



EUROPEAN CENTER FOR GEODYNAMICS AND SEISMOLOGY  
CENTRE EUROPEEN DE GEODYNAMIQUE ET DE SEISMOLOGIE



# ABSOLUTE GRAVITY MEASUREMENTS IN THE NETHERLANDS

## FINAL REPORT

NOVEMBER 27, 2004

Prof. Dr. Olivier Francis

*19, rue Josy Welter  
L-7256 Walferdange  
Grand-Duché de Luxembourg*

*Tel. : +352 33 14 87 35; Fax : +352 33 14 87 88  
Email : [olivier@ecgs.lu](mailto:olivier@ecgs.lu); Web site : [www.ecgs.lu](http://www.ecgs.lu)*

## Foreword

This report contains the results of absolute gravity measurements carried out in The Netherlands during June and July 2004. Gravity at five stations has been observed using an absolute gravimeter: Epen, Kootwijk (geodetic observatory + water tower), Westerbork and Zundert.

The FG5#216 from the European Center for Geodynamics and Seismology was operated by Olivier Francis. Rene Reudink from TU delft provided assistance and logistic support during the measurement campaign.

During this campaign, we reoccupied 4 stations. One new station has been occupied in Kootwijk in anticipation of the removal of the Geodetic Observatory in the near future. Due to high winds, the drop-to-drop scatters of the observations in Westerbork, Kootwijk and Zundert can be considered as medium range values. The anomalous atmospheric condition did not affect the final precision of the g-value except at Zundert where the precision is about 5 microgal. On the other hand, Epen is an excellent station.

## Data processing

Raw data from the absolute gravimeters consist of vectors of time and position of the falling object during the drops. To obtain the gravity value, a linear equation representing the equation of motion is fit to the raw data including the gravity gradient which has been measured with relative meters (except for the new site in Kootwijk where the vertical gravity gradient must be measured).

The data processing follows the protocol adopted during absolute gravimeters comparisons at the BIPM in Sèvres (Francis and van Dam, 2003). Geophysical corrections are applied to the raw gravity data: Earth tides (from state-of-the art model), atmospheric pressure using a constant admittance, and the polar motion effect using pole positions from IERS.

The g-soft version 4.0 software from Micro-g Solutions Inc. was used for the processing. All the text outputs as well as some figures are compiled in this report for future reference.

## Results

Station	Date	Gravity value /microgal	Standard Deviation/microgal
Epen	5-6 July 2004	9 81 100 543.1	0.6
Kootwijk - Geodetic Observatory	28-29 June 2004	9 81 250 895.3	2.1
Kootwijk - Water Tower	29-30 June 2004	9 81 249 304.7 *	2.1
	30 June-2 July 2004	9 81 249 304.2 *	1.7
Westerbork	24-28 June 2004	9 81 309 066.9	2.4
Zundert	2-3 July 2004	9 81 196 837.6	4.9

\* Provisional values until the vertical gravity gradient will be measured

## Reference

Francis O., van Dam T.M., Processing of the Absolute data of the ICAG01, Cahiers du Centre Européen de Géodynamique et de Séismologie, vol.22, 45-48, 2003. <https://doi.org/10.5281/zenodo.7890604>

# Epen



<b>STATION: EPEN</b>												
City:	EPEN					Country:	The Netherlands					
Location:	Seismological Observatory					Particularity:						
Situation:	Gravity Pier					Remarks:						
Date:	5-6 July 2004											
Code number:												
Latitude:	50.7631 degrees											
Longitude:	5.9311 degrees											
Elevation:	140 m											
Gradient:	-2.132 $\mu\text{gal}/\text{cm}$											
Reference height:	0.1305 m + 1.1640 m = 1.299m											
Meter:	FG5											
S/N:	216											
<b>Ocean loading correction (<math>\mu\text{gal}</math>, -Greenwich degree)</b>												
Wave	M <sub>2</sub>	S <sub>2</sub>	K <sub>1</sub>	O <sub>1</sub>	N <sub>2</sub>	P <sub>1</sub>	K <sub>2</sub>	Q <sub>1</sub>	M <sub>f</sub>	M <sub>m</sub>	S <sub>sa</sub>	
Ampl.	0.177	0.057	0.021	0.014	0.036	0.007	0.014	0.004	0.0	0.0	0.0	
Phase:	-56.8	-28.8	-61.1	-162.6	-72.7	-74.5	-27.2	128.2	0.0	0.0	0.0	
<b>Polar motion correction</b>						<b>Air pressure correction</b>						
X-coordinate:	0.086619			arc seconds			Nominal air pressure:			996.54 mbar		
Y-coordinate:	00.514911			arc seconds			Barometric admittance factor:			0.3 $\mu\text{gal}/\text{mbar}$		
<b>Gravity</b>												
Set gravity mean:	<b>9 81 100 543.1</b>					microgal						
Set std. dev.:	0.6					microgal						
Mean std. dev.:	4.4					microgal						
Number of sets:	21											
Number of drops per set:	100											
Drop interval:	10 seconds											
Set interval:	60 minutes											
Nominal/datum height:	0.0 cm											
Author: O. Francis	European Center for Geodynamics and Seismology											
Date: September 13, 2004												

# Project file

Micro-g Solutions g Processing Report  
File Created: 09/13/04, 15:26:13

Project Name: ep20040705  
g Acquisition Version: 1.0823  
g Processing Version: 4.0405

Company/Institution: ECGS  
Operator: Olivier FRANCIS

## Station Data

Name: Epen  
Site Code: Seismo Station  
Lat: 50.76310 Long: 5.93110 Elev: 140.00 m  
Reference Height: 13.05 cm  
Datum Height: 0.00 cm  
Gradient: -2.132 uGal/cm  
Nominal Air Pressure: 996.54 mBar  
Barometric Admittance Factor: 0.30  
Polar Motion Coord: 0.0866 " 0.5149 "  
Earth Tide (ETGTAB) Selected  
Potential Filename: C:\Program Files\Micro-g Solutions Inc\gWavefiles\Etcpot.dat  
Delta Factor Filename: F:\absolu\DATA\2004\FG5-216\epen\OceanLoad.dff

## Delta Factors

Start	Stop	Amplitude	Phase	Term
0.000000	0.002427	1.000000	0.0000	DC
0.002428	0.249951	1.160000	0.0000	Long
0.721500	0.906315	1.154250	0.0000	Q1
0.921941	0.974188	1.154240	0.0000	O1
0.989049	0.998028	1.149150	0.0000	P1
0.999853	1.216397	1.134890	0.0000	K1
1.719381	1.906462	1.161720	0.0000	N2
1.923766	1.976926	1.161720	0.0000	M2
1.991787	2.002885	1.161720	0.0000	S2
2.003032	2.182843	1.161720	0.0000	K2
2.753244	3.081254	1.07338	0.0000	M3
3.791964	3.937897	1.03900	0.0000	M4

Ocean Load ON, Filename: F:\absolu\DATA\2004\FG5-216\epen\OceanLoad.olf

Waves: M2 S2 K1 O1 N2 P1 K2 Q1 Mf Mm Ssa  
Amplitude (uGal): 1.773 0.573 0.206 0.139 0.362 0.065 0.144 0.037 0.000 0.000 0.000  
Phase (deg): -56.8 -28.8 -61.1 -162.6 -72.7 -74.5 -27.2 128.2 0.0 0.0 0.0

## Instrument Data

Meter Type: FG5  
Meter S/N: 216  
Factory Height: 116.40 cm  
Rubidium Frequency: 10000000.01020 Hz  
Laser: WEO (187)  
ID: 632.99117754 nm (-0.09 V)  
IE: 632.99119473 nm (-0.58 V)  
IF: 632.99121259 nm (-0.97 V)  
IG: 632.99123023 nm (-1.35 V)  
IH: 632.99136890 nm (-1.87 V)  
II: 632.99139822 nm (-1.64 V)

IJ: 632.99142704 nm (-1.44 V)  
Modulation Frequency: 8333.420 Hz

#### Processing Results

Date: 07/06/04

Time: 02:21:12

DOY: 188

Year: 2004

Gravity: 981100543.06 uGal

Set Scatter: 0.58 uGal

Measurement Precision: 0.13 uGal

Total Uncertainty: 0.13 uGal

Number of Sets Collected: 28

Number of Sets Processed: 21

Set #s Processed: 8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28

Number of Sets NOT Processed: 7

Set #s NOT Processed: 1,2,3,4,5,6,7

Number of Drops/Set: 100

Total Drops Accepted: 2087

Total Drops Rejected: 13

Total Fringes Acquired: 700

Fringe Start: 20

Processed Fringes: 600

GuideCard Multiplex: 4

GuideCard Scale Factor: 250

#### Gravity Corrections

Earth Tide (ETGTAB): -69.43 uGal

Ocean Load: 0.22 uGal

Polar Motion: -0.62 uGal

Barometric Pressure: 2.81 uGal

Datum Height: 275.99 uGal

Reference Xo: 0.00 uGal

# Set File

Source Data Filename: ep20040705

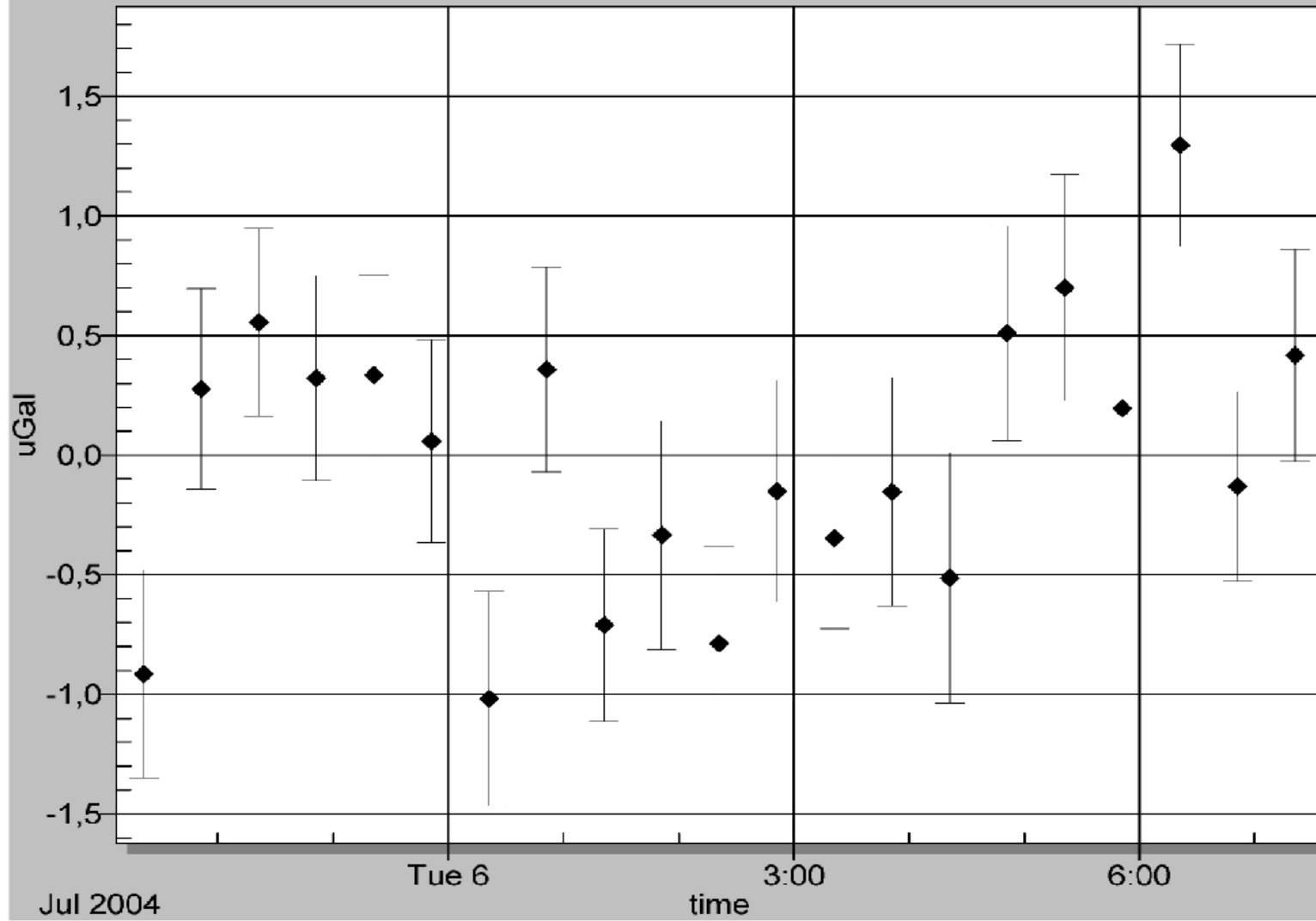
g Acquisition Version: 1.0823

g Processing Version: 4.0405

Set	Time	DOY	Year	Gravity	Sigma	Error	Uncert	Tide	Load	Baro	Polar	Datum	Refxo	Temp	Pres	Accept	Reject
8	21:21:11	187	2004	981100542.144	4.343	0.434	0.434	-86.014	-0.171	2.452	-0.618	275.987	0.002	20.445	1004.717	100	0
9	21:51:12	187	2004	981100543.335	4.176	0.420	0.420	-88.574	0.359	2.490	-0.618	275.987	0.002	20.455	1004.845	99	1
10	22:21:12	187	2004	981100543.613	3.896	0.394	0.394	-88.694	0.848	2.535	-0.618	275.987	0.002	20.476	1004.995	98	2
11	22:51:12	187	2004	981100543.380	4.260	0.428	0.428	-86.745	1.268	2.613	-0.618	275.987	0.002	20.483	1005.253	99	1
12	23:21:14	187	2004	981100543.393	4.176	0.420	0.420	-83.190	1.593	2.675	-0.618	275.987	0.002	20.477	1005.459	99	1
13	23:51:11	187	2004	981100543.116	4.227	0.423	0.423	-78.576	1.804	2.728	-0.618	275.987	0.002	20.480	1005.636	100	0
14	00:21:12	188	2004	981100542.041	4.451	0.447	0.447	-73.430	1.891	2.751	-0.618	275.987	0.002	20.487	1005.715	99	1
15	00:51:11	188	2004	981100543.416	4.277	0.428	0.428	-68.298	1.849	2.715	-0.618	275.987	0.002	20.483	1005.593	100	0
16	01:21:11	188	2004	981100542.349	4.024	0.402	0.402	-63.656	1.686	2.700	-0.618	275.987	0.002	20.490	1005.544	100	0
17	01:51:11	188	2004	981100542.724	4.772	0.477	0.477	-59.897	1.413	2.691	-0.618	275.987	0.002	20.481	1005.514	100	0
18	02:21:11	188	2004	981100542.271	4.047	0.407	0.407	-57.298	1.051	2.734	-0.618	275.987	0.002	20.476	1005.656	99	1
19	02:51:12	188	2004	981100542.907	4.619	0.464	0.464	-56.000	0.626	2.755	-0.618	275.987	0.002	20.482	1005.729	99	1
20	03:21:11	188	2004	981100542.712	3.781	0.378	0.378	-56.007	0.168	2.818	-0.618	275.987	0.002	20.477	1005.938	100	0
21	03:51:11	188	2004	981100542.905	4.761	0.476	0.476	-57.175	-0.293	2.891	-0.618	275.987	0.002	20.482	1006.182	100	0
22	04:21:15	188	2004	981100542.545	5.200	0.523	0.523	-59.243	-0.724	2.920	-0.618	275.987	0.002	20.474	1006.278	99	1
23	04:51:11	188	2004	981100543.568	4.484	0.448	0.448	-61.821	-1.095	2.963	-0.618	275.987	0.002	20.469	1006.420	100	0
24	05:21:10	188	2004	981100543.758	4.674	0.472	0.472	-64.474	-1.382	2.998	-0.618	275.987	0.002	20.473	1006.537	98	2
25	05:51:11	188	2004	981100543.254	4.584	0.458	0.458	-66.711	-1.565	3.067	-0.618	275.987	0.002	20.463	1006.767	100	0
26	06:21:15	188	2004	981100544.354	4.207	0.423	0.423	-68.042	-1.631	3.114	-0.618	275.987	0.002	20.460	1006.926	99	1
27	06:51:09	188	2004	981100542.928	3.933	0.395	0.395	-68.012	-1.575	3.166	-0.618	275.987	0.002	20.461	1007.097	99	1
28	07:21:11	188	2004	981100543.475	4.427	0.443	0.443	-66.252	-1.401	3.213	-0.618	275.987	0.002	20.498	1007.254	100	0

# Sets

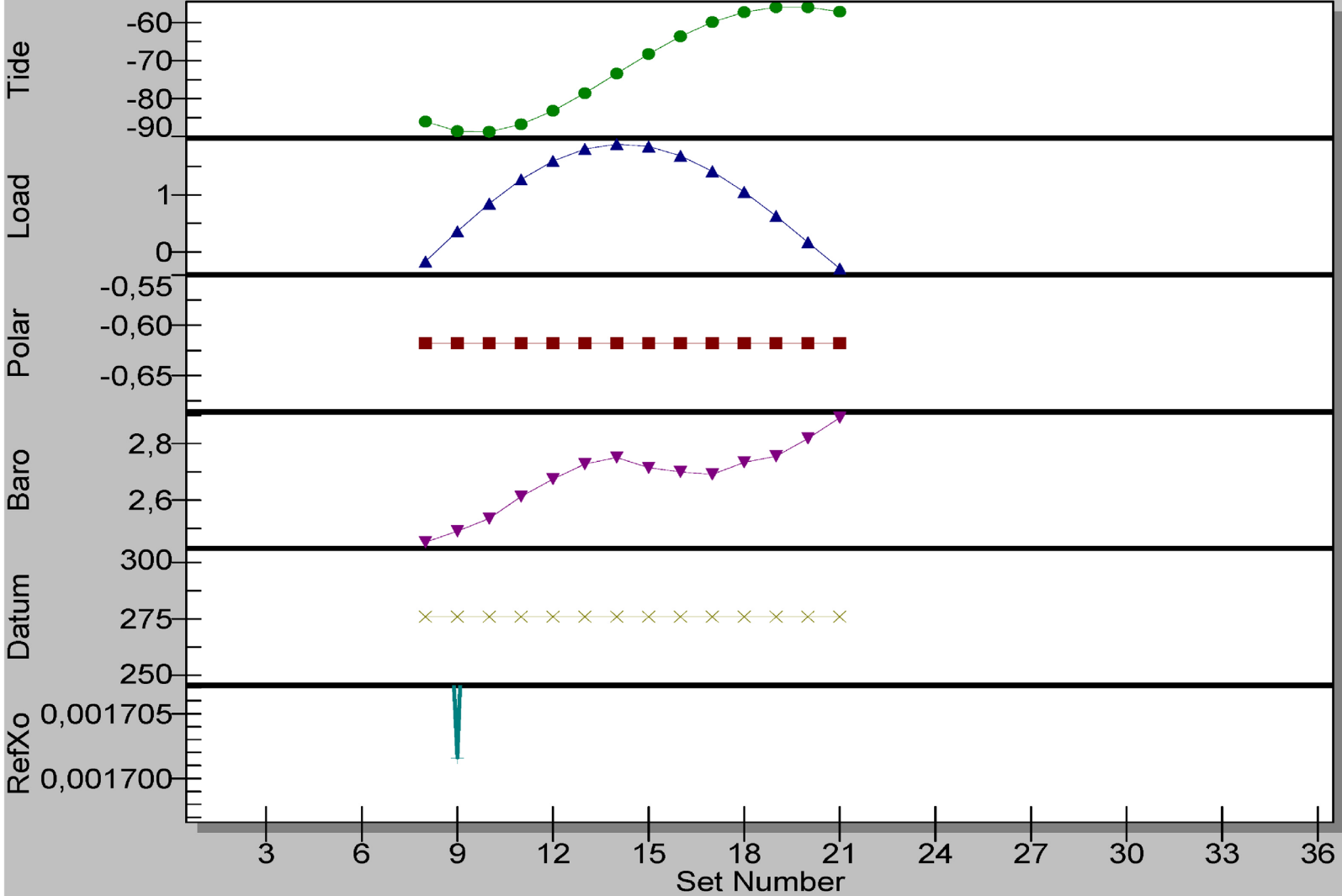
Cumulative Mean: 981100543.06 uGal +/- 0.58uGal +/- 0.13uGal

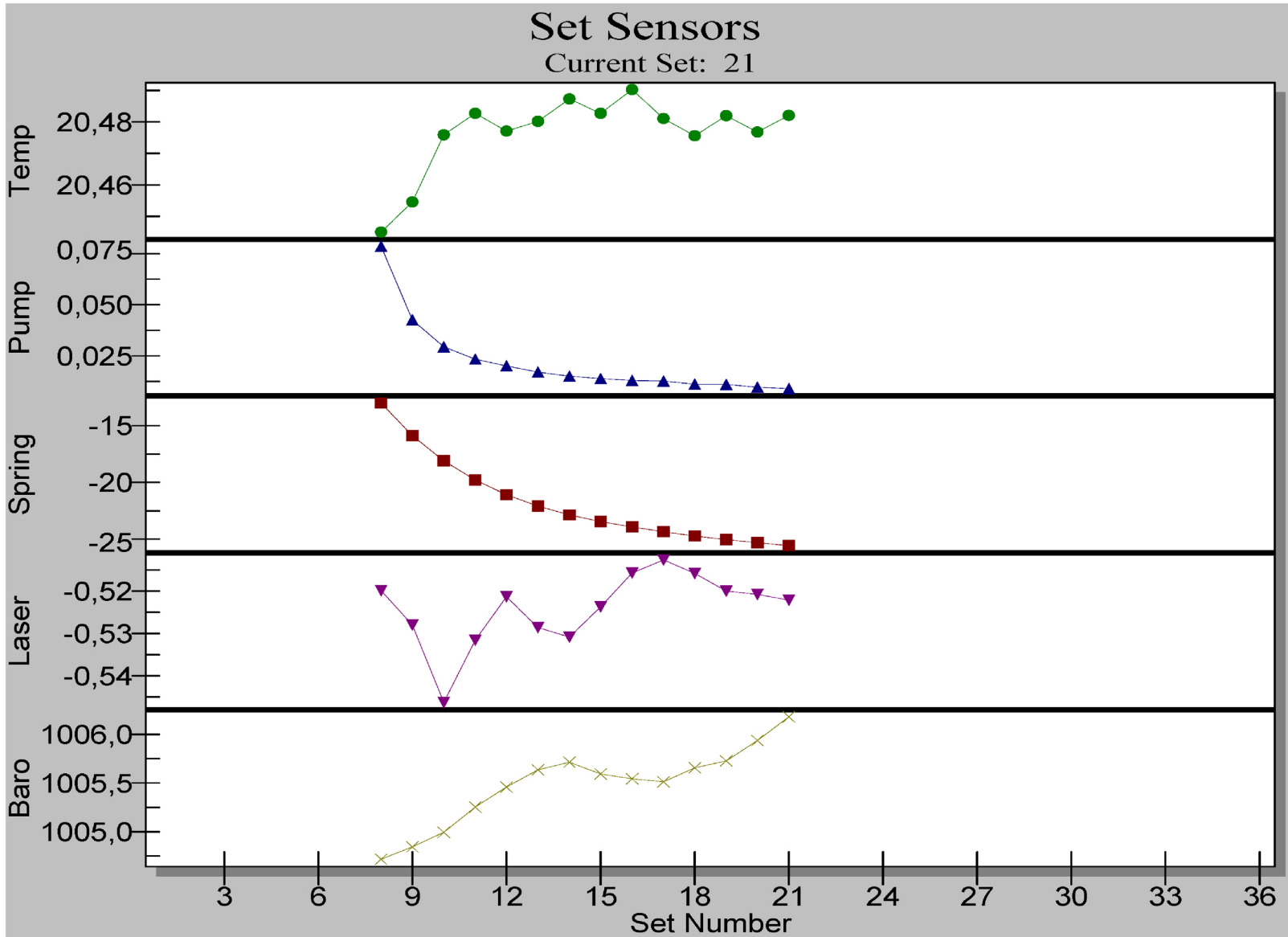




# Set Corrections

Current Set: 21





# Kootwijk

## Geodetic Observatory



<b>STATION: KOOTWIJK</b>												
City:	Kootwijk					Country:	The Netherlands					
Location:	Geodetic Observatory					Particularity:						
Situation:	Gravity Pier					Remarks:						
Date:	28 -29 June 2004											
Code number:												
Latitude:	52.1785 degrees											
Longitude:	5.8103 degrees											
Elevation:	41.33 m											
Gradient:	-3.198 $\mu$ gal/cm											
Reference height:	0.129 m + 1.164 m = 1.293 m											
Meter:	FG5											
S/N:	216											
<b>Ocean loading correction (<math>\mu</math>gal, -Greenwich degree)</b>												
Wave	M <sub>2</sub>	S <sub>2</sub>	K <sub>1</sub>	O <sub>1</sub>	N <sub>2</sub>	P <sub>1</sub>	K <sub>2</sub>	Q <sub>1</sub>	M <sub>f</sub>	M <sub>m</sub>	S <sub>sa</sub>	
Ampl.	0.171	0.053	0.019	0.011	0.037	0.006	0.013	0.003	0.0	0.0	0.0	
Phase:	317.6	341.9	298.2	212.9	297.5	282.3	345.2	124.6	0.0	0.0	0.0	
<b>Polar motion correction</b>						<b>Air pressure correction</b>						
X-coordinate:	0.066484			arc seconds			Nominal air pressure:			1008.29 mbar		
Y-coordinate:	0.518324			arc seconds			Barometric admittance factor:			0.3 $\mu$ gal/mbar		
<b>Gravity</b>												
Set gravity mean:	<b>9 81 250 895.3</b>					microgal						
Set std. dev.:	2.07					microgal						
Mean std. dev.:	31.21					microgal						
Number of sets:	18											
Number of drops per set:	100											
Drop interval:	5 seconds											
Set interval:	60 minutes											
Nominal/datum height:	0.0 cm											
Author:	O. Francis					European Center for Geodynamics and Seismology						
Date:	September 13, 2004											

# Project file

Micro-g Solutions g Processing Report  
File Created: 09/13/04, 10:17:27

Project Name: ko20040628  
g Acquisition Version: 1.0823  
g Processing Version: 4.0405

Company/Institution: ECGS  
Operator: Olivier FRANCIS

## Station Data

Name: Kootwijk  
Site Code: Geodetic Observatory  
Lat: 52.17850 Long: 5.81030 Elev: 41.33 m  
Reference Height: 12.90 cm  
Datum Height: 0.00 cm  
Gradient: -3.198 uGal/cm  
Nominal Air Pressure: 1008.29 mBar  
Barometric Admittance Factor: 0.30  
Polar Motion Coord: 0.0665 " 0.5183 "  
Earth Tide (ETGTAB) Selected  
Potential Filename: C:\Program Files\Micro-g Solutions Inc\gWavefiles\Etcpot.dat  
Delta Factor Filename: F:\absolu\DATA\2004\FG5-216\kootwijk\kootwijk.dff  
Delta Factors

Start	Stop	Amplitude	Phase Term
0.000000	0.002427	1.000000	0.0000 DC
0.002428	0.249951	1.160000	0.0000 Long
0.721500	0.906315	1.154250	0.0000 Q1
0.921941	0.974188	1.154240	0.0000 O1
0.989049	0.998028	1.149150	0.0000 P1
0.999853	1.216397	1.134890	0.0000 K1
1.719381	1.906462	1.161720	0.0000 N2
1.923766	1.976926	1.161720	0.0000 M2
1.991787	2.002885	1.161720	0.0000 S2
2.003032	2.182843	1.161720	0.0000 K2

Ocean Load ON, Filename: F:\absolu\DATA\2004\FG5-216\kootwijk\kootwijk.olf

Waves: M2 S2 K1 O1 N2 P1 K2 Q1 Mf Mm Ssa  
Amplitude (uGal): 1.711 0.529 0.185 0.109 0.367 0.059 0.129 0.025 0.000 0.000 0.000  
Phase (deg): -42.4 -18.1 -61.8 -147.1 -62.5 -77.7 -14.8 124.6 0.0 0.0 0.0

## Instrument Data

Meter Type: FG5  
Meter S/N: 216  
Factory Height: 116.40 cm  
Rubidium Frequency: 10000000.01020 Hz  
Laser: WEO (187)  
ID: 632.99117754 nm (-0.09 V)  
IE: 632.99119473 nm (-0.58 V)  
IF: 632.99121259 nm (-0.97 V)  
IG: 632.99123023 nm (-1.35 V)  
IH: 632.99136890 nm (-1.87 V)  
II: 632.99139822 nm (-1.64 V)  
IJ: 632.99142704 nm (-1.44 V)

Modulation Frequency: 8333.420 Hz

#### Processing Results

Date: 06/29/04

Time: 00:25:09

DOY: 181

Year: 2004

Gravity: 981250895.34 uGal

Set Scatter: 2.07 uGal

Measurement Precision: 0.49 uGal

Total Uncertainty: 1.11 uGal

Number of Sets Collected: 18

Number of Sets Processed: 18

Set #s Processed: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18

Number of Sets NOT Processed: 0

Set #s NOT Processed:

Number of Drops/Set: 100

Total Drops Accepted: 1796

Total Drops Rejected: 4

Total Fringes Acquired: 700

Fringe Start: 20

Processed Fringes: 600

GuideCard Multiplex: 4

GuideCard Scale Factor: 250

#### Gravity Corrections

Earth Tide (ETGTAB): -38.78 uGal

Ocean Load: 0.29 uGal

Polar Motion: -0.25 uGal

Barometric Pressure: 3.30 uGal

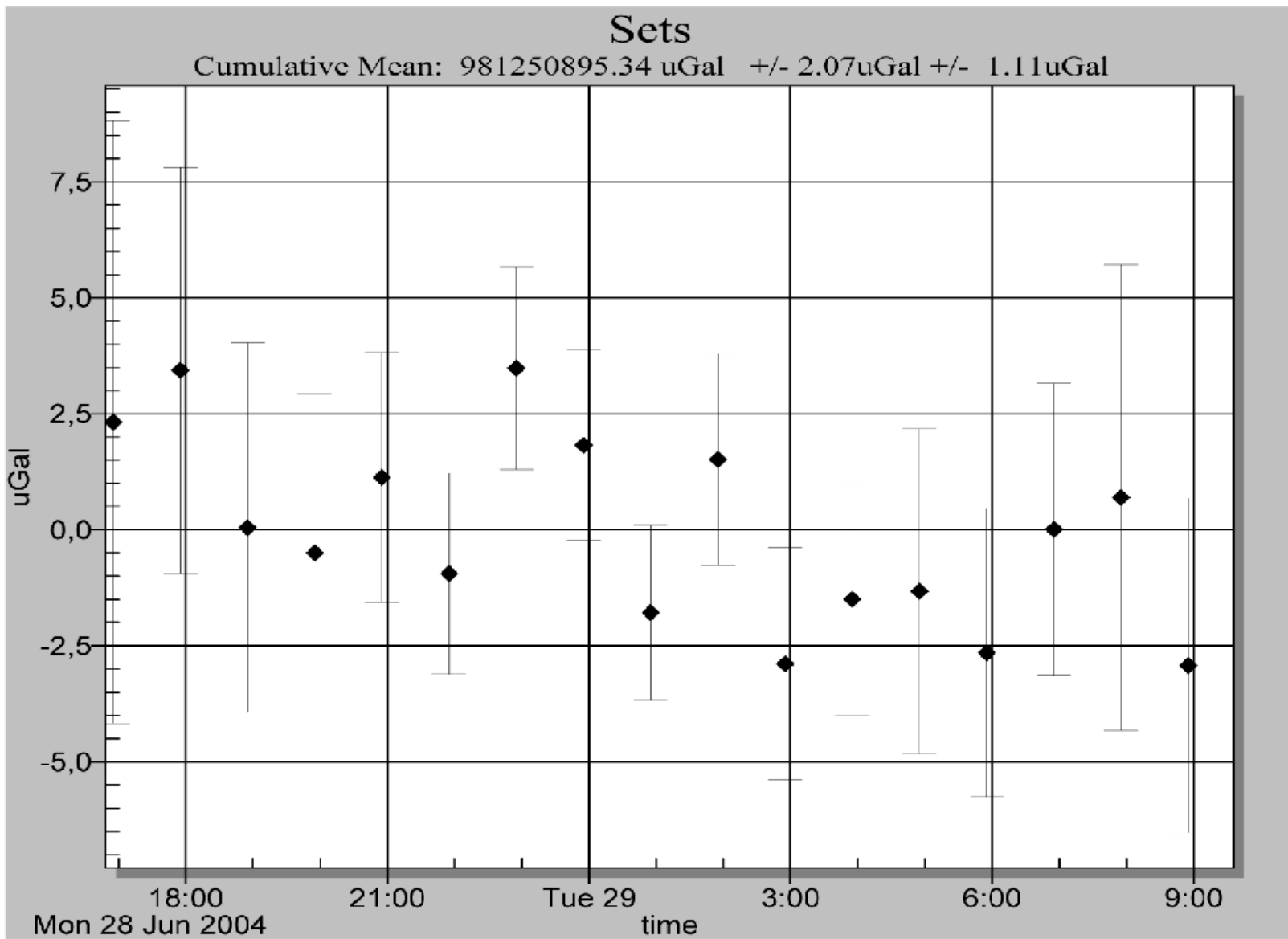
Datum Height: 413.50 uGal

Reference Xo: 0.00 uGal

# Set File

Source Data Filename: ko20040628  
g Acquisition Version: 1.0823  
g Processing Version: 4.0405

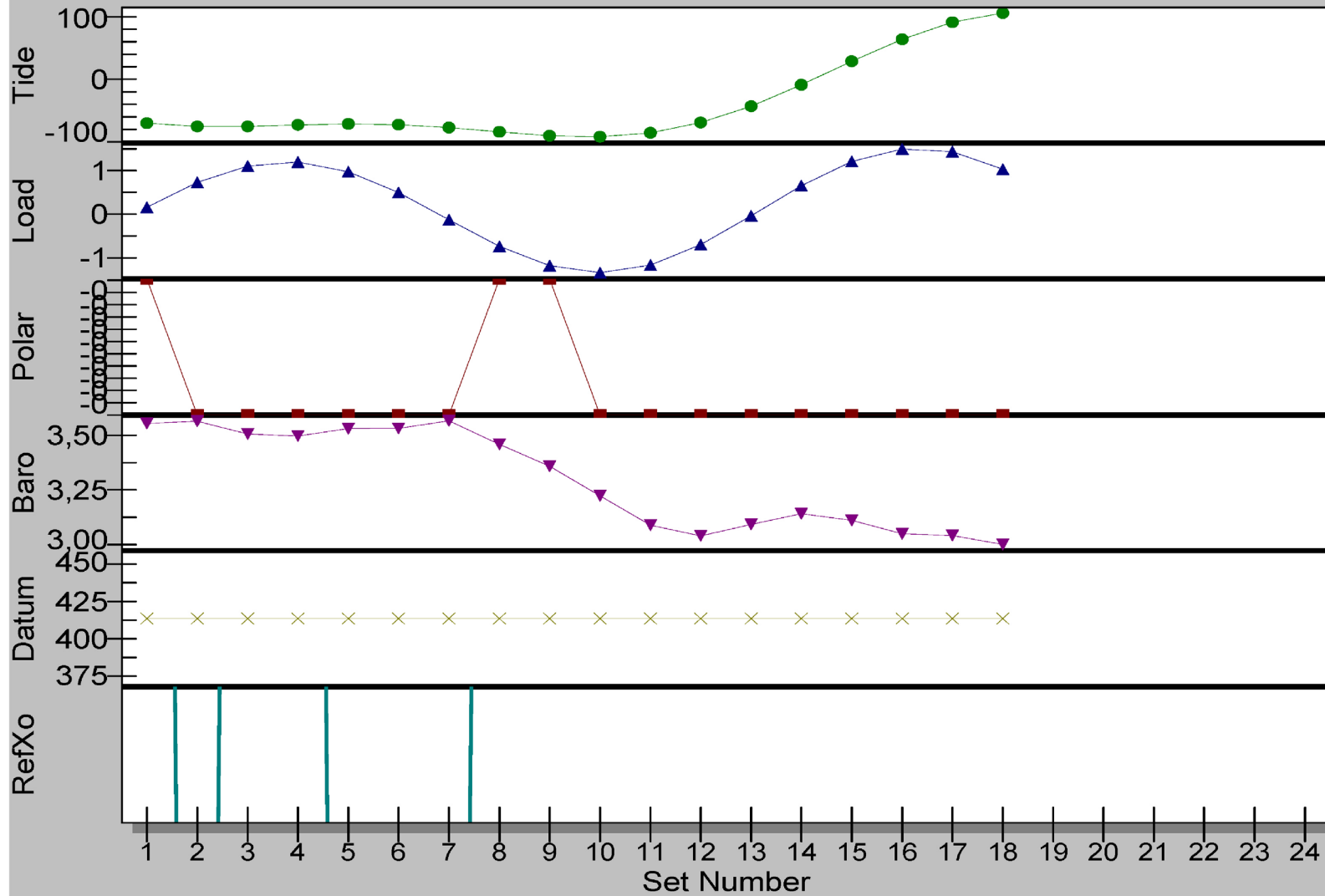
Set	Time	DOY	Year	Gravity	Sigma	Error	Uncert	Tide	Load	Baro	Polar	Datum	Refxo	Temp	Pres	Accept	Reject
1	15:55:09	180	2004	981250899.074	43.328	4.377		4.490	-70.090	0.159	3.553	-0.253	413.501	0.003	24.196	1020.139	98 2
2	16:55:08	180	2004	981250897.659	64.180	6.418		6.495	-75.370	0.727	3.564	-0.253	413.501	0.003	24.250	1020.173	100 0
3	17:55:08	180	2004	981250898.776	42.615	4.262		4.377	-75.307	1.105	3.506	-0.253	413.501	0.003	24.086	1019.980	100 0
4	18:55:08	180	2004	981250895.385	38.575	3.858		3.985	-72.945	1.197	3.496	-0.253	413.501	0.003	24.008	1019.948	100 0
5	19:55:08	180	2004	981250894.840	32.846	3.285		3.433	-71.347	0.977	3.530	-0.253	413.501	0.003	23.971	1020.062	100 0
6	20:55:08	180	2004	981250896.467	25.040	2.504		2.696	-72.644	0.495	3.531	-0.253	413.501	0.003	23.910	1020.065	100 0
7	21:55:08	180	2004	981250894.396	19.194	1.919		2.164	-77.356	-0.128	3.565	-0.253	413.501	0.003	23.887	1020.180	100 0
8	22:55:07	180	2004	981250898.820	19.328	1.943		2.185	-84.157	-0.739	3.458	-0.253	413.501	0.003	23.864	1019.823	99 1
9	23:55:11	180	2004	981250897.160	17.828	1.792		2.052	-90.186	-1.182	3.358	-0.253	413.501	0.003	23.853	1019.487	99 1
10	00:55:08	181	2004	981250893.552	16.020	1.602		1.889	-91.771	-1.341	3.223	-0.253	413.501	0.003	23.846	1019.038	100 0
11	01:55:08	181	2004	981250896.853	20.423	2.042		2.274	-85.506	-1.168	3.088	-0.253	413.501	0.003	23.811	1018.589	100 0
12	02:55:08	181	2004	981250892.449	22.883	2.288		2.497	-69.252	-0.698	3.040	-0.253	413.501	0.003	23.795	1018.427	100 0
13	03:55:08	181	2004	981250893.841	22.858	2.286		2.495	-42.930	-0.038	3.093	-0.253	413.501	0.003	23.763	1018.603	100 0
14	04:55:08	181	2004	981250894.016	33.617	3.362		3.507	-8.821	0.655	3.141	-0.253	413.501	0.003	23.751	1018.764	100 0
15	05:55:08	181	2004	981250892.687	29.359	2.936		3.102	28.701	1.212	3.111	-0.253	413.501	0.003	23.726	1018.663	100 0
16	06:55:08	181	2004	981250895.349	29.824	2.982		3.146	63.977	1.496	3.049	-0.253	413.501	0.003	23.747	1018.459	100 0
17	07:55:08	181	2004	981250896.034	49.186	4.919		5.019	91.215	1.432	3.042	-0.253	413.501	0.003	23.724	1018.435	100 0
18	08:55:08	181	2004	981250892.416	34.632	3.463		3.605	105.735	1.032	3.001	-0.253	413.501	0.003	23.791	1018.298	100 0





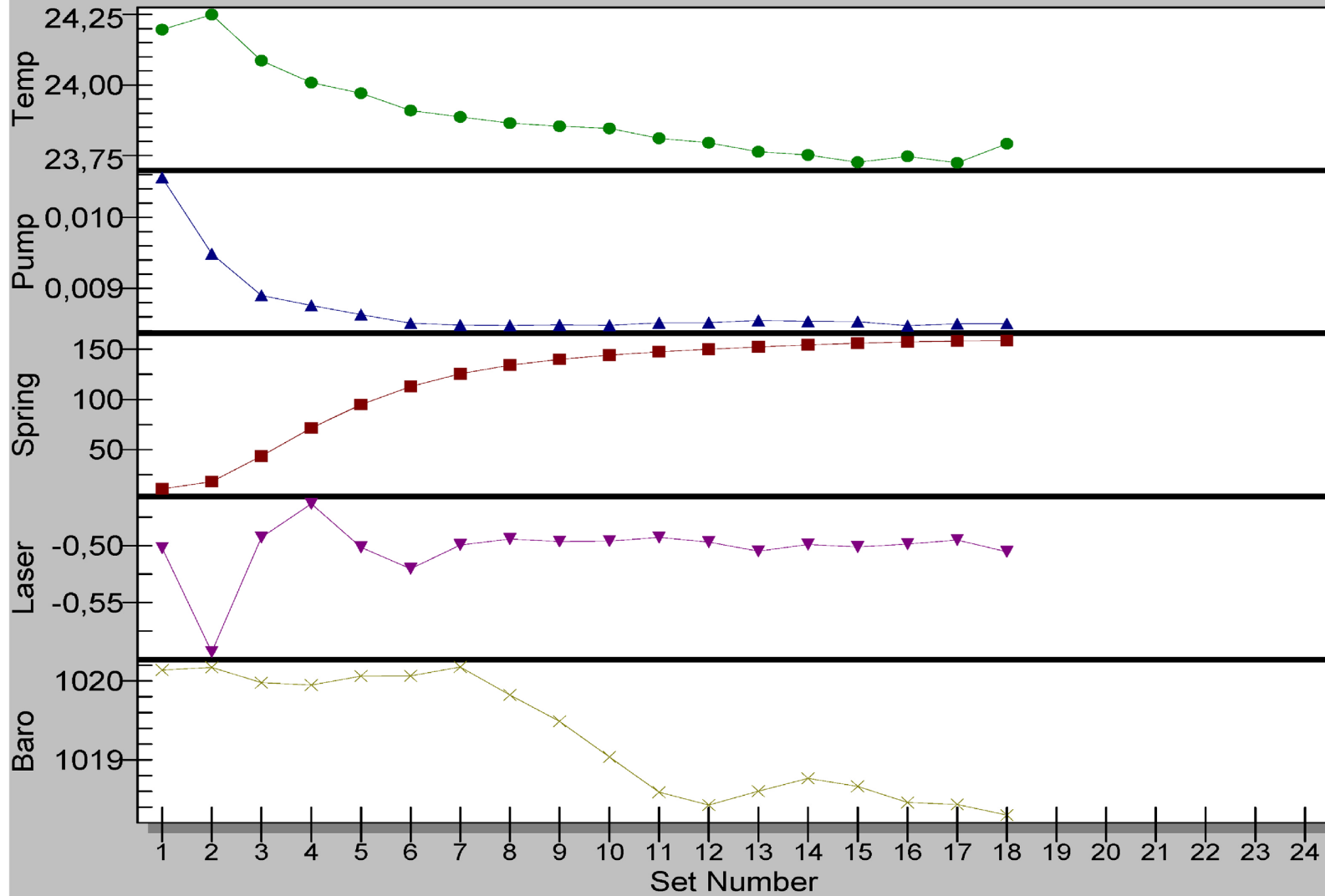
# Set Corrections

Current Set: 18



# Set Sensors

Current Set: 18



# Kootwijk

## Water Tower



<b>STATION: KOOTWIJK</b>												
City:	Kootwijk					Country:	The Netherlands					
Location:	Water Tower					Particularity:						
Situation:	Gravity Pier					Remarks:						
Date:	29-30 June 2004											
Code number:												
Latitude:	52.1785 degrees											
Longitude:	5.8103 degrees											
Elevation:	30 m											
Gradient:	-3.0 $\mu\text{gal}/\text{cm}$											
Reference height:	0.120 m + 1.164 m = 1.284 m											
Meter:	FG5											
S/N:	216											
<b>Ocean loading correction (<math>\mu\text{gal}</math>, -Greenwich degree)</b>												
Wave	M <sub>2</sub>	S <sub>2</sub>	K <sub>1</sub>	O <sub>1</sub>	N <sub>2</sub>	P <sub>1</sub>	K <sub>2</sub>	Q <sub>1</sub>	M <sub>f</sub>	M <sub>m</sub>	S <sub>sa</sub>	
Ampl.	0.171	0.053	0.019	0.011	0.037	0.006	0.013	0.003	0.0	0.0	0.0	
Phase:	317.6	341.9	298.2	212.9	297.5	282.3	345.2	124.6	0.0	0.0	0.0	
<b>Polar motion correction</b>						<b>Air pressure correction</b>						
X-coordinate:	0.068541			arc seconds			Nominal air pressure:			1009.65 mbar		
Y-coordinate:	0.517606			arc seconds			Barometric admittance factor:			0.3 $\mu\text{gal}/\text{mbar}$		
<b>Gravity</b>												
Set gravity mean:	<b>9 81 249 304.7</b>					microgal						
Set std. dev.:	2.1					microgal						
Mean std. dev.:	28.5					microgal						
Number of sets:	12											
Number of drops per set:	100											
Drop interval:	5 seconds											
Set interval:	60 minutes											
Nominal/datum height:	0.0 cm											
Author:	O. Francis					European Center for Geodynamics and Seismology						
Date:	September 13, 2004											

# Project file

Micro-g Solutions g Processing Report

File Created: 09/13/04, 10:27:56

Project Name: ko20040629

g Acquisition Version: 1.0823

g Processing Version: 4.0405

Company/Institution: ECGS

Operator: Olivier FRANCIS

## Station Data

Name: Kootwijk

Site Code: Water Tower

Lat: 52.17850 Long: 5.81030 Elev: 30.00 m

Reference Height: 12.00 cm

Datum Height: 0.00 cm

Gradient: -3.000 uGal/cm

Nominal Air Pressure: 1009.65 mBar

Barometric Admittance Factor: 0.30

Polar Motion Coord: 0.0685 " 0.5176 "

Earth Tide (ETGTAB) Selected

Potential Filename: C:\Program Files\Micro-g Solutions Inc\gWavefiles\Etcpot.dat

Delta Factor Filename: F:\absolu\DATA\2004\FG5-216\kootwijk\kootwijk.dff

## Delta Factors

Start	Stop	Amplitude	Phase Term
0.000000	0.002427	1.000000	0.0000 DC
0.002428	0.249951	1.160000	0.0000 Long
0.721500	0.906315	1.154250	0.0000 Q1
0.921941	0.974188	1.154240	0.0000 O1
0.989049	0.998028	1.149150	0.0000 P1
0.999853	1.216397	1.134890	0.0000 K1
1.719381	1.906462	1.161720	0.0000 N2
1.923766	1.976926	1.161720	0.0000 M2
1.991787	2.002885	1.161720	0.0000 S2
2.003032	2.182843	1.161720	0.0000 K2

Ocean Load ON, Filename: F:\absolu\DATA\2004\FG5-216\kootwijk\kootwijk.olf

Waves: M2 S2 K1 O1 N2 P1 K2 Q1 Mf Mm Ssa

Amplitude (uGal): 1.711 0.529 0.185 0.109 0.367 0.059 0.129 0.025 0.000 0.000 0.000

Phase (deg): -42.4 -18.1 -61.8 -147.1 -62.5 -77.7 -14.8 124.6 0.0 0.0 0.0

## Instrument Data

Meter Type: FG5

Meter S/N: 216

Factory Height: 116.40 cm

Rubidium Frequency: 10000000.01020 Hz

Laser: WEO (187)

ID: 632.99117754 nm (-0.09 V)

IE: 632.99119473 nm (-0.58 V)

IF: 632.99121259 nm (-0.97 V)

IG: 632.99123023 nm (-1.35 V)

IH: 632.99136890 nm (-1.87 V)

II: 632.99139822 nm (-1.64 V)

IJ: 632.99142704 nm (-1.44 V)

Modulation Frequency: 8333.420 Hz

#### Processing Results

Date: 06/30/04

Time: 01:04:07

DOY: 182

Year: 2004

Gravity: 981249304.74 uGal

Set Scatter: 2.06 uGal

Measurement Precision: 0.59 uGal

Total Uncertainty: 0.59 uGal

Number of Sets Collected: 12

Number of Sets Processed: 12

Set #s Processed: 1,2,3,4,5,6,7,8,9,10,11,12

Number of Sets NOT Processed: 0

Set #s NOT Processed:

Number of Drops/Set: 100

Total Drops Accepted: 1197

Total Drops Rejected: 3

Total Fringes Acquired: 700

Fringe Start: 20

Processed Fringes: 600

GuideCard Multiplex: 4

GuideCard Scale Factor: 250

#### Gravity Corrections

Earth Tide (ETGTAB): -64.86 uGal

Ocean Load: -0.00 uGal

Polar Motion: -0.29 uGal

Barometric Pressure: 1.68 uGal

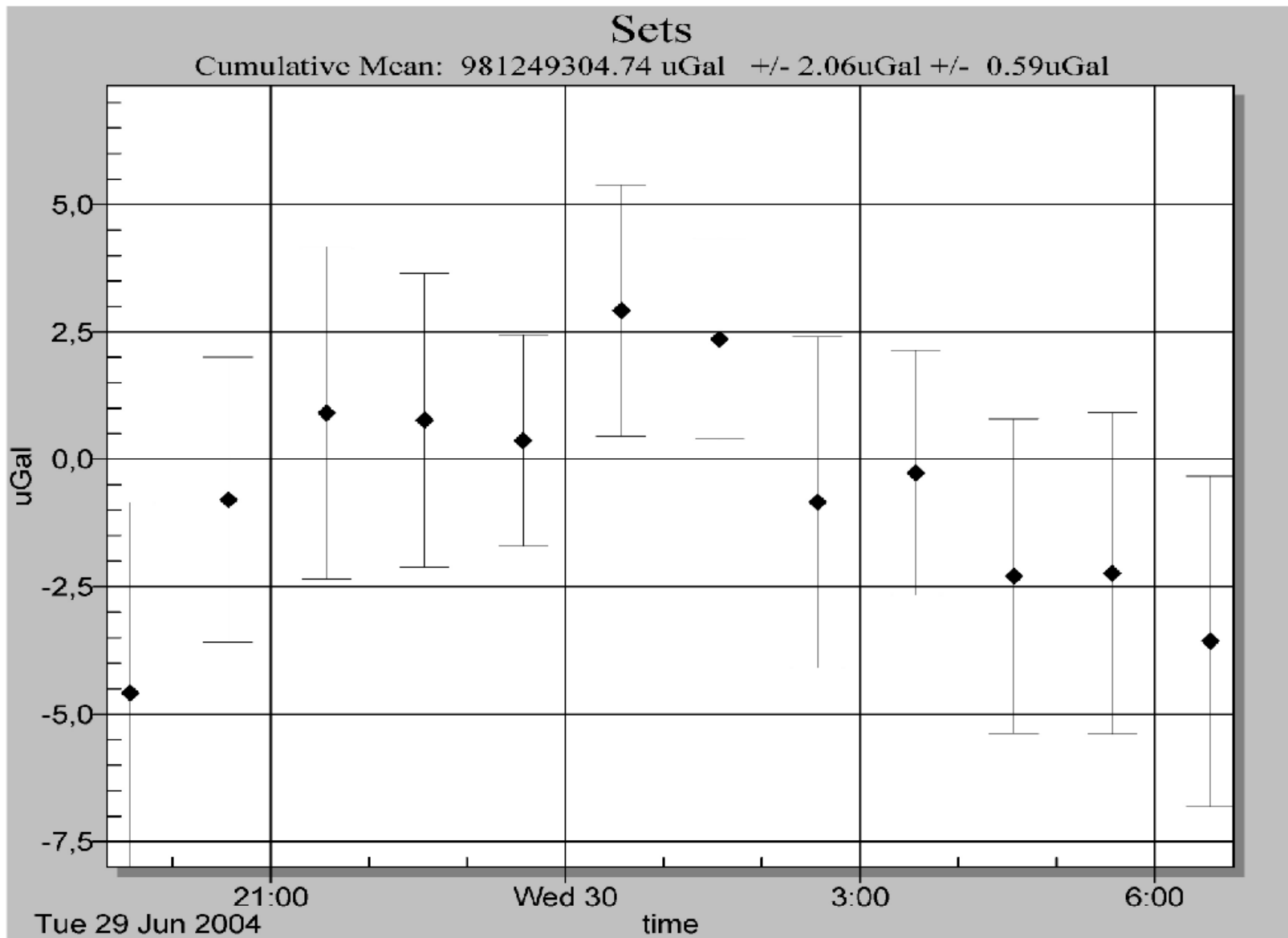
Datum Height: 385.20 uGal

Reference Xo: 0.00 uGal

# Set File

Source Data Filename: ko20040629  
g Acquisition Version: 1.0823  
g Processing Version: 4.0405

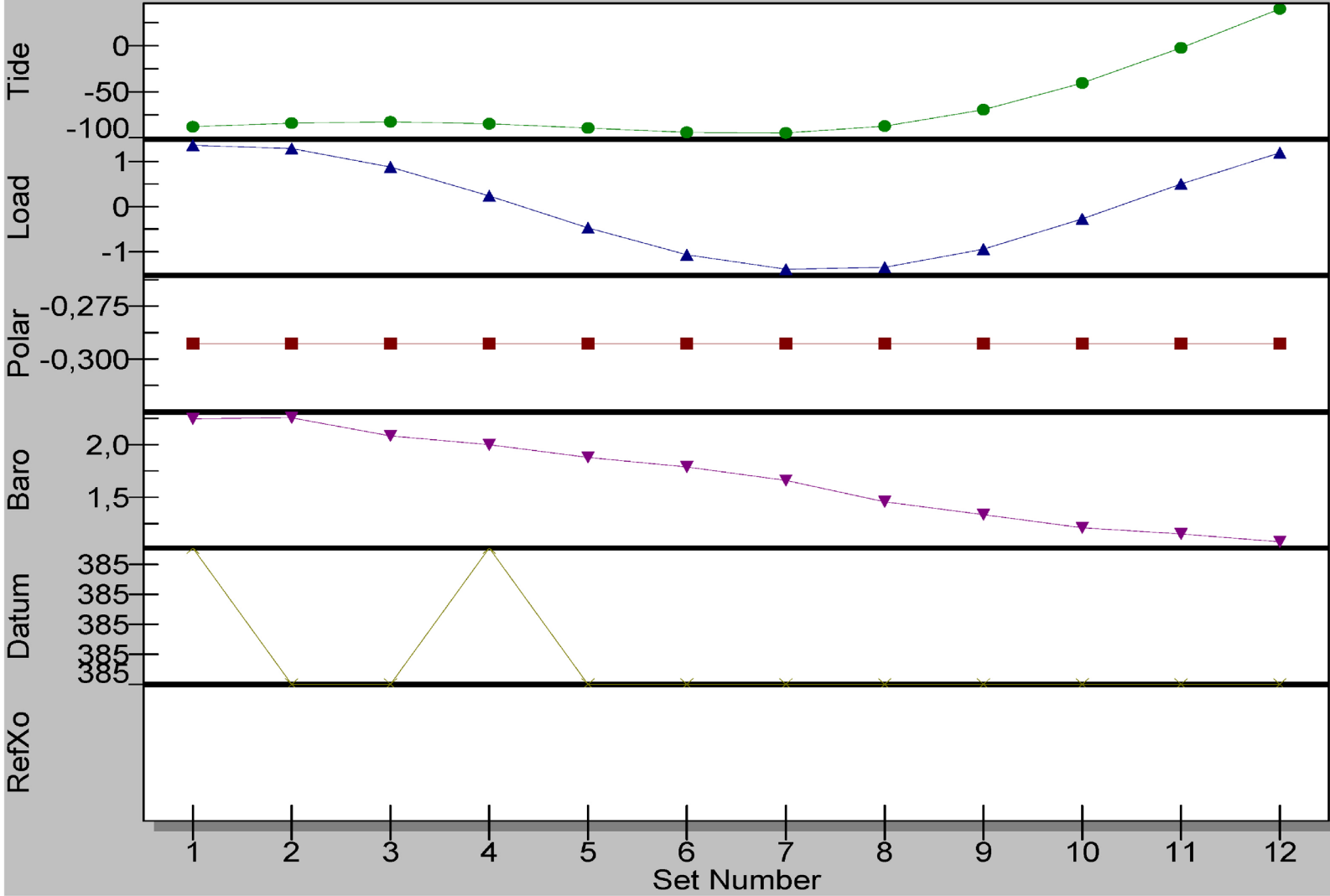
Set	Time	DOY	Year	Gravity	Sigma	ErrorUncert	Tide	Load	Baro	Polar	Datum	Refxo	Temp	Pres	Accept	Reject
1	19:34:08	181	2004	981249300.157	37.050	3.743	3.743	-87.987	1.363	2.246	-0.293	385.200	0.003	20.660	1017.139	98 2
2	20:34:07	181	2004	981249303.949	27.977	2.798	2.798	-84.258	1.288	2.255	-0.293	385.200	0.002	20.844	1017.167	100 0
3	21:34:07	181	2004	981249305.652	32.638	3.264	3.264	-82.811	0.877	2.083	-0.293	385.200	0.002	20.918	1016.595	100 0
4	22:34:05	181	2004	981249305.509	28.688	2.883	2.883	-84.873	0.235	2.000	-0.293	385.200	0.002	20.886	1016.319	99 1
5	23:34:07	181	2004	981249305.109	20.644	2.064	2.064	-89.582	-0.475	1.880	-0.293	385.200	0.002	20.928	1015.917	100 0
6	00:34:07	182	2004	981249307.658	24.617	2.462	2.462	-94.169	-1.069	1.789	-0.293	385.200	0.003	20.934	1015.616	100 0
7	01:34:07	182	2004	981249307.099	19.565	1.956	1.956	-94.742	-1.391	1.660	-0.293	385.200	0.002	20.961	1015.186	100 0
8	02:34:07	182	2004	981249303.901	32.483	3.248	3.248	-87.409	-1.350	1.456	-0.293	385.200	0.002	20.941	1014.505	100 0
9	03:34:07	182	2004	981249304.473	24.016	2.402	2.402	-69.487	-0.947	1.335	-0.293	385.200	0.003	20.934	1014.101	100 0
10	04:34:07	182	2004	981249302.447	30.871	3.087	3.087	-40.464	-0.275	1.211	-0.293	385.200	0.002	20.979	1013.687	100 0
11	05:34:07	182	2004	981249302.506	31.528	3.153	3.153	-2.466	0.504	1.152	-0.293	385.200	0.002	20.984	1013.490	100 0
12	06:34:07	182	2004	981249301.173	32.396	3.240	3.240	39.934	1.196	1.078	-0.293	385.200	0.003	20.991	1013.244	100 0

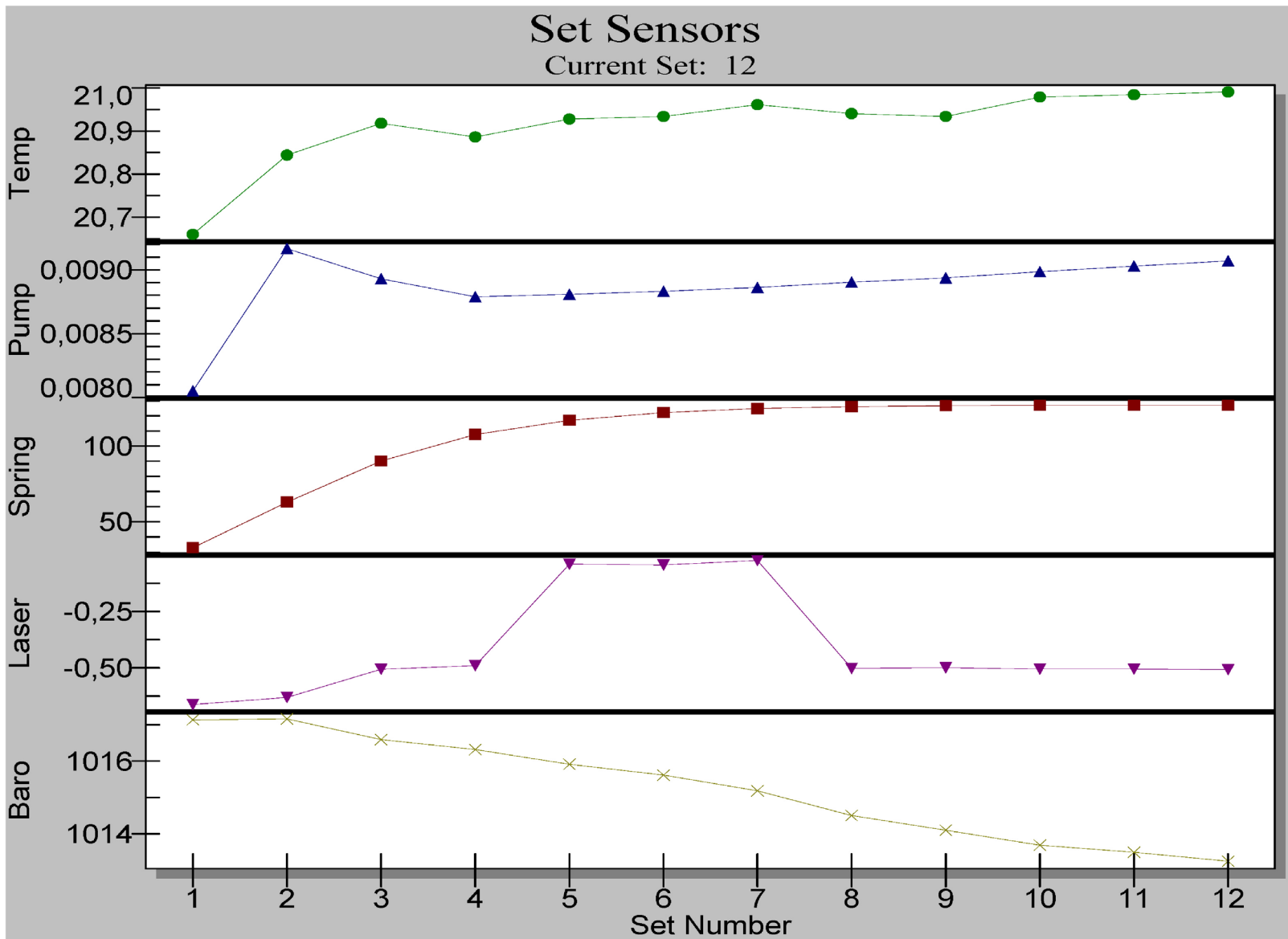




# Set Corrections

Current Set: 12





<b>STATION: KOOTWIJK</b>												
City:	Kootwijk					Country:	The Netherlands					
Location:	Water Tower					Particularity:						
Situation:	Gravity Pier					Remarks:						
Date:	30 June – 2 July 2004											
Code number:												
Latitude:	52.1785 degrees											
Longitude:	5.8103 degrees											
Elevation:	30 m											
Gradient:	-3.0 $\mu\text{gal}/\text{cm}$											
Reference height:	0.120 m + 1.164 m = 1.284 m											
Meter:	FG5											
S/N:	216											
<b>Ocean loading correction (<math>\mu\text{gal}</math>, -Greenwich degree)</b>												
Wave	M <sub>2</sub>	S <sub>2</sub>	K <sub>1</sub>	O <sub>1</sub>	N <sub>2</sub>	P <sub>1</sub>	K <sub>2</sub>	Q <sub>1</sub>	M <sub>f</sub>	M <sub>m</sub>	S <sub>sa</sub>	
Ampl.	0.171	0.053	0.019	0.011	0.037	0.006	0.013	0.003	0.0	0.0	0.0	
Phase:	317.6	341.9	298.2	212.9	297.5	282.3	345.2	124.6	0.0	0.0	0.0	
<b>Polar motion correction</b>						<b>Air pressure correction</b>						
X-coordinate:	0.68541			arc seconds			Nominal air pressure:			1009.65 mbar		
Y-coordinate:	0.517606			arc seconds			Barometric admittance factor:			0.3 $\mu\text{gal}/\text{mbar}$		
<b>Gravity</b>												
Set gravity mean:	<b>9 81 249 304.2</b>					Microgal						
Set std. dev.:	1.7					Microgal						
Mean std. dev.:	50.7					microgal						
Number of sets:	27											
Number of drops per set:	100											
Drop interval:	5 seconds											
Set interval:	60 minutes											
Nominal/datum height:	0.0 cm											
Author:	O. Francis					European Center for Geodynamics and Seismology						
Date:	September 14, 2004											

# Project File

Micro-g Solutions g Processing Report

File Created: 09/13/04, 10:33:24

Project Name: ko20040630

g Acquisition Version: 1.0823

g Processing Version: 4.0405

Company/Institution: ECGS

Operator: Olivier FRANCIS

## Station Data

Name: Kootwijk

Site Code: Water tower

Lat: 52.17850 Long: 5.81030 Elev: 30.00 m

Reference Height: 12.00 cm

Datum Height: 0.00 cm

Gradient: -3.000 uGal/cm

Nominal Air Pressure: 1009.65 mBar

Barometric Admittance Factor: 0.30

Polar Motion Coord: 0.0730 " 0.5161 "

Earth Tide (ETGTAB) Selected

Potential Filename: C:\Program Files\Micro-g Solutions Inc\gWavefiles\Etpot.dat

Delta Factor Filename: F:\absolu\DATA\2004\FG5-216\kootwijk\kootwijk.dff

## Delta Factors

Start	Stop	Amplitude	Phase Term
0.000000	0.002427	1.000000	0.0000 DC
0.002428	0.249951	1.160000	0.0000 Long
0.721500	0.906315	1.154250	0.0000 Q1
0.921941	0.974188	1.154240	0.0000 O1
0.989049	0.998028	1.149150	0.0000 P1
0.999853	1.216397	1.134890	0.0000 K1
1.719381	1.906462	1.161720	0.0000 N2
1.923766	1.976926	1.161720	0.0000 M2
1.991787	2.002885	1.161720	0.0000 S2
2.003032	2.182843	1.161720	0.0000 K2

Ocean Load ON, Filename: F:\absolu\DATA\2004\FG5-216\kootwijk\kootwijk.olf

Waves: M2 S2 K1 O1 N2 P1 K2 Q1 Mf Mm Ssa  
Amplitude (uGal): 1.711 0.529 0.185 0.109 0.367 0.059 0.129 0.025 0.000 0.000 0.000  
Phase (deg): -42.4 -18.1 -61.8 -147.1 -62.5 -77.7 -14.8 124.6 0.0 0.0 0.0

## Instrument Data

Meter Type: FG5

Meter S/N: 216

Factory Height: 116.40 cm

Rubidium Frequency: 10000000.01020 Hz

Laser: WEO (187)

ID: 632.99117754 nm (-0.09 V)

IE: 632.99119473 nm (-0.58 V)

IF: 632.99121259 nm (-0.97 V)

IG: 632.99123023 nm (-1.35 V)

IH: 632.99136890 nm (-1.87 V)

II: 632.99139822 nm (-1.64 V)

IJ: 632.99142704 nm (-1.44 V)

Modulation Frequency: 8333.420 Hz

Processing Results

Date: 07/01/04

Time: 09:19:08

DOY: 183

Year: 2004

Gravity: 981249304.18 uGal

Set Scatter: 1.68 uGal

Measurement Precision: 0.32 uGal

Total Uncertainty: 0.32 uGal

Number of Sets Collected: 27

Number of Sets Processed: 27

Set #s Processed: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27

Number of Sets NOT Processed: 0

Set #s NOT Processed:

Number of Drops/Set: 100

Total Drops Accepted: 2697

Total Drops Rejected: 3

Total Fringes Acquired: 700

Fringe Start: 20

Processed Fringes: 600

GuideCard Multiplex: 4

GuideCard Scale Factor: 250

Gravity Corrections

Earth Tide (ETGTAB): -6.50 uGal

Ocean Load: 0.14 uGal

Polar Motion: -0.38 uGal

Barometric Pressure: -1.07 uGal

Datum Height: 385.20 uGal

Reference Xo: 0.00 uGal

# Set File

Source Data Filename: ko20040630

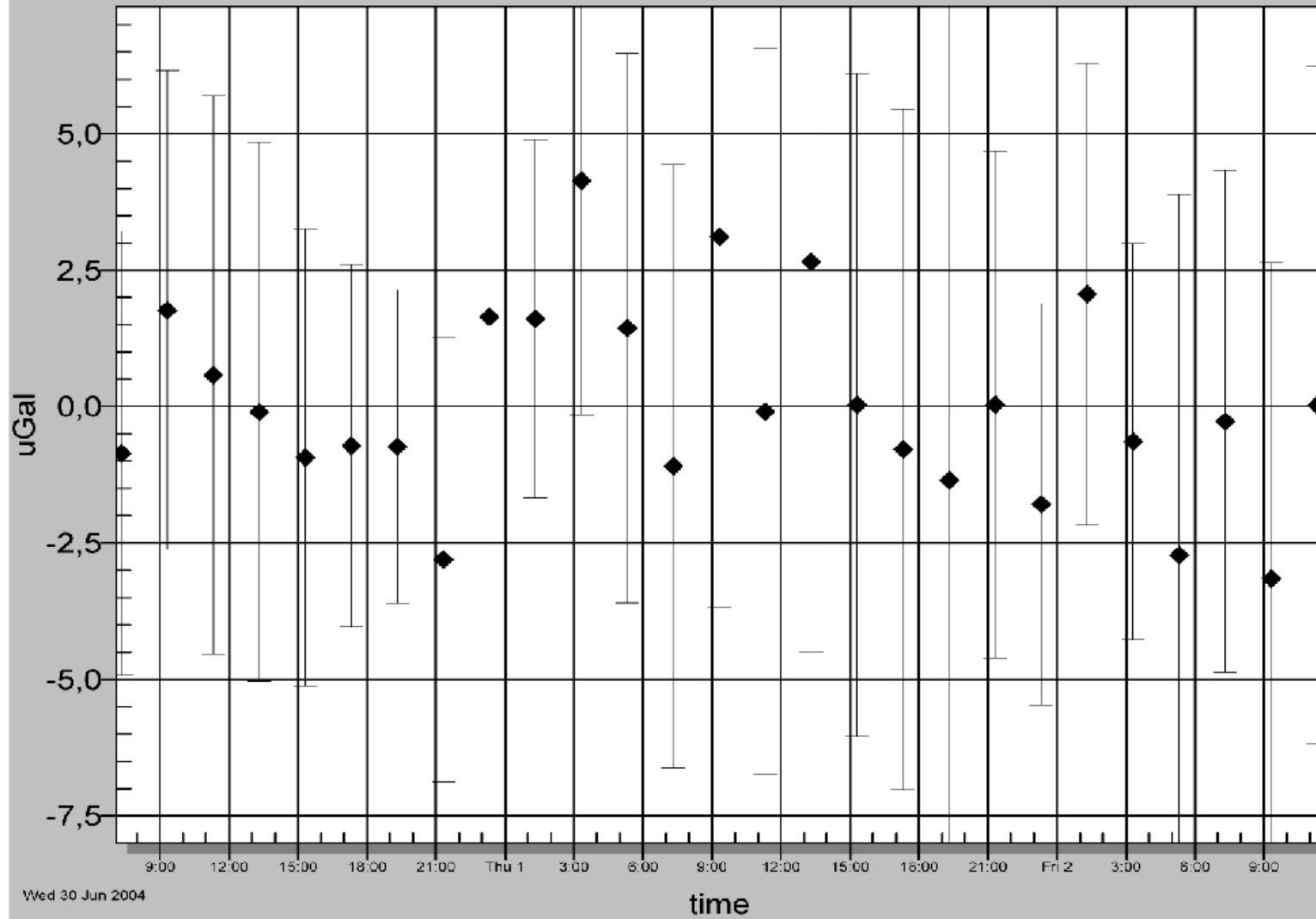
g Acquisition Version: 1.0823

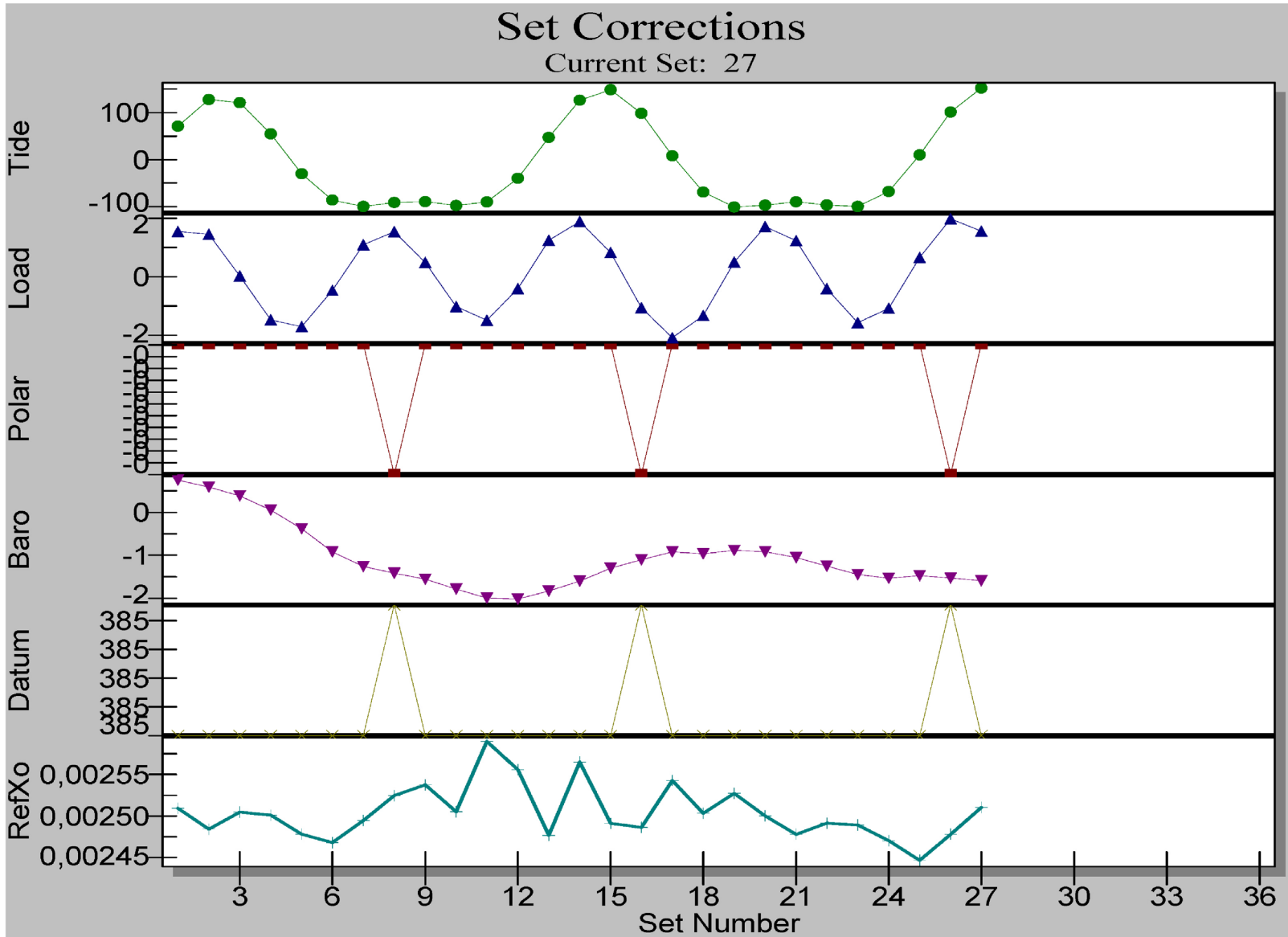
g Processing Version: 4.0405

Set	Time	DOY	Year	Gravity	Sigma	Error	Uncert	Tide	Load	Baro	Polar	Datum	Refxo	Temp	Pres	Accept	Reject
1	07:19:07	182	2004	981249303.321	40.706	4.071	4.071		70.916	1.550	0.748	-0.378	385.200	0.003	21.243	1012.146	100 0
2	09:19:07	182	2004	981249305.942	43.900	4.390	4.390		127.956	1.452	0.589	-0.378	385.200	0.002	20.928	1011.615	100 0
3	11:19:07	182	2004	981249304.756	51.170	5.117	5.117		121.217	0.028	0.383	-0.378	385.200	0.003	20.932	1010.929	100 0
4	13:19:07	182	2004	981249304.079	49.406	4.941	4.941		54.573	-1.475	0.054	-0.378	385.200	0.003	20.955	1009.833	100 0
5	15:19:07	182	2004	981249303.244	41.912	4.191	4.191		-29.826	-1.706	-0.383	-0.378	385.200	0.002	20.984	1008.375	100 0
6	17:19:07	182	2004	981249303.460	33.125	3.313	3.313		-86.064	-0.465	-0.920	-0.378	385.200	0.002	21.028	1006.583	100 0
7	19:19:07	182	2004	981249303.446	28.701	2.870	2.870		-99.484	1.097	-1.261	-0.378	385.200	0.002	21.063	1005.448	100 0
8	21:19:08	182	2004	981249301.375	40.510	4.071	4.071		-91.105	1.541	-1.418	-0.378	385.200	0.003	21.067	1004.925	99 1
9	23:19:07	182	2004	981249305.825	46.476	4.648	4.648		-89.309	0.488	-1.559	-0.378	385.200	0.003	21.078	1004.453	100 0
10	01:19:07	183	2004	981249305.788	32.886	3.289	3.289		-97.497	-1.018	-1.787	-0.378	385.200	0.003	21.095	1003.693	100 0
11	03:19:07	183	2004	981249308.318	42.907	4.291	4.291		-89.812	-1.488	-1.998	-0.378	385.200	0.003	21.096	1002.993	100 0
12	05:19:07	183	2004	981249305.616	50.379	5.038	5.038		-39.612	-0.406	-2.018	-0.378	385.200	0.003	21.118	1002.926	100 0
13	07:19:07	183	2004	981249303.084	55.298	5.530	5.530		46.988	1.247	-1.831	-0.378	385.200	0.002	21.125	1003.548	100 0
14	09:19:07	183	2004	981249307.289	67.838	6.784	6.784		126.315	1.888	-1.601	-0.378	385.200	0.003	21.124	1004.313	100 0
15	11:19:07	183	2004	981249304.087	66.505	6.650	6.650		148.563	0.824	-1.300	-0.378	385.200	0.002	21.114	1005.317	100 0
16	13:19:09	183	2004	981249306.833	71.156	7.151	7.151		98.419	-1.059	-1.102	-0.378	385.200	0.002	21.123	1005.976	99 1
17	15:19:07	183	2004	981249304.208	60.756	6.076	6.076		8.255	-2.081	-0.923	-0.378	385.200	0.003	21.126	1006.573	100 0
18	17:19:07	183	2004	981249303.395	62.325	6.232	6.232		-68.711	-1.327	-0.966	-0.378	385.200	0.003	21.134	1006.430	100 0
19	19:19:07	183	2004	981249302.827	89.523	8.952	8.952		-100.581	0.497	-0.886	-0.378	385.200	0.003	21.137	1006.698	100 0
20	21:19:07	183	2004	981249304.212	46.400	4.640	4.640		-96.882	1.712	-0.916	-0.378	385.200	0.003	21.145	1006.599	100 0
21	23:19:08	183	2004	981249302.389	36.812	3.681	3.681		-89.714	1.235	-1.050	-0.378	385.200	0.002	21.161	1006.150	100 0
22	01:19:08	184	2004	981249306.240	42.255	4.225	4.225		-96.212	-0.405	-1.252	-0.378	385.200	0.002	21.143	1005.479	100 0
23	03:19:08	184	2004	981249303.537	36.323	3.632	3.632		-99.596	-1.570	-1.447	-0.378	385.200	0.002	21.104	1004.829	100 0
24	05:19:08	184	2004	981249301.457	66.036	6.604	6.604		-67.543	-1.076	-1.536	-0.378	385.200	0.002	21.061	1004.530	100 0
25	07:19:08	184	2004	981249303.909	46.043	4.604	4.604		10.027	0.659	-1.475	-0.378	385.200	0.002	21.068	1004.734	100 0
26	09:19:08	184	2004	981249301.025	57.706	5.800	5.800		101.259	1.981	-1.533	-0.378	385.200	0.002	21.040	1004.541	99 1
27	11:19:08	184	2004	981249304.204	62.070	6.207	6.207		151.986	1.558	-1.591	-0.378	385.200	0.003	21.004	1004.347	100 0

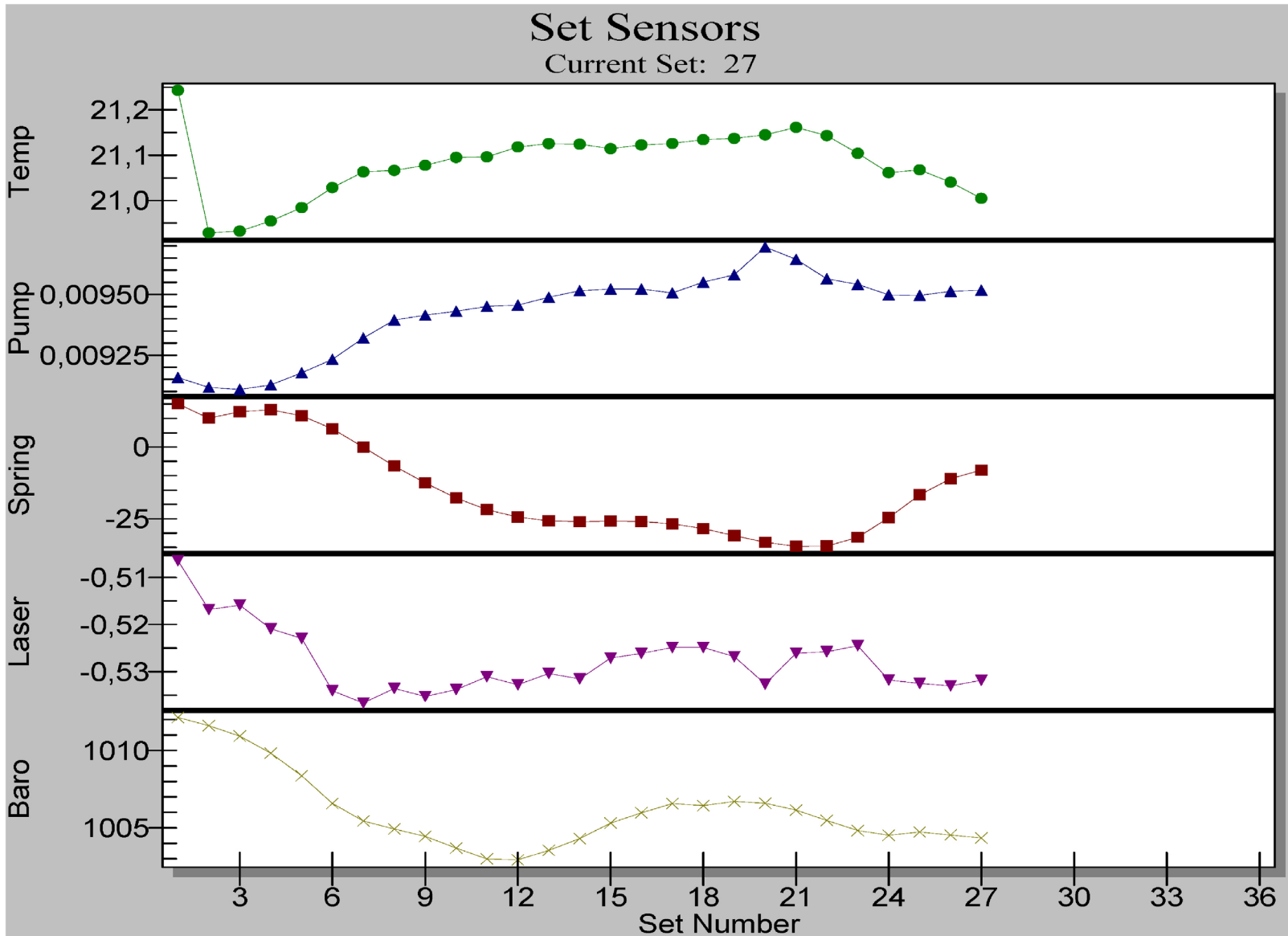
# Sets

Cumulative Mean: 981249304.18 uGal +/- 1.68uGal +/- 0.32uGal









# Westerbork



<b>STATION: WESTERBORK</b>												
City:	Westerbork					Country:	The Netherlands					
Location:	Radio Observatory					Particularity:						
Situation:	Gravity Pier					Remarks:						
Date:	24-28 June2004											
Code number:												
Latitude:	52.9148 degrees											
Longitude:	6.6038 degrees											
Elevation:	15.8 m											
Gradient:	-2.950 $\mu\text{gal}/\text{cm}$											
Reference height:	0.1265 m + 1.164 m = 1.2905 m											
Meter:	FG5											
S/N:	216											
<b>Ocean loading correction (<math>\mu\text{gal}</math>, -Greenwich degree)</b>												
Wave	M <sub>2</sub>	S <sub>2</sub>	K <sub>1</sub>	O <sub>1</sub>	N <sub>2</sub>	P <sub>1</sub>	K <sub>2</sub>	Q <sub>1</sub>	M <sub>f</sub>	M <sub>m</sub>	S <sub>sa</sub>	
Ampl.	0.147	0.044	0.018	0.010	0.033	0.006	0.011	0.002	0.0	0.0	0.0	
Phase:	327.5	347.4	299.3	215.7	304.4	282.0	353.0	115.7	0.0	0.0	0.0	
<b>Polar motion correction</b>						<b>Air pressure correction</b>						
X-coordinate:	0.061591			arc seconds			Nominal air pressure:			1011.35 mbar		
Y-coordinate:	0.519014			arc seconds			Barometric admittance factor:			0.3 $\mu\text{gal}/\text{mbar}$		
<b>Gravity</b>												
Set gravity mean:	<b>9 81 309 066.9</b>					microgal						
Set std. dev.:	2.4					microgal						
Mean std. dev.:	44.6					microgal						
Number of sets:	36											
Number of drops per set:	100											
Drop interval:	5 seconds											
Set interval:	60 minutes											
Nominal/datum height:	0.0 cm											
Author:	O. Francis					European Center for Geodynamics and Seismology						
Date:	September 14, 2004											

# Project file

Micro-g Solutions g Processing Report  
File Created: 09/13/04, 10:09:26

Project Name: we20040625  
g Acquisition Version: 1.0823  
g Processing Version: 4.0405

Company/Institution:  
Operator: Olivier

## Station Data

Name: Westerbork  
Site Code: Gravity point  
Lat: 52.91480 Long: 6.60380 Elev: 15.80 m  
Reference Height: 12.65 cm  
Datum Height: 0.00 cm  
Gradient: -2.950 uGal/cm  
Nominal Air Pressure: 1011.35 mBar  
Barometric Admittance Factor: 0.30  
Polar Motion Coord: 0.0616 " 0.5190 "  
Earth Tide (ETGTAB) Selected  
Potential Filename: C:\Program Files\Micro-g Solutions Inc\gWavefiles\Etcpot.dat  
Delta Factor Filename: F:\absolu\DATA\2004\FG5-216\westerbork\westerbork.dff  
Delta Factors

Start	Stop	Amplitude	Phase	Term
0.000000	0.002427	1.000000	0.0000	DC
0.002428	0.249951	1.160000	0.0000	Long
0.721500	0.906315	1.154250	0.0000	Q1
0.921941	0.974188	1.154240	0.0000	O1
0.989049	0.998028	1.149150	0.0000	P1
0.999853	1.216397	1.134890	0.0000	K1
1.719381	1.906462	1.161720	0.0000	N2
1.923766	1.976926	1.161720	0.0000	M2
1.991787	2.002885	1.161720	0.0000	S2
2.003032	2.182843	1.161720	0.0000	K2

Ocean Load ON, Filename: F:\absolu\DATA\2004\FG5-216\westerbork\westerbork.olf

Waves: M2 S2 K1 O1 N2 P1 K2 Q1 Mf Mm Ssa  
Amplitude (uGal): 1.473 0.444 0.175 0.099 0.328 0.057 0.107 0.022 0.000 0.000 0.000  
Phase (deg): -32.5 -12.6 -60.7 -144.3 -55.6 -78.0 -7.0 115.7 0.0 0.0 0.0

## Instrument Data

Meter Type: FG5  
Meter S/N: 216  
Factory Height: 116.40 cm  
Rubidium Frequency: 10000000.01020 Hz  
Laser: WEO (187)  
ID: 632.99117754 nm (-0.09 V)  
IE: 632.99119473 nm (-0.58 V)  
IF: 632.99121259 nm (-0.97 V)  
IG: 632.99123023 nm (-1.35 V)  
IH: 632.99136890 nm (-1.87 V)  
II: 632.99139822 nm (-1.64 V)  
IJ: 632.99142704 nm (-1.44 V)

Modulation Frequency: 8333.420 Hz

#### Processing Results

Date: 06/26/04

Time: 18:34:20

DOY: 178

Year: 2004

Gravity: 981309066.89 uGal

Set Scatter: 2.37 uGal

Measurement Precision: 0.40 uGal

Total Uncertainty: 0.40 uGal

Number of Sets Collected: 36

Number of Sets Processed: 36

Set #s Processed:

1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36

Number of Sets NOT Processed: 0

Set #s NOT Processed:

Number of Drops/Set: 100

Total Drops Accepted: 3591

Total Drops Rejected: 9

Total Fringes Acquired: 700

Fringe Start: 20

Processed Fringes: 600

GuideCard Multiplex: 4

GuideCard Scale Factor: 250

#### Gravity Corrections

Earth Tide (ETGTAB): -33.10 uGal

Ocean Load: -0.03 uGal

Polar Motion: -0.03 uGal

Barometric Pressure: 1.32 uGal

Datum Height: 380.70 uGal

Reference Xo: 0.00 uGal



# Set File

Source Data Filename: we20040625

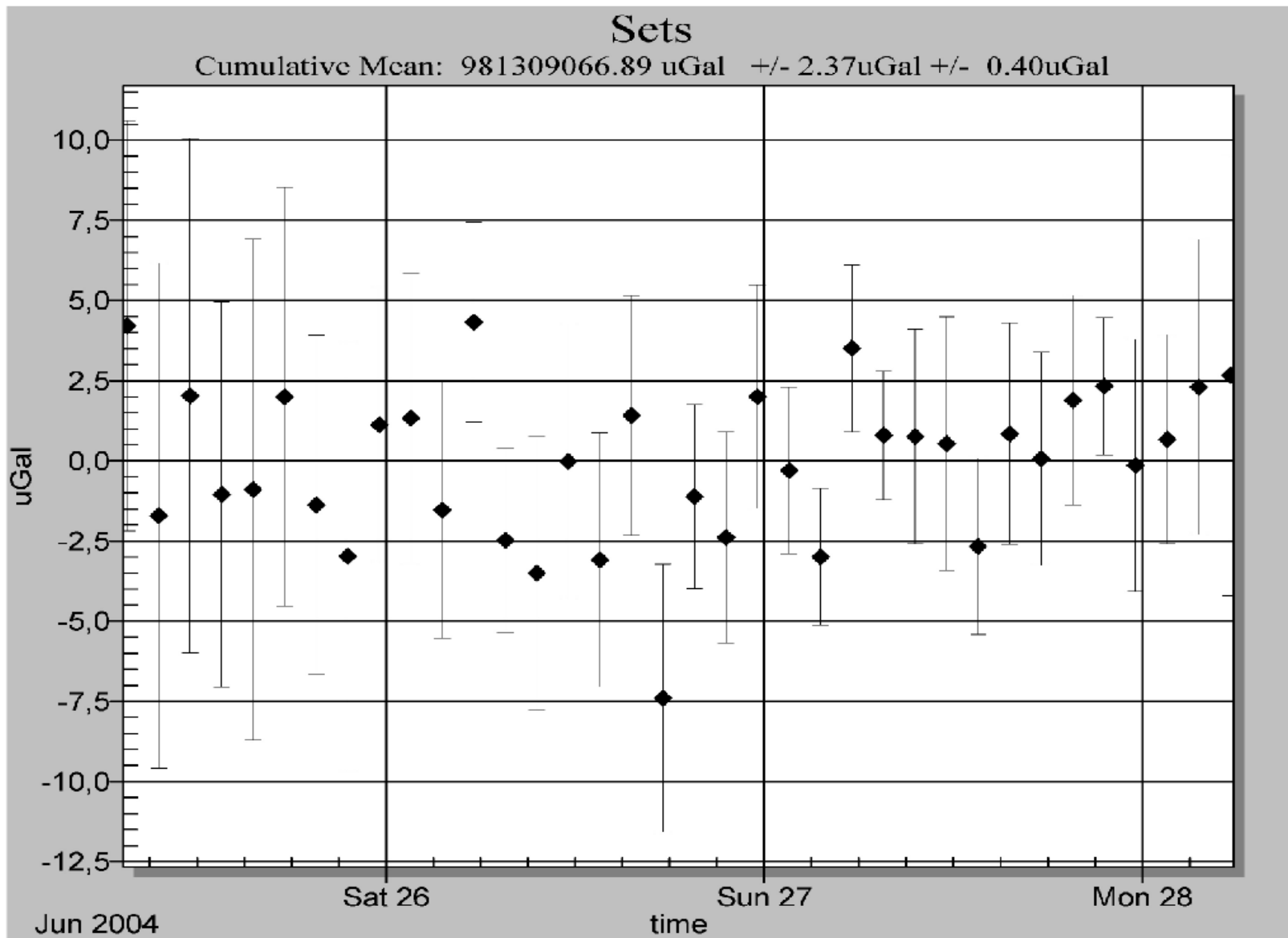
g Acquisition Version: 1.0823

g Processing Version: 4.0405

Set	Time	DOY	Year	Gravity	Sigma	Error	Uncert	Tide	Load	Baro	Polar	Datum	Refxo	Temp	Pres	Accept	Reject
1	07:34:19	177	2004	981309071.105	63.984	6.398	6.398	-19.599	-0.470	-1.195	-0.028	380.697	0.003	23.243	1007.370	100	0
2	09:34:19	177	2004	981309065.186	78.784	7.878	7.878	-25.343	-0.896	-0.541	-0.028	380.697	0.003	22.850	1009.549	100	0
3	11:34:19	177	2004	981309068.919	80.235	8.024	8.024	-24.601	-0.322	-0.046	-0.028	380.697	0.003	22.873	1011.200	100	0
4	13:34:21	177	2004	981309065.840	59.447	6.005	6.005	-12.884	0.663	0.529	-0.028	380.697	0.003	22.948	1013.116	98	2
5	15:34:19	177	2004	981309065.999	78.141	7.814	7.814	-1.299	1.069	1.109	-0.028	380.697	0.003	22.985	1015.050	100	0
6	17:34:19	177	2004	981309068.884	65.336	6.534	6.534	-6.212	0.447	1.534	-0.028	380.697	0.003	22.866	1016.466	100	0
7	19:34:20	177	2004	981309065.512	52.598	5.286	5.286	-32.446	-0.687	1.774	-0.028	380.697	0.003	22.641	1017.265	99	1
8	21:34:19	177	2004	981309063.913	66.970	6.697	6.697	-65.796	-1.326	2.051	-0.028	380.697	0.003	22.495	1018.191	100	0
9	23:34:19	177	2004	981309068.013	42.624	4.262	4.262	-82.830	-0.892	2.240	-0.028	380.697	0.002	22.492	1018.819	100	0
10	01:34:21	178	2004	981309068.223	44.981	4.521	4.521	-69.985	0.239	2.289	-0.028	380.697	0.003	22.364	1018.983	99	1
11	03:34:19	178	2004	981309065.357	39.978	3.998	3.998	-35.432	1.087	2.395	-0.028	380.697	0.003	22.267	1019.336	100	0
12	05:34:19	178	2004	981309071.213	31.213	3.121	3.121	-2.821	0.956	2.416	-0.028	380.697	0.003	22.319	1019.407	100	0
13	07:34:26	178	2004	981309064.409	28.236	2.867	2.867	7.774	0.045	2.561	-0.028	380.697	0.003	22.595	1019.889	97	3
14	09:34:19	178	2004	981309063.390	42.828	4.283	4.283	-4.747	-0.761	2.550	-0.028	380.697	0.003	22.868	1019.853	100	0
15	11:34:19	178	2004	981309066.883	42.455	4.246	4.246	-24.155	-0.723	2.397	-0.028	380.697	0.003	22.894	1019.343	100	0
16	13:34:19	178	2004	981309063.803	39.570	3.957	3.957	-33.397	0.084	2.209	-0.028	380.697	0.003	22.957	1018.716	100	0
17	15:34:19	178	2004	981309068.307	37.326	3.733	3.733	-30.466	0.855	2.047	-0.028	380.697	0.003	22.991	1018.178	100	0
18	17:34:19	178	2004	981309059.493	41.701	4.170	4.170	-28.808	0.816	1.899	-0.028	380.697	0.003	23.012	1017.683	100	0
19	19:34:19	178	2004	981309065.780	28.669	2.867	2.867	-42.001	-0.052	1.779	-0.028	380.697	0.003	22.969	1017.284	100	0
20	21:34:19	178	2004	981309064.505	32.941	3.294	3.294	-67.439	-0.987	1.780	-0.028	380.697	0.002	22.895	1017.286	100	0
21	23:34:19	178	2004	981309068.895	34.776	3.478	3.478	-85.266	-1.137	1.615	-0.028	380.697	0.003	22.857	1016.736	100	0
22	01:34:19	179	2004	981309066.592	25.960	2.596	2.596	-74.916	-0.340	1.090	-0.028	380.697	0.002	22.828	1014.985	100	0
23	03:34:22	179	2004	981309063.899	21.226	2.133	2.133	-34.857	0.726	0.755	-0.028	380.697	0.002	22.817	1013.870	99	1
24	05:34:19	179	2004	981309070.407	26.056	2.606	2.606	12.769	1.144	0.702	-0.028	380.697	0.003	22.839	1013.692	100	0
25	07:34:19	179	2004	981309067.690	20.072	2.007	2.007	38.274	0.586	0.513	-0.028	380.697	0.003	22.960	1013.063	100	0
26	09:34:20	179	2004	981309067.648	33.447	3.345	3.345	27.591	-0.408	0.447	-0.028	380.697	0.003	23.079	1012.844	100	0
27	11:34:20	179	2004	981309067.427	39.536	3.954	3.954	-7.392	-0.926	0.541	-0.028	380.697	0.003	23.119	1013.156	100	0
28	13:34:20	179	2004	981309064.222	27.316	2.745	2.745	-40.603	-0.518	0.744	-0.028	380.697	0.002	23.168	1013.834	99	1
29	15:34:20	179	2004	981309067.731	34.504	3.450	3.450	-54.668	0.399	0.846	-0.028	380.697	0.002	23.237	1014.174	100	0
30	17:34:20	179	2004	981309066.957	33.296	3.330	3.330	-54.002	0.935	0.914	-0.028	380.697	0.003	23.233	1014.401	100	0
31	19:34:20	179	2004	981309068.785	32.707	3.271	3.271	-56.325	0.550	0.907	-0.028	380.697	0.003	23.207	1014.378	100	0

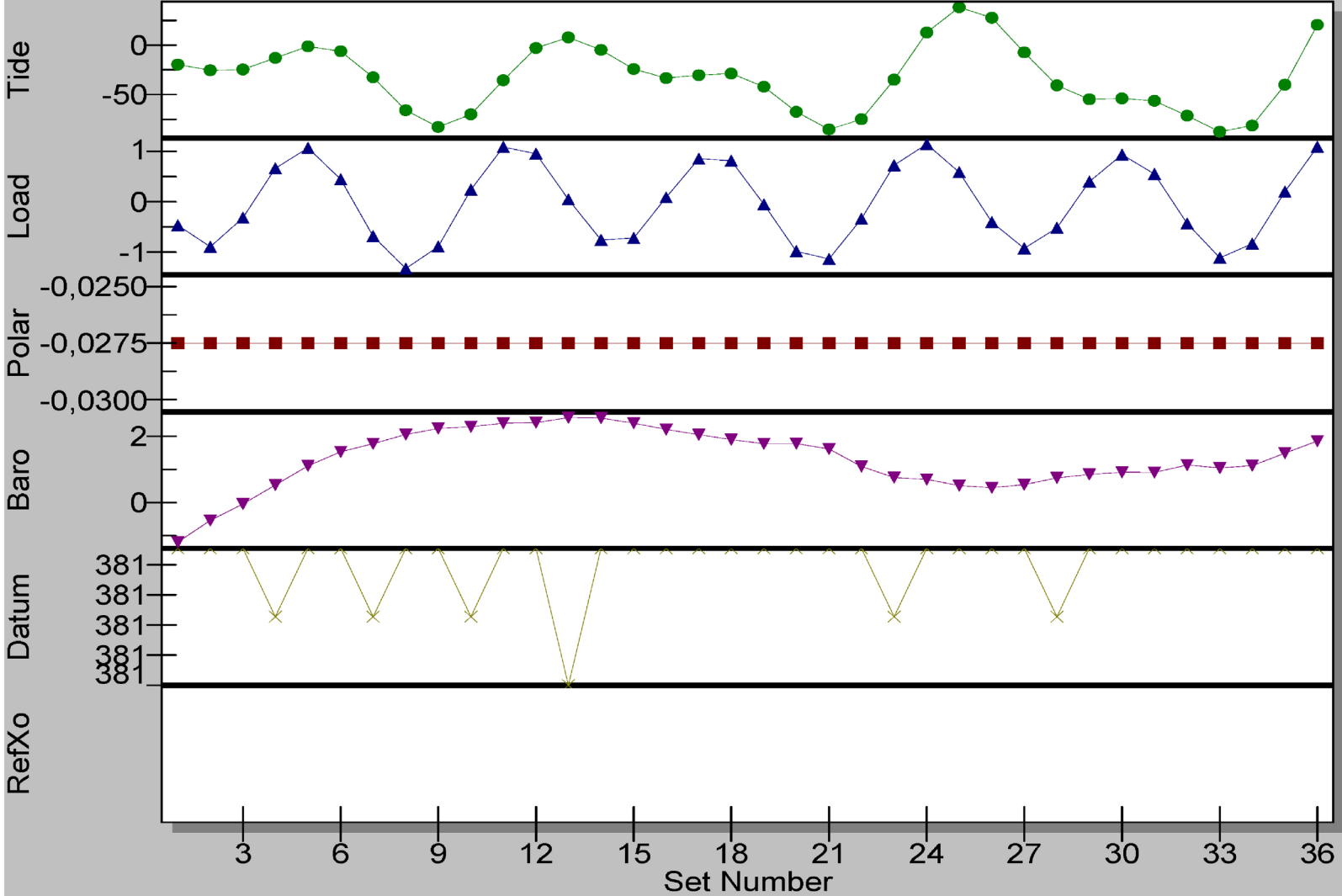
32	21:34:20	179	2004981309069.223	21.417	2.142	2.142	-71.319	-0.432	1.131	-0.028	380.697	0.003	23.106	1015.123	100	0
33	23:34:20	179	2004981309066.753	39.194	3.919	3.919	-87.526	-1.113	1.044	-0.028	380.697	0.003	23.174	1014.833	100	0
34	01:34:20	180	2004981309067.563	32.537	3.254	3.254	-81.231	-0.835	1.117	-0.028	380.697	0.003	23.140	1015.076	100	0
35	03:34:20	180	2004981309069.196	45.987	4.599	4.599	-40.112	0.199	1.491	-0.028	380.697	0.003	22.997	1016.322	100	0
36	05:34:20	180	2004981309069.554	68.763	6.876	6.876	20.525	1.090	1.857	-0.028	380.697	0.002	23.026	1017.544	100	0

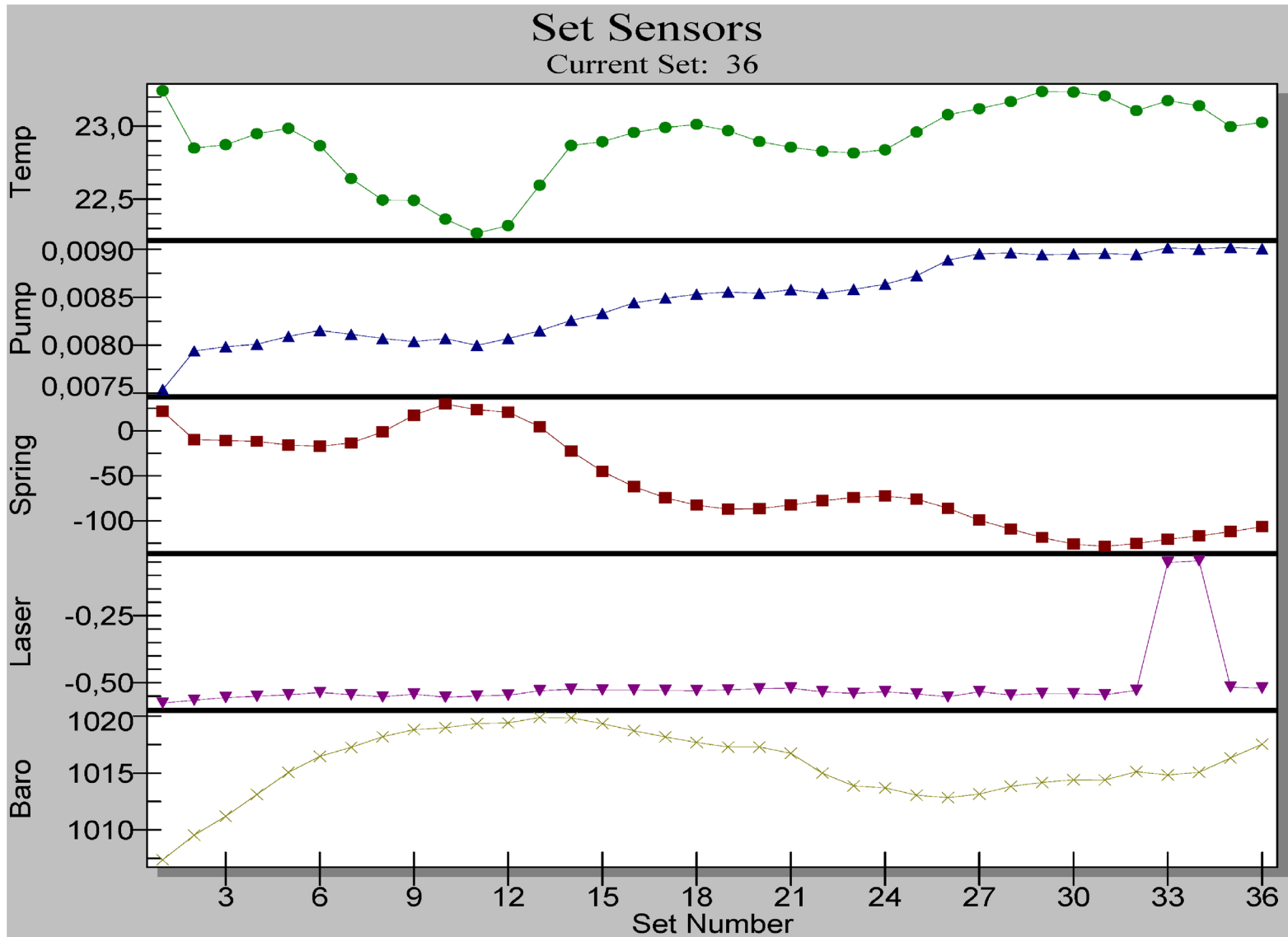




# Set Corrections

Current Set: 36





# Zundert



<b>STATION: ZUNDERT</b>												
City:	Zundert					Country:	The Netherlands					
Location:	Fire Station					Particularity:						
Situation:	Cleaning Room					Remarks:						
Date:	20-21 May 1999											
Code number:												
Latitude:	51.5950 degrees											
Longitude:	4.7796 degrees											
Elevation:	2 m											
Gradient:	-2.993 $\mu\text{gal}/\text{cm}$											
Reference height:	0.1295 m + 1.164 m = 1.2935 m											
Meter:	FG5											
S/N:	216											
<b>Ocean loading correction (<math>\mu\text{gal}</math>, -Greenwich degree)</b>												
Wave	M <sub>2</sub>	S <sub>2</sub>	K <sub>1</sub>	O <sub>1</sub>	N <sub>2</sub>	P <sub>1</sub>	K <sub>2</sub>	Q <sub>1</sub>	M <sub>f</sub>	M <sub>m</sub>	S <sub>sa</sub>	
Ampl.	0.186	0.059	0.020	0.011	0.039	0.006	0.014	0.003	0.0	0.0	0.0	
Phase:	308.4	334.0	294.9	210.0	291.6	279.7	334.9	125.9	0.0	0.0	0.0	
<b>Polar motion correction</b>						<b>Air pressure correction</b>						
X-coordinate:	0.078391			arc seconds			Nominal air pressure:			1013.01 mbar		
Y-coordinate:	0.515259			arc seconds			Barometric admittance factor:			0.3 $\mu\text{gal}/\text{mbar}$		
<b>Gravity</b>												
Set gravity mean:	<b>9 81 196 837.6</b>					microgal						
Set std. dev.:	4.9					microgal						
Mean std. dev.:	34.4					microgal						
Number of sets:	13											
Number of drops per set:	100											
Drop interval:	10 seconds											
Set interval:	60 minutes											
Nominal/datum height:	0.0 cm											
Author:	O. Francis					European Center for Geodynamics and Seismology						
Date:	September 14, 2004											

# Project file

Micro-g Solutions g Processing Report

File Created: 09/14/04, 09:37:55

Project Name: zu20040702

g Acquisition Version: 1.0823

g Processing Version: 4.0405

Company/Institution:

Operator: Olivier

## Station Data

Name: Zundert

Site Code: Fire Station

Lat: 51.59500 Long: 4.77960 Elev: 2.00 m

Reference Height: 12.95 cm

Datum Height: 0.00 cm

Gradient: -2.993 uGal/cm

Nominal Air Pressure: 1013.01 mBar

Barometric Admittance Factor: 0.30

Polar Motion Coord: 0.0784 " 0.5153 "

Earth Tide (ETGTAB) Selected

Potential Filename: C:\Program Files\Micro-g Solutions Inc\gWavefiles\Etcpot.dat

Delta Factor Filename: F:\absolu\DATA\2004\FG5-216\zundert\OceanLoad.dff

## Delta Factors

Start	Stop	Amplitude	Phase	Term
0.000000	0.002427	1.000000	0.0000	DC
0.002428	0.249951	1.160000	0.0000	Long
0.721500	0.906315	1.154250	0.0000	Q1
0.921941	0.974188	1.154240	0.0000	O1
0.989049	0.998028	1.149150	0.0000	P1
0.999853	1.216397	1.134890	0.0000	K1
1.719381	1.906462	1.161720	0.0000	N2
1.923766	1.976926	1.161720	0.0000	M2
1.991787	2.002885	1.161720	0.0000	S2
2.003032	2.182843	1.161720	0.0000	K2
2.753244	3.081254	1.07338	0.0000	M3
3.791964	3.937897	1.03900	0.0000	M4

Ocean Load ON, Filename: F:\absolu\DATA\2004\FG5-216\zundert\OceanLoad.olf

Waves: M2 S2 K1 O1 N2 P1 K2 Q1 Mf Mm Ssa  
Amplitude (uGal): 1.857 0.593 0.202 0.111 0.389 0.063 0.143 0.026 0.000 0.000 0.000  
Phase (deg): -51.6 -26.0 -65.1 -150.0 -68.4 -80.3 -25.1 125.9 0.0 0.0 0.0

## Instrument Data

Meter Type: FG5

Meter S/N: 216

Factory Height: 116.40 cm

Rubidium Frequency: 10000000.01020 Hz

Laser: WEO (187)

ID: 632.99117754 nm (-0.09 V)

IE: 632.99119473 nm (-0.58 V)

IF: 632.99121259 nm (-0.97 V)

IG: 632.99123023 nm (-1.35 V)

IH: 632.99136890 nm (-1.87 V)

II: 632.99139822 nm (-1.64 V)  
IJ: 632.99142704 nm (-1.44 V)  
Modulation Frequency: 8333.420 Hz

#### Processing Results

Date: 07/03/04  
Time: 00:17:02  
DOY: 185  
Year: 2004  
Gravity: 981196837.63 uGal  
Set Scatter: 4.91 uGal  
Measurement Precision: 1.36 uGal  
Total Uncertainty: 1.36 uGal  
Number of Sets Collected: 13  
Number of Sets Processed: 13  
Set #s Processed: 1,2,3,4,5,6,7,8,9,10,11,12,13  
Number of Sets NOT Processed: 0  
Set #s NOT Processed:  
Number of Drops/Set: 100  
Total Drops Accepted: 1284  
Total Drops Rejected: 16  
Total Fringes Acquired: 700  
Fringe Start: 20  
Processed Fringes: 600  
GuideCard Multiplex: 4  
GuideCard Scale Factor: 250

#### Gravity Corrections

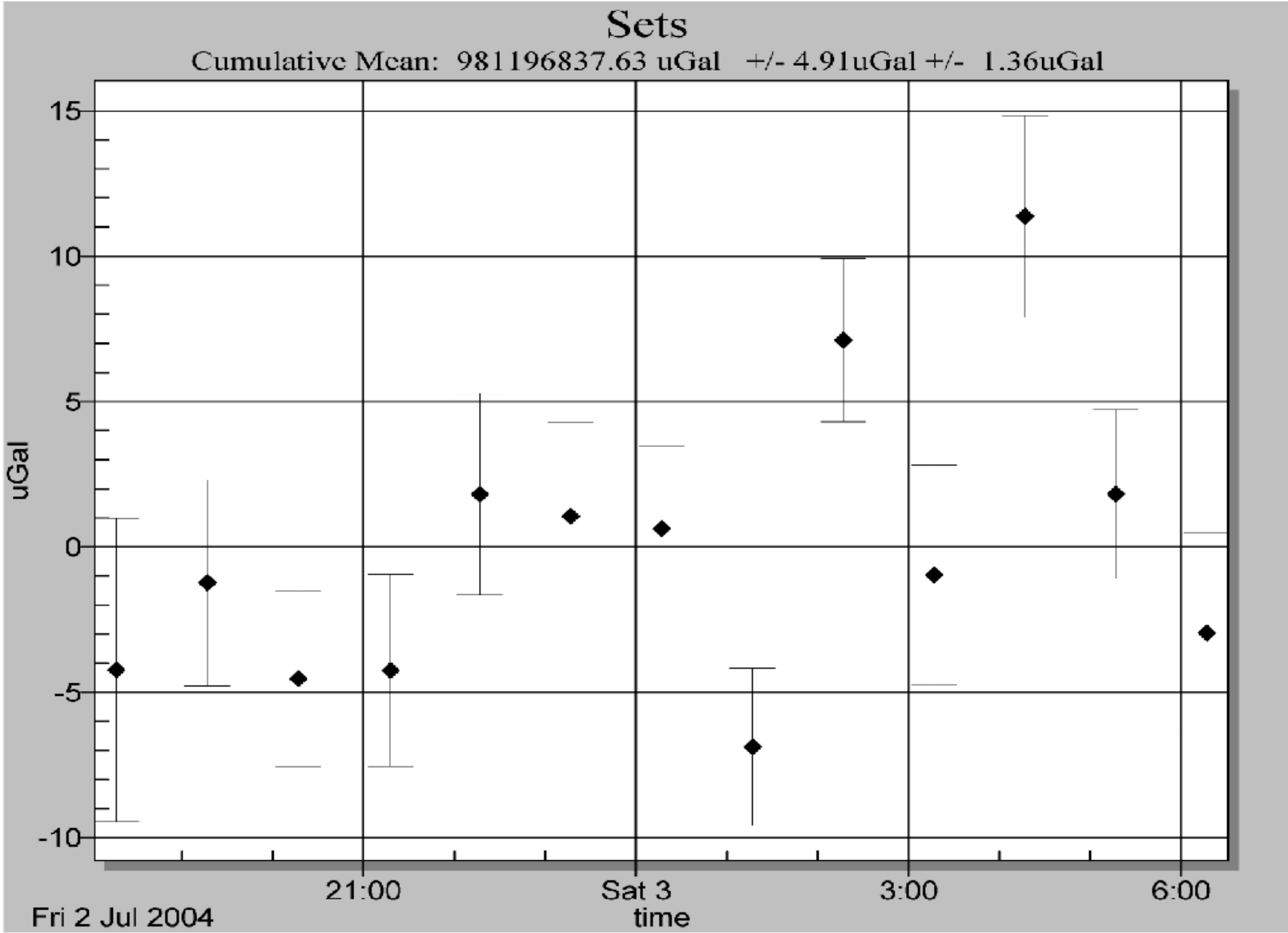
Earth Tide (ETGTAB): -90.43 uGal  
Ocean Load: -0.02 uGal  
Polar Motion: -0.66 uGal  
Barometric Pressure: -0.93 uGal  
Datum Height: 387.14 uGal  
Reference Xo: 0.00 uGal

# Set File

Source Data Filename: zu20040702  
g Acquisition Version: 1.0823  
g Processing Version: 4.0405

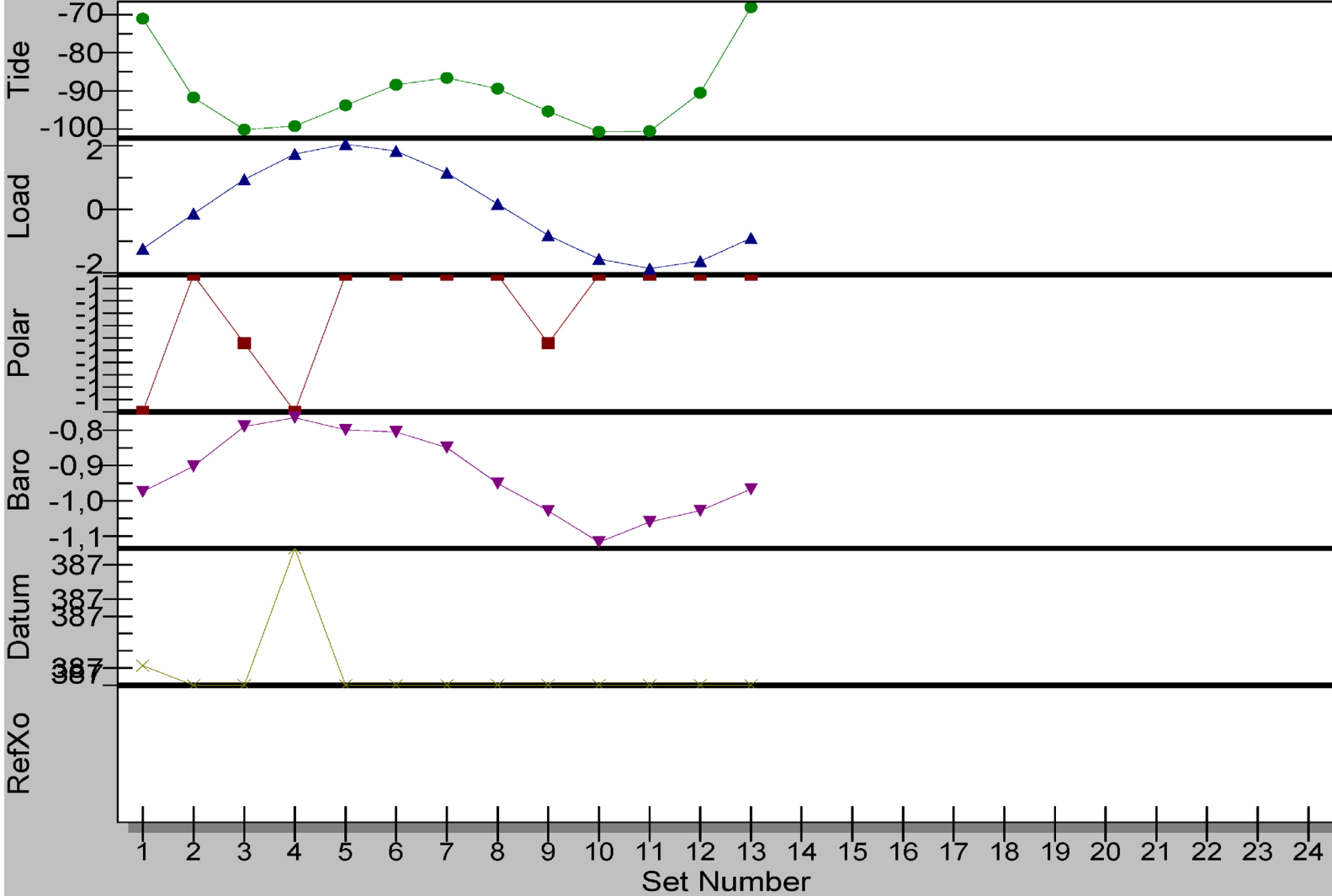
Set	Time	DOY	Year	Gravity	Sigma	ErrorUncert	Tide	Load	Baro	Polar	Datum	Refxo	Temp	Pres	Accept	Reject
1	18:16:59	184	2004	981196833.400	51.549	5.207	5.207	-71.060	-1.243	-0.974	-0.656	387.145	0.002	27.106	1009.762	98 2
2	19:16:57	184	2004	981196836.398	35.438	3.544	3.544	-91.737	-0.141	-0.902	-0.656	387.145	0.002	29.140	1010.004	100 0
3	20:16:58	184	2004	981196833.096	30.110	3.026	3.026	-100.139	0.940	-0.790	-0.656	387.145	0.002	29.256	1010.378	99 1
4	21:17:56	184	2004	981196833.379	31.129	3.318	3.318	-99.215	1.745	-0.765	-0.656	387.145	0.002	29.290	1010.461	88 12
5	22:16:57	184	2004	981196839.442	34.644	3.464	3.464	-93.778	2.057	-0.799	-0.656	387.145	0.002	29.279	1010.347	100 0
6	23:16:57	184	2004	981196838.684	32.478	3.248	3.248	-88.395	1.836	-0.805	-0.656	387.145	0.002	29.125	1010.327	100 0
7	00:16:57	185	2004	981196838.257	28.214	2.821	2.821	-86.577	1.145	-0.849	-0.656	387.145	0.002	29.030	1010.179	100 0
8	01:16:57	185	2004	981196830.750	27.009	2.701	2.701	-89.429	0.172	-0.950	-0.656	387.145	0.002	28.934	1009.841	100 0
9	02:16:59	185	2004	981196844.742	27.894	2.803	2.803	-95.392	-0.820	-1.028	-0.656	387.145	0.002	28.860	1009.583	99 1
10	03:16:57	185	2004	981196836.664	37.698	3.770	3.770	-100.695	-1.566	-1.117	-0.656	387.145	0.002	28.759	1009.287	100 0
11	04:16:57	185	2004	981196848.996	34.677	3.468	3.468	-100.533	-1.864	-1.060	-0.656	387.145	0.002	28.579	1009.477	100 0
12	05:16:57	185	2004	981196839.448	29.116	2.912	2.912	-90.513	-1.628	-1.028	-0.656	387.145	0.002	28.457	1009.583	100 0
13	06:16:57	185	2004	981196834.666	34.302	3.430	3.430	-68.088	-0.912	-0.967	-0.656	387.145	0.002	28.223	1009.787	100 0





# Set Corrections

Current Set: 13



# Set Sensors

Current Set: 13

