EUMETSAT AC SAF ATMOSPHERIC COMPOSITION MONITORING

SERVICE SPECIFICATION

Issue 2.1

EUMETSAT AC SAF

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

The Atmospheric Composition Satellite Application Facility (AC SAF), a part of EUMETSAT, is dedicated to monitoring and analysing key atmospheric components such as ozone, trace gases, aerosols, and ultraviolet radiation. These observations contribute to understanding climate change, air quality, and the health of the environment on both regional and global scale.

Background

Monitoring atmospheric composition has become critical in understanding and mitigating the impacts of both anthropogenic and natural changes to the Earth's atmosphere. Human activities, such as combustion of fossil fuels and industrial pollution, contribute to global warming, the depletion of stratospheric ozone, and an increase in harmful ultraviolet (UV) radiation. In addition, natural hazards like volcanic eruptions and forest fires release pollutants that can affect air quality and climate on regional and global scales.

Accurate and continuous monitoring of atmospheric chemistry and radiation is essential for tracking these changes and assessing the effectiveness of international environmental agreements such as the Montreal Protocol and the Paris Agreement. AC SAF plays a crucial role in this process by providing reliable, timely data to policymakers, scientists, and the general public. These data are indispensable for informed decision-making on environmental protection, climate mitigation strategies, and public health initiatives.

Objectives

The primary objectives of the AC SAF are to process, archive, validate, and disseminate high-quality atmospheric data, including gaseous compounds, aerosols and surface radiation. These products, derived from EUMETSAT satellites such as Metop and future platforms (MTG, EPS-SG), are critical for environmental research, public health, and policy decisions.

The objective is reached by providing near real-time (NRT) data as well as long-term, high-quality atmospheric composition data records.

Product categories, timeliness

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

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

Data records are available from the AC SAF archives after reprocessing or dedicated data record generation activities.

Data availability

All AC SAF data is freely available to users worldwide. To access the data, interested users need to register through the AC SAF website. More detailed information on data access, product specifications, and registration can be found at http://ac-saf.eumetsat.int/ by selecting 'Data access'.

AC SAF WWW site: http://ac-saf.eumetsat.int/
AC SAF on X: @Atmospheric_SAF
AC SAF Helpdesk: helpdesk@acsaf.org

Document signatures			
	FUNCTION	NAME	DATE
PREPARED BY	AC SAF Technical Manager	Jari Hovila / FMI	28/04/2025
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APPROVED BY	AC SAF Steering Group		04/06/2025

Document change log		
ISSUE	DATE	Description of change
1.0	07/09/2017	Name of the SAF changed from O3M SAF to AC SAF in the beginning of the CDOP-3, Service Specification updated accordingly. Updates in Appendix 1: - Metop-A product (O3M-181) added to NRT IASI CO product table Updates in Appendix 2: - 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 OClO product (O3M-119) added - "Time period" and "Data Volume" updated for the following data records: O3M-110, O3M-114, O3M-115, O3M-117, O3M-118, O3M-121, O3M-123 Updates in Appendix 3: - NRT SO2 and NRT HCHO added to EUMETCast and WMO/GTS Updates in Appendix 4: - O3M SAF replaced by AC SAF Approved by the Steering Group (AC_DEC_CDOP3SG02-06)
1.1	19/04/2018	Updates in Appendix 1: - NRT IASI SO2 products (O3M-57) added Updates in Appendix 2: - NO2 and H2O climate data records (O3M-87, O3M-88) added Approved by the Steering Group (AC_DEC_CDOP3SG03-09)

1.2	07/06/2019	Updates in Appendix 1: - Old surface UV products replaced by multi-mission products (O3M-450 – O3M-464) Updates in Appendix 2: - Reprocessed surface UV data record R1 tables (O3M-138 – O3M-152) added Approved by the Steering Group (AC_DEC_CDOP3SG06-01)
1.3	17/06/2019	Section 3.1: PR-35 updated to specify three working days as the maximum response time for user contacts to AC SAF Helpdesk. Updates in Appendix 2: - 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) Approved by the Steering Group (AC_DEC_CDOP3SG06-07)
1.4	22/09/2020	Updates in Appendix 1: - AAH products (O3M-68, O3M-69, O3M-78, O3M-79, O3M-364, O3M-365) added - Metop-C information added to: • Total O3 (O3M-300, O3M-301) • Offline tropical tropospheric O3 (O3M-302) • Global tropospheric O3 (O3M-304, O3M-305) • Total NO2 (O3M-338, O3M-339) • Tropospheric NO2 (O3M-341, O3M-342) • Total SO2 (O3M-374, O3M-375) • Total HCHO (O3M-344, O3M-345) • Offline total BrO (O3M-317) • Offline total H2O (O3M-386) • Ozone profiles, high resolution (O3M-311, O3M-312) • AAI from PMDs (O3M-362, O3M-363) • NRT UV index (O3M-409, O3M-410) Update in Appendix 2: - Reprocessed AAH data record (O3M-170) added Appendices 3 and 4 updated to reflect the current situation All remaining references to MACC replaced by CAMS Approved by the Steering Group (AC_DEC_CDOP3SG08-02)

1.5	14/12/2021	General updates: - All requirements and references to EUMETSAT Data Centre and/or UMARF system removed Update in Appendix 1: - Comment section of the total SO2 products (O3M-09.1, O3M-54.1, O3M-55.1, O3M-56.1, O3M-374, O3M-375) updated - Absorbing aerosol index products from main science channels (O3M-14.1, O3M-61.1, O3M-70.1, O3M-71.1) removed due to product discontinuation during the CDOP 3 evaluation process and accepted CDOP 3 product portfolio - Metop-C IASI CO and SO2 products (O3M-352, O3M-377) added - Acronym for Metop-A/B IASI SO2 products (O3M-57) renamed MABI-N-SO2 to better illustrate data usage from two satellite platforms behind a single product ID Update in Appendix 2 based on Delivery Readiness Review (DRR) for total CHOCHO and tropospheric BrO data records (O3M-120.0 and O3M-116), May-June 2021: - Total CHOCHO data record (O3M-120.0) added Appendices 3 and 4 updated to reflect the current situation Approved by the Steering Group (AC_DEC_CDOP3SG11-03)
1.6	22/06/2022	Update in Appendix 1 based on Operational Readiness Review (ORR) for the NRT IASI HNO3 (O3M-81, O3M-336), NRT IASI total O3 (O3M-44, O3M-306) and NRT IASI O3 Profile (O3M-49, O3M-315): - Tables for NRT IASI HNO3 (O3M-81, O3M-336), NRT IASI total ozone (O3M-44, O3M-306) and NRT IASI ozone profile (O3M-49, O3M-315) added. Tables updated: HDF5 removed as data format. Update in Appendix 2 based on delta Delivery Readiness Review (DRR) for the tropospheric BrO data record (O3M-116.0): - Tropospheric BrO data record (O3M-116.0) added Update in Appendix 2 based on Delivery Readiness Review (DRR) for the reprocessed GOME-2 ozone profile data record (O3M-112): - Reprocessed high-resolution ozone profile data record (O3M-112) added. Table updated: data volume added, spatial resolution information updated, comment removed. Approved by the Steering Group (AC_DEC_CDOP4SG02-02)

1.7	01/03/2023	AC SAF introductory page: typos corrected Update in Appendix 1 based on Operational Readiness Review (ORR) for the offline L3 daily/monthly products based on Metop-A/B/C: - Level 3 daily averaged total O3 (O3M-303) added - Level 3 daily averaged BrO (O3M-318) added - Level 3 daily averaged total NO2 (O3M-340) added - Level 3 daily averaged tropospheric NO2 (O3M-343) added - Level 3 daily averaged total HCHO (O3M-346) added - Level 3 daily averaged SO2 (O3M-376) added - Level 3 daily averaged total H2O (O3M-387) added - Level 3 monthly averaged total O3 (O3M-388) added - Level 3 monthly averaged total NO2 (O3M-389) added - Level 3 monthly averaged tropospheric NO2 (O3M-390) added - Level 3 monthly averaged BrO (O3M-391) added - Level 3 monthly averaged total H2O (O3M-393) added - Level 3 monthly averaged total HCHO (O3M-394) added - Level 3 monthly averaged SO2 (O3M-397) added Updates in Appendix 1 based on AC SAF Operations Review 14 (OR-14) Recommendation 01: - NRT coarse resolution ozone profile products (O3M-03, O3M-45) removed - Offline coarse resolution ozone profile products (O3M-13, O3M-46) removed Updates in Appendix 2 based on IASI L3 CO CDR/ICDR (O3M-543, O3M-359) Product Consolidation Review (PCR) and Operational/Delivery Readiness Review (ORR/DRR): - Tables for O3M-359 and O3M-543 added Approved by the Steering Group (AC_DEC_CDOP4SG03-10)

1.8	15/05/2024	Section 1.2: RD2 (EPS End User Requirements Document) removed based on AC SAF Operations Review 15 Action AC_OR15_A01 Section 1.3: Definition of accuracy updated based on AC SAF Operations Review 15 Action AC_OR15_A01 Update in Appendix 1 based on Operational Readiness Review (ORR) for the NRT IASI SO2 altitude product (O3M-379): - Table for O3M-379 added (editorial change 6 August 2024: WMO GTS removed as means of dissemination) Updates in Appendix 2 based on Delivery Readiness Review (DRR) for the IASI L2 CO and SO2 CDRs (O3M-517 and O3M-540): - Tables for O3M-517 and O3M-540 added Update in Appendix 2 based on being replaced by a new data record (O3M-110): - Table for reprocessed total O3 (O3M-40) removed Appendices 3 and 4 (AC SAF product delivery diagram and AC SAF subsystems) removed. Presentation of them is not seen necessary in the context of this document. Approved by the Steering Group (AC_DEC_CDOP4SG05-12)
1.9	26/02/2025	AC SAF introductory page updated Update in Appendix 2 based on Delivery Readiness Review (DRR) for the GOME-2 merged LER surface albedo data record (O3M-402.1): - Table for O3M-402 replaced by O3M-402.1 Approved by the Steering Group (AC_DEC_CDOP4SG06-04)
2.0	01/04/2025	Update in Appendix 1 based on Requirements Review (RR) for the Global 1-day UV index forecast (O3M-410.1): - Tables for O3M-409 and O3M-410 replaced by O3M-410.1 - Product name changed from “NRT UV Index” to “Global 1-day UV index forecast” Update in Appendix 2: - Time periods for IASI-A/B L3 CO CDRs (O3M-543) updated Approved by the Steering Group (AC_DEC_CDOP4SG07-03)

2.1	28/04/2025	Update in Appendix 2 based on Requirements Review (RR) and Delivery Readiness Review (DRR) for the IASI L2 O3 CDRs (O3M-520.1 and O3M-521.1): - Tables for O3M-520.1 and O3M-521.1 added Approved by the Steering Group (AC_DEC_CDOP4SG07-15)

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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

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 of a satellite product is defined as a comparison of the mean/median bias (absolute and/or relative differences) of the product against ground-based and/or satellite-based reference data. Precision around the accuracy is given as a spread around the averaged bias (either through standard deviation or other robust metrics).

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.

2.2. Requirements related to product archiving and distribution

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

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: **Removed**

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 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: Removed

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
- Links to the websites of other consortium members
- Latest SAF news
- Links to product user manuals, validation reports and algorithm theoretical basis documents
- 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 O3		
NRT: O3M-01.1, O3M-41.1, O3M-300 **Offline: O3M-06.1, O3M-42.1, O3M-301**	**MAG-N-O3, MBG-N-O3, MCG-N-O3** **MAG-O-O3, MBG-O-O3, MCG-O-O3**	
Type	Product	
Applications and users	Climate monitoring, C3S, air quality, NWP, 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/C: GOME-2	
Algorithm version	Metop-A/B: GDP 4.8 Metop-C: GDP 4.9	
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/C: nominal pixel size 80 x 40 km^2	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Offline tropical tropospheric O3		
O3M-35, O3M-43, O3M-302	**MAG-O-O3TR, MBG-O-O3TR, MCG-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/C: GOME-2	
Algorithm version	1.0	
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 O3		
NRT: O3M-172, O3M-174, O3M-304 **Offline: O3M-173, O3M-175, O3M-305**	**MAG-N-O3TROC, MBG-N-O3TROC, MCG-N-O3TROC** **MAG-O-O3TROC, MBG-O-O3TROC, MCG-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/C: GOME-2	
Algorithm version	1.37	
Dissemination		
Type	Format	Means
NRT	BUFR, HDF5	EUMETCast, WMO GTS
Offline	HDF5	HTTPS
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/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/C: nominal pixel size 80 x 40 km^2	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Total NO2		
NRT: O3M-02.1, O3M-50.1, O3M-338 **Offline: O3M-07.1, O3M-51.1, O3M-339**	**MAG-N-NO2, MBG-N-NO2, MCG-N-NO2** **MAG-O-NO2, MBG-O-NO2, MCG-O-NO2**	
Type	Product	
Applications and users	NWP, Climate change monitoring, air quality, health, 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/C: GOME-2	
Algorithm version	Metop-A/B: GDP 4.8 Metop-C: GDP 4.9	
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)	$3\text{-}5 \cdot 10^{14}$ molec/cm^2 (8-15 % annual mean)	$1\text{-}3 \cdot 10^{14}$ 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/C: nominal pixel size 80 x 40 km^2	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Tropospheric NO2		
NRT: O3M-36.1, O3M-52.1, O3M-341 **Offline: O3M-37.1, O3M-53.1, O3M-342**	**MAG-N-NO2TR, MBG-N-NO2TR, MCG-N-NO2TR** **MAG-O-NO2TR, MBG-O-NO2TR, MCG-O-NO2TR**	
Type	Product	
Applications and users	NWP, air quality, health, 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/C: GOME-2	
Algorithm version	Metop-A/B: GDP 4.8 Metop-C: GDP 4.9	
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/C: nominal pixel size 80 x 40 km^2	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Total SO2		
NRT: O3M-54.1, O3M-55.1, O3M-374 **Offline: O3M-09.1, O3M-56.1, O3M-375**	**MAG-N-SO2, MBG-N-SO2, MCG-N-SO2** **MAG-O-SO2, MBG-O-SO2, MCG-O-SO2**	
Type	Product	
Applications and users	Volcanic emissions, SACS, VAACs, TEMIS, research institutes, anthropogenic emission monitoring, 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/C: GOME-2	
Algorithm version	Metop-A/B: GDP 4.8 Metop-C: GDP 4.9	
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/C: 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 CAMS. This volcanic SO2 flag is included in the NRT and offline GOME-2 total SO2 products.		

Total HCHO		
NRT: O3M-176, O3M-177, O3M-344 Offline: O3M-10.1, O3M-58.1, O3M-345	**MAG-N-HCHO, MBG-N-HCHO, MCG-N-HCHO MAG-O-HCHO, MBG-O-HCHO, MCG-O-HCHO**	
Type	Product	
Applications and users	Air quality. The NRT HCHO product is required by CAMS for assimilation and monitoring purposes, since it is the only constraint on the VOC chemistry in the CAMS system. The offline HCHO product is used by 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/C: GOME-2	
Algorithm version	Metop-A/B: GDP 4.8 Metop-C: GDP 4.9	
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/C: nominal pixel size 80 x 40 km^2	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Offline total BrO		
O3M-08.1, O3M-82.1, O3M-317	**MAG-O-BrO, MBG-O-BrO, MCG-O-BrO**	
Type	Product	
Applications and users	Climate monitoring research: ozone depletion, UCAM	
Characteristics and methods	DOAS slant column fitting + AMF conversion	
Generation frequency	Metop orbit repeat cycle	
Input satellite data	Metop-A/B/C: GOME-2	
Algorithm version	Metop-A/B: GDP 4.8 Metop-C: GDP 4.9	
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/C: nominal pixel size 80 x 40 km^2	≤ 2 weeks
Comments		

Offline total H2O		
O3M-12.1, O3M-86.1, O3M-386	**MAG-O-H2O, MBG-O-H2O, MCG-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	Metop orbit repeat cycle	
Input satellite data	Metop-A/B/C: GOME-2	
Algorithm version	Metop-A/B: GDP 4.8 Metop-C: GDP 4.9	
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/C: nominal pixel size 80 x 40 km^2	≤ 2 weeks
Comments		

Ozone profiles, high resolution		
NRT: O3M-38.1, O3M-47.1, O3M-311 **Offline: O3M-39.1, O3M-48.1, O3M-312**	**MAG-N-O3HRPR, MBG-N-O3HRPR, MCG-N-O3HRPR** **MAG-O-O3HRPR, MBG-O-O3HRPR, MCG-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 frequency, every 3 minutes on daylight side of orbit Offline: Metop orbit repeat cycle	
Input satellite data	Metop-A/B/C: GOME-2	
Algorithm version	2.0	
Dissemination		
Type	Format	Means
NRT	BUFR	EUMETCast, WMO GTS
Offline	HDF5	HTTPS
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 resolution nominal size 80 x 40 km^2	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Absorbing aerosol index from PMDs		
NRT: O3M-62.1, O3M-72.1, O3M-362 **Offline: O3M-63.1, O3M-73.1, O3M-363**	**MAG-N-AAIPMD, MBG-N-AAIPMD, MCG-N-AAIPMD** **MAG-O-AAIPMD, MBG-O-AAIPMD, MCG-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/C: GOME-2	
Dissemination		
Type	Format	Means
NRT	HDF5	EUMETCast
Offline	HDF5	HTTPS
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/Metop-A: nominal pixel size 10 x 40 km^2 (before 15 July 2013) nominal pixel size 5 x 40 km^2 (after 15 July 2013) GOME-2/Metop-B/C: nominal pixel size 10 x 40 km^2	NRT ≤ 3 hours Offline ≤ 2 weeks
Comments		

Absorbing aerosol height		
NRT: O3M-68, O3M-78, O3M-364 **Offline: O3M-69, O3M-79, O3M-365**	**MAG-N-AAH, MBG-N-AAH, MCG-N-AAH** **MAG-O-AAH, MBG-O-AAH, MCG-O-AAH**	
Type	Product	
Applications and users	Aviation Security, Volcanic Ash Advisory Centres (VAAC), aerosol plume modelling	
Characteristics and methods	Height of absorbing aerosol layer, RTModel, retrieval, Rayleigh scattering, FRESCO++	
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/C: GOME-2	
Dissemination		
Type	Format	Means
NRT	HDF5	EUMETCast, WMO GTS
Offline	HDF5	HTTPS
Accuracy		
Threshold	Target	Optimal
Layer height < 10 km: 3 km Layer height > 10 km: 4 km	Layer height < 10 km: 2 km Layer height > 10 km: 3 km	Layer height < 10 km: 1 km Layer height > 10 km: 2 km
Verification method	Lidar and microwave radiometer measurements, other satellites with cloud top and/or aerosol detection	
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, O3M-352	**MAI-N-CO, MBI-N-CO, MCI-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/C: IASI	
Algorithm version	v20151001	
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		

NRT IASI SO2		
O3M-57, O3M-377	**MABI-N-SO2, MCI-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/C: IASI	
Algorithm version	v20150205_sp20171122	
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		
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).		

NRT IASI HNO3		
O3M-81, O3M-336	**MxI-N-HNO3**	
Type	Product	
Applications and users	Stratospheric ozone chemistry monitoring; Lightning NOx emissions, polar chemistry monitoring	
Characteristics and methods	RT: FORLI, OEM	
Generation frequency	PDU dissemination frequency, every 3 minutes	
Input satellite data	Metop-B/C: IASI	
Algorithm version	v20151001	
Dissemination		
Type	Format	Means
NRT	BUFR	EUMETCast, WMO GTS
Accuracy on total column for standard cases		
Threshold	Target	Optimal
50 %	35 %	10 %
Verification method	Ground-based FTIR, data from other satellites	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	IASI spatial resolution, cloud fraction below 25 %	≤ 3 hours
Comments		

NRT IASI total ozone		
O3M-44, O3M-306	**MxI-N-O3**	
Type	Product	
Applications and users	NWP, air quality, ESA TEMIS, DLR WDC-RSAT, MACC/CAMS, ECMWF	
Characteristics and methods	RT: FORLI, OEM	
Generation frequency	PDU dissemination frequency, every 3 minutes on morning and evening orbits	
Input satellite data	Metop-B/C: IASI	
Algorithm version		
Dissemination		
Type	Format	Means
NRT	BUFR	EUMETCast, WMO GTS
Accuracy		
Threshold	Target	Optimal
10 %	5 %	1 %
Verification method	Sondes, ground-based and other satellite instruments	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	IASI resolution	≤ 3 hours
Comments		

NRT IASI ozone profile		
O3M-49, O3M-315	**MxI-N-O3PR**	
Type	Product	
Applications and users	NWP, air quality, ESA TEMIS, DLR WDC-RSAT, MACC/CAMS, ECMWF	
Characteristics and methods	RT: FORLI, OEM	
Generation frequency	PDU dissemination frequency, every 3 minutes on morning and evening orbits	
Input satellite data	Metop-B/C: IASI	
Algorithm version		
Dissemination		
Type	Format	Means
NRT	BUFR	EUMETCast, WMO GTS
Accuracy		
Threshold	Target	Optimal
30 % in stratosphere 50 % in troposphere	15 % in stratosphere 30 % in troposphere	5 % in stratosphere 10 % in troposphere
Verification method	Sondes, ground-based and other satellite instruments	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	IASI resolution	≤ 3hours
Comments		

NRT IASI SO2 altitude		
O3M-379	**MBI-N-SO2alt**	
Type	Product	
Applications and users	Volcanic monitoring (VAACs)	
Characteristics and methods	LUT	
Generation frequency	PDU dissemination frequency, every 3 minutes	
Input satellite data	Metop-B / IASI	
Dissemination		
Format	Means	
BUFR	EUMETCast	
Quality		
Threshold	Target	Optimal
< 3 km below 10 km < 6 km above 10 km	< 2 km below 10 km < 4 km above 10 km	< 1 km below 10 km < 2 km above 10 km
Validation method	Other satellite data and possibly ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial sampling	Timeliness
Global	IASI spatial resolution, cloud fraction below 20 %	3 hours
Comments		
This product gives an estimate of the SO_2 plume height (in meters)		

Global 1-day UV index forecast		
O3M-410.1	**MxG-NUV**	
Type	Product	
Applications and users	Climate monitoring, health risk evaluation, INMH (Meteo-Romania), RMI, Danish Sun Safety Campaign, general public information	
Characteristics and methods	Clear sky UV index derived from NRT total ozone applying climatologies for aerosol optical depth and surface albedo. Product contains 2 values: Clear-sky and cloud-corrected 1-hour resolution using ECMWF cloud information.	
Quantity	UV index (1-15)	
Unit	1	
Generation frequency	1 per day	
Temporal sampling	1 hour	
Input satellite data	The best available AC SAF internal ATO product based on GOME-2 AC SAF total ozone assimilation	
Algorithm version	3.5	
Dissemination		
Type	Format	Means
NRT	NetCDF-4	FTP, HTTP
Accuracy		
Threshold	Target	Optimal
2 (absolute deviation in UV index)	1 (absolute deviation in UV index)	0.5 (absolute deviation in UV index)
Verification method	Comparison with ground-based measurements Comparison to the CAMS forecast quality	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.25˚ x 0.25˚ grid	Product available before 04:00 UTC
Comments		
The AC SAF may generate data files in other formats on request (PNG, ASCII, CSV, etc.)		

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	- 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	HTTPS
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, 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	- 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	HTTPS
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	- 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	HTTPS
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 *et al.* (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 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	- 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	HTTPS
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	- 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	HTTPS
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, 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	- 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	HTTPS
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	- 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	HTTPS
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, 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	- 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	HTTPS
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 *et al.* (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	- 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	HTTPS
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, 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	- 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	HTTPS
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	- 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	HTTPS
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 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	- 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	HTTPS
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	- 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	HTTPS
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, 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	- 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	HTTPS
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	- 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	HTTPS
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 GOME-2 L3 daily averaged total O3		
O3M-303	**MxG-O-O3-daily**	
Type	Product	
Applications and users	Climate monitoring, C3S, air quality, NWP, CAMS, ozone depletion	
Characteristics and methods	L3 daily gridded	
Generation frequency	Daily	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 daily averaged BrO		
O3M-318	**MxG-O-BrO-daily**	
Type	Product	
Applications and users	Climate monitoring, ozone depletion	
Characteristics and methods	L3 daily gridded	
Generation frequency	Daily	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 daily averaged total NO2		
O3M-340	**MxG-O-NO2-daily**	
Type	Product	
Applications and users	Air quality, CAMS	
Characteristics and methods	L3 daily gridded	
Generation frequency	Daily	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	FTP
Accuracy		
Threshold	Target	Optimal
20%	8 %	5 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 daily averaged tropospheric NO2		
O3M-343	**MxG-O-NO2Tr-daily**	
Type	Product	
Applications and users	Air quality, CAMS	
Characteristics and methods	L3 daily gridded	
Generation frequency	Daily	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 daily averaged total HCHO		
O3M-346	**MxG-O-HCHO-daily**	
Type	Product	
Applications and users	Air quality	
Characteristics and methods	L3 daily gridded	
Generation frequency	Daily	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	FTP
Accuracy		
Threshold	Target	Optimal
100 % (polluted cond.)	50 % (polluted cond.)	30 % (polluted cond.)
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 daily averaged SO2		
O3M-376	**MxG-O-SO2-daily**	
Type	Product	
Applications and users	Volcanic emissions, air quality, anthropogenic emission monitoring	
Characteristics and methods	L3 daily gridded	
Generation frequency	Daily	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 daily averaged total H2O		
O3M-387	**MxG-O-H2O-daily**	
Type	Product	
Applications and users	Climate monitoring: Climate change, WCRP-GEWEX	
Characteristics and methods	L3 daily gridded	
Generation frequency	Daily	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 monthly averaged total O3		
O3M-388	**MxG-O-O3-monthly**	
Type	Product	
Applications and users	Climate monitoring, C3S, air quality, NWP, CAMS, ozone depletion	
Characteristics and methods	L3 monthly means	
Generation frequency	Monthly	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 monthly averaged total NO2		
O3M-389	**MxG-O-NO2-monthly**	
Type	Product	
Applications and users	Climate monitoring, air quality	
Characteristics and methods	L3 monthly means	
Generation frequency	Monthly	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	FTP
Accuracy		
Threshold	Target	Optimal
20%	8 %	5 %
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 monthly averaged tropospheric NO2		
O3M-390	**MxG-O-NO2Tr-monthly**	
Type	Product	
Applications and users	Climate monitoring, air quality	
Characteristics and methods	L3 monthly means	
Generation frequency	Monthly	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 monthly averaged BrO		
O3M-391	**MxG-O-BrO-monthly**	
Type	Product	
Applications and users	Climate monitoring, ozone depletion	
Characteristics and methods	L3 monthly means	
Generation frequency	Monthly	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 monthly averaged total H2O		
O3M-393	**MxG-O-H2O-monthly**	
Type	Product	
Applications and users	Climate monitoring: Climate change, WCRP-GEWEX	
Characteristics and methods	L3 monthly means	
Generation frequency	Monthly	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 monthly averaged total HCHO		
O3M-394	**MxG-O-HCHO-monthly**	
Type	Product	
Applications and users	Climate monitoring, air quality	
Characteristics and methods	L3 monthly means	
Generation frequency	Monthly	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	FTP
Accuracy		
Threshold	Target	Optimal
100 % (polluted cond.)	50 % (polluted cond.)	30 % (polluted cond.)
Verification method	Comparison with ground-based measurements Satellite-to-satellite comparison	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	0.25° x 0.25°	≤ 2 weeks
Comments		

Offline GOME-2 L3 monthly averaged SO2		
O3M-397	**MxG-O-SO2-monthly**	
Type	Product	
Applications and users	Volcanic emissions, air quality, anthropogenic emission monitoring	
Characteristics and methods	L3 monthly means	
Generation frequency	Monthly	
Input satellite data	Metop-B and/or Metop-C GOME-2 instrument data which is available, Level 2 GDP 4.8/4.9	
Algorithm version	1.0	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	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	0.25° x 0.25°	≤ 2 weeks
Comments		

Appendix 2: AC SAF data records

Reprocessed total O3		
O3M-110	**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
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		

Reprocessed total NO2		
O3M-114	**MxG-RP1-NO2**	
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 important input product to the Copernicus Atmospheric Monitoring Service (CAMS) for assimilation in the reanalysis system, and for 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
Accuracy		
Threshold	Target	Optimal
10^{15} molec/cm^2 (20 % annual mean)	$3\text{-}5 \cdot 10^{14}$ molec/cm^2 (8-15 % annual mean)	$1\text{-}3 \cdot 10^{14}$ 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 NO2 measurements from NDACC.		

Reprocessed total BrO		
O3M-115	**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
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		

Reprocessed tropospheric BrO		
O3M-116.0	**MxG-RP1-BrOTR**	
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 trop. 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 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 and 6.X)	
Algorithm version	GDP 4.9x	
Time period	23/01/2007 – 30/06/2020	
Data volume	1037 GB	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	FTP
Accuracy		
Threshold	Target	Optimal
100 %	60 %	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 / 40 x 40 km^2	-
Comments		

Reprocessed total SO2		
O3M-117	**MxG_RP1-SO2**	
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 CAMS, i.e. for assimilation in the CAMS reanalysis system, and for 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 SO2 product is also used by several research institutes for various applications such as evaluation of anthropogenic SO2 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
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 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 CAMS. This volcanic SO2 flag will be included in the GOME-2 reprocessed total SO2 product.		

Reprocessed total HCHO		
O3M-118	**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 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
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		

Reprocessed total OClO		
O3M-119	**MxG-RP1-OClO**	
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 OClO 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
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		

Reprocessed total CHOCHO		
O3M-120.0	**MxG-RP1-CHOCHO**	
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 CHOCHO column is important input product to CAMS for assimilation in the reanalysis system, and for the validation/monitoring of this 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 and 6.X)	
Algorithm version	GDP 4.9x	
Time period	GOME-2A: 23/01/2007 – 31/12/2017 GOME-2B: 01/01/2013 – 30/06/2020	
Data volume	240 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	NetCDF-4	FTP
Accuracy		
Threshold	Target	Optimal
100 % (polluted cond.)	50 % (polluted cond.)	30 % (polluted cond.)
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 / 40 x 40 km^2	-
Comments		

Reprocessed total H2O		
O3M-121	**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
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		

Reprocessed tropospheric NO2		
O3M-123	**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 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
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		

Reprocessed ozone profiles in HR		
O3M-112	**MxG-RP1-O3HRPR**	
Type	Data Record	
Applications and users	Climate monitoring, air quality	
Characteristics and methods	RTModel: LidortA Inversion: Optimal estimation	
Input satellite data	Metop-A/B: GOME-2 L1b (PPF 5.3, 6.0 and 6.1)	
Algorithm version	Opera v2.0 or higher	
Time period	GOME-2A: 01/2007 – 12/2018, GOME-2B: 12/2012 – 12/2018	
Data volume	GOME-2A: 22.5 TB, GOME-2B: 11.5 TB	
Dissemination		
Type	Format	Means
Offline, reprocessed	NetCDF	HTTPS
Accuracy		
Threshold	Target	Optimal
30 % in stratosphere 70 % in troposphere	15 % in stratosphere 30 % in troposphere	10 % in stratosphere 25 % in troposphere
Verification methods	Balloon soundings Lidar and microwave radiometer measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 band 1b resolution 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) Metop-B: nominal pixel size 80 x 40 km^2	-
Comments		

Reprocessed absorbing aerosol index		
O3M-113	**MAG-RP1-AAI**	
Type	Data Record	
Applications and users	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 (CAMS), 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). Users indicate the need for the stable long term aerosol products in the following documents (for example): • 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 This is the first reprocessing for the GOME-2 aerosol products.	
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'	
Data volume	~4 GB / year	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTPS
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/Metop-A resolution: nominal pixel size 80 x 40 km^2 (before 15 July 2013) nominal pixel size 40 x 40 km^2 (after 15 July 2013)	-
Comments		

Absorbing aerosol height data record		
O3M-170	**MxG-RP1-AAH**	
Type	Data Record	
Applications and users	Aviation Security, Volcanic Ash Advisory Centres (VAAC), aerosol plume modelling	
Characteristics and methods	Height of absorbing aerosol layer, RTModel, retrieval, Rayleigh scattering, FRESCO++	
Input satellite data	Metop-A/B: GOME-2	
Algorithm version	1.25	
Time period	January 2007 - July 2018	
Data volume	82.3 GB	
Dissemination		
Type	Format	Means
Offline, reprocessed	HDF5	HTTPS
Accuracy		
Threshold	Target	Optimal
Layer height < 10 km: 3 km Layer height > 10 km: 4 km	Layer height < 10 km: 2 km Layer height > 10 km: 3 km	Layer height < 10 km: 1 km Layer height > 10 km: 2 km
Verification method	Lidar and microwave radiometer measurements Other satellites with cloud top and/or aerosol detection	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	GOME-2 resolution, nominal size 80 x 40 km^2	-
Comments		

Reprocessed absorbing aerosol index from PMDs		
O3M-178	**MAG-RP1-AAIPMD**	
Type	Data Record	
Applications and users	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 (CAMS), 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). Users indicate the need for the stable long term aerosol products in the following documents (for example): • 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 This is the first reprocessing for the GOME-2 aerosol products	
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	HTTPS
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		

Reprocessed absorbing aerosol index		
O3M-179	**MBG-RP1-AAI**	
Type	Data Record	
Applications and users	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 (CAMS), 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). Users indicate the need for the stable long term aerosol products in the following documents (for example): • 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 This is the first reprocessing for the GOME-2 aerosol products.	
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-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	HTTPS
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 resolution, nominal pixel size 80 x 40 km^2	-
Comments		

Reprocessed absorbing aerosol index from PMDs		
O3M-180	**MBG-RP1-AAIPMD**	
Type	Data Record	
Applications and users	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 (CAMS), 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). Users indicate the need for the stable long term aerosol products in the following documents (for example): • 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 This is the first reprocessing for the GOME-2 aerosol products	
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-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	HTTPS
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	-
Comments		

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 contains 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% Trop. NO2: 50 %	8 % 30 %	5 % 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.		

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	- Total ozone data record O3M-110 - 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	HTTPS
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	- Total ozone data record O3M-110 - 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	HTTPS
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, 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	- Total ozone data record O3M-110 - 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	HTTPS
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 *et al.* (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	- Total ozone data record O3M-110 - 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	HTTPS
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, 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	- Total ozone data record O3M-110 - 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	HTTPS
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	- Total ozone data record O3M-110 - 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	HTTPS
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, 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	- Total ozone data record O3M-110 - 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	HTTPS
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	- Total ozone data record O3M-110 - 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	HTTPS
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 *et al.* (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 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	- Total ozone data record O3M-110 - 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	HTTPS
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	- Total ozone data record O3M-110 - 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	HTTPS
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, 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	- Total ozone data record O3M-110 - 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	HTTPS
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	- Total ozone data record O3M-110 - 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	HTTPS
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 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	- Total ozone data record O3M-110 - 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	HTTPS
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	- Total ozone data record O3M-110 - 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	HTTPS
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, 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	- Total ozone data record O3M-110 - 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	HTTPS
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		

GOME-2 merged LER surface albedo data record		
O3M-402.1	**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 KNMI: DLER used to update the QA4ECV-based NO2 EUMETSAT Secretariat: DLER used as input for the Polar Multisensor Aerosol product (PMAp) retrieved from the synergy of GOME-2, AVHRR and IASI sensors DLR uses DLER for trace gas retrievals (O3M-500.1, O3M-514.1, O3M-506.1, O3M-515.1, O3M-509.1, O3M-507.1, O3M-510.1, O3M-513.1, O3M-41.2, O3M-42.2, O3M-300.1, O3M-301.1, O3M-43.1, O3M-302.1, O3M-50.2, O3M-51.2, O3M-338.1, O3M-339.1, O3M-52.2, O3M-53.2, O3M-341.1, O3M-342.1, O3M-82.1, O3M-317, O3M-55.2, O3M-56.2, O3M-374.1, O3M-375.1, O3M-58.2, O3M-177.1, O3M-344.1, O3M-345.1, O3M-86.2, O3M-384, O3M-385, O3M-386.1)	
Characteristics and methods	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. The surface DLER is provided for 26 selected GOME-2 wavelength bands located outside strong gaseous absorption bands. 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 From the PMDs: 333, 339, 369, 382, 414, 461, 520, 555, 590, 640, 757, 799 nm Multi-year average for the period: MSC: 04/01/2007 – 31/08/2022 PMD: 13/03/2008 – 31/08/2022	
Algorithm version	4.1	
Temporal sampling	1 month	
Input satellite data	Metop-A/B GOME-2 L1b and assimilated total ozone columns from NTO	
Data volume	MSC: 2.3 GB PMD: 1.6 GB	
Dissemination		
Type	Format	Means
Offline	NetCDF-4	HTTP
Accuracy		
Threshold	Target	Optimal
0.05 + 10 % (bias)	0.03 + 10 % (bias)	0.01 + 5 % (bias)
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.		

IASI L3 monthly gridded carbon monoxide (CO) – Interim Climate Data Record (ICDR)		
O3M-359	**MxI-O-CO-monthly**	
Type	Product	
Applications and users	Scientific institutes for studying long term trends and climate research. Potential users: model evaluation and climatologies (e.g., CAMS, C3S)	
Characteristics and methods	RT: FORLI, OEM ICDR continuing consistently and seamlessly the data record (O3M-543) for day and night observations separately.	
Generation frequency	Monthly	
Input satellite data	Metop-B/C: IASI	
Dissemination		
Type	Format	Means
Offline	NetCDF	AC SAF web page and redistribution through AERIS
Accuracy on total column for standard cases		
Threshold	Target	Optimal
15 %	10 %	8 %
Accuracy on total column for unusual cases (high pollution or low signal)		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Other satellite instruments	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	1.0° x 1.0° grid	≤ 5 days

Comments
It is hard to properly assess the errors on the L3 CO during unusual cases, and each case needs to be assessed separately. The product is delivered with a retrieval error grid associated with each day/night monthly averaged CO concentration grid. When averaging over the 1°x1° grid, the total retrieval error of the different CO total columns within a grid is taken into account by giving more weight to the pixels associated with lowers errors (more information is found in the ATBD). The users can rely on these error grids in their product evaluation. The inter-comparison of the CO ICDR with the CO CDR, on overlapping periods should be zero (or very close). The reader can refer to the L3 ICDR validation report for more information.

IASI L3 monthly gridded carbon monoxide (CO) – Climate Data Record (CDR)		
O3M-543	**MxI-O-CO-monthly**	
Type	Data record	
Applications and users	Scientific institutes for studying long term trends and climate research. Potential users: model evaluation and climatologies (e.g., CAMS, C3S)	
Characteristics and methods	RT: FORLI (Algorithm version Forli v20151001_sp2017112), OEM	
Generation frequency	Not applicable	
Input satellite data	Metop-A/B: IASI	
Time period	Metop-A: July 2007 – December 2019 Metop-B: March 2013 – December 2023	
Dissemination		
Type	Format	Means
Data record	NetCDF	AC SAF web page and redistribution through AERIS
Accuracy on total column for standard cases		
Threshold	Target	Optimal
15 %	10 %	8 %
Accuracy on total column for unusual cases (high pollution or low signal)		
Threshold	Target	Optimal
50 %	20 %	10 %
Verification method	Other satellite instruments	
Coverage, resolution and timeliness		
Spatial coverage	Spatial resolution	Timeliness
Global	1.0° x 1.0° grid	Not applicable
Comments		
It is hard to properly assess the errors on the L3 CO during unusual cases, and each case needs to be assessed separately. The product is delivered with a retrieval error grid associated with each day/night monthly averaged CO concentration grid. When averaging over the 1°x1° grid, the total retrieval error of the different CO total columns within a grid is taken into account by giving more weight to the pixels associated with lowers errors (more information is found in the ATBD). The users can rely on these error grids in their product evaluation. During pollution/exceptional events the errors depend on many factors affecting the L2 retrievals, such as the thermal contrast, the temperature (the season), and other meteorological factors such as the boundary layer height, etc. It is therefore highly dependent on the location of the event.		

DR IASI L2 CO – Climate Data Record (CDR)		
O3M-517	**MxI-DR1-CO**	
Type	Data record	
Applications and users	Scientific institutes for modelling, validation, inversion sources, dedicated campaigns e.g. Polarcat, BORTAS and the CAMS community.	
Characteristics and methods	RT: FORLI, OEM. Consistent with MOPITT.	
Generation frequency	Once	
Temporal Coverage		
Input satellite data	Metop-A / IASI, Metop-B / IASI	
Dissemination		
Format	Means	
NetCDF 4.0	EUMETSAT Data Store	
Quality		
Threshold	Target	Optimal
25 % for standard cases 50 % for unusual cases (high pollution or low signal)	12 % for standard cases 20 % for unusual cases (high pollution or low signal)	5 % for standard cases 10 % for unusual cases (high pollution or low signal)
Validation method	Ground-based measurements, other satellite data	
Coverage, resolution and timeliness		
Spatial coverage	Spatial sampling	Timeliness
Global	IASI spatial resolution, cloud fraction below 25%	-
Temporal sampling	Temporal resolution	Temporal coverage
Orbit	About 14 orbits/day/instrument	Start date: IASI-A: 10/07/2007, IASI-B: 20/02/2013 End date: IASI-A: 15/09/2021, IASI-B: 31/12/2023
Comments		

DR IASI L2 SO2 – Climate Data Record (CDR)		
O3M-540	**MxI-DR1-SO2**	
Type	Data record	
Applications and users	Climate studies, reanalysis	
Characteristics and methods	LUT	
Generation frequency	Once	
Input satellite data	Metop-A / IASI, Metop-B / IASI	
Dissemination		
Format	Means	
NetCDF 4.0	EUMETSAT Data Store	
Quality		
Threshold	Target	Optimal
200 % below 10 km 100 % above 10 km	100 % below 10 km 35 % above 10 km	50 % below 10 km 20 % above 10 km
Validation method	Other satellite data and possibly ground-based measurements	
Coverage, resolution and timeliness		
Spatial coverage	Spatial sampling	Timeliness
Global	IASI spatial resolution, cloud fraction below 20 %	-
Temporal sampling	Temporal resolution	Temporal coverage
Orbit	About 14 orbits/day/instrument	Start date: IASI-A: 10/07/2007, IASI-B: 20/02/2013 End date: IASI-A: 15/09/2021, IASI-B: 31/12/2023
Comments		
This product contains the SO2 columns for fixed altitudes and also the SO2 altitude retrieved by the algorithm with a corresponding interpolated SO2 column at the retrieved plume. 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).		

DR IASI L2 total O3 – Climate Data Record (CDR)		
O3M-520.1	**MxI-DR-O3RP1**	
Type	Data record	
Applications and users	Climate monitoring, TOAR	
Characteristics and methods	As L2 with Forli 2015 algorithm	
Generation frequency	Once	
Temporal Coverage	10/07/2007 – 31/12/2023	
Input satellite data	Metop-A / IASI Metop-B / IASI	
Dissemination		
Format	Means	
NetCDF	EUMETSAT Data Store	
Quality		
Threshold	Target	Optimal
10 %	5 %	1 %
Validation method	Ground-based measurements, other satellite data	
Coverage, resolution and timeliness		
Spatial coverage	Spatial sampling	Timeliness
Global	Pixel size 12 km	N/A
Comments		
• Distribution via EUMETSAT Data Store (EDS) • Spatial resolution of around 50 km x 50 km, composed of 2 x 2 pixels, each corresponding to a 12 km diameter round footprint on the ground at nadir		

DR IASI L2 O3 profile – Climate Data Record (CDR)		
O3M-521.1	**MxI-DR-O3profRP1**	
Type	Data record	
Applications and users	Climate monitoring, TOAR assessment	
Characteristics and methods	As L2 with Forli 2015 algorithm	
Generation frequency	Once	
Temporal Coverage	10/07/2007 – 31/12/2023	
Input satellite data	Metop-A / IASI Metop-B / IASI	
Dissemination		
Format	Means	
NetCDF	EUMETSAT Data Store	
Quality		
Threshold	Target	Optimal
30 % in stratosphere 50 % in troposphere	15 % in stratosphere 30 % in troposphere	5 % in stratosphere 10 % in troposphere
Validation method	Ground-based measurements, other satellite data	
Coverage, resolution and timeliness		
Spatial coverage	Spatial sampling	Timeliness
Global	Pixel size 12 km	N/A
Comments		
• Distribution via EUMETSAT Data Store (EDS) • Spatial resolution of around 50 km x 50 km, composed of 2 x 2 pixels, each corresponding to a 12 km diameter round footprint on the ground at nadir		