Notes on the releases of OMI data products

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1. Introduction

This document describes the various releases of the OMI L1B, L2 and higher data products as available on the DISC. Reason for a new product release is either an improved L0-L1B algorithm or L2 retrieval algorithm or, more often, a post-processing of the L1B data due to changed OMI row anomaly behaviour, consequently followed by a re-processing of all the L2 data.
Considering the strong impact on dataprocessing caused by the row anomaly, some extra remarks are made on providing information about this anomaly in the L1B and L2 products.
For a summary of the data product releases see the table at the end of this document.

This is a working document that will be updated any time OMI data need to be post- and/or re-processed.

2. Data available on the DISC

Various categories of OMI data products are available on the DISC:

2.1 Level-1B data

L1B: Products containing geolocated and calibrated spectral radiance and solar irradiance data for the UV and VIS channel.

2.2 Level-2 and higher data

L2: Atmospheric products derived from the L1B product. They consist of one file per orbit.
L2G: Daily binned global products derived from the L2 products.
L3: Daily averaged global gridded products, screened for bad data points.

All data can be found on the GES DISC OMI product webpage
http://disc.sci.gsfc.nasa.gov/Aura/overview/data-holdings/OMI/index.shtml

and also on the Mirador webpage
http://mirador.gsfc.nasa.gov/

3. Describing the data collection

Three numbers describe a dataproduct (see also the table at the end of this document):

Collection number: The currently available data are all Collection 003 data. This Collection number is tied to the status of the L1B product. In case of an improved L0-L1B algorithm, L1B data will be re-processed for a new Collection. So far, there have been two L1B re-processing campaigns.

Algorithm number: This number, also called PGE (program executable) version, identifies the version of the software algorithm used for generating a specific dataproduct.

Release number: A dataproduct can have several releases in the same collection. Due to e.g. an update of the L1B XtrackQualityFlags field (see section "Flagging L1B data" below) it might be needed to re-process L2 and higher products, resulting in new releases.

4. File naming convention

Following the AURA Guidelines, the following file naming convention is used for all OMI data products:

```
<InstrumentID>_<DataType>_<DataID>_<Version>.<Suffix>
```

An arbitrary L2 product is shown below as an example:

```
OMI-Aura_L2-OMNO2_2006m0101t2253-o07801_v003-2011m1009t170840.he5

Hence:
<InstrumentID> = OMI-AURA
<DataType>     = L2-OMNO2
<DataID>       = 2006m0101t2253-o7801 (<ObservationDateTime>-<OrbitNr>)
<Version>      = v003-2011m1009t170840 (<CollectionNr>-<ProductionDateTime)
<Suffix>       = he5
```

As can be seen from this example the version number `<Version>` has been made synonymous to the Collection number, currently 003. The algorithm number and release number of a specific product are not contained in the filename of that product. Note however that in the meta data of a product specific information about the product can be found: by clicking on the corresponding xml file (will open as text document), information is provided on production time, equator crossing longitude and lattitude etc. including the PGE (program executable) version. Also, in case of a new release, the product will have an updated `<ProductionDateTime>` timestamp. Using release date information given in the table at the end of this document, these timestamps can be used by data users as an additional check on the release status of a product. In the example above the `<ProductionDateTime>` in 2011 differs from the `(<ObservationDateTime>` in 2006, clearly indicating that this is a re-processed product.

5. Post-processing and re-processing OMI data

In this document we distinguish between post-processing and re-processing OMI data. Post-processing is related to the L1B data and is regularly needed to update information on the OMI row anomaly that is contained in the L1B files. Post-processing L1B data does not change the spectral radiance data contained in the L1B file. It results in a new release of L1B data within the same Collection (currently 003). As a consequence of L1B post-processing, all L2 and higher data need to be re-processed resulting in new releases of those products within the same Collection.
Re-processing a L2 product is also needed in case a L2 retrieval algorithm has been updated.
Note that only the latest release of a product is available on the DISC. More details on post- and re-processing is given in sections below.

6. OMI row anomaly

Starting around May/June 2007, the OMI science data are affected by the so-called row anomaly. This anomaly effects the quality of the OMI science data for specific OMI groundpixels (each groundpixel corresponds with a certain viewing angle within the OMI swath). The anomaly causes four different types of errors: a multiplicative error, a wavelength shift error, a stray earthlight related additive error and a stray sunlight related additive error. Unfortunately, the row anomaly shows a dynamic behaviour in time. In addition, which of the four errors show up depends on the position of OMI in its orbit. Despite various attempts, it turned out that due to the complex nature of the row anomaly it is not possible to correct the L1B data with sufficient accuracy (≤ 1%) for the errors caused by the row anomaly.

6.1 Flagging L1B data

Because correcting the L1B data for the row anomaly is not possible, it is needed to flag the groundpixels affected by the row anomaly. This is done by means of a field in the L1B data called XtrackQualityFlags containing various flags (for flag definition see webpage reference below). One of the bits identifies if a groundpixel is affected or not by the row anomaly. If a groundpixel is affected other bits identify the type of error caused by the row anomaly. Level 2 developers are strongly advised to copy the L1B XtrackQualityFlags field into their L2 products.

6.2 Post-processing L1B data

Due to the changing row anomaly behaviour, the content of the XtrackQualityFlags field needs to be updated every now and then. Because there will always be some time in between taking note of changing row anomaly

behaviour and running updated flags in the L1B forward stream, the L1B data from this 'in between period' need to be post-processed. When post-processing the L1B data the old flags within the XtrackQualityFlags field will be replaced with updated flags reflecting the changed new status of the row anomaly behaviour. Post-processed L1B files can be recognized by the '-p1' at the end of the L1B filename, e.g.:

`OMI-Aura_L1-OML1BRUG_2011m0306t1924-o35322_v003-2011m0805t113437-p1.he4`

Important to note: post-processing does not change the hard content, i.e. the spectral data of the L1B files.

Any time the L1B data need to be post-processed due to changed row anomaly behaviour, a RSS feed will be sent to subscribed users. For subscription to this RSS feed see the following OMI webpage:
http://www.knmi.nl/omi/research/product/rowanomaly-background.php#overview.
An overview of past RSS feeds can also be found on this webpage by clicking on the link "past messages".

Questions related to the row anomaly can be sent to the OMI science team at KNMI via email: omi-ra@knmi.nl.

6.3 Re-processing L2 data

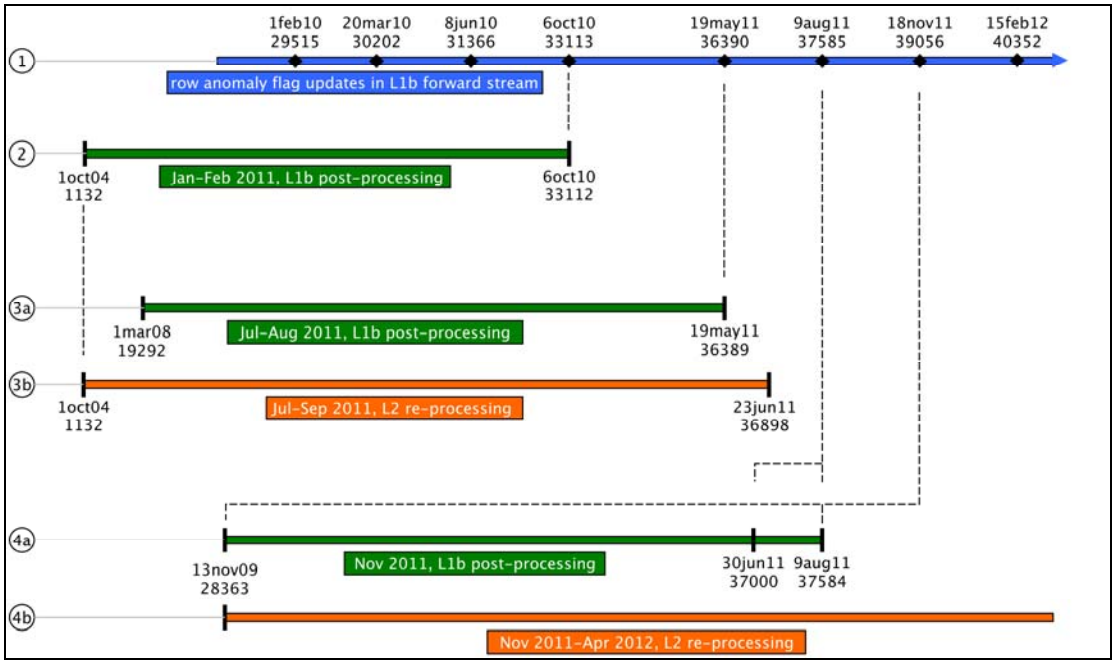
When L1B data have been post-processed there are two reasons why it is required to re-process the L2 data:

- It must always be possible to link a L2 product to the L1B file it has been derived from. However, post-processed L1B files will replace the original L1B files on the DISC. Therefore, the link to the L1B file will be lost when a L2 product is not re-processed using the new, post-processed L1B file.
- A L2 product needs to be re-processed in order to include the updated XtrackQualityFlags field, copied from the post-processed L1B data.

For up-to-date information about the row anomaly see:
http://www.knmi.nl/omi/research/product/rowanomaly-background.php#overview
On this webpage also the definition of the flags contained in the XtrackQualityFlags field is given.

7. Product release overview

At the end of this document a table is shown providing a summary of the various product releases. These releases are resulting from a number of steps of which the figure below gives an overview. The numbers on the left in the figure identify the various steps and are described in more detail below.



OMI data processing status for April 2012

1. Row anomaly flag updates in L1B forward stream

Description:
The blue colored timeline shows the dates/orbit numbers at which the L1B XtrackQualityFlags field was updated in L1B forward stream. The latest update is from Feb 15, 2012.
All L1B data from the forward stream are available on the DISC.

L1B version used:
Algorithm version 1.1.3, which is running in forward stream since Feb 1, 2010 / orbit 29515.

2. Jan-Feb 2011, L1B post-processing

Description:
This is the first post-processing campaign carried out in Jan-Feb 2011 on the L1B data for orbit range 1132 – 33112. All these post-processed L1B data are available on the DISC.

This L1B post-processing campaign was not directly followed by a L2 re-processing campaign because at the time of the L1B post-processing campaign several updated L2 retrieval algorithms were expected to be delivered soon.

L1B version used:
Algorithm version 1.1.3

3a. Jul-Aug 2011, L1B post-processing

Description:
This is the post-processing campaign carried out in Jul-Aug 2011 on the L1B data for orbit range 19292 – 36389. Reason for post-processing was a new update of the XtrackQualityFlags field which also impacted L1B data that were already post-processed as part of step 2.

L1B version used:
Algorithm version 1.1.3

3b. Jul-Sep 2011, L2 re-processing

Description:
This is the first re-processing campaign carried out in Jul-Sep 2011 on some L2 products for orbit range 1132 – 36898. There were two reasons for re-processing the L2 data:

- Consequence of step 3a: include the updated XtrackQualityFlags from the post-processed L1B files in the L2 products.
- New releases of the L2 products due to algorithm updates.

L1B version used:
Algorithm version 1.1.3

Affected L2 products:
The following L2 products were re-processed:

- OMCLDO2, algorithm version 1.2.3.3 (new version)
- OMNO2A*, algorithm version 1.2.3.1 (new version)
- OMDOAO3, algorithm version 1.2.3.1 (new version)
- OMAERO, algorithm version 1.2.3.1 (new version)

*An intermediate product which is not released to the GES DISC.

4a. Nov 2011, L1B post-processing

Description:
This is the post-processing campaign carried out in November 2011 on the L1B data for orbit range 28363 – 37584. Reason for post-processing were two updates (Aug 9 and Nov 18, 2011) of the XtrackQualityFlags field. This also impacted part of the L1B data that were already post-processed as part of step 3a. Note that the Nov 18 update of the XtrackQualityFlags field

actually replaced the Aug 9 update by applying the same row anomaly flagging rules to a larger orbit range (28363-37584 instead of 37000-37584).
L1B version used:
Algorithm version 1.1.3

4b. Nov 2011 - Apr 2012, L2 re-processing

Description:
This is the re-processing campaign carried out in the November 2011 – April 2012 period. This was a direct consequence of the post-processing of L1B as described in step 4 a, i.e. include the updated XtrackQualityFlags from the post-processed L1B files in the L2 products.

L1B version used:
Algorithm version 1.1.3

Affected L2 products:
The following L2 products were re-processed:

- OMCLDO2, algorithm version 1.2.3.3
- OMNO2A*, algorithm version 1.2.3.1
- OMDOAO3, algorithm version 1.2.3.1
- OMAERO, algorithm version 1.2.3.1
- OMNO2, algorithm version 1.1.4.4 (new version)
- OMAERUV, algorithm version 1.3.7 (new version)

*An intermediate product which is not released to the GES DISC.

Summary

The table below summarizes the processing status for the various L1B and L2 products, including the dates at which specific product versions started to run in forward and NRT stream on the OSIPS. Also indicated are the various orbit ranges for which L1B data have been post-processed and L2 data have been re-processed due to row anomaly (RA) changes and when these data were released to the DISC.

L1B Product	Collection Number/ Algorithm Version	Release date forward + NRT stream	L1B post-processing status	Release date post-processed data
All L1B	003 / 1.1.3	01feb10 / orbit 29515	Orbits 01132-33112 using RA flag update from 06oct10 Orbits 19292-36389 using RA flag update from 19may11 Orbits 28363-37584 using RA flag update from 18nov11	Feb, 2011 Jan, 2012 Jan, 2012
L2 Product	**Collection Number / Algorithm Version / Release Version**	**Release data forward + NRT stream**	**L2 re-processing status**	**Release date Re-processed data**
OMCLDO2	003 / 1.2.3.3 / 2	24jan12	Orbits 01132-36898 using RA flags update from 19may11 Orbits 28363-39829 using RA flags update from 18nov11	24jan12
OMNO2A	003 / 1.2.3.1 / 2	forward: 25jan12 / orbit 40047 NRT : 27jan12 / orbit 40084	Orbits 01132-36898 using RA flags update from 19may11 Orbits 28363-40046 using RA flags update from 18nov11	See note [1]
OMDOAO3	003 / 1.2.3.1 / 2	forward: 05mar12 / orbit 40631 NRT : 05mar12 / orbit 40634	Orbits 01132-36898 using RA flags update from 19may11 Orbits 28363-40630 using RA flags update from 18nov11	14mar12
OMAERO	003 / 1.2.3.1 / 2	forward: 08mar12 / orbit 40675 NRT : 08mar12 / orbit 40677	Orbits 01132-36898 using RA flags update from 19may11 Orbits 28363-40674 using RA flags update from 18nov11	22mar12
OMNO2	003 / 1.1.4.4 / 2 see note [2]	forward: 08dec11 / orbit 39347 NRT : 27jan12 / orbit 40084	Orbits 01132-39346 using RA flags update from 18nov11	Dec, 2011
OMAERUV	003/ 1.3.7 / 2	forward: 05dec11 / orbit 39314 NRT : TBD (in the process of testing)	Orbits 01132-39313 using RA flags update from 18nov11	Dec, 2011
OMCLDRR	003/1.9.0/2	forward: 30mar12 / orbit 40994 NRT : TBD (in the process of testing)	Orbits 01132-40993 using RA flags update from 18nov11	30mar12
OMTO3	003/2.2.1/2	forward: 30mar12 / orbit 40994 NRT : TBD (in the process of testing)	Orbits 01132-40993 using RA flags update from 18nov11	31mar12
OMSO2	003/1.1.5/2	forward: 05apr12 / orbit 41080	Orbits 01132-41079 using RA flags update from 18nov11	05apr12
OMAERUV	003/1.4.2/3	forward: 11apr12 / orbit 41240 NRT : TBD (in the process of testing)	Orbits 01132-40993 using RA flags update from 18nov11	18apr12

[1] This is an intermediate product which is not released to the DISC but which is used as input for the OMNO2 product.

[2] The OMNO2 metadata contain an incorrect version number 1.2.3.1. This will be corrected for in a later release of the OMNO2 product.

Note that the current Collection Number is 003. This number is related to the status of the L1B product and will only increase to Collection Number 004 in case the L1B data will be re-processed.
There are no plans yet for re-processing the L1B data.

OMI data users are strongly advised to check the readme files which are available on the DISC for all products.

Document version history record

Issue	Release Date	Description
1	Dec 12, 2011	- First release of document to the GES DISC.
1.1	Dec 27, 2011	- OMAERUV 1.3.7 released
1.2	Jan 24, 2012	- post-processed L1B 1.1.3 released (OML1BRUG, OML1BRUZ, OML1BRVG, OML1BRVZ) - OMCLDO2 1.2.3.3 released (OMCLDO2, OMCLDO2G)
1.3	Apr 20, 2012	- OML1b: row anomaly flag update from orbit 40352 (Feb 15, 2012) onward. Note that L1b data still need to be post-processed for orbit range 39519 – 40351 due to this row anomaly flag update. - OMDOAO3 1.2.3.1 released (OMDOAO3, OMDOAO3G, OMDOAO3e) - OMAERO 1.2.3.1 released (OMAERO, OMAEROG, OMAEROe) - OMCLDRR 1.9.0 released (OMCLDRR, OMCLDRG) - OMTO3 2.2.1 released (OMTO3, OMTO3G, OMTO3d, OMTO3e) - OMSO2 1.1.3 released (OMSO2, OMSO2G, OMSO2e) - OMAERUV 1.4.2 released (OMAERUV, OMAERUVG) Note that: - OMNO2 1.4.2 will be released before June 30, 2012 - OMUVB is expected to be released by the end of April, 2012