Title : GOCE L1b Data Quality Control Report
       June 2012

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## DOCUMENT CHANGE RECORD

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1. INTRODUCTION

1.1 Purpose and Scope

This document contains the Quality report for GOCE L1b data for June 2012.

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.

<table>
<thead>
<tr>
<th>ABBREVIATION</th>
<th>MEANING</th>
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<tbody>
<tr>
<td>EGG</td>
<td>Electrostatic Gravity Gradiometer</td>
</tr>
<tr>
<td>DFACS</td>
<td>Drag Free and Attitude control system</td>
</tr>
<tr>
<td>SST-I</td>
<td>Satellite-to-satellite tracking instrument</td>
</tr>
<tr>
<td>CTR</td>
<td>Control Voltages</td>
</tr>
<tr>
<td>STR</td>
<td>Star Tracker</td>
</tr>
<tr>
<td>Trace SD</td>
<td>Trace Spectral Density</td>
</tr>
<tr>
<td>ICM</td>
<td>Inverse Calibration Matrix</td>
</tr>
<tr>
<td>GAR</td>
<td>Gradiometer Angular Rates</td>
</tr>
<tr>
<td>FPM</td>
<td>Fine Pointing Mode</td>
</tr>
<tr>
<td>MBW</td>
<td>Measurement Bandwidth</td>
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</table>
2. JUNE 2012 OVERVIEW

01-Jun-12  Outlier in CTR ds with impacts on performance
06-Jun-12  Anomaly in gradients Uyy and Uzz with impacts on trace at UTC 13:28:19

Beam Out event at UTC 18:44:56

07-Jun-12  GOCE Safe Mode derived by an anomaly on the gradiometer.
08-Jun-12  Initial Safe Mode recovery activities in FPM.
            Gradiometer switch ON and transition to Acquisition
09-Jun-12  Transition to DFM_PREP at 6.5mN (at 09:00)
10-Jun-12  DFM_PREP Operations
11-Jun-12  DFM_PREP Operations
12-Jun-12  DFM_PREP Operations
13-Jun-12  07.30.27 - DFM_COARSE entry
            11.15.00 - DFM_FINE entry. With an acceleration bias of +1.87E-07 m/s².
            14.49.36 - EGG detector and controller offsets (K2-Offsets) were loaded in Science
16-Jun to 17-Jun-12  Trace PSD out of spec in LMBW. High CM signals and Thrust level, high solar activity Kp index > 7
19-Jun to 20-Jun-12  Calibration

3. JUNE 2012 DATA QUALITY ANALYSIS

3.1 Gradients oscillation on 01st of June

An outlier event occurred in gradients time series on 1st of June with impacts on trace, as reported below for the three gradients components:
The oscillation is more evident in Uyy component.

### 3.2 Uyy and Uzz anomaly on 6th June

An anomalous event occurred on 6th June at UTC 13:28:19 with impacts on trace. The event is displayed below for the Uyy and Uzz gradients:
3.3 S/C Anomaly: GOCE safe mode and EGG anomaly

On 7th June safe mode was entered due to a loss of attitude control. This was caused by a Gradiometer anomaly, which resulted in the drag-free control system using erroneous acceleration data. As part of safe mode recovery activities, firing of the ion propulsion system was resumed on 9th June. Recovery of the altitude lost due to the safe mode (about 1.2 km) was performed. The Gradiometer was switched on to acquisition mode successfully on 8th June. Drag-free mode operations were resumed on 13rd June at 11:15 and the complete recovering of science operations on 14th June.

3.4 High drag and geomagnetic storm

A peak of geomagnetic activity occurred from 16th June to 18th June, as reported below with a Kp index values above 6:

![Figure 3 Kp Index](image)

This high geomagnetic activity had impacts on data quality producing high trace values in the lower part of the measurement bandwidth, as reported below:

![Figure 4 Trace PSD during the geomagnetic storm](image)
The impact of the high solar activity is evident in the CM signals PSDs which show higher values:

![Figure 5 CM signals PSD before (left) and during (right) the peak of the solar activity](image)

The thrust values have increased during this period, as reported below:

![Figure 6 Thrust values before (left) and during the storm (right)](image)
The end of the peak activity on 19\textsuperscript{th} June reports the trace at nominal values:

![Figure 7 Trace PSD after the geomagnetic storm](image)

3.5 Instrument calibration

Special Spacecraft Operations for Instrument Calibration were performed on 19\textsuperscript{th} June 2012, from

- 20120619T050632
- 20120620T050208

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

- GO\_CONS\_EGG\_NOM\_1b\_20120619T033649\_20120619T050632
- GO\_CONS\_EGG\_NOM\_1b\_20120620T050208\_20120620T063152
3.6 Beam Out events

The following Beam Out events occurred during June 2012 reference frame:

<table>
<thead>
<tr>
<th>EVENT</th>
<th>UTC TIME</th>
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<tbody>
<tr>
<td>06-Jun-12</td>
<td>Beam Out event at UTC 18:44:56</td>
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Table 1 Beam out events

The effects of a Beam Out event are clearly visible in the common mode acceleration, component 14_x, as a sharp peak in the acceleration values. The effect is the same as reported in previous monthly reports.

The Beam Out event enters in the gradients time series notably in the Uxx component without any relevant impacts on performance.