-0.028157	-85.064	980191114.86	33.40
g306	4607.374	4607.37	0.03	0.030	0	-92.369	-0.028790	-92.398	980183780.23	40.19
g307	4598.154	4598.15	0.025	0.025	3	-101.589	-0.029430	-101.619	980174559.59	36.61

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g308	4589.733	4589.73	0.03	0.030	4	-110.010	-0.030097	-110.040	980166137.92	40.19
g309	4580.536	4580.54	0.022	0.022	1	-119.207	-0.031643	-119.239	980156939.38	34.63
g310	4569.289	4569.29	0.022	0.022	0	-130.454	-0.032331	-130.487	980145691.69	34.63
g311	4556.349	4556.35	0.018	0.018	1	-143.394	-0.033061	-143.427	980132750.96	32.24
g312	4557.936	4557.94	0.038	0.038	2	-141.807	-0.033826	-141.841	980134337.19	46.47
g313	4560.331	4560.33	0.038	0.038	1	-139.412	-0.034503	-139.447	980136731.52	46.47
g314	4565.034	4565.03	0.054	0.054	27	-134.709	-0.035242	-134.745	980141433.78	60.26
g315	4569.729	4569.73	0.024	0.024	3	-130.014	-0.035972	-130.050	980146128.05	35.94
g316	4573.259	4573.26	0.023	0.023	12	-126.484	-0.036650	-126.521	980149657.37	35.28
g317	4564.855	4564.86	0.038	0.038	6	-134.888	-0.037313	-134.926	980141252.71	46.47
g318	4564.778	4564.78	0.036	0.036	7	-134.965	-0.038054	-135.003	980141174.97	44.85
g319	4554.244	4554.24	0.021	0.021	1	-145.499	-0.039051	-145.538	980130639.97	34.01
g320	4557.568	4557.57	0.027	0.027	3	-142.175	-0.040083	-142.215	980133962.94	38.01
g321	4559.33	4559.33	0.026	0.026	1	-140.413	-0.040815	-140.454	980135724.20	37.30
g322	4548.734	4548.73	0.025	0.025	5	-151.009	-0.041691	-151.051	980125127.33	36.61
g323	4537.913	4537.91	0.027	0.027	0	-161.830	-0.042369	-161.873	980114305.65	38.01
g324	4543.384	4543.38	0.019	0.019	0	-156.359	-0.043022	-156.402	980119776.00	32.81
g325	4551.124	4551.12	0.028	0.028	10	-148.619	-0.043903	-148.663	980127515.12	38.72
g326	4551.957	4551.96	0.02	0.020	8	-147.786	-0.044607	-147.831	980128347.41	33.40
g327	4552.69	4552.69	0.025	0.025	3	-147.053	-0.045280	-147.099	980129079.74	36.61
g328	4565.593	4565.59	0.019	0.019	4	-134.150	-0.046286	-134.197	980141981.73	32.81
g329	4580.826	4580.83	0.024	0.024	6	-118.917	-0.047263	-118.965	980157213.76	35.94
g330	4584.347	4584.35	0.015	0.015	6	-115.396	-0.047967	-115.444	980160734.05	30.67
g331	4601.13	4601.13	0.034	0.034	5	-98.613	-0.048645	-98.662	980177516.37	43.26
g332	4621.41	4621.41	0.016	0.016	0	-78.333	-0.049383	-78.383	980197795.64	31.17
g333	4642.194	4642.19	0.024	0.024	1	-57.549	-0.050154	-57.600	980218578.87	35.94
g334	4652.166	4652.17	0.021	0.021	0	-47.577	-0.050995	-47.628	980228550.02	34.01

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g335	4652.891	4652.89	0.015	0.015	0	-46.852	-0.051770	-46.904	980229274.25	30.67
g336	4646.604	4646.60	0.013	0.013	0	-53.139	-0.052517	-53.192	980222986.50	29.74
g337	4657.197	4657.20	0.011	0.011	0	-42.546	-0.053425	-42.600	980233578.59	28.92
g338	4671.268	4671.27	0.013	0.013	1	-28.475	-0.054115	-28.530	980247648.90	29.74
g339	4671.888	4671.89	0.016	0.016	1	-27.855	-0.054833	-27.910	980248268.19	31.17
g340	4674.59	4674.59	0.019	0.019	10	-25.153	-0.055559	-25.209	980250969.46	32.81
g341	4685.531	4685.53	0.019	0.019	5	-14.212	-0.056399	-14.269	980261909.62	32.81
g342	4690.89	4690.89	0.077	0.077	0	-8.853	-0.057315	-8.911	980267267.70	81.51
AUTH1	4699.928		0.013		1					
	4699.927		0.018		0					
	4699.927	4699.93	0.015	0.019	1	0.184	-0.077366	0.107	980276285.25	32.58
	4699.927		0.023		5					
	4699.929		0.024		10					
AUTH	4699.821		0.016		9					
	4699.824		0.013		0					
	4699.824	4699.82	0.013	0.018	0	0.079	-0.079400	0.000	980276178.42	32.13
	4699.823		0.022		5					
	4699.822		0.025		3					

Table 15: Gravity measurements during the 12th day

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
AUTH	4700.116		0.012		0					
	4700.114		0.013		0					

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
	4700.115	4700.116	0.014	0.015	1					
	4700.118		0.018		0					
	4700.115		0.020		1					
AUTH_1	4700.229		0.010		0					
	4700.228		0.011		0					
	4700.228	4700.229	0.011	0.017	17	0.113	-0.000712	0.112	980276290.91	24.96
	4700.231		0.031		28					
	4700.228		0.020		3					
g348	4652.306	4652.306	0.034	0.034	23	-47.810	-0.003422	-47.813	980228365.40	38.77
g349	4652.007	4652.007	0.105	0.105	31	-48.109	-0.004563	-48.113	980228065.26	106.64
g350	4649.801	4649.801	0.046	0.046	33	-50.315	-0.005137	-50.320	980225858.68	49.63
g351	4649.456	4649.456	0.032	0.032	31	-50.660	-0.005487	-50.665	980225513.33	37.03
g352	4648.922	4648.922	0.019	0.019	5	-51.194	-0.005891	-51.199	980224978.93	26.62
g353	4648.234	4648.234	0.023	0.023	3	-51.882	-0.006231	-51.888	980224290.59	29.60
g354	4646.770	4646.770	0.034	0.034	2	-53.346	-0.006541	-53.352	980222826.28	38.77
g355	4644.960	4644.960	0.036	0.036	0	-55.156	-0.006952	-55.163	980221015.87	40.54
g356	4644.236	4644.236	0.025	0.025	27	-55.880	-0.007341	-55.887	980220291.48	31.18
g357	4641.682	4641.682	0.036	0.036	23	-58.434	-0.007681	-58.441	980217737.14	40.54
g358	4639.673	4639.673	0.032	0.032	10	-60.443	-0.008013	-60.451	980215727.81	37.03
g359	4630.639	4630.639	0.038	0.038	9	-69.477	-0.008361	-69.485	980206693.46	42.33
g360	4620.125	4620.125	0.027	0.027	25	-79.991	-0.008709	-79.999	980196179.11	32.81
g361	4620.661	4620.661	0.015	0.015	0	-79.455	-0.009055	-79.464	980196714.76	23.93
g362	4622.188	4622.188	0.029	0.029	22	-77.928	-0.009371	-77.937	980198241.45	34.47
g363	4623.552	4623.552	0.033	0.033	7	-76.564	-0.009721	-76.573	980199605.10	37.90
g364	4628.929	4628.929	0.026	0.026	3	-71.187	-0.010016	-71.197	980204981.80	31.99
g365	4623.042	4623.042	0.025	0.025	24	-77.074	-0.010331	-77.084	980199094.49	31.18
g366	4622.672	4622.672	0.034	0.034	34	-77.444	-0.010633	-77.454	980198724.19	38.77

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g367	4620.919	4620.919	0.033	0.033	22	-79.197	-0.010971	-79.208	980196970.85	37.90
g368	4619.596	4619.596	0.021	0.021	21	-80.520	-0.012014	-80.532	980195646.81	28.08
g369	4614.729	4614.729	0.017	0.017	6	-85.387	-0.012348	-85.399	980190779.47	25.23
g370	4616.143	4616.143	0.020	0.020	12	-83.973	-0.012713	-83.985	980192193.11	27.34
g371	4606.701	4606.701	0.019	0.019	2	-93.415	-0.013108	-93.428	980182750.71	26.62
g372	4590.366	4590.366	0.015	0.015	9	-109.750	-0.013431	-109.763	980166415.39	23.93
g373	4602.369	4602.369	0.032	0.032	12	-97.747	-0.013780	-97.760	980178418.04	37.03
g374	4605.100	4605.100	0.024	0.024	19	-95.016	-0.014144	-95.030	980181148.68	30.39
g375	4598.762	4598.762	0.013	0.013	1	-101.354	-0.014463	-101.368	980174810.36	22.72
g376	4589.991	4589.991	0.032	0.032	7	-110.125	-0.014803	-110.139	980166039.02	37.03
g377	4593.339	4593.339	0.013	0.013	0	-106.777	-0.015152	-106.792	980169386.67	22.72
g378	4596.793	4596.793	0.037	0.037	20	-103.323	-0.015452	-103.338	980172840.37	41.43
g379	4595.102	4595.102	0.011	0.011	0	-105.014	-0.015857	-105.029	980171148.96	21.64
g380	4577.433	4577.433	0.014	0.014	0	-122.683	-0.016779	-122.699	980153479.04	23.31
g381	4561.229	4561.229	0.011	0.011	0	-138.887	-0.017210	-138.904	980137274.61	21.64
g382	4547.966	4547.966	0.013	0.013	1	-152.150	-0.017615	-152.167	980124011.20	22.72
g383	4552.231	4552.231	0.033	0.033	13	-147.885	-0.017938	-147.903	980128275.88	37.90
g384	4565.084	4565.084	0.013	0.013	2	-135.032	-0.018233	-135.050	980141128.59	22.72
g385	4570.336	4570.336	0.020	0.020	6	-129.780	-0.018610	-129.798	980146380.21	27.34
g386	4572.925	4572.925	0.010	0.010	0	-127.191	-0.019080	-127.210	980148968.74	21.15
g387	4576.429	4576.429	0.010	0.010	8	-123.687	-0.019462	-123.706	980152472.36	21.15
g388	4581.585	4581.585	0.030	0.030	11	-118.531	-0.019833	-118.550	980157627.99	35.32
g389	4587.539	4587.539	0.013	0.013	0	-112.577	-0.020165	-112.597	980163581.65	22.72
g390	4588.875	4588.875	0.013	0.013	0	-111.241	-0.020532	-111.261	980164917.29	22.72
g391	4576.590	4576.590	0.021	0.021	0	-123.526	-0.020865	-123.546	980152631.95	28.08
g392	4562.313	4562.313	0.021	0.021	16	-137.803	-0.021182	-137.824	980138354.64	28.08
g393	4576.313	4576.313	0.015	0.015	6	-123.803	-0.021651	-123.824	980152354.17	23.93

ID	GRAV [mGal]	GRAV (mean) [mGal]	SD	sd (mean) [mGal]	REJ	δg [mGal]	nl drift cor. [mGal]	δg cor. [mGal]	g [μ Gal]	std [μ Gal]
g394	4566.188	4566.188	0.033	0.033	2	-133.928	-0.022057	-133.950	980142228.76	37.90
g395	4547.147	4547.147	0.013	0.013	0	-152.969	-0.022518	-152.991	980123187.30	22.72
g396	4552.519	4552.519	0.020	0.020	1	-147.597	-0.022824	-147.619	980128559.00	27.34
g397	4529.799	4529.799	0.018	0.018	3	-170.317	-0.023439	-170.340	980105838.38	25.91
g398	4525.921	4525.921	0.037	0.037	1	-174.195	-0.023711	-174.218	980101960.11	41.43
g399	4526.429	4526.429	0.039	0.039	6	-173.687	-0.023986	-173.711	980102467.83	43.23
g400	4537.653	4537.653	0.021	0.021	24	-162.463	-0.024380	-162.487	980113691.44	28.08
AUTH1	4700.030		0.017		20					
	4700.029		0.022		41					
	4700.031	4700.031	0.010	0.015	0	-0.084	-0.032749	-0.117	980276061.27	24.05
	4700.033		0.011		0					
	4700.033		0.016		36					
AUTH	4700.159		0.017		6					
	4700.159		0.014		5					
	4700.160	4700.161	0.026	0.020	21	0.045	-0.045000	0.000	980276178.42	27.49
	4700.162		0.028		1					
	4700.163		0.016		16					

In total, 12 days of field measurements have been performed resulting in a total number of 395 densification points being acquired. The measurements fill-in appropriately the South, East and South-East part of the 100 km radius study area around the CORS station of AUT1, which complement the already available gravity measurements of the research team (see Figure 22). Table 16 below summarizes the entire set of gravity observations and GNSS data collected during the 12-day field campaign within the GeoGravGOCE project.

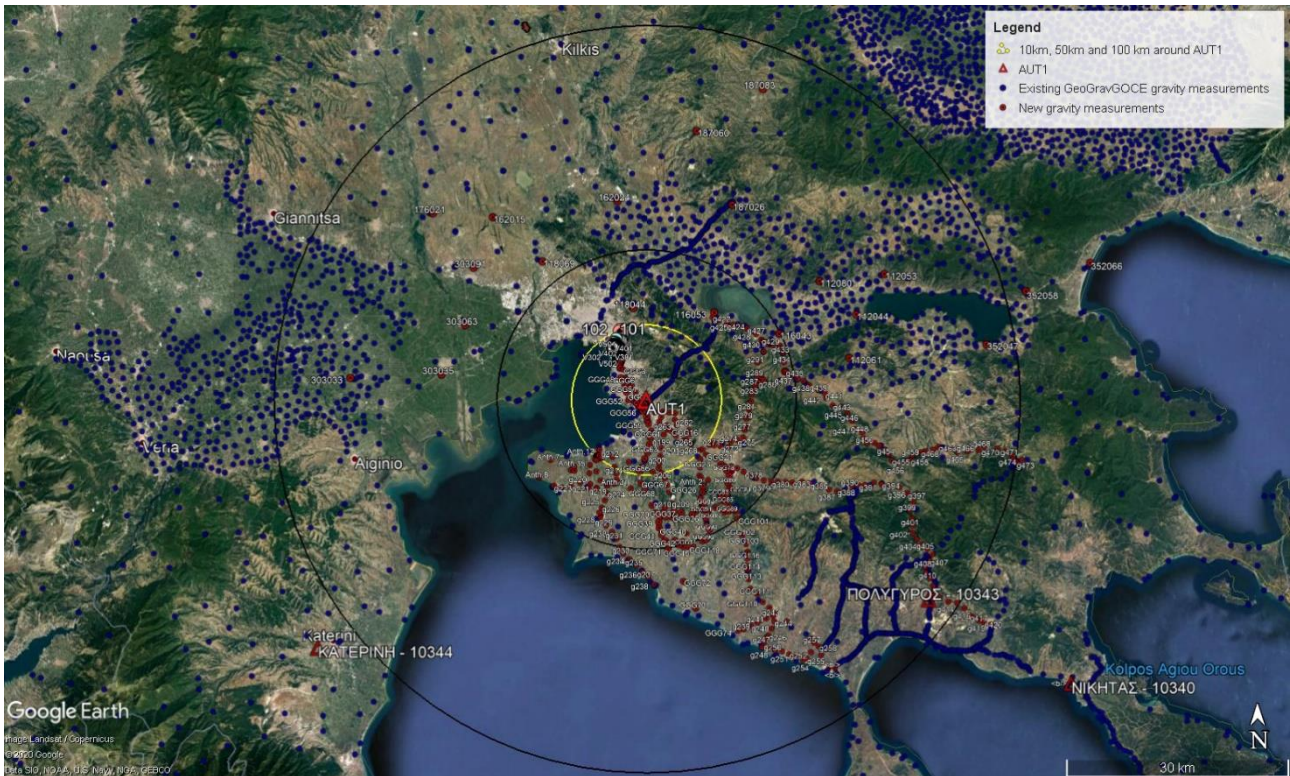


Figure 22: Gravity densification points measured during the field campaigns (red) and the available observations by GeoGravGOCE (blue).

Table 16: Gravity and GNSS data collected during the GeoGravGOCE field campaigns.

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g1	411959.515	4497354.744	66.880	25.2500	980274771.337	195.433
g2	411982.214	4497394.712	63.077	21.51	980272271.489	32.696
g3	412186.721	4495986.568	60.296	18.7600	980271291.224	66.287
g4	412590.400	4495043.957	67.046	25.5620	980267214.935	77.104
g5	412840.980	4493918.406	80.869	39.4610	980261151.410	27.295
g6	412840.988	4493918.432	80.850	39.4420	980261151.410	27.295
g7	412945.591	4493172.909	101.757	60.4010	980250100.151	37.337
g8	413703.315	4492827.436	112.978	71.6050	980246998.273	50.695
g9	414192.717	4491925.619	116.672	75.3340	980241770.435	27.295
g10	414905.950	4490914.143	110.038	68.7200	980240993.890	22.204
g11	415381.985	4490362.710	119.317	77.9990	980237366.352	19.850
g12	416178.295	4489766.839	103.115	61.7740	980239054.690	60.415
g13	416699.550	4489248.369	101.542	60.1920	980238733.488	35.469
g14	417517.659	4488568.182	96.872	55.4990	980240799.118	22.204
g15	417250.339	4487958.350	87.534	46.2120	980237033.887	47.802

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g16	418184.903	4487502.865	102.995	61.6350	980237488.281	22.204
g17	418805.410	4486717.359	87.175	45.8170	980238026.706	35.469
g18	419452.153	4486041.694	81.566	40.2050	980236060.942	38.276
g19	420490.202	4485445.880	74.461	33.0760	980237669.322	85.000
g20	421407.553	4484916.700	78.038	36.6330	980238079.680	19.850
g21	422660.475	4484096.393	84.203	42.7840	980233036.650	28.178
g22	423394.759	4483494.943	89.790	48.3700	980228933.213	24.699
g23	422642.304	4482887.573	77.911	36.5640	980226084.149	49.730
g24	422545.623	4481798.184	93.367	52.0890	980218059.702	21.402
g25	422456.142	4480703.025	129.220	88.0100	980211462.282	20.616
g26	422733.099	4480399.446	135.821	94.6150	980210744.511	30.871
g27	422940.061	4479301.002	218.605	177.453	980195516.68	17.10
g28	422839.278	4478488.304	295.358	254.254	980180514.46	20.91
g29	422606.944	4477603.729	305.609	264.564	980175662.63	22.57
g30	423033.535	4476635.314	248.479	207.466	980187694.32	17.81
g31	423376.602	4475882.516	221.370	180.381	980192420.70	26.91
g32	422748.849	4476486.087	271.592	230.600	980181334.25	35.17
g33	421855.563	4475955.251	228.305	187.383	980187144.38	26.02
g34	421375.970	4475558.358	223.387	182.509	980186924.93	27.81
g35	419933.390	4475873.924	273.598	232.767	980177820.38	27.81
g36	418984.374	4476006.326	261.234	220.437	980180665.58	37.06
g37	418669.879	4475252.994	229.793	189.051	980184120.94	29.62
g38	417811.294	4475303.994	235.927	195.218	980181487.73	56.33
g39	417125.542	4475415.298	213.412	172.726	980185817.55	32.38
g40	416925.171	4474646.695	196.429	155.793	980187063.80	46.62
g41	416929.328	4473867.002	168.097	127.504	980191286.82	44.69
g42	417258.630	4472961.472	153.860	113.303	980192755.96	51.46
g43	417667.109	4472146.272	164.084	123.556	980189361.49	66.13
g44	417974.814	4471841.673	164.115	123.592	980234144.42	108.19
g45	418992.563	4472150.284	151.143	110.560	980193775.02	62.20
g46	419574.379	4471564.992	148.140	107.565	980193726.06	40.86
g47	412175.900	4495265.100	56.279	14.800	980268769.47	42.06
g48	412175.009	4495266.251	24.223	22.700	980268720.11	45.88
g49	412260.171	4493955.269	80.845	39.465	980259249.46	122.69
g50	412718.748	4493123.837	85.254	43.914	980253273.54	28.18
g51	413001.738	4492799.564	110.287	68.957	980246422.47	33.62
g52	412947.576	4492014.406	89.131	47.863	980245572.93	30.87
g53	413238.589	4491022.811	65.737	24.524	980245353.61	23.85
g54	413962.762	4490901.657	90.307	49.055	980241097.66	25.55
g55	414233.843	4490560.617	78.395	37.144	980242758.49	32.70
g56	414482.021	4490139.568	72.673	31.429	980242614.45	40.16
g57	415083.823	4489439.285	79.316	38.072	980238609.44	37.34
g58	415621.908	4488691.391	72.237	30.993	980237243.79	38.28
g59	415685.107	4488181.812	65.823	24.599	980236453.71	37.34
g60	415824.770	4487746.996	65.179	23.966	980235335.30	93.90
g61	416226.021	4486774.946	60.175	18.980	980234374.50	54.57

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g62	416041.927	4485926.210	50.005	8.860	980233164.04	71.20
g63	415869.680	4484985.341	51.358	10.266	980230010.24	104.81
g64	415610.710	4483931.618	63.230	22.198	980226446.88	68.25
g65	415205.336	4483105.895	79.476	38.500	980223688.51	70.21
g66	414832.455	4482008.313	139.820	98.909	980211347.70	40.16
g67	414445.454	4481436.895	185.988	145.119	980199941.30	35.47
g68	414626.431	4479876.899	230.863	190.054	980186576.38	59.44
g69	415122.366	4478823.266	272.427	231.647	980176681.21	39.22
g70	416058.510	4476898.395	261.529	220.807	980178162.70	44.92
g71	416501.598	4475865.506	228.153	187.468	980183457.66	39.22
g72	418067.165	4471002.923	150.769	110.289	980190488.53	56.52
g73	420022.685	4466655.427	109.740	69.444	980194379.11	81.05
g74	421600.151	4463052.286	95.133	54.985	980194697.43	81.05
g75	427210.245	4459978.703	64.456	24.236	980202144.36	76.12
g76	431152.423	4458953.167	57.658	17.376	980210869.85	52.63
g77	425384.259	4482147.352	97.189	55.756	980218710.03	70.45
g78	425824.896	4481866.86	100.32	58.884	980218356.73	42.45
g79	426135.433	4481308.865	101.778	60.36	980216406.96	27.90
g80	426510.862	4480599.564	113.891	72.496	980212667.82	35.02
g81	426297.456	4479661.217	142.951	101.619	980207321.53	19.27
g82	426485.955	4478946.96	186.479	145.178	980199069.60	17.98
g83	426071.16	4478167.327	233.5	192.261	980186693.66	22.94
g84	425343.888	4478120.127	273.679	232.477	980179818.02	18.61
g85	425245.201	4477399.771	408.597	367.439	980153728.65	26.20
g86	425910.731	4477120.977	467.361	426.186	980141469.89	15.44
g87	426502.859	4476438.487	477.262	440.557	980138587.71	17.39
g88	426226.736	4475925.656	423.579	382.449	980150311.89	18.61
g89	425585.581	4475819.104	386.334	345.241	980157135.85	22.17
g90	424571.276	4476428.333	322.298	281.223	980170127.41	17.39
g91	423534.405	4475696.43	213.343	172.357	980187643.22	16.32
g92	423039.319	4475892.432	251.934	210.96	980178394.33	17.39
g93	423202.944	447504.975	242.917	201.981	980178289.13	25.37
g94	423255.609	4474031.043	215.586	174.701	980182159.03	26.20
g95	423479.721	4472575.898	153.329	112.51	980188649.11	27.04
g96	423199.543	4472195.093	148.174	107.39	980193082.04	24.54
g97	422702.265	4472017.334	137.535	96.786	980192535.76	36.86
g98	420102.326	4471322.801	155.353	114.768	980193456.71	68.49
g99	420102.326	4471322.801	155.353	114.768	980185493.09	50.06
g100	426744.494	4475975.701	456.504	415.346	980143841.67	22.87
g101	427319.217	4475836.947	496.058	454.879	980135500.21	27.21
g102	427424.448	4474884.419	449.177	408.039	980143771.44	30.91
g103	427692.212	4473626.384	388.192	347.1	980152310.81	43.59
g104	427963.159	4472637.94	302.077	261.017	980168984.12	27.21
g105	428270.8	4472083.77	323.701	282.65	980164558.33	32.48
g106	428518.001	4471480.755	327.377	286.34	980162684.06	23.98
g107	428672.874	4470432.685	357.565	316.572	980154277.84	23.98

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g108	428557.977	4469359.415	327.054	286.122	980158985.31	172.11
g109	428483.382	4468644.07	294.32	253.435	980164762.66	229.83
g110	428666.523	4468036.717	266.871	226.012	980171187.42	235.81
g111	428665.573	4468036.474	266.831	225.973	980171135.94	172.11
g112	428906.866	4467192.142	250.258	209.439	980175755.90	993.19
g113	428589.152	4466166.579	217.591	176.865	980179518.46	1434.13
g114	438269.546	4456402.241	65.922	25.379	980225566.05	63.08
g115	436980.607	4458643.179	86.887	46.332	980219494.63	116.64
g116	433764.892	4461013.567	101.363	60.885	980203183.77	120.58
g117	432065.417	4462148.294	154.771	114.259	980189795.26	70.73
g118	431480.448	4462890.704	172.868	132.308	980189237.99	44.49
g119	430596.663	4463661.918	169.609	129.008	980190331.42	38.32
g120	429856.49	4464706.752	164.875	124.206	980190398.02	23.41
g121	428956.636	4465496.485	191.582	150.888	980184196.04	31.69
g122	428737.959	4466744.291	234.475	193.699	980178222.34	27.91
g123	428629.507	4468060.098	268.128	227.27	980170696.54	25.85
g124	428495.499	4468671.326	294.49	253.603	980164759.24	23.98
g125	428589.191	4469549.998	334.711	293.767	980157829.16	23.98
g126	428663.929	4470388.644	358.464	317.474	980153957.93	27.21
g127	420789.171	4471171.519	161.664	121.056	980184373.11	29.38
g128	421468.63	4471275.81	169.051	128.405	980183674.01	35.77
g129	420035.21	4472037.128	180.724	140.101	980181474.93	30.14
g130	420556.398	4473021.466	229.068	188.365	980173301.04	45.39
g131	416363.599	4466161.293	51.692	11.55	980202855.12	52.26
g132	417106.778	4465883.958	64.194	24.043	980200486.41	52.26
g133	418105.586	4465742.323	57.355	17.182	980202793.00	52.26
g134	419129.513	4465437.895	67.408	27.224	980201278.83	59.69
g135	419822.263	4465532.448	71.162	30.948	980201513.56	45.02
g136	420017.266	4467067.279	119.201	78.879	980192911.34	43.26
g137	420806.914	4467444.089	85.799	45.418	980201502.13	34.80
g138	421913.116	4467673.154	110.646	70.196	980197744.15	51.34
g139	422730.377	4467498.227	166.299	125.814	980186684.74	28.07
g140	423006.244	4468157.816	190.109	149.569	980182619.64	26.76
g141	423156.604	4469172.422	227.355	186.745	980175948.72	30.92
g142	423411.122	4469907.93	254.326	213.66	980171336.64	25.54
g143	423903.023	4470738.276	275.893	235.152	980168659.48	28.76
g144	424579.321	4471186.156	276.719	235.916	980170800.64	34.80
g145	425119.558	4471794.257	261.517	220.652	980177312.50	28.07
g146	426155.109	4471445.488	248.462	207.558	980181305.28	34.00
g147	427006.216	4471338.99	241.165	200.219	980183736.24	24.96
g148	427717.509	4471633.03	258.494	217.494	980181907.15	30.18
g149	428331.47	4471712.415	309.382	268.345	980173107.25	34.80
g150	427983.151	4465060.077	159.715	119.101	980192267.94	28.07
g151	426867.377	4464498.423	117.737	77.215	980197112.69	43.26
g152	425935.312	4464274.379	98.48	58.016	980199811.35	36.43
g153	424842.979	4464169.087	80.301	39.898	980202726.70	28.07

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g154	423646.363	4463892.669	124.423	84.1	980191734.42	28.76
g155	422596.47	4463377.546	92.623	52.394	980196888.03	36.43
g156	418312.908	4486891.452	88.489	47.153	980276756.25	29.46
g157	417816.699	4486263.009	66.406	25.134	980274402.52	34.00
g158	417638.772	4485293.246	55.551	14.339	980268419.09	108.00
g159	417463.719	4484460.38	57.046	15.885	980263192.63	58.75
g160	417334.562	4483473.211	72.204	31.098	980258051.18	36.43
g161	417134.792	4482438.723	92.352	51.307	980251274.71	33.21
g162	417053.415	4481797.202	100.594	59.584	980248141.29	33.21
g163	417413.706	4481166.626	161.288	120.291	980248168.87	25.54
g164	417844.532	4480412.973	194.154	153.175	980246730.41	30.18
g165	418151.71	4479512.107	213.911	172.964	980246025.98	44.14
g166	418386.558	4478565.582	235.719	194.811	980242604.42	30.92
g167	418653.794	4477192.154	273.821	232.975	980239996.93	32.44
g168	417768.598	4476557.491	261.119	220.345	980236243.31	50.43
g169	417483.942	4475974.072	256.751	216.02	980233938.71	73.95
g170	410884.693	4483436.489	64.278	23.504	980231275.30	63.46
g171	411138.234	4482112.479	122.203	81.462	980229503.69	57.82
g172	411385.956	4481219.31	163.696	122.974	980227660.20	58.75
g173	411379.81	4480401.67	184.983	144.293	980225360.72	46.81
g174	411068.488	4479820.667	210.901	170.246	980225013.18	45.02
g175	410065.464	4479638.187	185.266	144.663	980225546.60	49.52
g176	408689.903	4479256.521	168.395	127.866	980225939.42	54.10
g177	407583.862	4479283.18	159.428	118.945	980225861.87	49.52
g178	406484.828	4480114.635	168.495	128.027	980226079.36	55.03
g179	405273.396	4479660.133	133.642	93.237	980224878.98	52.26
g180	403994.388	4479532.585	96.059	55.703	980217605.47	57.82
g181	402925.102	4479793.7	45.486	5.156	980211061.71	60.63
g182	410050.854	4478656.007	142.373	101.811	980211424.94	82.63
g183	409728.362	4477699.247	117.342	76.836	980219182.16	68.21
g184	409286.933	4476726.207	96.989	56.546	980219079.07	59.69
g185	408919.071	4476045.976	93.883	53.486	980215104.52	74.91
g186	409068.103	4475309.363	95.681	55.313	980202952.79	116.84
g187	409827.234	4474298.747	105.943	65.598	980203263.02	121.77
g188	410596.693	4473443.67	86.387	46.059	980203299.41	148.45
g189	411211.648	4472528.976	70.541	30.24	980201736.82	145.48
g190	411565.15	4471407.217	65.432	25.179	980204471.99	123.74
g191	412035.823	4470515.568	63.093	22.871	980204768.14	103.09
g192	412878.365	4469721.464	53.973	13.763	980204908.54	99.18
g193	413742.797	4468867.61	53.226	13.031	980204138.28	100.16
g194	414550.12	4467994.936	59.627	19.448	980202362.68	87.48
g195	415324.609	4467259.314	54.622	14.455	980202112.00	75.87
g196	416048.459	4466290.012	45.029	4.89	980204762.55	100.16
g197	427971.036	4460055.771	66.018	25.768	980204070.61	69.16
g198	418312.908	4486891.452	88.489	47.153	980236942.55	22.46
g199	417816.699	4486263.009	66.406	25.134	980235295.26	40.60

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g200	417638.772	4485293.246	55.551	14.339	980231854.34	60.36
g201	417463.719	4484460.38	57.046	15.885	980228484.85	40.60
g202	417334.562	4483473.211	72.204	31.098	980224681.28	37.88
g203	417134.792	4482438.723	92.352	51.307	980222247.65	28.43
g204	417053.415	4481797.202	100.594	59.584	980220968.36	26.84
g205	417413.706	4481166.626	161.288	120.291	980208031.72	29.24
g206	417844.532	4480412.973	194.154	153.175	980200537.01	21.80
g207	418151.71	4479512.107	213.911	172.964	980195747.45	23.14
g208	418386.558	4478565.582	235.719	194.811	980193709.76	25.30
g209	418653.794	4477192.154	273.821	232.975	980183658.21	21.80
g210	417768.598	4476557.491	261.119	220.345	980180291.76	29.24
g211	417483.942	4475974.072	256.751	216.02	980178721.26	38.78
g212	410884.693	4483436.489	64.278	23.504	980224293.35	46.13
g213	411138.234	4482112.479	122.203	81.462	980211471.80	35.22
g214	411385.956	4481219.31	163.696	122.974	980201111.33	41.51
g215	411379.81	4480401.67	184.983	144.293	980194738.61	54.62
g216	411068.488	4479820.667	210.901	170.246	980187343.92	38.78
g217	410065.464	4479638.187	185.266	144.663	980191665.38	67.11
g218	408689.903	4479256.521	168.395	127.866	980193372.64	39.69
g219	407583.862	4479283.18	159.428	118.945	980194424.89	45.20
g220	406484.828	4480114.635	168.495	128.027	980193333.14	48.94
g221	405273.396	4479660.133	133.642	93.237	980198876.68	54.62
g222	403994.388	4479532.585	96.059	55.703	980205662.17	73.91
g223	402925.102	4479793.7	45.486	5.156	980216461.48	52.72
g224	410050.854	4478656.007	142.373	101.811	980199075.71	58.44
g225	409728.362	4477699.247	117.342	76.836	980202072.98	73.91
g226	409286.933	4476726.207	96.989	56.546	980203913.28	70.02
g227	408919.071	4476045.976	93.883	53.486	980203060.81	42.43
g228	409068.103	4475309.363	95.681	55.313	980201027.83	45.20
g229	409827.234	4474298.747	105.943	65.598	980197197.29	58.44
g230	410596.693	4473443.67	86.387	46.059	980200479.86	75.86
g231	411211.648	4472528.976	70.541	30.24	980202808.45	57.48
g232	411565.15	4471407.217	65.432	25.179	980202211.97	52.72
g233	412035.823	4470515.568	63.093	22.871	980201731.55	70.02
g234	412878.365	4469721.464	53.973	13.763	980203475.14	57.48
g235	413742.797	4468867.61	53.226	13.031	980203221.55	52.72
g236	414550.12	4467994.936	59.627	19.448	980201481.87	33.47
g237	415324.609	4467259.314	54.622	14.455	980202439.32	47.07
g238	416048.459	4466290.012	45.029	4.89	980203933.85	59.40
g239	427971.036	4460055.771	66.018	25.768	980203217.51	45.20
g240	428923.328	4460510.649	74.166	33.858	980204319.71	30.91
g241	429842.49	4460958.352	89.195	48.833	980204692.16	26.06
g242	431016.221	4461476.189	116.827	76.401	980201695.52	26.84
g243	431936.728	4461799.765	137.941	97.463	980198687.91	32.61
g244	432046.848	4461076.506	114.779	74.353	980202665.10	34.34
g245	431702.977	4460074.466	84.208	43.848	980207921.68	33.47

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g246	431259.973	4459128.375	59.929	19.635	980211073.28	33.47
g247	430615.285	4458220.229	48.435	8.205	980210429.79	70.02
g248	430312.796	4457606.81	42.189	2	980210172.37	58.44
g249	431364.14	4457433.054	47.342	7.123	980212289.87	41.51
g250	432098.228	4457138.113	46.29	6.052	980215179.46	36.99
g251	433033.992	4456997.583	69.7	29.426	980213719.92	40.60
g252	433963.811	4456629.909	48.024	7.721	980221906.40	47.07
g253	434640.856	4456138.217	46.145	5.828	980223803.01	64.21
g254	435795.959	4455738.337	42.701	2.339	980227476.44	47.07
g255	436312.799	4455985.987	45.84	5.438	980229109.94	37.88
g256	436905.699	4456820.15	52.05	11.577	980230947.42	41.51
g257	437370.286	4458051.916	62.75	22.196	980231319.95	26.84
g258	437978.607	4457560.971	61.823	21.249	980232589.54	27.63
g259	417752.733	4489337.274	125.154	83.724	980241798.37	22.12
g260	418591.703	4489171.447	161.586	120.109	980236776.63	21.10
g261	419395.912	4489034.07	186.604	145.08	980193517.38	21.60
g262	419343.701	4488211.919	159.958	118.483	980196361.64	22.12
g263	419584.702	4487468.167	154.764	113.316	980194436.84	24.52
g264	419293.877	4486555.936	92.238	50.858	980195869.03	22.12
g265	420810.791	4485448.615	77.801	36.398	980197191.26	28.04
g266	421201.161	4486205.896	141.367	99.9	980190372.43	21.60
g267	421198.177	4486772.066	161.318	119.818	980190604.70	21.10
g268	423019.957	4484220.101	92.048	50.604	980190985.09	35.29
g269	423890.469	4484767.383	123.682	82.165	980191054.27	23.27
g270	424455.698	4485207.526	164.463	122.895	980188893.48	22.68
g271	424509.695	4484689.814	137.644	96.104	980189212.72	21.10
g272	425366.04	4484552.458	141.444	99.873	980189650.92	22.12
g273	426406.294	4484426.902	144.337	102.73	980193760.10	24.52
g274	426819.541	4485117.084	178.139	136.478	980192698.26	29.57
g275	427639.908	4485361.106	254.292	212.586	980178383.45	21.60
g276	428431.091	4485627.639	327.488	285.745	980162367.66	21.60
g277	428627.096	4486642.921	392.68	350.887	980150886.83	20.23
g278	429004.758	4487187.015	463.804	421.978	980137827.02	20.65
g279	428866.461	4488134.584	539.076	497.221	980122716.21	21.10
g280	429285.974	4488639.136	603.391	561.511	980110390.44	32.78
g281	429256.66	4489336.07	702.545	660.643	980090280.87	20.23
g282	429564.689	4490410.281	708.629	666.701	980089594.15	24.52
g283	429684.569	4491385.562	724.216	682.269	980083431.47	24.52
g284	429633.801	4492005.013	662.738	620.786	980095752.79	22.68
g285	430109.546	4492475.084	588.136	546.182	980108926.09	21.60
g286	430590.794	4492932.22	497.565	455.611	980124837.46	21.60
g287	431335.34	4493257.772	412.169	370.219	980138604.71	23.27
g288	431016.386	4493653.005	357.47	315.519	980150037.10	25.87
g289	430448.942	4493788.128	420.364	378.408	980139117.33	25.87
g290	430460.022	4494340.387	365.841	323.888	980148286.99	25.19
g291	430574.867	4495553.014	304.98	263.037	980155479.16	31.15

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g292	431452.927	4497007.717	262.422	220.515	980161542.41	25.19
g293	431894.498	4498016.211	166.29	124.436	980176313.60	25.19
g294	431192.531	4498565.101	152.23	110.376	980178998.77	43.20
g295	426757.334	4481847.073	108.270	66.793	980228406.99	72.14
g296	427533.146	4481565.456	114.099	72.604	980231795.65	76.81
g297	428384.166	4481076.348	123.380	81.877	980233290.93	86.25
g298	429276.723	4480505.887	134.949	93.440	980231910.09	72.14
g299	430087.768	4480184.913	146.313	104.792	980229624.37	41.71
g300	431073.833	4479857.100	165.181	123.641	980225656.37	48.95
g301	432053.463	4479660.780	189.366	147.804	980221182.49	47.29
g302	432923.492	4479699.177	215.019	173.428	980218848.86	34.63
g303	433992.137	4479591.443	261.163	219.546	980210148.06	53.21
g304	434884.097	4479514.774	302.868	261.229	980201809.52	38.01
g305	436124.215	4479589.194	348.005	306.328	980191114.86	33.40
g306	437203.107	4479350.191	370.925	329.226	980183780.23	40.19
g307	438555.228	4479022.789	402.034	360.310	980174559.59	36.61
g308	439739.459	4478475.788	431.285	389.547	980166137.92	40.19
g309	440795.805	4478261.543	469.968	428.214	980156939.38	34.63
g310	441925.363	4478200.118	521.208	479.435	980145691.69	34.63
g311	442836.769	4478942.873	580.730	538.927	980132750.96	32.24
g312	443690.579	4479033.436	568.315	526.499	980134337.19	46.47
g313	444514.970	4479013.774	550.921	509.095	980136731.52	46.47
g314	445744.280	4479264.023	515.829	473.983	980141433.78	60.26
g315	446779.525	4479028.348	491.449	449.592	980146128.05	35.94
g316	447867.074	4478810.866	464.161	422.291	980149657.37	35.28
g317	449100.977	4478565.161	515.220	473.332	980141252.71	46.47
g318	450173.273	4477787.375	515.591	473.686	980141174.97	44.85
g319	450918.181	4476627.045	570.710	528.797	980130639.97	34.01
g320	450413.505	4475433.869	560.078	518.188	980133962.94	38.01
g321	450725.165	4474407.762	554.409	512.533	980135724.20	37.30
g322	450751.759	4473467.456	615.408	573.552	980125127.33	36.61
g323	450778.214	4472463.599	674.770	632.938	980114305.65	38.01
g324	451274.715	4471624.089	651.294	609.462	980119776.00	32.81
g325	451992.572	4471009.078	613.345	571.510	980127515.12	38.72
g326	452685.008	4470270.127	612.307	570.477	980128347.41	33.40
g327	453275.387	4469611.644	612.926	571.102	980129079.74	36.61
g328	452970.040	4468717.280	568.790	526.998	980141981.73	32.81
g329	452353.438	4467936.431	521.470	479.711	980157213.76	35.94
g330	452425.082	4467121.538	522.334	480.602	980160734.05	30.67
g331	452959.424	4466334.091	452.531	410.824	980177516.37	43.26
g332	453382.268	4465347.885	377.800	336.129	980197795.64	31.17
g333	453342.174	4464286.021	309.448	267.812	980218578.87	35.94
g334	454206.575	4463736.279	263.138	221.517	980228550.02	34.01
g335	455371.925	4463166.059	271.312	229.702	980229274.25	30.67
g336	456578.376	4462953.496	298.850	257.248	980222986.50	29.74
g337	457571.190	4462207.582	258.314	216.732	980233578.59	28.92

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g338	458275.167	4461259.102	198.375	156.821	980247648.90	29.74
g339	458676.759	4461037.371	190.422	148.877	980248268.19	31.17
g340	459526.104	4460511.557	168.944	127.419	980250969.46	32.81
g341	460219.298	4460174.069	109.505	68.001	980261909.62	32.81
g342	461135.501	4459959.780	63.406	21.924	980267267.70	81.51
g343	424666.178	4501747.665	133.134	91.515	980228365.40	38.77
g344	425578.918	4501289.309	134.680	93.040	980228065.26	106.64
g345	426554.021	4500775.860	145.192	103.496	980225858.68	49.63
g346	427451.856	4500696.452	138.041	96.324	980225513.33	37.03
g347	428541.587	4500515.740	133.254	91.501	980224978.93	26.62
g348	429284.187	4500158.678	136.632	94.844	980224290.59	29.60
g349	430473.774	4499361.818	141.085	99.259	980222826.28	38.77
g350	431159.242	4498574.534	152.464	110.610	980221015.87	40.54
g351	431716.782	4498272.758	154.353	112.501	980220291.48	31.18
g352	432710.002	4497854.769	160.960	119.136	980217737.14	40.54
g353	433660.104	4497758.978	164.977	123.196	980215727.81	37.03
g354	434018.818	4496788.113	218.801	177.007	980206693.46	42.33
g355	434130.309	4495494.086	263.739	221.906	980196179.11	32.81
g356	434285.321	4494281.689	265.721	223.864	980196714.76	23.93
g357	435014.398	4493695.775	257.719	215.870	980198241.45	34.47
g358	435881.013	4493272.282	248.235	206.397	980199605.10	37.90
g359	436668.024	4493005.104	221.383	179.558	980204981.80	31.99
g360	437417.109	4492407.530	244.656	202.833	980199094.49	31.18
g361	438612.709	4491706.466	240.613	198.791	980198724.19	38.77
g362	439514.257	4491271.791	244.450	202.631	980196970.85	37.90
g363	439677.226	4490586.722	250.024	208.194	980195646.81	28.08
g364	440488.686	4489623.400	269.696	227.859	980190779.47	25.23
g365	441604.383	4489467.283	257.642	215.817	980192193.11	27.34
g366	442454.045	4488541.612	307.062	265.234	980182750.71	26.62
g367	443013.033	4487523.046	392.872	351.035	980166415.39	23.93
g368	443488.848	4486428.346	330.080	288.237	980178418.04	37.03
g369	444377.911	4486012.582	309.065	267.223	980181148.68	30.39
g370	444522.174	4485187.274	328.818	286.969	980174810.36	22.72
g371	444961.877	4484540.752	372.562	330.711	980166039.02	37.03
g372	445978.358	4484527.725	345.610	303.760	980169386.67	22.72
g373	446610.304	4484164.260	333.154	291.302	980172840.37	41.43
g374	447372.892	4483619.396	343.386	301.529	980171148.96	21.64
g375	447756.800	4482964.623	431.412	389.550	980153479.04	23.31
g376	448185.447	4482168.700	520.819	478.951	980137274.61	21.64
g377	448992.115	4481823.670	589.685	547.812	980124011.20	22.72
g378	449931.090	4482024.642	562.414	520.541	980128275.88	37.90
g379	450667.192	4482128.150	494.783	452.911	980141128.59	22.72
g380	450998.904	4482785.487	462.250	420.388	980146380.21	27.34
g381	452074.655	4483149.435	443.888	402.036	980148968.74	21.15
g382	452793.301	4483306.369	429.834	387.989	980152472.36	21.15
g383	453756.247	4483482.174	394.701	352.864	980157627.99	35.32

Point id	E(m)	N(m)	h(m)	H(m)	g [μ Gal]	std [μ Gal]
g384	454496.351	4483836.253	365.082	323.253	980163581.65	22.72
g385	455638.439	4483533.758	352.506	310.675	980164917.29	22.72
g386	456986.993	4483073.704	415.555	373.707	980152631.95	28.08
g387	458413.297	4483120.838	487.351	445.496	980138354.64	28.08
g388	459802.138	4483305.443	417.055	375.198	980152354.17	23.93
g389	460592.906	4483683.749	471.198	429.348	980142228.76	37.90
g390	462326.222	4483442.861	567.587	525.731	980123187.30	22.72
g391	463310.052	4483084.479	543.443	501.580	980128559.00	27.34
g392	464261.596	4482480.486	661.732	619.861	980105838.38	25.91
g393	464393.339	4481943.702	680.729	638.847	980101960.11	41.43
g394	464818.145	4481523.026	678.271	636.382	980102467.83	43.23
g395	465556.998	4481785.402	629.911	588.032	980113691.44	28.08

1.4 Concluding remarks

In this report, a detailed description on the measurement campaigns for the collection of local gravity and GNSS data needed for the foreseen GeoGravGOCE geoid and potential determination is provided. Information about the origin of the raw data, the processing methodology, the accuracy estimates and the corresponding statistical calculations are presented. Finally, this report is accompanied by one annex with the raw CG-5 data during field acquisition of the measured points.

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