

<b>Issue Date</b>	:	<b>20 June 2012</b>
<b>Issue</b>	:	<b>2.0</b>

**Title** : **GOCE L1b Data Quality Control Report  
October 2010**

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**Distribution** : **GOCE Users Community**



## DOCUMENT CHANGE RECORD

Issue	Date	Reason for Change	Changed Pages/Paragraphs
1.0	19/03/2011	First issue	
2.0	20/06/2012	Reprocessing EGG V5.0	All document



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## 1. INTRODUCTION

### 1.1 Purpose and Scope

This document contains the Quality report for GOCE L1b data for October 2010.

The latest version of this document is available on the GOCE Data Quality portal at:

<http://earth.esa.int/GOCE/> → “Level 1b QC” → “Monthly”

The GOCE Data Quality portal is the principal source for any quality-related information on GOCE products.

<http://earth.esa.int/GOCE/> → “Level 1b QC”.

### 1.2 Glossary

The following acronyms and abbreviations have been used in this report.

ABBREVIATION	MEANING
EGG	Electrostatic Gravity Gradiometer
DFACS	Drag Free and Attitude control system
SST-I	Satellite-to-satellite tracking instrument
CTR	Control Voltages
STR	Star Tracker
Trace SD	Trace Spectral Density
ICM	Inverse Calibration Matrix
GAR	Gradiometer Angular Rates
FPM	Fine Pointing Mode
DFM	Drag Free Mode

## 2. DATA QUALITY OVERVIEW

### 2.1 Instruments Quality summary tables

Oct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Table 1 October 2010 EGG QC Status

Oct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Table 2 October 2010 SST QC Status

	GAP (details within Monthly Report)
	NOT USABLE
	Special Event
	Nominal
	Calibration
	EGG in Acquisition Mode
	Not yet released

### 2.2 EGG data – Available baselines

Baseline	EGG Processor	SST processor
Baseline D	EGG v5 (> 5.06) installed 31/03/2012	V02.18 Patch B Installed 20/01/2011
Baseline A	EGG v4 (<4.8) Installed 18/05/2010	V02.18 Patch B Installed 20/01/2011

Baseline may be verified by reading out the <Creator\_Version> tag in the file header, e.g:

<Creator\_Version>05.06</Creator\_Version>

(for the latest baseline)

- EGG v5 reprocessed baseline is available through the GOCE Virtual On-line Archive  
 → <http://eo-virtual-archive1.esa.int/Index.html>
- EGG v4 is the older baseline. Products are still accessible through the GOCE Virtual On-line Archive

### 3. EGG DATA QUALITY: SPACECRAFT AND ENVIRONMENT RELATED EVENTS

#### 3.1 Summary

- Oscillation in Gradients time series on 04<sup>th</sup> of October at UTC 07:41:11 due to the installation of the new Detector offsets from the latest K2 calibration and oscillation on 04<sup>th</sup> of October at UTC 23:25:00 in gradients due to GCA-A switch on.
- ICM Calibration on 05<sup>th</sup> of October. EGG data are not produced during Calibration Operations.
- K2 calibrations on 06<sup>th</sup> and 13<sup>th</sup> of October.
- Anomalous oscillation found on 08<sup>th</sup> of October at UTC 06:05:22 in CM datasets components 14\_Y, 25\_Y, 36\_Y, DM datasets components 14\_Y, 25\_X, 25\_Z, 36\_Y and in CTR components A2\_X, A2\_Y and A5\_X.
- Spike in gradients time series at time 20<sup>th</sup> of October at UTC 06:31 due to the installation of the new Detector offsets from the latest K2 calibration.
- BeamOut event on 9<sup>th</sup> of October.
- BeamOut event on 18<sup>th</sup> of October.
- BeamOut event on 22<sup>nd</sup> of October.

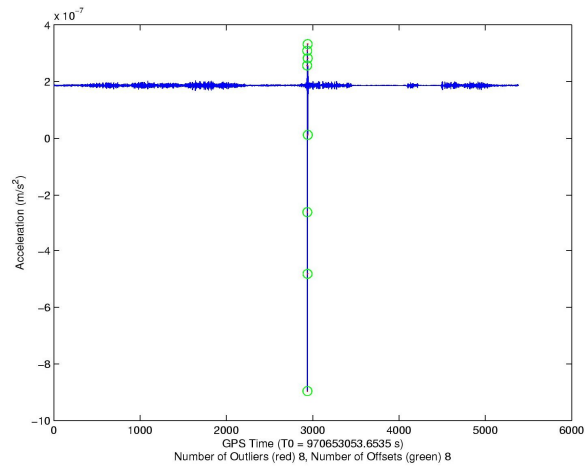
#### 3.2 Beam Out events

Three Beam Out events occurred at the following UTC time during October 2010 reference frame:

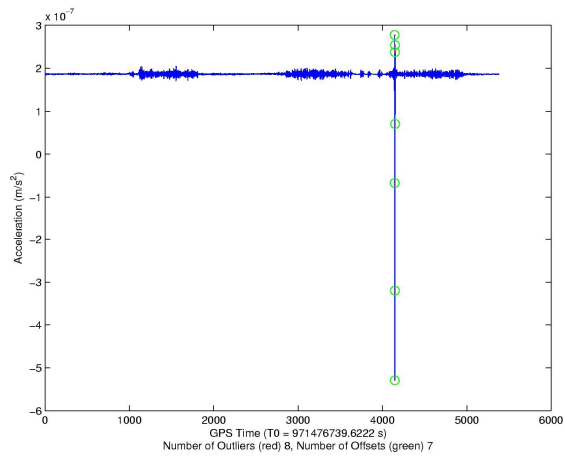
EVENT NUMBER	UTC TIME
1	2010-10-09T10:39:38
2	2010-10-18T23:47:52
3	2010-10-22T23:10:08

**Table 3 Beam out event**

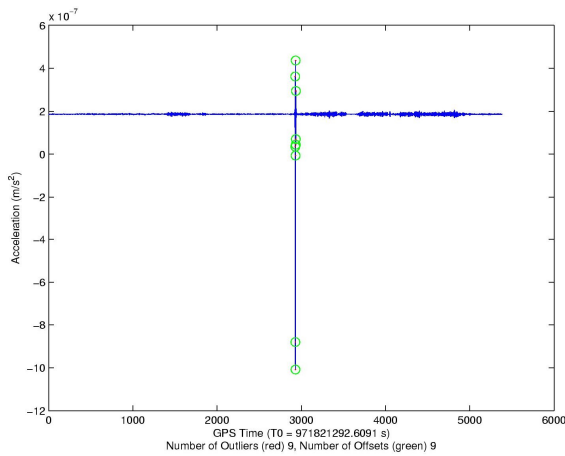
Below, the effects of the Beam Out in the common mode acceleration, component 14\_x, are displayed, for the three events.



**Figure 1 Beam Out event on 09<sup>th</sup> of October**



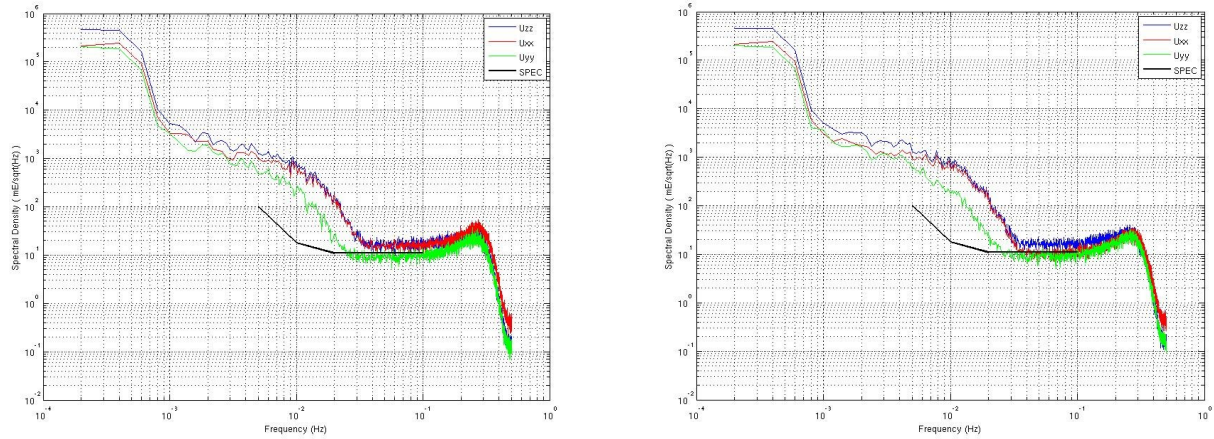
**Figure 2 Beam Out event on 18<sup>th</sup> of October**



**Figure 3 Beam Out event on 22<sup>nd</sup> of October**

This oscillation enters the gradients time series notably in the Uxx component.

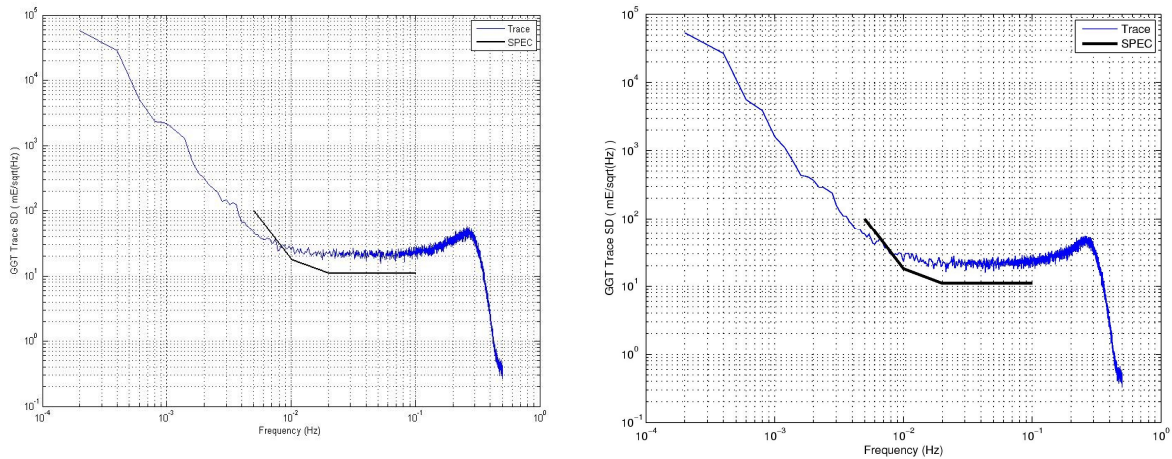
This effect may be seen in the Gradients PSD graphs below:



**Figure 4 Gradients PSD considering the Beam Out event (left), gradients PSD not considering the Beam Out event (right)**

Uxx (red in the plots) has a higher value in the PSD above, when the beam-out is included in the time interval 09/10 10:00 to 09/10 11:00 (only the trace and gradients PSD for 09<sup>th</sup> of October are reported, plots for 18<sup>th</sup> and 22<sup>nd</sup> of October showing similar behavior).

No relevant differences in terms of trace PSD are recognized, as reported in figure 5:



**Figure 5 Trace PSD considering the Beam out event (left), trace PSD not considering the Beam out event (right)**

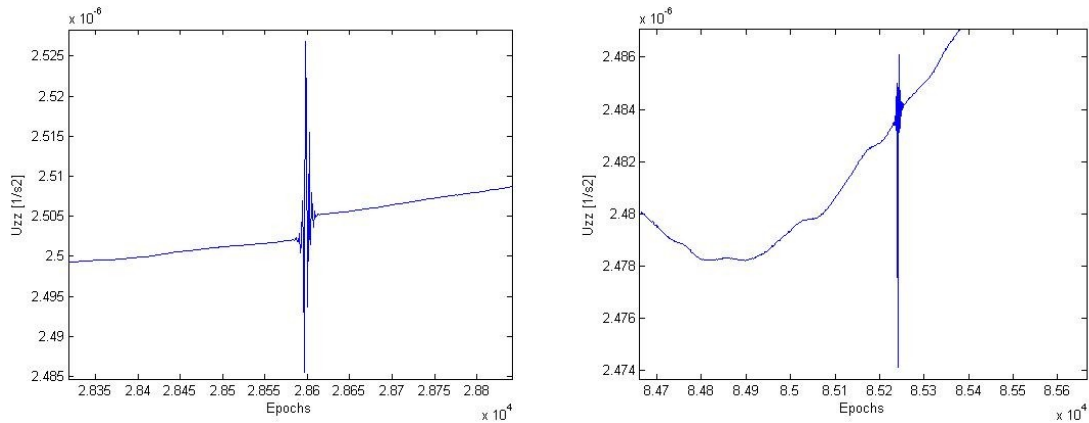


### 3.3 Gradients anomalous oscillations on 04<sup>th</sup> of October

During the reference period two anomalous oscillations are visible in the gradients time series due to spacecraft operations:

- installation of the new Detector offsets from the latest K2 calibration at UTC 07:41:11
- GCA-A switch on at UTC 23:25:00.

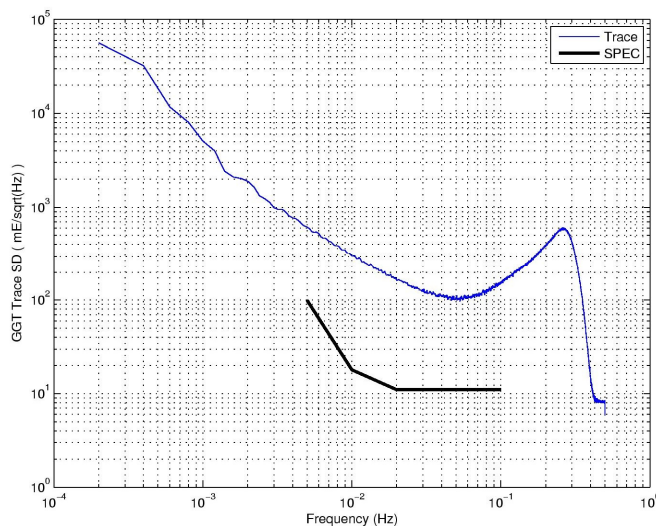
Below the effects of the oscillations in Uzz component of the gravity gradients tensor:



**Figure 6 Uzz oscillation for the first event of 04<sup>th</sup> of October (left panel) and for the second event (right panel)**

The same oscillations are present also in Differential mode accelerations components 14\_X, 25\_Y and 36\_Z.

This oscillation leads to a non nominal behaviour of the computed trace PSD as reported below:



**Figure 7 Trace PSD for 04th of October reference period**

### 3.4 Instrument calibration on 05<sup>th</sup> of October

Special Spacecraft Operations for Instrument Calibration were performed on 05<sup>th</sup> of October, from

- 20101005T010950

to

- 20101006T010950

EGG\_NOM\_1b data are unavailable during this period, i.e. between products:

- GO\_CONS\_EGG\_NOM\_1b\_20101004T234007\_20101005T010950
- and
- GO\_CONS\_EGG\_NOM\_1b\_20101006T010950\_20101006T023510

Due to the new processor logic, the following products before and after the calibration, have incomplete GGT and IAQ datasets:

GO\_CONS\_EGG\_NOM\_1b\_20101004T204040\_20101004T221023  
 GO\_CONS\_EGG\_NOM\_1b\_20101004T221023\_20101004T234007  
 GO\_CONS\_EGG\_NOM\_1b\_20101004T234007\_20101005T010950  
 Calibration  
 GO\_CONS\_EGG\_NOM\_1b\_20101006T010950\_20101006T023510  
 GO\_CONS\_EGG\_NOM\_1b\_20101006T023510\_20101006T040454  
 GO\_CONS\_EGG\_NOM\_1b\_20101006T040454\_20101006T053437

### 3.5 K2 Calibrations on 06<sup>th</sup> and 13<sup>th</sup> of October

The first EGG K2 calibration on all 12 Ultra Sensitive axes was performed on DoY 279 (06<sup>th</sup> of October). The timing was as follows:

- 279.10.25.00 – Enabling of DFACS 10Hz storage
- 279.10.30.00 – Start of first shaking sequence
- 279.16.35.40 – End of last shaking sequence
- 279.16.40.00 – Disabling of DFACS 10Hz storage

The K2 calibration affected the following couple of products:

- GO\_CONS\_EGG\_NOM\_1b\_20101006T100348\_20101006T113331\_0001 for the first shaking sequence.
- GO\_CONS\_EGG\_NOM\_1b\_20101006T160242\_20101006T173226\_0001 for the second shaking sequence.

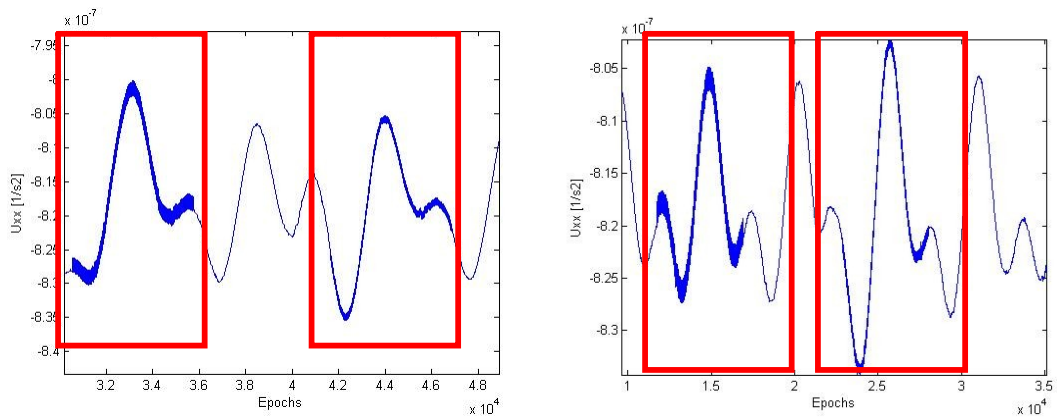
A second EGG K2 calibration on all 12 Ultra Sensitive axes was performed on DoY 286 (13<sup>th</sup> of October). The timing was as follows:

- 286.00.00.00 – DFACS 10Hz storage enabled
- 286.03.50.00 – Start of first shaking sequence
- 286.09.55.40 – End of last shaking sequence
- 286.10:00:00 – DFACS 10Hz storage disabled

The K2 calibration affected the following couple of products:

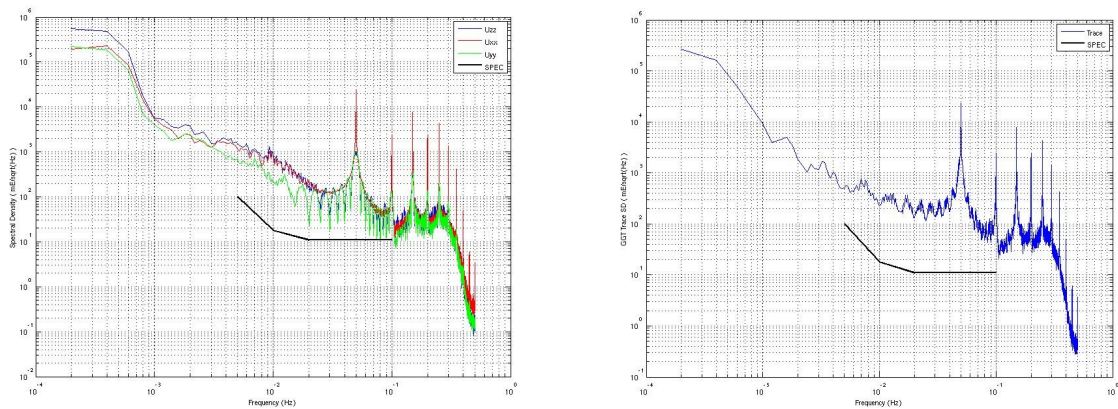
- GO\_CONS\_EGG\_NOM\_1b\_20101013T033409\_20101013T050353\_0001 for the first shaking sequence.
- GO\_CONS\_EGG\_NOM\_1b\_20101013T093303\_20101013T110246\_0001 for the second shaking sequence.

Below the effects of the two K2 calibrations on gradient time series (Uxx time series is reported but the same effect is visible on the other two diagonal components Uyy and Uzz):



**Figure 8** The two shaking sequences for the 06th of October K2 calibration (left panel) and the two shaking sequences for the 13th of October K2 calibration (right panel)

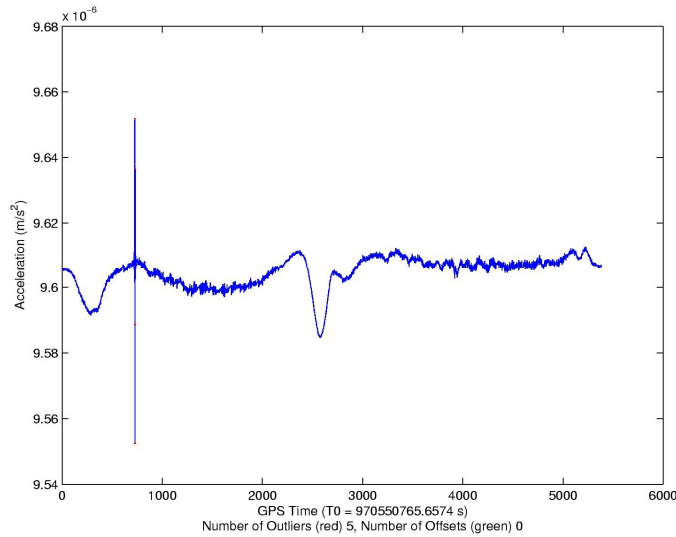
Below the effects on the gradients and trace PSDs:



**Figure 9** Gradients (left panel) and trace (right panel) PSDs during the K2 calibration

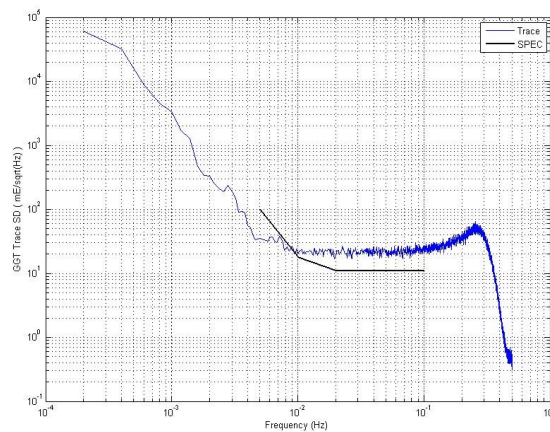
### 3.6 Gradients oscillation on 08<sup>th</sup> of October

Anomalous oscillation found at 06:05:22 in CM datasets components 14\_Y, 25\_Y, 36\_Y, DM datasets components 14\_Y, 25\_X, 25\_Z, 36\_Y and in CTR components A2\_X, A2\_Y and A5\_X, as reported below (only component DM 36\_Y is reported).



**Figure 10 Anomalous oscillation in DM component 36\_Y**

No impacts on performance recognized for the considered time period, as reported below:

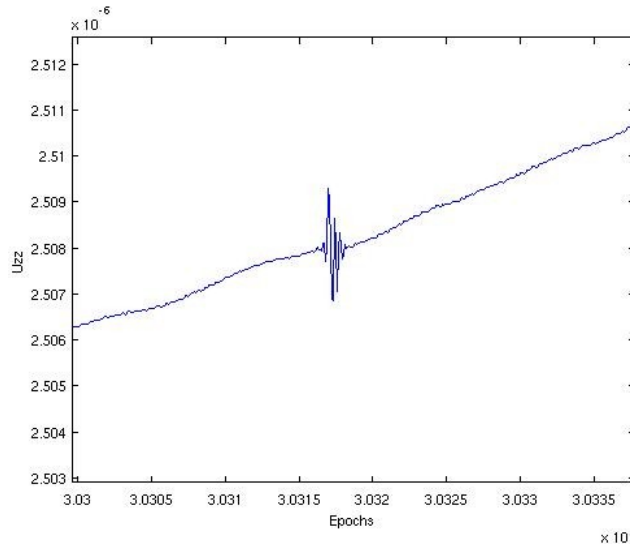


**Figure 11 Trace PSD for 8th of October time frame**

### 3.7 Spike in gradients time series on 20<sup>th</sup> of October

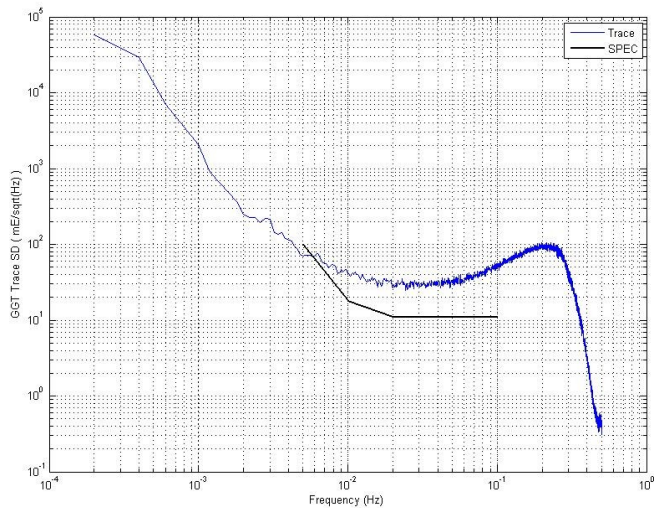
During the reference period a spike in gradients time series is evident at time 20/10 06:31 due to the installation of the new Detector offsets from the latest K2 calibration.

The effect on the gradients time series is reported below:



**Figure 12 Spike in Uzz time series at time 20/10 06:31**

The oscillation leads to a non-nominal behaviour of the trace PSD for the 20<sup>th</sup> October reference period, as reported below:



**Figure 13 Trace PSD for 20th of October reference period**