



EUMETSAT
AC SAF

REFERENCE: **SAF/AC/FMI/RQ/SESP/001**

ISSUE: 1.3

DATE: 17/06/2019

PAGES: 58



EUMETSAT

AC SAF

**ATMOSPHERIC COMPOSITION
MONITORING**

SERVICE SPECIFICATION

Issue 1.3

Introduction to EUMETSAT Satellite Application Facility on Atmospheric Composition monitoring (AC SAF)

Background

The monitoring of atmospheric chemistry is essential due to several human caused changes in the atmosphere, like global warming, loss of stratospheric ozone, increasing UV radiation, and pollution. Furthermore, the monitoring is used to react to the threats caused by the natural hazards as well as follow the effects of the international protocols.

Therefore, monitoring the chemical composition and radiation of the atmosphere is a very important duty for EUMETSAT and the target is to provide information for policy makers, scientists and general public.

Objectives

The main objectives of the AC SAF is to process, archive, validate and disseminate atmospheric composition products (O₃, NO₂, SO₂, BrO, HCHO, H₂O, OCIO, CO, NH₃), aerosol products and surface ultraviolet radiation products utilising the satellites of EUMETSAT. The majority of the AC SAF products are based on data from the GOME-2 and IASI instruments onboard Metop satellites.

Another important task besides the near real-time (NRT) and offline data dissemination is the provision of long-term, high-quality atmospheric composition products resulting from reprocessing activities.

Product categories, timeliness and dissemination

NRT products are available in less than three hours after measurement. These products are disseminated via EUMETCast, WMO GTS or internet.

- Near real-time trace gas columns (total and tropospheric O₃ and NO₂, total SO₂, total HCHO, CO) and ozone profiles
- Near real-time absorbing aerosol indexes from main science channels and polarization measurement detectors
- Near real-time UV indexes, clear-sky and cloud-corrected

Offline products are available within two weeks after measurement and disseminated via dedicated web services at EUMETSAT and AC SAF.

- Offline trace gas columns (total and tropospheric O₃ and NO₂, total SO₂, total BrO, total HCHO, total H₂O) and ozone profiles
- Offline absorbing aerosol indexes from main science channels and polarization measurement detectors
- Offline surface UV, daily doses and daily maximum values with several weighting functions

Data records are available after reprocessing activities from the EUMETSAT Data Centre and/or the AC SAF archives.

- Data records generated in reprocessing
- Lambertian-equivalent reflectivity
- Total OCIO

Users can access the AC SAF offline products and data records (free of charge) by registering at the AC SAF web site.

More information about the AC SAF project, products and services: <https://acsaf.org/>

AC SAF Helpdesk: helpdesk@acsaf.org

Twitter: https://twitter.com/Atmospheric_SAF



Document signatures

	FUNCTION	NAME	DATE
PREPARED BY	AC SAF Project Configuration Manager	Jari Hovila / FMI	08/05/2019
CHECKED BY	AC SAF Project Manager	Seppo Hassinen / FMI	08/05/2019
APPROVED BY	AC SAF Steering Group		17/06/2019



Document change log

ISSUE	DATE	Description of change
1.0	07/09/2017	<p>Name of the SAF changed from O3M SAF to AC SAF in the beginning of the CDOP-3, Service Specification updated accordingly.</p> <p>Updates in Appendix 1:</p> <ul style="list-style-type: none"> - Metop-A product (O3M-181) added to NRT IASI CO product table <p>Updates in Appendix 2:</p> <ul style="list-style-type: none"> - Reprocessed absorbing aerosol index products (O3M-113, O3M-178, O3M-179, O3M-180) added - Product table for LER Surface Albedo for GOME-2/Metop-A (O3M-89) updated, new identifier is O3M-89.1 - Product table for LER Surface Albedo for GOME-2/Metop-B (O3M-90) added - Reprocessed total OCIO product (O3M-119.0) added - “Time period” and “Data Volume” updated for the following data records: O3M-110.0, O3M-114.0, O3M-115.0, O3M-117.0, O3M-118.0, O3M-121.0, O3M-123.0 <p>Updates in Appendix 3:</p> <ul style="list-style-type: none"> - NRT SO2 and NRT HCHO added to EUMETCast and WMO/GTS <p>Updates in Appendix 4:</p> <ul style="list-style-type: none"> - O3M SAF replaced by AC SAF <p>Approved by the Steering Group (AC_DEC_CDOP3SG02-06)</p>
1.1	19/04/2018	<p>Updates in Appendix 1:</p> <ul style="list-style-type: none"> - NRT IASI SO2 products (O3M-57) added <p>Updates in Appendix 2:</p> <ul style="list-style-type: none"> - NO2 and H2O climate data records (O3M-87, O3M-88) added <p>Approved by the Steering Group (AC_DEC_CDOP3SG03-09)</p>
1.2	07/06/2019	<p>Updates in Appendix 1:</p> <ul style="list-style-type: none"> - Old surface UV products replaced by multi-mission products (O3M-450 – O3M-464) <p>Updates in Appendix 2:</p> <ul style="list-style-type: none"> - Reprocessed surface UV data record R1 tables (O3M-138 – O3M-152) added <p>Approved by the Steering Group (AC_DEC_CDOP3SG06-01)</p>



1.3	17/06/2019	<p>Section 3.1: PR-35 updated to specify three working days as the maximum response time for user contacts to AC SAF Helpdesk.</p> <p>Updates in Appendix 2:</p> <ul style="list-style-type: none">- LER surface albedo for GOME-2/Metop-A (O3M-89.1) and LER surface albedo for GOME-2/Metop-B (O3M-90) replaced by merged LER Surface Albedo for GOME-2 (Metop-A/B) (O3M-402) <p>Approved by the Steering Group (AC_DEC_CDOP3SG06-07)</p>
-----	------------	---

TABLE OF CONTENTS

1. Introduction	7
1.1. Scope	7
1.2. Reference documents.....	7
1.3. Definition of terms	7
2. Requirements related to products	8
2.1. General requirements.....	8
2.2. Requirements related to product archiving and distribution.....	8
2.3. Requirements related to product validation and quality control	9
3. Requirements related to user services	10
3.1. Product ordering, AC SAF website and helpdesk.....	10
Appendix 1: AC SAF Products.....	11
Appendix 2: AC SAF Data Records	30
Appendix 3: AC SAF Product Delivery Diagram	54
Appendix 4: AC SAF Subsystems	55

1. Introduction

1.1. Scope

This document presents the requirements for operational products and services of the Satellite Application Facility on Atmospheric Composition Monitoring (AC SAF) of the EUMETSAT.

This document is made available to the users and constantly revised and updated as new products and services are brought into operation.

1.2. Reference documents

Reference	Title	Id.
RD1	EUMETSAT Operational Services Specification	EUM/OPS/SPE/09/0810
RD2	EPS End User Requirements Document	EPS/MIS/REQ/93001

1.3. Definition of terms

Availability is based on the definition in the EUMETSAT Operational Services Specification [RD1].

Product-specific clarifications:

- For NRT products, the monthly availability limit is 97.5 %. The availability is calculated as a “worst case scenario”:

$$\frac{\text{in time processed and disseminated L2 PDUs}}{\text{received L1b PDUs} + \text{missed L1b PDUs marked as “reception confirmed” in the EUMETCast sendlist}}$$

- For offline products, the availability is defined as the ratio of the number of in time processed, archived and quality-approved L2 products to the number of orbits for which L1b PDUs have been received per month. Availability limit for offline products is 95.5 %.

NUV and OUV are daily L3 products, and availability is defined as the fraction of days in a month with products fulfilling the timeliness requirements.

Timeliness defines whether the product is near real time (NRT) product which is disseminated or ready for download in three hours from sensing at the latest or offline product which is available for download in two weeks after sensing at the latest, during system availability. System unavailability will in most cases not lead to loss of data but to delays with respect to the specified timeliness. In practice, timeliness of a product is determined by calculating the time from sensing to EUMETCast or archive upload.

Accuracy is defined as in the EPS End User Requirements Document [RD2]: the values of accuracy “represent RMS values” taking as reference the 'true value' measured by ground based instruments.

2. Requirements related to products

2.1. General requirements

PR-1: The AC SAF shall generate and distribute the products as specified in Appendices 1 and 2. Delivery of operational products is presented in Appendix 3.

2.2. Requirements related to product archiving and distribution

PR-2: The products and services shall be available to all EUMETSAT member countries.

PR-3: All offline products derived within AC SAF shall be available from the (decentralized) AC SAF archive.

PR-4: National Meteorological Services of the EUMETSAT member states, and users authorized by these shall have access to the AC SAF archive.

PR-5: All AC SAF products shall be archived at least until the end of the Metop program.

PR-6: The SAF products shall be recoverable for at a minimum the EPS mission duration.

PR-7: A catalogue containing the list of AC SAF products and associated metadata shall be made available to UMARF.

PR-8: HDF5 or NetCDF (for Thematic Climate Data Records) shall be the archive and disk storage format for the geophysical products.

PR-9: AC SAF shall deliver the offline products in HDF5 or NetCDF formats. NRT products, excluding NUV, shall be delivered in HDF5 and/or BUFR format. NUV shall be delivered in PNG format.

PR-10: It shall be possible to reprocess all the GOME-2 data sets using new or improved algorithms.

PR-11: Temporary access failures to archive items shall not exceed 0.5 % over any one month period.

PR-12: There shall be provisions to ensure that no more than 0.1 % of vital data, and none of the algorithms and coefficients, of the total archive can be permanently lost.

PR-13: There shall be provisions to ensure that no more than 0.5 % of non-vital data of the total archive can be permanently lost.

PR-14: **Removed.**

PR-15: NRT products shall be made available in three hours from sensing. Products are made available to users via EUMETCast, WMO GTS, FTP, web pages and/or web-services.

PR-16: Offline products shall be delivered to AC SAF archives at DLR or FMI and made available directly from the archives or through UMARF via FTP and other web services in 15 days from sensing.

2.3. Requirements related to product validation and quality control

- PR-17:** The AC SAF shall provide validation services for all the products in operations, against their product requirements.
- PR-18:** Quality of the products shall be controlled with continuous online quality monitoring services.
- PR-19:** **Removed.**
- PR-20:** **Removed.**
- PR-21:** Validation reports shall be available via Internet.
- PR-22:** The AC SAF project team shall cooperate with the community of the EPS system development in order to ensure that the following availability requirements are to be fulfilled:
- EPS-SYS-8.3-220: The EPS Ground Segment NRT product delivery function to any single user shall be successful within timeliness for more than 97.5% of the overall data downlinked by the spacecraft, for any 30 days period.
 - EPS-SYS-8.3-225: Service for a SAF chain shall be better than 95% over calendar month with a target availability of 98%.
 - EPS-SYS-8.3-230: The EPS Ground Segment archive function shall be successful within the specified timeliness for more than 95.5% of the overall data downlinked by the spacecraft, for any 30 days period.
 - EPS-SYS-8.3-240: The EPS Ground Segment archive function at the end of the full mission lifetime shall have been successful for more than 98.9% of the overall data downlinked by the successive operational spacecrafts during the whole mission.
 - EPS-SYS-8.3-245: The access to the archive function provided by the EPS Ground Segment to any single user shall be successful within the specified timeliness for more than 98 % of the overall user access requests, for any 30 days period.
 - EPS-SYS-8.3-250: The access to the archive function provided by the EPS Ground Segment to any single user shall be successful for more than 99.5% of the overall user access requests, for any 30 days period.
- PR-23:** Online quality control shall be undertaken during the generation of the SAF products.
- PR-24:** Online quality control shall be performed within the timeliness requirements.
- PR-25:** Offline quality control of the data and products generated by the product generation facilities shall be implemented.
- PR-26:** Offline quality control shall be performed for each type of data and product in order to identify improvements required in the data and product processing chains.

3. Requirements related to user services

3.1. Product ordering, AC SAF website and helpdesk

- PR-27:** Users shall be able to submit orders for receiving AC SAF products by using UMARF.
- PR-28:** Users shall be able to submit orders for receiving offline AC SAF products directly from the DLR archive.
- PR-29:** Users shall be able to submit orders for receiving offline AC SAF products directly from the FMI archive.
- PR-30:** AC SAF shall provide a centralized website (<https://acsaf.org>) for user services.
- PR-31:** The website and associated user services shall be maintained by the operative SAF personnel at the FMI.
- PR-32:** The website shall reflect that the AC SAF is a consortium effort.
- PR-33:** The AC SAF website shall provide the following public functions:
- Overview of the SAF project
 - Access to the product descriptions
 - Link to UMARF
 - Links to the websites of the consortium members
 - Latest SAF news
 - Links to product user manuals and validation reports
 - Section for frequently asked questions
 - Contact information
- PR-34:** The SAF team pages shall have restricted access. These pages shall include the whole SAF documentation and additional information about the project.
- PR-35:** Contacts by users shall be responded within three (3) working days. FMI personnel can forward the inquiries to other consortium members, if necessary.
- PR-36:** The user community shall be kept informed of any service disruptions and possibly associated reduced quality of the service offered.
- PR-37:** All users shall be informed in advance of any planned reduction of service by email.
- PR-38:** All users shall be informed of any failure within the SAF affecting operational services by email.

Appendix 1: AC SAF Products

The following tables provide detailed characteristics and requirements of pre-operational and operational AC SAF products. Products are divided into product categories. The coloured bar on top of each category table lists the product IDs, names and acronyms.

NOTE: the nominal spatial resolution of the GOME-2 instrument depends on the actually implemented instrument operations mode.

Total Ozone		
NRT: O3M-01.1, O3M-41.1		MAG-N-O3, MBG-N-O3
Offline: O3M-06.1, O3M-42.1		MAG-O-O3, MBG-O-O3
Type	Product	
Applications and users	Climate monitoring, C3S, air quality, NWP, MACC/CAMS, ozone depletion	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Generation frequency	NRT: PDU dissemination frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Algorithm version	GDP 4.8	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
20 %	4 % (SZA < 80) 6 % (SZA > 80)	1.5 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

AC SAF Products

Offline Tropical Tropospheric Ozone		
O3M-35, O3M-43		MAG-O-O3TR, MBG-O-O3TR
Type	Product	
Applications and users	Climate monitoring, air quality	
Characteristics and methods	Convective-Cloud-Differential Method	
Generation frequency	Monthly/weekly	
Input satellite data	Metop-A/B: GOME-2	
Dissemination		
Type	Format	Means
Offline	NetCDF	FTP
Accuracy		
Threshold	Target	Optimal
50 %	25 %	15 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
(sub)tropics: 20S – 20N	1.25° x 2.5° lat-lon grid	≤ 2 weeks
Comments		

Global Tropospheric Ozone		
NRT: O3M-172, O3M-174		MAG-N-O3TROC, MBG-N-O3TROC
Offline: O3M-173, O3M-175		MAG-O-O3TROC, MBG-O-O3TROC
Type	Product	
Applications and users	NWP, air quality, health, scientific, ECMWF	
Characteristics and methods	Ozone profiles	
Generation frequency	NRT: PDU dissemination frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	15 %
Verification method	Balloon soundings, lidar and microwave radiometer measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 resolution nominal size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

AC SAF Products

Total NO2		
NRT: O3M-02.1, O3M-50.1		MAG-N-NO2, MBG-N-NO2
Offline: O3M-07.1, O3M-51.1		MAG-O-NO2, MBG-O-NO2
Type	Product	
Applications and users	NWP, Climate change monitoring, air quality, health, MACC/CAMS	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Generation frequency	NRT: PDU dissemination frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Algorithm version	GDP 4.8	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
10 ¹⁵ molec/cm ² (20 % annual mean)	3-5·10 ¹⁴ molec/cm ² (8-15 % annual mean)	1-3·10 ¹⁴ molec/cm ² (4-8 % annual mean)
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

AC SAF Products

Tropospheric NO2		
NRT: O3M-36.1, O3M-52.1		MAG-N-NO2TR, MBG-N-NO2TR
Offline: O3M-37.1, O3M-53.1		MAG-O-NO2TR, MBG-O-NO2TR
Type	Product	
Applications and users	NWP, air quality, health, MACC/CAMS	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Generation frequency	NRT: PDU dissemination frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Algorithm version	GDP 4.8	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
50 %	30 %	20 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

AC SAF Products

Total SO2		
NRT: O3M-54.1, O3M-55.1		MAG-N-SO2, MBG-N-SO2
Offline: O3M-09.1, O3M-56.1		MAG-O-SO2, MBG-O-SO2
Type	Product	
Applications and users	Volcanic emissions, SACS, VAACs, TEMIS, research institutes, anthropogenic emission monitoring, MACC/CAMS	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Generation frequency	NRT: PDU dissemination frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Algorithm version	GDP 4.8	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
100 %	50 % (SZA < 70°)	30 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		
A specific volcanic SO2 detection flag to identify enhanced GOME-2 SO2 levels and to separate these measurements from GOME-2 pixels with high noise levels is required for use of GOME-2 SO2 columns in MACC and CAMS. This volcanic SO2 flag will be included in the NRT and Offline GOME-2 Total SO2 products.		

AC SAF Products

Total HCHO		
NRT: O3M-176.0, O3M-177.0		MAG-N-HCHO, MBG-N-HCHO
Offline: O3M-10.1, O3M-58.1		MAG-O-HCHO, MBG-O-HCHO
Type	Product	
Applications and users	Air quality. The NRT HCHO product is required by MACC (and CAMS in the future) for assimilation and monitoring purposes, since it is the only constraint on the VOC chemistry in the MACC/CAMS system. The offline HCHO product is used by MACC/CAMS for validation/monitoring purposes, and for assimilation in the CAMS reanalysis system.	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Generation frequency	NRT: PDU dissemination frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Algorithm version	GDP 4.8	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
100 %	50 % (polluted)	30 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

AC SAF Products

Offline Total BrO		
O3M-08.1, O3M-82.1		MAG-O-BrO, MBG-O-BrO
Type	Product	
Applications and users	Climate monitoring research: ozone depletion, UCAM	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Generation frequency	Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Algorithm version	GDP 4.8	
Dissemination		
Type	Format	Means
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
50 %	30 %	15 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	≤ 2 weeks
Comments		

AC SAF Products

Offline Total H2O		
O3M-12.1, O3M-86.1		MAG-O-H2O, MBG-O-H2O
Type	Product	
Applications and users	Climate monitoring: Climate change, WCRP-GEWEX and GlobVapour.	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Generation frequency	Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Dissemination		
Type	Format	Means
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
25 %	10 %	5 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	≤ 2 weeks
Comments		

Ozone Profiles, coarse resolution		
NRT: O3M-03, O3M-45 Offline: O3M-13, O3M-46		MAG-N-O3PR, MBG-N-O3PR MAG-O-O3PR, MBG-O-O3PR
Type	Product	
Applications and users	NWP, air quality, health, scientific, ECMWF	
Characteristics and methods	RTModel: LidortA; Inversion: Optimal estimation	
Generation frequency	NRT: PDU dissemination, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
30 % in stratosphere 70 % in troposphere	15 % in stratosphere 30 % in troposphere	10 % in stratosphere 25 % in troposphere
Verification method	Balloon soundings, lidar and microwave radiometer measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 band 1a resolution nominal size: 640 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Ozone Profiles, high resolution		
NRT: O3M-38, O3M-47		MAG-N-O3HRPR, MBG-N-O3HRPR
Offline: O3M-39, O3M-48		MAG-O-O3HRPR, MBG-O-O3HRPR
Type	Product	
Applications and users	NWP, air quality, health, scientific, ECMWF	
Characteristics and methods	RTModel: LidortA; Inversion: Optimal estimation	
Generation frequency	NRT: PDU dissemination, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
30 % in stratosphere	15 % in stratosphere	10 % in stratosphere
70 % in troposphere	30 % in troposphere	25 % in troposphere
Verification method	Balloon soundings, lidar and microwave radiometer measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 resolution nominal size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Absorbing Aerosol Index		
NRT: O3M-61.1, O3M-71.1		MAG-N-AAI, MBG-N-AAI
Offline: O3M-14.1, O3M-70.1		MAG-O-AAI, MBG-O-AAI
Type	Product	
Applications and users	Climate monitoring, desert dust, biomass burning, volcanic ash, aerosol modelling	
Characteristics and methods	Rayleigh scattering, including a correction on the reflectance for the degradation of the GOME-2 instrument	
Generation frequency	NRT: PDU dissemination frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Dissemination		
Type	Format	Means
NRT	HDF5	EUMETCast
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
1.0 index points	0.5 index points	0.2 index points
Verification method	Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 resolution nominal size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

AC SAF Products

Absorbing Aerosol Index from PMDs		
NRT: O3M-62.1, O3M-72.1		MAG-N-AAIPMD, MBG-N-AAIPMD
Offline: O3M-63.1, O3M-73.1		MAG-O-AAIPMD, MBG-O-AAIPMD
Type	Product	
Applications and users	Climate monitoring, desert dust, biomass burning, volcanic ash, aerosol modelling	
Characteristics and methods	Rayleigh scattering, including a correction on the reflectance for the degradation of the GOME-2 instrument	
Generation frequency	NRT: PDU dissemination frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B: GOME-2	
Dissemination		
Type	Format	Means
NRT	HDF5	EUMETCast
Offline	HDF5	FTP
Accuracy		
Threshold	Target	Optimal
1.0 index points	0.5 index points	0.2 index points
Verification method	Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 resolution nominal size 80 x 40 km ²	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

NRT IASI CO		
O3M-181, O3M-80		MAI-N-CO, MBI-N-CO
Type	Product	
Applications and users	Scientific institutes for modelling, validation, inversion sources, dedicated campaigns e.g. Polarcat, BORTAS and CAMS	
Characteristics and methods	RT: FORLI, OEM	
Generation frequency	PDU dissemination frequency, every 3 minutes	
Input satellite data	Metop-A/B: IASI	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Accuracy on total column for standard cases		
Threshold	Target	Optimal
25 %	12 %	5 %
Accuracy on total column for unusual cases (high pollution or low signal)		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Airplane campaigns, other satellite instruments	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	IASI spatial resolution, cloud fraction below 25 %	≤ 3 hours
Comments		
Current version: v20100815, initial release		

AC SAF Products

NRT IASI SO2		
O3M-57		MxI-N-SO2
Type	Product	
Applications and users	Climate studies, volcanic monitoring (VAACs)	
Characteristics and methods	LUT	
Generation frequency	PDU dissemination frequency, every 3 minutes	
Input satellite data	Metop-A/B: IASI	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Accuracy below 10 km		
Threshold	Target	Optimal
200 %	100 %	50 %
Accuracy above 10 km		
Threshold	Target	Optimal
100 %	35 %	20 %
Verification method	Other satellite data and possibly ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	IASI spatial resolution, cloud fraction below 20 %	≤ 3 hours
Comments		
<p>Accuracies are highly dependent on the altitude of the SO₂ plume. The percentages in this table assume knowledge of the altitude, temperature and pressure of the SO₂ layer, and in addition assume no major cloud and aerosol contamination. The operational range of the algorithm is 0.5-5000 DU (depending on the altitude).</p>		

NRT UV, Clear-sky		
O3M-91		MBG-NUV_CLEAR
Type	Product	
Applications and users	Climate monitoring, health risk evaluation, INMH	
Characteristics and methods	Climatologies applied to Assimilated Total Ozone from KNMI	
Generation frequency	1 per day	
Input satellite data	Metop-A/B: GOME-2 via internal ATO product	
Dissemination		
Type	Format	Means
NRT	PNG, HTML	FTP, WWW, GE
Accuracy		
Threshold	Target	Optimal
20 %	10 %	5 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.25° x 0.25° grid	≤ 3 hours
Comments		

AC SAF Products

NRT UV, Cloud-corrected		
O3M-92		MBG-NUV_CLOUD
Type	Product	
Applications and users	Climate monitoring, health risk evaluation, INMH	
Characteristics and methods	Climatologies applied to Assimilated Total Ozone from KNMI	
Generation frequency	1 per day	
Input satellite data	Metop-A/B: GOME-2 via internal ATO product	
Dissemination		
Type	Format	Means
NRT	PNG, HTML	FTP, WWW, GE
Accuracy		
Threshold	Target	Optimal
20 %	10 %	5 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.25° x 0.25° grid	≤ 3 hours
Comments		

Offline UV, daily dose, erythemal (CIE) weighting		
O3M-450		MM-O-UV_DD_CIE
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

AC SAF Products

Offline UV, daily dose, plant response weighting		
O3M-451		MM-O-UV_DD_PLANT
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

Offline UV, daily dose, DNA damage weighting		
O3M-452		MM-O-UV_DD_DNA
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		
The DNA damage UV product corresponds to the UV damage on pure DNA, dissolved in liquid, following Setlow <i>et al.</i> (1974). It is to be noted that it can't directly be interpreted as DNA damage in living tissues, e.g. human skin.		

AC SAF Products

Offline UV, daily dose, UVA range (315-400 nm)		
O3M-453		MM-O-UV_DD_UVA
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

Offline UV, daily dose, UVB range (280-315 nm)		
O3M-454		MM-O-UV_DD_UVB
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

AC SAF Products

Offline UV, daily maximum dose rate, erythemal (CIE) weighting		
O3M-455		MM-O-UV_MDSR_CIE
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

Offline UV, daily maximum dose rate, plant response weighting		
O3M-456		MM-O-UV_MDSR_PLANT
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

AC SAF Products

Offline UV, daily maximum dose rate, DNA damage weighting		
O3M-457		MM-O-UV_MDSR_DNA
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		
The DNA damage UV product corresponds to the UV damage on pure DNA, dissolved in liquid, following Setlow <i>et al.</i> (1974). It is to be noted that it can't directly be interpreted as DNA damage in living tissues, e.g. human skin.		

Offline UV, daily maximum dose rate, UVA range (315-400 nm)		
O3M-458		MM-O-UV_MDSR_UVA
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - Total ozone NRT products O3M-01.1 and O3M-41.1 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

AC SAF Products

Offline UV, daily maximum dose rate, UVB range (280-315 nm)		
O3M-459		MM-O-UV_MDSR_UVB
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

Offline UV, solar noon UV Index		
O3M-460		MM-O-UV_NOON_UVI
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

AC SAF Products

Offline UV, daily maximum ozone photolysis rate		
O3M-461		MM-O-UV_MPHR_O3
Type	Product	
Applications and users	Climate monitoring, UV chemical effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

Offline UV, daily maximum NO2 photolysis rate		
O3M-462		MM-O-UV_MPHR_NO2
Type	Product	
Applications and users	Climate monitoring, UV chemical effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

AC SAF Products

Offline UV, daily dose, vitamin D weighting		
O3M-463		MM-O-UV_DD_VITD
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

Offline UV, daily maximum dose rate, vitamin D weighting		
O3M-464		MM-O-UV_MDSR_VITD
Type	Product	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Generation frequency	1 per day	
Input satellite data	<ul style="list-style-type: none"> - AC SAF GOME-2 NRT total ozone products that are available - AVHRR/3 channel 1 reflectance from Metops and NOAA-18/19 that are available - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Dissemination		
Type	Format	Means
Offline	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	≤ 2 weeks
Comments		

Appendix 2: AC SAF Data Records

Reprocessed Total Ozone		
O3M-40		MAG-RP1-O3
Type	Data Record	
Applications and users	Climate monitoring	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Input satellite data	Metop-A: GOME-2 L1 (PPF 4.x)	
Algorithm version	GDP 4.4	
Time period	January 2007 – December 2009	
Data volume	200 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
20 %	3 % (SZA < 80°) 6 % (SZA > 80°)	1.5 %
Verification methods	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 resolution, nominal size 80 x 40 km ²	-
Comments		

AC SAF Data Records

Reprocessed Total Ozone		
O3M-110.0		MxG-RP1-O3
Type	Data Record	
Applications and users	The product is targeted for the generation of homogenous and stable long data records for climate research, monitoring and applications. Targeted users are: WMO WOUDC, WMO OMP, DLR WDC-RSAT, TEMIS, CAMS (Copernicus Atmospheric Monitoring Service) reanalysis, and C3S (Copernicus Climate Change Service). In general, scientific community interested in the long-term evolution of the ozone layer.	
Characteristics and Methods	Homogenous data set, DOAS slant column fitting + AMF conversion	
Input Satellite Data	Metop-A/B: GOME-2 L1 (PPF 5.3.0)	
Algorithm Version	GDP 4.8	
Time period	23/01/2007 – 16/11/2016	
Data Volume	1037 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
20 %	3 % (SZA < 80°) 6 % (SZA > 80°)	1.5 %
Verification methods	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	-
Comments		

AC SAF Data Records

Reprocessed Total NO ₂		
O3M-114.0		MxG-RP1-NO ₂
Type	Data Record	
Applications and users	The product is targeted for the generation of homogenous and stable long data records for climate and air quality research, monitoring and applications. The GOME-2 NO ₂ column is important input product to the Copernicus Atmospheric Monitoring Service (CAMS) for assimilation in the reanalysis system, and for MACC/CAMS validation/monitoring purposes. In addition, it is used in support of regional model runs for Europe as well as in verification of emissions, investigation of trends etc.	
Characteristics and methods	Homogenous data set, DOAS slant column fitting + AMF conversion	
Input satellite data	Metop-A/B: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	GDP 4.8	
Time period	23/01/2007 – 16/11/2016	
Data volume	1037 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
10 ¹⁵ molec/cm ² (20 % annual mean)	3-5·10 ¹⁴ molec/cm ² (8-15 % annual mean)	1-3·10 ¹⁴ molec/cm ² (4-8 % annual mean)
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	-
Comments		
The accuracy specifications for this product are focussed on stratospheric applications and have been verified with ground-based stratospheric NO ₂ measurements from NDACC.		

AC SAF Data Records

Reprocessed Total BrO		
O3M-115.0		MxG-RP1-BrO
Type	Data Record	
Applications and users	The product is targeted for the generation of homogenous and stable long data records for climate research, monitoring and applications. The product is used by research institutes (e.g. UCAM) for comparison with local measurements and with chemistry-transport model simulations (Yang et al., 2010). In the future, GOME-2 BrO data could also be useful for the planning and interpretation of polar campaign experiments such as the past ARCTAS campaign (Salawitch et al., 2010). The product can be used in assessment of the Montreal Protocol.	
Characteristics and methods	Homogenous data set, DOAS slant column fitting + AMF conversion	
Input satellite data	Metop-A/B: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	GDP 4.8	
Time period	23/01/2007 – 16/11/2016	
Data volume	1037 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
50 %	30 %	15 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	-
Comments		

AC SAF Data Records

Reprocessed Total SO ₂		
O3M-117.0		MxG_RP1-SO ₂
Type	Data Record	
Applications and users	The product is targeted for the generation of homogenous and stable long data records for climate and air quality research, monitoring and applications. The key users will be MACC and in the future CAMS, i.e. for assimilation in the CAMS reanalysis system, and for MACC/CAMS validation/monitoring activities. Furthermore, the product is used in support of regional model runs for Europe. Other users are volcanic emissions monitoring services, such as SACS, VAST and VAACs. The SO ₂ product is also used by several research institutes for various applications such as evaluation of anthropogenic SO ₂ emissions from large point sources (smelters and power plants) (Fioletov et al., 2013), investigation of temporal trends in high-polluted regions (e.g. ESA Dragon-3 project), verification of bottom-up emission inventory etc.	
Characteristics and methods	Homogenous data set, DOAS slant column fitting + AMF conversion	
Input satellite data	Metop-A/B: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	GDP 4.8	
Time period	23/01/2007 – 16/11/2016	
Data volume	1037 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
100 %	50 % (SZA < 70°)	30 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	-
Comments		
A specific volcanic SO ₂ detection flag to identify enhanced GOME-2 SO ₂ levels and to separate these measurements from GOME-2 pixels with high noise levels is required for use of GOME-2 SO ₂ columns in MACC and CAMS. This volcanic SO ₂ flag will be included in the GOME-2 reprocessed total SO ₂ product.		

AC SAF Data Records

Reprocessed Total HCHO		
O3M-118.0		MxG-RP1-HCHO
Type	Data Record	
Applications and users	The product is targeted for the generation of homogenous and stable long data records for climate and air quality research, monitoring and applications. The GOME-2 formaldehyde column is an important input product to the Copernicus Atmospheric Monitoring Service (CAMS) for assimilation in the reanalysis system, and for validation/monitoring of the MACC/CAMS system. In addition, it is used in support of regional model runs for Europe as well as in verification of emissions, investigation of trends etc.	
Characteristics and methods	Homogenous data set, DOAS slant column fitting + AMF conversion	
Input satellite data	Metop-A/B: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	GDP 4.8	
Time period	23/01/2007 – 16/11/2016	
Data volume	1037 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
100 %	50 % (polluted)	30 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	-
Comments		

AC SAF Data Records

Reprocessed Total OCIO		
O3M-119.0		MxG-RP1-OCIO
Type	Data Record	
Applications and users	This is a homogenous, stable and long data record for climate research, monitoring and applications. It is targeted to research institutes for comparison with local measurements and with chemistry-transport model simulations. The data record can be used by WMO and other research institutes in the framework of the Montreal Protocol Assessments.	
Characteristics and methods	Homogenous data set, DOAS slant column fitting. Only OCIO slant column densities are provided.	
Input satellite data	Metop-A/B: GOME-2 L1 (PPF 5.3.0 and 6.X)	
Algorithm version	GDP 4.8	
Time period	23/01/2007 – 16/11/2016	
Data volume	1037 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
100 %	50 %	30 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 resolution, nominal size 80 x 40 km ²	-
Comments		

AC SAF Data Records

Reprocessed Total H2O		
O3M-121.0		MxG-RP1-H2O
Type	Data Record	
Applications and users	The product is targeted for the generation of homogenous and stable long data records for climate research, monitoring and applications. H2O product is an important input to the WCRP-GEWEX project and ESA's DUE GlobVapour project.	
Characteristics and methods	Homogenous data set, DOAS slant column fitting + AMF conversion	
Input satellite data	Metop-A/B: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	GDP 4.8	
Time period	23/01/2007 – 16/11/2016	
Data volume	1037 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
25 %	10 %	5 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	-
Comments		

AC SAF Data Records

Reprocessed Tropospheric NO2		
O3M-123.0		MxG-RP1-NO2TR
Type	Data Record	
Applications and users	The product is targeted for the generation of homogenous and stable long data records for climate and air quality research, monitoring and applications. The GOME-2 NO2 column is an important input product to the Copernicus Atmospheric Monitoring Service (CAMS) for assimilation in the reanalysis system, and for validation/monitoring of the MACC/CAMS system. In addition, it is used in support of regional model runs for Europe.	
Characteristics and methods	Homogenous data set, DOAS slant column fitting + AMF conversion	
Input satellite data	Metop-A/B: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	GDP 4.8	
Time period	23/01/2007 – 16/11/2016	
Data volume	1037 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	FTP, EDC
Accuracy		
Threshold	Target	Optimal
50 %	30 % (polluted)	20 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2/Metop-A: nominal pixel size 80 x 40 km ² (before 15 July 2013) nominal pixel size 40 x 40 km ² (after 15 July 2013) GOME-2/Metop-B: nominal pixel size 80 x 40 km ²	-
Comments		

AC SAF Data Records

Reprocessed Absorbing Aerosol Index		
O3M-113		MAG-RP1-AAI
Type	Data Record	
Applications and users	<p>The product is targeted for the generation of homogenous and stable long data records for climate research, aerosol services and applications. The specific areas are: climate monitoring (MACC), detection and modelling of desert dust, volcanic ash (like Temis and SACS, biomass burning and validation of polar multi-sensor aerosol properties (PMAp) product (EUMETSAT).</p> <p>Users indicate the need for the stable long term aerosol products in the following documents (for example):</p> <ul style="list-style-type: none"> • ESA Climate Change Initiative aerosol_cci User Requirement Document, Version 1.5 (Aerosol_cci_URD_v1.5) • 1997 Aerosol Workshop http://www.giss.nasa.gov/meetings/aerosols1997/summary.html • Global Aerosol Climatology Project (http://gacp.giss.nasa.gov/) • SACS support letter <p>This is the first reprocessing for the GOME-2 aerosol products.</p>	
Characteristics and methods	<p>Rayleigh scattering including degradation correction: de Graaf, M., P. Stammes, O. Torres, and R. B. A. Koelemeijer (2005), Absorbing Aerosol Index: Sensitivity analysis, application to GOME and comparison with TOMS, J. Geophys. Res., 110, D01201, doi:10.1029/2004JD005178</p>	
Input satellite data	Metop-A: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	OPERA 1.30	
Time period	24/01/2007 – ‘current’	
Data volume	~4 GB / year	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
General quality requirement	<p>Specific accuracy user requirements for AAI products don't exist due to the qualitative nature of the product. Thus, the quality success criteria is such that the product allow setting of Absorbing Aerosol Index value thresholds for applications mentioned in the “Applications and Users” section and that the selected threshold values are usable for the whole data record without time dependent variations. The values of those thresholds are set by the data users and thus, cannot be specified here.</p>	
Verification method	Satellite-to-satellite comparison (SCIAMACHY/Envisat)	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	<p>GOME-2/Metop-A resolution: nominal pixel size 80 x 40 km² (before 15 July 2013) nominal pixel size 40 x 40 km² (after 15 July 2013)</p>	-
Comments		

Reprocessed Absorbing Aerosol Index from PMDs		
O3M-178		MAG-RP1-AAIPMD
Type	Data Record	
Applications and users	<p>The product is targeted for the generation of homogenous and stable long data records for climate research, aerosol services and applications. The specific areas are: climate monitoring (MACC), detection and modelling of desert dust, volcanic ash (like Temis and SACS), biomass burning and validation of polar multi-sensor aerosol properties (PMAp) product (EUMETSAT).</p> <p>Users indicate the need for the stable long term aerosol products in the following documents (for example):</p> <ul style="list-style-type: none"> • ESA Climate Change Initiative aerosol_cci User Requirement Document, Version 1.5 (Aerosol_cci_URD_v1.5) • 1997 Aerosol Workshop http://www.giss.nasa.gov/meetings/aerosols1997/summary.html • Global Aerosol Climatology Project (http://gacp.giss.nasa.gov/) • SACS support letter <p>This is the first reprocessing for the GOME-2 aerosol products</p>	
Characteristics and methods	Rayleigh scattering including degradation correction: de Graaf, M., P. Stammes, O. Torres, and R. B. A. Koelemeijer (2005), Absorbing Aerosol Index: Sensitivity analysis, application to GOME and comparison with TOMS, J. Geophys. Res., 110, D01201, doi:10.1029/2004JD005178	
Input satellite data	Metop-A: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	OPERA 1.30	
Time period	24/01/2007 – ‘current’ Note: the PMD data before and after 12 March 2008 are not comparable because the wavelength definition of the PMD bands is different.	
Data volume	~30 GB / year	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
General quality requirement	Specific accuracy user requirements for AAI products don't exist due to the qualitative nature of the product. Thus, the quality success criteria is such that the product allow setting of Absorbing Aerosol Index value thresholds for applications mentioned in the “Applications and Users” section and that the selected threshold values are usable for the whole data record without time dependent variations. The values of those thresholds are set by the data users and thus, cannot be specified here.	
Verification method	Satellite-to-satellite comparison (SCIAMACHY/Envisat)	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 PMD resolution: nominal pixel size 10 x 40 km ² (before 15 July 2013) nominal pixel size 5 x 40 km ² (after 15 July 2013)	-
Comments		

AC SAF Data Records

Reprocessed Absorbing Aerosol Index		
O3M-179		MBG-RP1-AAI
Type	Data Record	
Applications and users	<p>The product is targeted for the generation of homogenous and stable long data records for climate research, aerosol services and applications. The specific areas are: climate monitoring (MACC), detection and modelling of desert dust, volcanic ash (like Temis and SACS, biomass burning and validation of polar multi-sensor aerosol properties (PMAp) product (EUMETSAT).</p> <p>Users indicate the need for the stable long term aerosol products in the following documents (for example):</p> <ul style="list-style-type: none"> • ESA Climate Change Initiative aerosol_cci User Requirement Document, Version 1.5 (Aerosol_cci_URD_v1.5) • 1997 Aerosol Workshop http://www.giss.nasa.gov/meetings/aerosols1997/summary.html • Global Aerosol Climatology Project (http://gacp.giss.nasa.gov/) • SACS support letter <p>This is the first reprocessing for the GOME-2 aerosol products.</p>	
Characteristics and methods	<p>Rayleigh scattering including degradation correction: de Graaf, M., P. Stammes, O. Torres, and R. B. A. Koelemeijer (2005), Absorbing Aerosol Index: Sensitivity analysis, application to GOME and comparison with TOMS, J. Geophys. Res., 110, D01201, doi:10.1029/2004JD005178</p>	
Input satellite data	Metop-B: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	OPERA 1.30	
Time period	12/12/2012 – ‘current’	
Data volume	~4 GB / year	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
General quality requirement	<p>Specific accuracy user requirements for AAI products don't exist due to the qualitative nature of the product. Thus, the quality success criteria is such that the product allow setting of Absorbing Aerosol Index value thresholds for applications mentioned in the “Applications and Users” section and that the selected threshold values are usable for the whole data record without time dependent variations. The values of those thresholds are set by the data users and thus, cannot be specified here.</p>	
Verification method	Satellite-to-satellite comparison (SCIAMACHY/Envisat)	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 resolution, nominal pixel size 80 x 40 km ²	-
Comments		

AC SAF Data Records

Reprocessed Absorbing Aerosol Index from PMDs		
O3M-180		MBG-RP1-AAIPMD
Type	Data Record	
Applications and users	<p>The product is targeted for the generation of homogenous and stable long data records for climate research, aerosol services and applications. The specific areas are: climate monitoring (MACC), detection and modelling of desert dust, volcanic ash (like Temis and SACS), biomass burning and validation of polar multi-sensor aerosol properties (PMAp) product (EUMETSAT).</p> <p>Users indicate the need for the stable long term aerosol products in the following documents (for example):</p> <ul style="list-style-type: none"> • ESA Climate Change Initiative aerosol_cci User Requirement Document, Version 1.5 (Aerosol_cci_URD_v1.5) • 1997 Aerosol Workshop http://www.giss.nasa.gov/meetings/aerosols1997/summary.html • Global Aerosol Climatology Project (http://gacp.giss.nasa.gov/) • SACS support letter <p>This is the first reprocessing for the GOME-2 aerosol products</p>	
Characteristics and methods	<p>Rayleigh scattering including degradation correction: de Graaf, M., P. Stammes, O. Torres, and R. B. A. Koelemeijer (2005), Absorbing Aerosol Index: Sensitivity analysis, application to GOME and comparison with TOMS, J. Geophys. Res., 110, D01201, doi:10.1029/2004JD005178</p>	
Input satellite data	Metop-B: GOME-2 L1 (PPF 5.3.0)	
Algorithm version	OPERA 1.30	
Time period	12/12/2012 – ‘current’	
Data volume	~30 GB / year	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
General quality requirement	<p>Specific accuracy user requirements for AAI products don't exist due to the qualitative nature of the product. Thus, the quality success criteria is such that the product allow setting of Absorbing Aerosol Index value thresholds for applications mentioned in the “Applications and Users” section and that the selected threshold values are usable for the whole data record without time dependent variations. The values of those thresholds are set by the data users and thus, cannot be specified here.</p>	
Verification method	Satellite-to-satellite comparison (SCIAMACHY/Envisat)	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 PMD resolution, nominal pixel size 10 x 40 km ²	-
Comments		

AC SAF Data Records

TCDR NO2		
O3M-87		MxG-DS-TCDRNO2
Type	Data Record	
Applications and users	The product is targeted for climate and air quality research and applications. The product contain both total as well as tropospheric NO2.	
Characteristics and methods	Monthly means	
Input satellite data	Metop-x: GOME-2 L2 product	
Algorithm version	1.0	
Time period	January 2007 – August 2017	
Data volume	2.9 GB	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	FTP
Accuracy		
Threshold	Target	Optimal
Total NO2: 20%	8 %	5 %
Trop. NO2: 50 %	30 %	20 %
Verification method	-	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.25° x 0.25°	-
Comments		
The GCOS long term accuracy target for tropospheric NO2 column is 20 % (CGOS, 2016). This GCOS target is in line with the estimated optimal accuracy of 20 % for the GOME-2 TCDR NO2 product.		

TCDR H2O		
O3M-88		MxG-DS-TCDRH2O
Type	Data Record	
Applications and users	The product is targeted for climate change research, and applications. WCRP-GEWEX.	
Characteristics and methods	Monthly means	
Input satellite data	Metop-x: GOME-2 L2 product	
Algorithm version	1.0	
Time period	January 2007 – August 2017	
Data volume	2.9 GB	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	FTP
Accuracy		
Threshold	Target	Optimal
25 %	10 %	5 %
Verification method	-	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5°	-
Comments		
GCOS long-term accuracy target for total H2O column is 2 % (CGOS, 2016). This GCOS target for the H2O column will be difficult to obtain from GOME-2. Although a 2 % accuracy might not be feasible, the GOME-2 H2O TCDR is a valuable data set because of its long-term consistency and stability, the limited use of external (auxiliary) information in the retrieval, and the global coverage over both land and ocean.		

AC SAF Data Records

UV Data Record R1, daily dose, erythemal (CIE) weighting		
O3M-138		MxG-RP1-O-UV_DD_CIE
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

UV Data Record R1, daily dose, plant response weighting		
O3M-139		MxG-RP1-O-UV_DD_PLANT
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

AC SAF Data Records

UV Data Record R1, daily dose, DNA damage weighting		
O3M-140		MxG-RP1-O-UV_DD_DNA
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		
The DNA damage UV product corresponds to the UV damage on pure DNA, dissolved in liquid, following Setlow <i>et al.</i> (1974). It is to be noted that it can't directly be interpreted as DNA damage in living tissues, e.g. human skin.		

UV Data Record R1, daily dose, UVA range (315-400 nm)		
O3M-141		MxG-RP1-O-UV_DD_UVA
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

AC SAF Data Records

UV Data Record R1, daily dose, UVB range (280-315 nm)		
O3M-142		MxG-RP1-O-UV_DD_UVB
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

UV Data Record R1, daily maximum dose rate, erythemal (CIE) weighting		
O3M-143		MxG-RP1-O-UV_MDSR_CIE
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

AC SAF Data Records

UV Data Record R1, daily maximum dose rate, plant response weighting		
O3M-144		MxG-RP1-O-UV_MDSR_PLANT
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

UV Data Record R1, daily maximum dose rate, DNA damage weighting		
O3M-145		MxG-RP1-O-UV_MDSR_DNA
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		
The DNA damage UV product corresponds to the UV damage on pure DNA, dissolved in liquid, following Setlow <i>et al.</i> (1974). It is to be noted that it can't directly be interpreted as DNA damage in living tissues, e.g. human skin.		

AC SAF Data Records

UV Data Record R1, daily maximum dose rate, UVA range (315-400 nm)		
O3M-146		MxG-RP1-O-UV_MDSR_UVA
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

UV Data Record R1, daily maximum dose rate, UVB range (280-315 nm)		
O3M-147		MxG-RP1-O-UV_MDSR_UVB
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

AC SAF Data Records

UV Data Record R1, solar noon UV Index		
O3M-148		MxG-RP1-O-UV_NOON_UVI
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

UV Data Record R1, daily maximum ozone photolysis rate		
O3M-149		MxG-RP1-O-UV_MPHR_O3
Type	Data Record	
Applications and users	Climate monitoring, UV chemical effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

AC SAF Data Records

UV Data Record R1, daily maximum NO2 photolysis rate		
O3M-150		MxG-RP1-O-UV_MPHR_NO2
Type	Data Record	
Applications and users	Climate monitoring, UV chemical effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

UV Data Record R1, daily dose, vitamin D weighting		
O3M-151		MxG-RP1-O-UV_DD_VITD
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

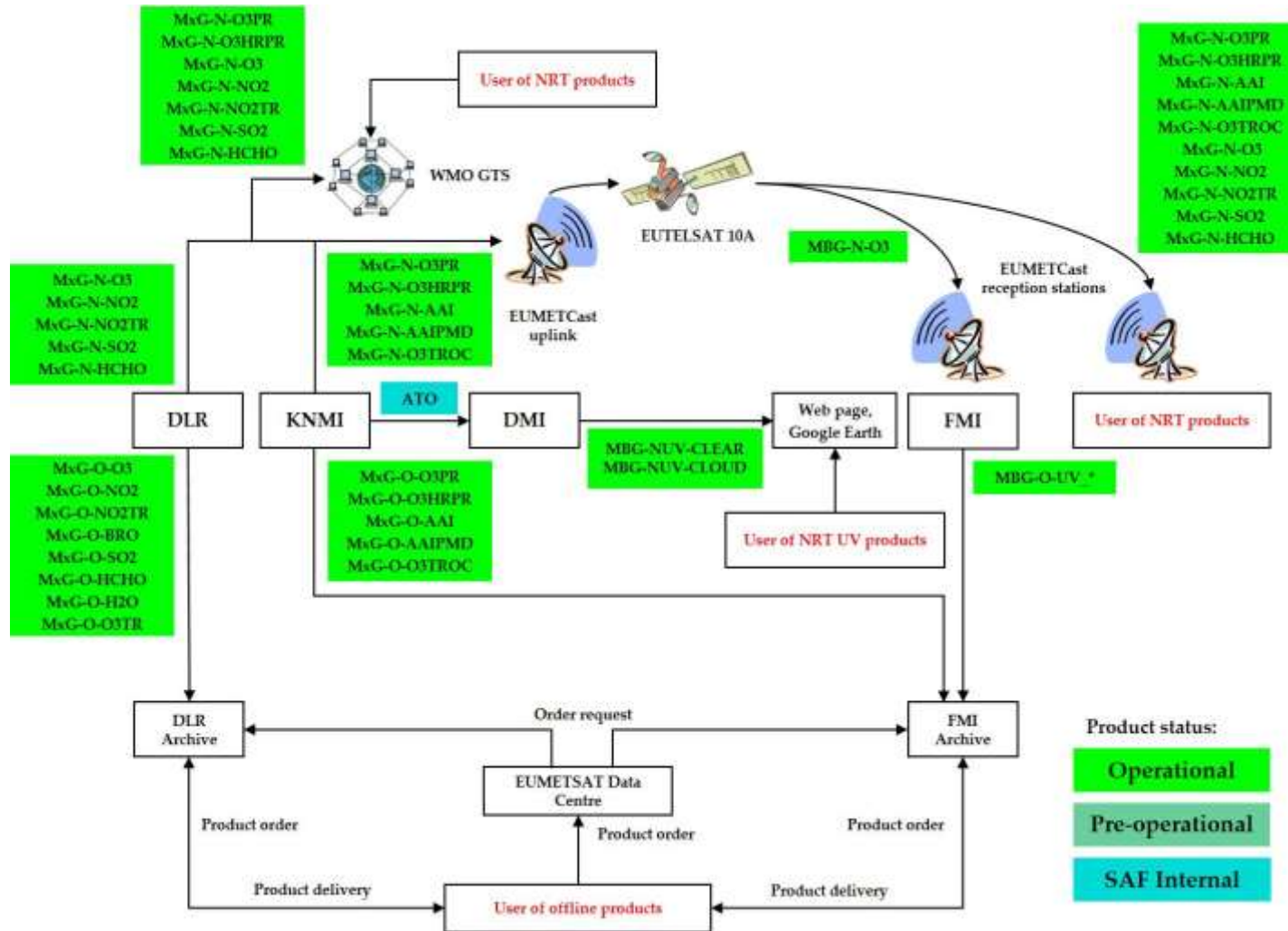
AC SAF Data Records

UV Data Record R1, daily maximum dose rate, vitamin D weighting		
O3M-152		MxG-RP1-O-UV_MDSR_VITD
Type	Data Record	
Applications and users	Climate monitoring, UV biological effects	
Characteristics and methods	Radiative transfer modelling	
Input satellite data	<ul style="list-style-type: none"> - Total ozone data record O3M-110.0 - AVHRR/3 channel 1 reflectance from Metop-A/B and NOAA-18/19 - Surface albedo and aerosol come from MODIS Aura/Terra Collection 006 instead of Tanskanen, Koepke and Kinne climatologies 	
Algorithm version	OUV PGE 2.00	
Time period	June 2007 – May 2017	
Data volume	Approx. 160 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTP
Accuracy		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Comparison with ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.5° x 0.5° grid	-
Comments		

AC SAF Data Records

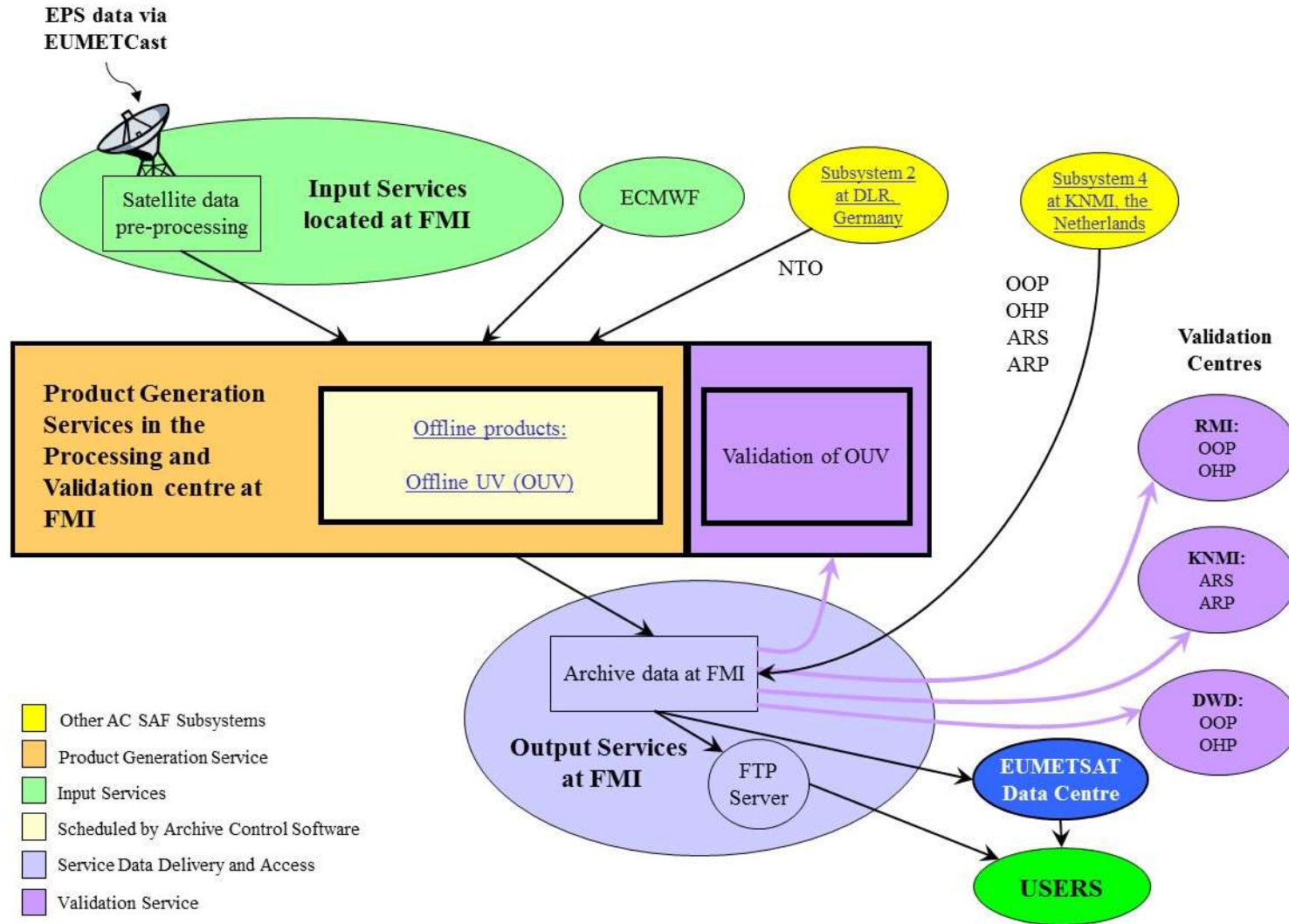
Merged LER Surface Albedo for GOME-2 (Metop-A/B)		
O3M-402		MxG-DS-LER
Type	Data Record	
Applications and users	Climate monitoring: shortwave radiation balance, models, support of trace gas retrievals and of retrievals of clouds and aerosols	
Characteristics and methods	<p>The derived GOME-2 surface DLER product is the directionally dependent Lambertian-equivalent reflectivity (DLER) of the surface, which contains the directional dependence of the surface reflectivity.</p> <p>The surface DLER is provided for 26 selected GOME-2 wavelength bands located outside strong gaseous absorption bands.</p> <p>From the main science channels (MSC): 328, 335, 340, 354, 367, 380, 388, 416, 425, 440, 463, 494, 510, 526, 546, 555, 564, 585, 610, 640, 670, 685, 697, 712, 758, 772 nm</p> <p>From the PMDs: 333, 339, 369, 382, 414, 461, 520, 555, 590, 640, 757, 799 nm</p>	
Input satellite data	Metop-A/B GOME-2 L1b and assimilated total ozone columns from NTO	
Algorithm version	3.0	
Time period	MSC: 01/02/2007 – 30/06/2018 PMD: 01/04/2008 – 30/06/2018	
Data volume	MSC: 2.5 GB PMD: 1.6 GB	
Dissemination		
Type	Format	Means
Offline	NetCDF	HTTP
Accuracy		
Threshold	Target	Optimal
0.10	0.04	0.02
Verification method	Intercomparison with GOME-1, OMI and MERIS surface albedo databases	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	Resolution: - Main science channels: 1° x 1° - PMD bands: 0.5° x 0.5° Sampling: - MSC: 0.25° x 0.25° - PMD: 0.25° x 0.25°	-
Comments		
The MSC-LER and PMD-LER products are provided on a grid with a sampling of 0.25° x 0.25°. This is to accommodate a higher spatial resolution of 0.25° x 0.25° near the coastlines. The real, intrinsic resolution for land and ocean surfaces not containing coastlines is as noted above under “Spatial resolution” (Main science channels: 1° x 1° and PMD bands: 0.5° x 0.5°). With “spatial resolution” we mean the spatial representativeness, with “spatial sampling” we refer to the cell size in the latitude and longitude grid. The LER is dimensionless; the threshold/target/optimal accuracies mentioned above are also unitless.		

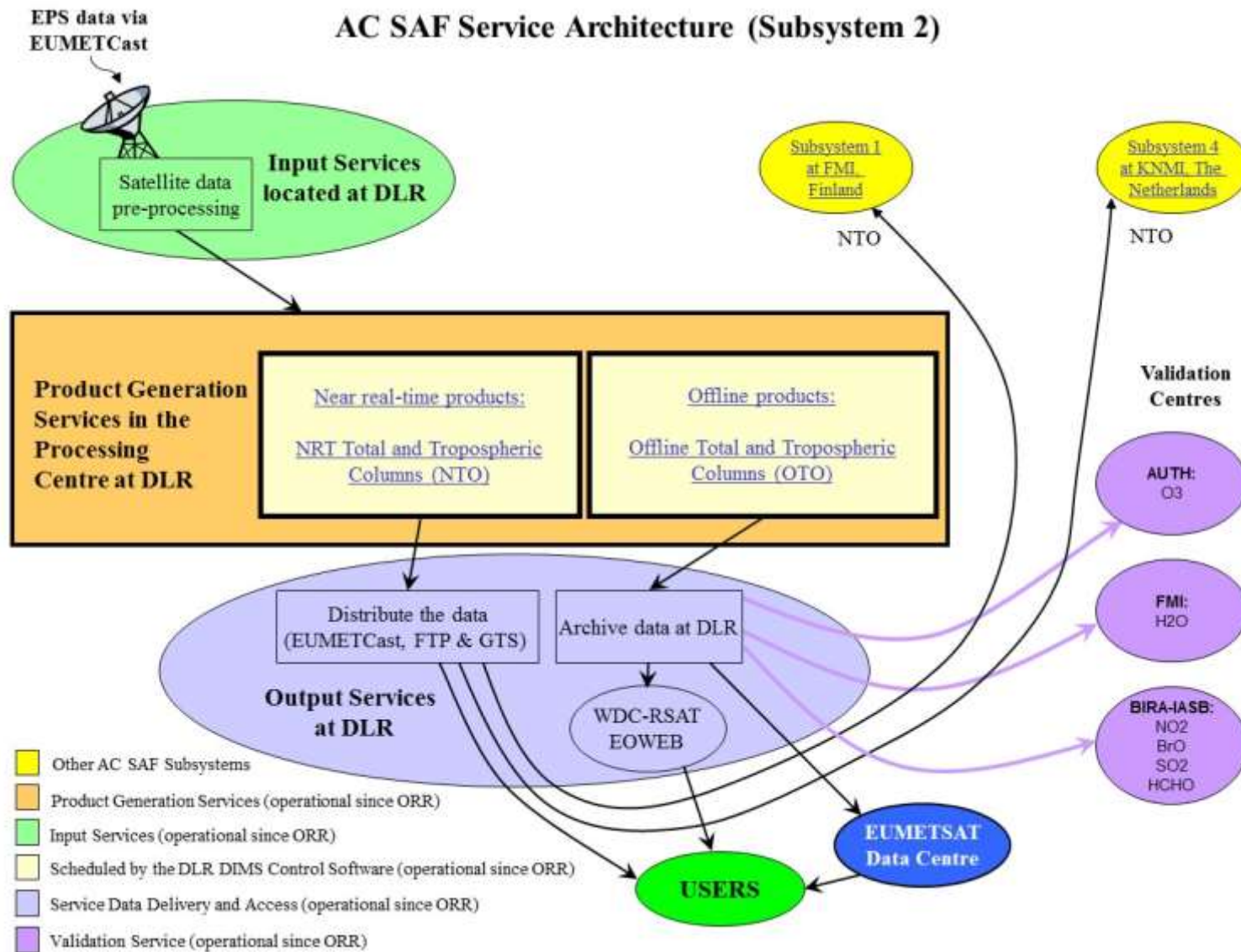
Appendix 3: AC SAF Product Delivery Diagram



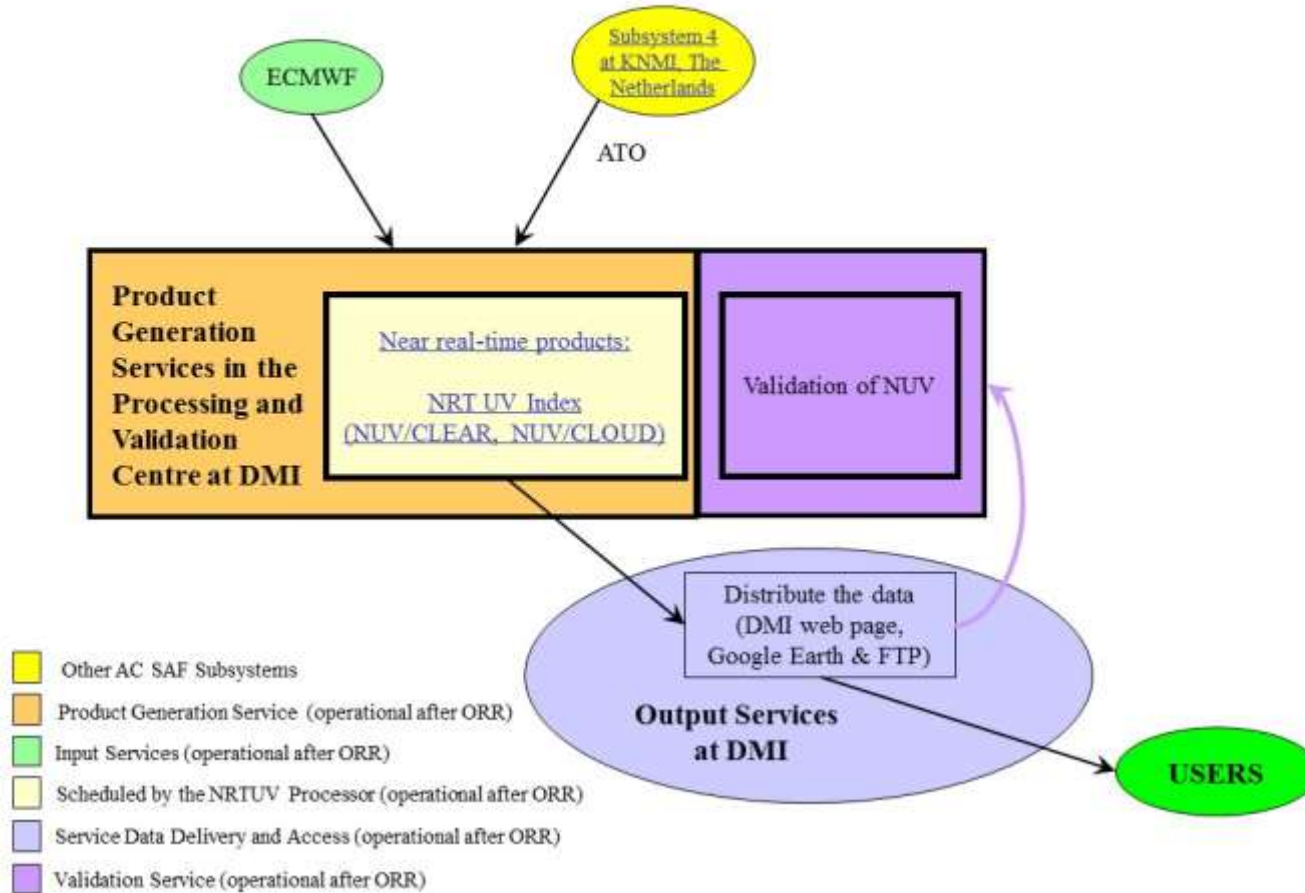
Appendix 4: AC SAF Subsystems

AC SAF Service Architecture (Subsystem 1)





AC SAF Service Architecture (Subsystem 3)



AC SAF Service Architecture (Subsystem 4)

