Title : **GOCE L1b Data Quality Control Report**
December 2009

Author : **GOCE Quality**
Control Team

Distribution : GOCE Users Community

DOCUMENT CHANGE RECORD

Issue	Date	Reason for Change	Changed Pages/Paragraphs
1.0	07/07/2010	First issue	
2.0	07/05/2012	Reprocessing EGG V5.0	All document

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Purpose and Scope

This document contains the Quality report for GOCE L1b data for December 2009.

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

2. DATA QUALITY OVERVIEW

2.1 Instrument data quality summary tables

Dec `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 December 2009 EGG QC Status

Dec `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 December 2009 SST QC Status

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

Two anomalous events are found within the 19 – 23 Dec 2009 time frame, affecting the following products:

- GO_CONS_EGG_NOM_1b_20091221T031037_20091221T044021_0002
  - at time 2009-12-21T03:38:4956.
- GO_CONS_EGG_NOM_1b_20091223T192855_20091223T205838_0002
  - at time 2009-12-23T20:54:2352.
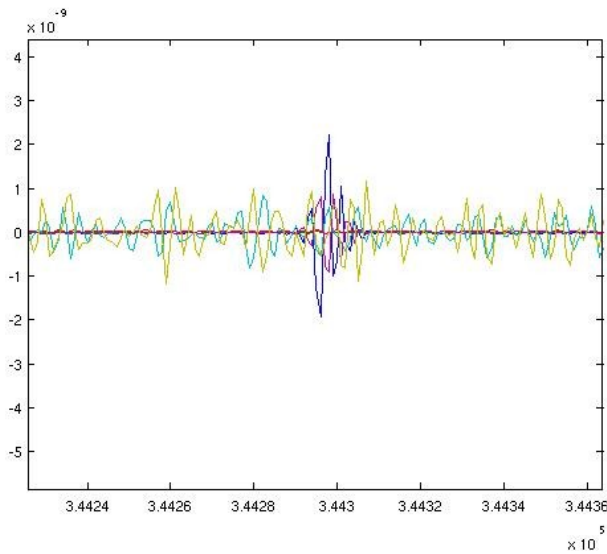
3.2 Special events analysis

The plot below reports the gradients time series. Component xy (in colour cyan) shows anomalous amplitude of ~2e-8 1/s2 peak-to-peak in the time interval of one second while the mean is in the order of 2e-9
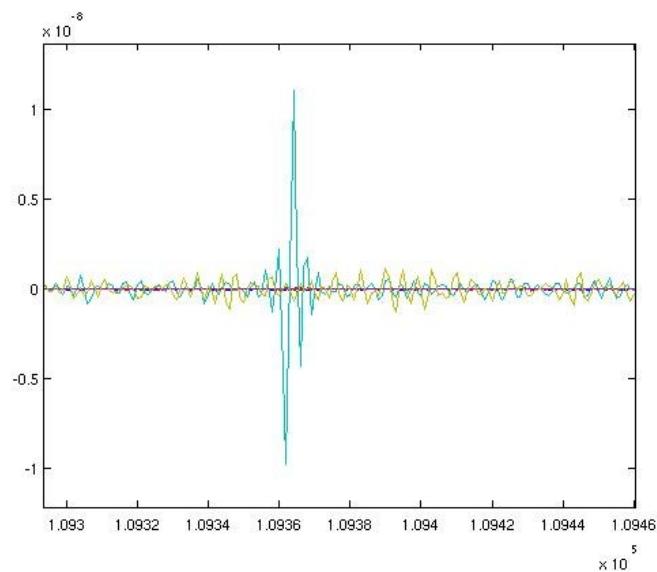
Figure 1 Gradients time series vs epoch – 21 Dec event

The gradients time series for the second event are reported below:

**Figure 2 Gradients time series vs epoch – 23 Dec event**

In this case the diagonal components xx and yy (blue and red lines) show anomalous amplitude of ~ 4.2e-9 1/s2 peak-to-peak in the time interval of one second while the mean is in the order of 1e-11.

## 3.2.1 Control Voltages Time series

The control voltages (CTR) time series show anomalies in all 8 components of the six accelerometers at the same time (only components X1 and Y1 are reported. All other components show a similar behavior). X1 components present a peak-to-peak oscillation of ~ 1.8e-6 V of one second, Y1 components of 21 Dec event presents a peak-to-peak oscillation of ~ 18e-3 V of one second while Y1 components of 23 Dec event presents a peak-to-peak oscillation of ~ 0.35 V of one second.
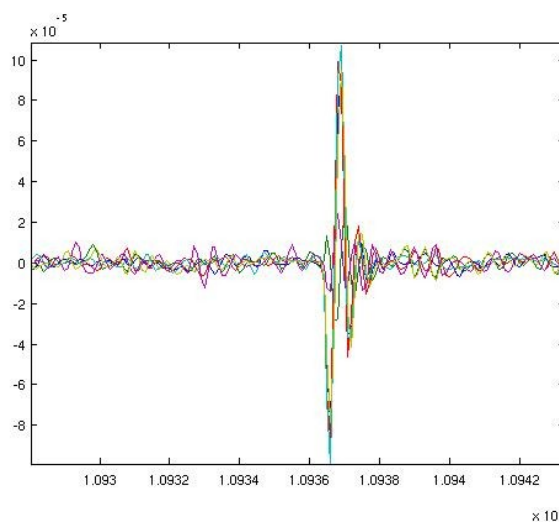
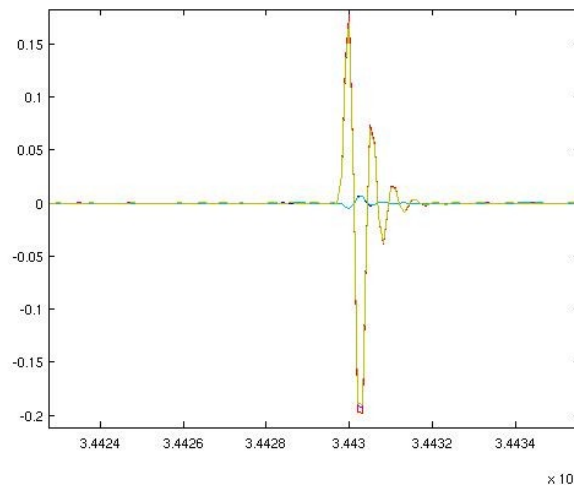**Figure 3 CTR time series component X1 vs epoch – 21 Dec event**
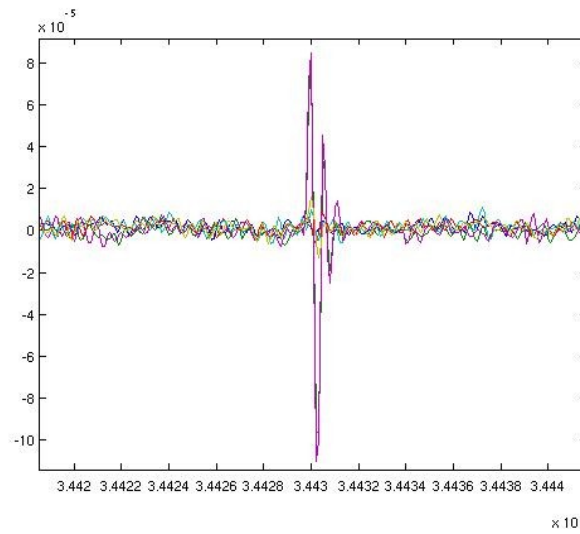
Figure 4 CTR time series component X1 vs epoch – 23 Dec event
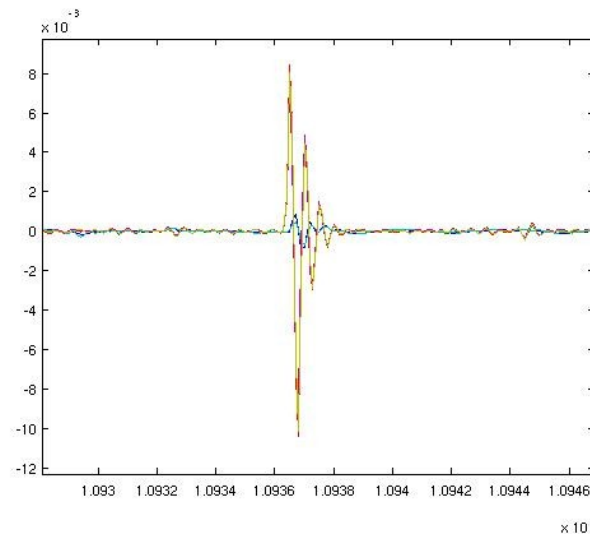
Figure 5 CTR time series component Y1 vs epoch – 21 Dec event

Figure 6 CTR time series component Y1 vs epoch – 23 Dec event

The oscillation on 21 December is visible also in L0 CTR time series for the following components:

- A1 components Z1 and Z2
- A2 components Y1, Y2, Z1 and Z2
- A3 components Y1 and Y2
- A4 components Z1 and Z2
- A5 components Y1, Y2, Z1 and Z2
- A6 components Y1 and Y2
-

Below an example of the oscillation in the L0 products is reported:
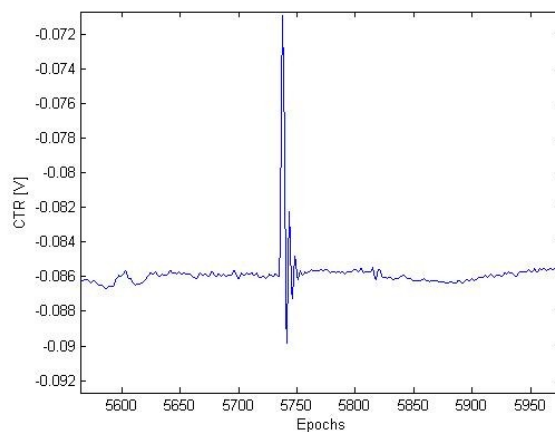
Figure 7 CTR L0 time series component A6 Y1 for 21 December

The oscillation of 23 December, flagged as a Beam Out is present in the L0 datasets as well.

3.2.2 Trace Spectral Density

The two events presented above do not influence the computed spectral density of the trace, over the period 19 – 23 Dec, shown in Figure 8.

The first event does not so by definition, because the xy component does not enter the trace computation.
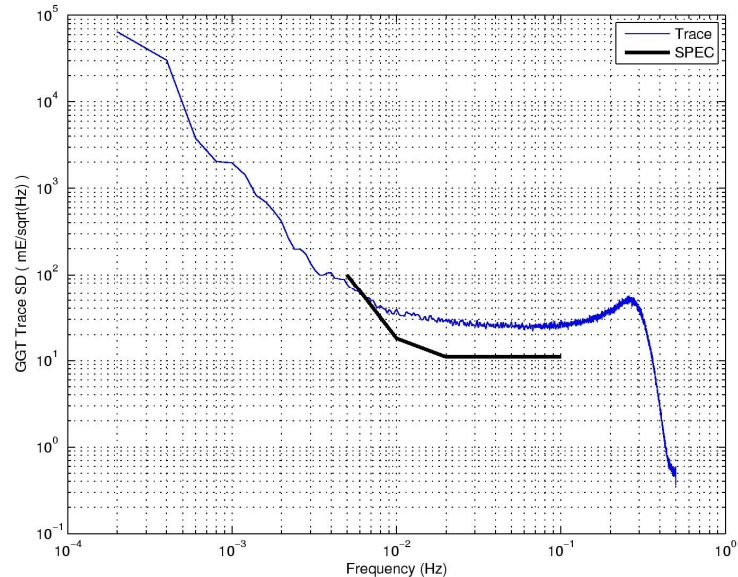

Figure 8 Trace SD – 19 to 23 Dec time window

3.2.3 Conclusions about the special events

Two anomalous events can be found in the gradients and in the CTR time series for the period 19 – 23 Dec 2009.
The second event of Dec 23, on xx and yy gradient tensor components, is connected with a beam-out event visible in L0 data as well (flagged in the L1b product).
The first event of Dec 21, on the gravity gradients xy component, is not flagged as a beam out and the same oscillation is visible at the same time in the corresponding L0 products.
The two events do not influence the gradients trace spectral density and nothing can be done at PDGS level to avoid these two effects that are correlated with the spacecraft.

4. EGG DATA QUALITY– EGG V5 BASELINE

Missing epochs reported in chapter 5 have been recovered in the reprocessed products.

5. EGG DATA QUALITY– EGG V4 BASELINE

5.1 EGG missing epochs analysis

Below the list of the missing epochs in the reference period is reported:

DAY	MISSING EPOCH	UTC MISSING EPOCHS	NOTES
05/12/2009	1	01:20:48	Gap in the ANX between products GO_CONS_EGG_NOM_1b_20091204T235104_20091205T012048_0002 GO_CONS_EGG_NOM_1b_20091205T012048_20091205T025032_0002 Same gap in STR datasets at the same time between products GO_CONS_STR_VC2_1b_20091204T235104_20091205T012048_0002 GO_CONS_STR_VC2_1b_20091205T012048_20091205T025032_0002 The missing epoch is the last epoch of product GO_CONS_EGG_NOM_1b_20091204T235104_20091205T012048_0002
08/12/2009	1	23:33:37	Gap in the ANX between products GO_CONS_EGG_NOM_1b_20091208T220353_20091208T233337_0002 GO_CONS_EGG_NOM_1b_20091208T233337_20091209T010321_0002 No gap found in STR/SST datasets. The missing epoch is the first epoch of product GO_CONS_EGG_NOM_1b_20091208T233337_20091209T010321_0002

No sapling anomalies found in the corresponding L0 packets for the two days affected by gaps.

The investigation is on-going and eventually the two missing epochs are expected to be recovered by a reprocessing activity.

5.2 SST missing epochs analysis

Below the list of the missing epochs in the reference period is reported:

DAY	MISSING EPOCH	UTC MISSING EPOCHS	NOTES
13/12/2009	1	00:45:56	Gap in the ANX between products GO_CONS_SST_NOM_1b_20091212T231612_20091213T004556_0001 GO_CONS_SST_NOM_1b_20091213T004556_20091213T021540_0001 There is a gap at the same time (13/12 00:45:56) in STR datasets. The missing epoch is the first epoch of product GO_CONS_SST_NOM_1b_20091213T004556_20091213T021540_0001

			Missing epoch in product GO_CONS_SST_NOM_1b_20091220T091353_20091220T104337_0001
20/12/2009	1	09:47:43	No missing epochs found in EGG/STR datasets.

No sapling anomalies found in the corresponding L0 packets for the two days affected by gaps.

The investigation is on-going and eventually the two missing epochs are expected to be recovered by a reprocessing activity.