Contribution to CAMS Knowledge Base to document products provided by CAMS2\_61

(CAMS2\_61 product portfolio)

Issued by: MET Norway / Michael Gauss

Date: ??/12/2024

Ref: CAMS261\_2021SC1\_D6.1.1-2024\_202412\_SPP\_v1.docx

CAMS261\_2021SC1\_D6.1.1-2024\_202412\_SPP\_v1

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# Introduction

This document contains the CAMS2\_61 product portfolio.

* For each CAMS2\_61 product, there is one table (‘CAMS SPP table’) in the format of the original [CAMS Service Product Portfolio](https://atmosphere.copernicus.eu/sites/default/files/2018-12/CAMS%20Service%20Product%20Portfolio%20-%20July%202018.pdf) (2018 version); however, as agreed with ECMWF in November 2023 we have added a few rows for some of the products to make these tables even more useful for both users and providers;
* Following the CAMS SPP table there are *additional* tables with basic information about earlier versions of each product, at a level of detail considered appropriate by the provider of the product.

The document only includes versions that have been *publicly* available at some point in time, or at least have been distributed to users *outside* the CAMS2\_61 consortium. The content of this document is updated regularly by the CAMS2\_61 consortium, in particular when a new CAMS2\_61 product (or a new version of it) has been made available.

The aim of this document is to provide the CAMS management and the [ADS](https://ads.atmosphere.copernicus.eu/) staff with *key information* to update the CAMS portfolio and the documentation. A separate deliverable (Documentation of CAMS emission inventory products) provides *more detailed documentation* for each CAMS2\_61 product (latest version: [Denier van der Gon et al., 2023](https://atmosphere.copernicus.eu/node/1054)).

# Overview of CAMS2\_61 products

As of December 2023, CAMS2\_61 has 12 products:

* European anthropogenic emissions – Air Pollutants
* Global anthropogenic emissions
* Global ship emissions
* European anthropogenic emissions – Greenhouse gases
* Global aviation emissions
* European temporal profiles
* Global temporal profiles
* Global biogenic emissions
* Global volcanic emissions
* Global oceanic emissions
* Global emissions from soils
* Global emissions from termites

Some of these products include data sets from different sources, with different resolutions, methods, update cycles, etc. The rules for acknowledgments for each CAMS2\_61 product (and separate components therein) have to be stated clearly at the sites where these products are made available (e.g. ADS and ECCAD).

# Description of CAMS2\_61 products (including earlier versions)

The various products of the CAMS2\_61 portfolio are described in this chapter. For each product, the table about the latest version, intended to be available at ADS, is given first.

Afterwards, similar tables are given for earlier versions. The level of detail in those tables is up to the provider of the product. It should enable version control and facilitate user support to the extent possible (e.g. be relevant for frequently asked questions, etc.). Some of the earlier versions may still be available on ADS, while others are declared obsolete and should NOT be disseminated any longer.

## European anthropogenic emissions – Air pollutants

### CAMS-REG-AP information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
|  |  |
| **Status** | Operational |
| **Description** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2000 to 2021. |
| **Product family** | Anthropogenic emissions |
| **Species** | CH4, CO, NOx, NMVOCs, SO2, NH3, PM2.5, PM10 |
| **Geographical area** | Europe (-30.0, 60.0, 30.0, 72.0) |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux, point sources and area sources |
| **Horizontal resolution** | 0.1° x 0.05° longitude-latitude |
| **Time coverage** | 2000 – 2018 (v5.1), 2019 and 2020 (v6.1), 2021 (v7.1) |
| **Time resolution** | Annual with default profiles for monthly, daily, hourly on request |
| **Update frequency** | Annual (latest year),bi/tri-annual (full time series) |
| **Dissemination mechanism** | ECCAD (only up to v6.1), FTP, Data Server, ADS (in progress) |
| **Data format** | NetCDF, CSV |
| **Dissemination time** | June 2021 (v5.1), December 2022 (v6.1), December 2023 (v7.1) |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
| **Reported data submissions** | 2023 submissions (v7.1), 2022 submissions (v6.1), 2020 submissions (v5.1) |
| **Shipping emissions** | STEAM v4.3 (2021), STEAM v3.5 (2019-2020), STEAM v2 (2000-2018) |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-REG-AP\_v5.1 (2000-2018), CAMS-REG-AP\_v6.1 (2019-2020), CAMS-REG-AP\_v7.1 (2021) |
| **Responsible partner(s)** | TNO |
|  |  |
|  |  |

### CAMS-REG-AP version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

| **Version name or file name** | **CAMS-REG-AP\_v7.1** |
| --- | --- |
| **Release date (MM/YYYY)** | 12/2023 |
| **publicly available or declared obsolete?** | pending delivery, will be publicly available once ready |
| **if publicly available: where?** | ECCAD database (in progress), FTP, Data Server, ADS (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2021. This version is an update of v5 and v6, providing the data for the latest year (2021) only. For the earlier years, no reprocessing of data is done and it is recommended to use the v5.1 and v6.1 versions. However it should be taken into account that each of the three versions is based on different reporting submissions, hence there could be inconsistencies between them. In 2024, a consistent time series will be made again. |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Stijn Dellaert, Jeroen Kuenen, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |

| **Version name or file name** | **CAMS-REG-AP\_v6.1** |
| --- | --- |
| **Release date (MM/YYYY)** | 12/2022 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database, ADS (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2019 and 2020. This version is an update of v5.1, providing the data for 2019 and 2020. For the earlier years, no reprocessing of data is done and it is recommended to use the v5.1 version. However it should be taken into account that v5.1 and v6.1 are based on different reporting submissions, hence there could be inconsistencies between the years 2018 and 2019. |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Stijn Dellaert, Jeroen Kuenen, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |

| **Version name or file name** | **CAMS-REG-AP\_v5.1** |
| --- | --- |
| **Release date (MM/YYYY)** | 05/2021 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database, ADS (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2000-2018. This version is an update of v4.2, providing a consistent dataset for the full time series. |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Stijn Dellaert, Jeroen Kuenen, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-AP\_v4.2** |
| **Release date (MM/YYYY)** | 05/2020 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2000-2017. This version is an update of v2.2.1 and v3.1, providing a consistent dataset for the full time series. |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Jeroen Kuenen, Stijn Dellaert, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-AP\_v3.1** |
| **Release date (MM/YYYY)** | 02/2019 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2016.  This version contains emissions for a single year that do not fit directly v2.2.1 because of the different reporting year of national inventories.. |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Jeroen Kuenen, Stijn Dellaert, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** | 10.24380/m89g-j508 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-AP\_v2.2.1** |
| **Release date (MM/YYYY)** | 06/2018 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2000-2015. This version was an update of version 1.1 and in addition covering the full time series instead of only a single year. |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Jeroen Kuenen, Stijn Dellaert, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-AP\_v1.1** |
| **Release date (MM/YYYY)** | 03/2018 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2015 (single year) |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Jeroen Kuenen, Stijn Dellaert, Antoon Visschedijk, Hugo Denier van der Gon |

## Global anthropogenic emissions

### CAMS-GLOB-ANT information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-ANT\_v6.2** |
| **Status** | Operational |
| **Description** | Anthropogenic emissions for various chemical species and aerosols for the global domain, based on the EDGAR (version 6) and CEDS (April 2021 version) inventories. Use of the last versions of CAMS-GLOB-SHIP and CAMS-TEMPO described in this report. |
| **Product family** | Anthropogenic emissions |
| **Species** | CO2\_excl\_short\_cycle, CO2\_organic cycle, CH4, CO, NOx, NMVOCs, SO2, BC, OC, NH3, and 25 speciated VOCs/groups of VOCs |
| **Geographical area** | Global |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux (point sources and area sources) |
| **Horizontal resolution** | 0.1° x 0.1° longitude-latitude |
| **Time coverage** | January 2000 – December 2024 |
| **Time resolution** | Monthly |
| **Update frequency** | Annual |
| **Dissemination mechanism** | ECCAD and later ADS |
| **Data format** | NetCDF |
| **Dissemination time** | November 2023 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-GLOB-ANT\_v6.1, errors found in this version are corrected in version 6.2 |
| **Responsible partner(s)** | CNRS-LA until March 2024, MPI-Meteorology after April 2024 |
|  |  |
|  |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-ANT\_v5.3** |
| **Status** | Operational |
| **Description** | Anthropogenic emissions for various chemical species and aerosols for the global domain, based on the EDGAR (version 5) and CEDS (April 2021 version) inventories. |
| **Product family** | Anthropogenic emissions |
| **Species** | CO2\_excl\_short\_cycle, CO2\_organic cycle, CH4, CO, NOx, NMVOCs, SO2, BC, OC, NH3, and 25 speciated VOCs/groups of VOCs |
| **Geographical area** | Global |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux (point sources and area sources) |
| **Horizontal resolution** | 0.1° x 0.1° longitude-latitude |
| **Time coverage** | January 2000 – December 2024 |
| **Time resolution** | Monthly |
| **Update frequency** | Annual |
| **Dissemination mechanism** | ECCAD, ADS (in progress) |
| **Data format** | NetCDF |
| **Dissemination time** | October 2021 (version 5.3 up to 2021), November 2022 (version 5.3 up to 2023) and November 2023 (version 5.3 up to 2024) |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-GLOB-ANT\_v5.3 (using version 3.1 of CAMS-GLOB-TEMPO and version 3.1 of CAMS-GLOB-SHIP); CAMS-GLOB-ANT\_v5.2 and v5.1 are rather similar as version 5.3, but use somewhat older versions of CAMS-GLOB-SHIP |
| **Responsible partner(s)** | CNRS-LA |
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### 

### CAMS-GLOB-ANT version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-ANT\_v4.2** |
| **Release date (MM/YYYY)** | 08/2020 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | ADS database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Version 4.2 based on EDGARv4.3.2 and version 1 of CEDS global emissions |
| **Identified users? (optional)** | ECMWF and many modellers worldwide |
| **Responsible partners(s)** | CNRS-LA |
| **Authors / contributors** | N. Elguindi, S. Darras, C. Granier |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-ANT\_v4.2\_R1.1** |
| **Release date (MM/YYYY)** | 05/2020 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | Not available |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Version 4.2 merged in China with emissions from MEICv1.3. Version release in February 2020 was for years 2008-2016 and in November 2020 for years 2008-2020 |
| **Identified users? (optional)** | ECMWF, NCAR, MPI, PolyU Hong-Kong |
| **Responsible partners(s)** | CNRS-LA |
| **Authors / contributors** | N. Elguindi, S. Darras, C. Granier |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-ANT\_v4.1** |
| **Release date (MM/YYYY)** |  |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** |  |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Same as version 3.1, with agriculture sector split into three sectors (livestock, soils, waste burning) |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | CNRS-LA |
| **Authors / contributors** | N. Elguindi, S. Darras, C. Granier |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-ANT\_v3.1** |
| **Release date (MM/YYYY)** | 08/2019 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** |  |
| **acknowledgments?** |  |
| **Description (any relevant text)** | 2000-2019 emissions with CAMS-TEMPO-GLOB profiles, completed in summer 2019 |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | CNRS-LA |
| **Authors / contributors** | N. Elguindi, S. Darras, C. Granier |
| **DOI** |  |

## Global ship emissions

### CAMS-GLOB-SHIP information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
|  |  |
| **Status** | Operational |
| **Description** | Ship emissions for various chemical species. |
| **Product family** | Ship emissions |
| **Species** | CO2, CO, NOx, NMVOCs, SOx, SO4, OC, EC, ash, and CH4. N2O only for 2022 and onwards. |
| **Geographical area** | Global |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux (point sources and area sources) |
| **Horizontal resolution** | 0.1°x0.1° longitude-latitude |
| **Time coverage** | 1 January 2000 – 31 December 2022 |
| **Time resolution** | Daily |
| **Update frequency** | Annual |
| **Dissemination mechanism** | FTP, ECCAD (in progress), ADS (in progress) |
| **Data format** | NetCDF |
| **Dissemination time** | October 2023 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
|  |  |
| **Included CAMS2\_61 version(s)** | CAMS-GLOB-SHIP\_v4 / STEAM 4.3.1\_CAMS2\_61 (updated 26.10.2023) |
| **Responsible partner(s)** | FMI |
|  |  |
|  |  |

### CAMS-GLOB-SHIP version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-SHIP\_v4** |
| **Release date (MM/YYYY)** | 10/2023 |
| **publicly available or declared obsolete?** | publicly available via FTP |
| **if publicly available: where?** | ECCAD (in progress), ADS (in progress) |
| **acknowledgments?** | The user is recommended to reference the following work when using CAMS-GLOB-SHIP data:  Jalkanen et al., Atmos. Chem. Phys., 9 (2009) 9209  Jalkanen et al., Atmos. Chem. Phys., 12 (2012) 2641-2659  Johansson et al., Atmos. Chem. Phys., 13 (2013) 11375-11389  Johansson et al., Atm. Env., 167 (2017) 403-415 |
| **Description (any relevant text)** | This dataset is based on global vessel activity from years 2000-2022, constructed from both terrestrial and satellite data from Automatic Identification System (AIS). The applied method is the Ship Traffic Emission Assessment Model (STEAMv4.3), see Johansson et al., Atm. Env., 167 (2017) 403-415 for the description of the model used in this work. Additional resistance components because of weather effects (wind, waves, ice cover, sea currents) are included in this dataset. Emissions from both inland shipping and deep sea shipping are included, but it should be noted that the coverage of inland shipping data may be poor, because the use and coverage of AIS in inland waterways is incomplete. For deep sea shipping AIS is mandatory, but for inland shipping it is voluntary. Note, that only total shipping emissions are provided regardless of sea/inland or domestic/international shipping contributions. CAMS data currently does not maintain a split to International and Domestic shipping. N2O emissions are added to the list of pollutants for the year 2022 and onwards.  Ship emissions for earlier years, 2000-2013, have been updated to use new STEAM version. The data for 2000-2013 are back casted using the global ship activity for 2016 as a baseline. The projections use scaling of emission totals, by increasing them with 8% which is the average contribution of weather effects.  Version history:  v1.1 - 0.25 by 0.25 deg grid with daily totals, obsolete  v2.1 - 0.1 by 0.1 deg grid with daily totals, bugfix for leap years  v3 - 0.1 by 0.1 deg grid with daily totals, added methane, fixed consistency bug v4 - 0.1 by 0.1 deg grid with daily totals, added N2O, fixed an error in CMEMS data handling |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | FMI |
| **Authors / contributors** | Jukka-Pekka Jalkanen, Lasse Johansson, Elisa Majamäki |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-SHIP\_v3** |
| **Release date (MM/YYYY)** | 11/2021 |
| **publicly available or declared obsolete?** | Obsolete |
| **if publicly available: where?** | ECCAD database (v.3.2) |
| **acknowledgments?** | The user is recommended to reference the following work when using CAMS-GLOB-SHIP data:  Jalkanen et al., Atmos. Chem. Phys., 9 (2009) 9209  Jalkanen et al., Atmos. Chem. Phys., 12 (2012) 2641-2659  Johansson et al., Atmos. Chem. Phys., 13 (2013) 11375-11389  Johansson et al., Atm. Env., 167 (2017) 403-415 |
| **Description (any relevant text)** | This dataset is based on global vessel activity from years 2014-2020, constructed from both terrestrial and satellite data from Automatic Identification System (AIS). The applied method is the Ship Traffic Emission Assessment Model (STEAMv3.5), see Johansson et al., Atm. Env., 167 (2017) 403-415 for the description of the model version used in this work. Additional resistance components because of weather effects have not been included in this dataset. Emissions from both inland shipping and deep sea shipping are included, but it should be noted that the coverage of inland shipping data may be poor, because the use and coverage of AIS in inland waterways is incomplete. For deep sea shipping AIS is mandatory, but for inland shipping it is voluntary. Note, that no distinction is made between national and international shipping. Methane slip from gas engines is added to the list of pollutants.  Ship emissions for earlier years, 2000-2013, have not been updated to use new STEAM version. These data are not consistent with the v3 of emissions (different emission factors etc.) and should not be used together.  Version history:  v1.1 - 0.25 by 0.25 deg grid with daily totals, obsolete  v2.1 - 0.1 by 0.1 deg grid with daily totals, bugfix for leap years  v3 - 0.1 by 0.1 deg grid with daily totals, added methane, fixed consistency bug |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | FMI |
| **Authors / contributors** | Jukka-Pekka Jalkanen, Lasse Johansson, Elisa Majamäki |
| **DOI** |  |

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| **Version name or file name** | **CAMS-GLOB-SHIP\_v2.1** |
| **Release date (MM/YYYY)** | 06/2021 |
| **publicly available or declared obsolete?** | publicly available (0.1 by 0.1 deg grid) from ECCAD and ADS databases |
| **if publicly available: where?** | ECCAD database, EMEP CEIP, ADS |
| **Restricted?** | Obsolete, please refer to v3 of the data product |
| **acknowledgments?** | The user is recommended to reference the following work when using CAMS-GLOB-SHIP data:  Jalkanen et al., Atmos. Chem. Phys., 9 (2009) 9209  Jalkanen et al., Atmos. Chem. Phys., 12 (2012) 2641-2659  Johansson et al., Atmos. Chem. Phys., 13 (2013) 11375-11389  Johansson et al., Atm. Env., 167 (2017) 403-415 |
| **Description (any relevant text)** | This dataset is based on global vessel activity from years 2014-2020, constructed from both terrestrial and satellite data from Automatic Identification System (AIS). The applied method is the Ship Traffic Emission Assessment Mode (STEAM3), see Johansson et al., Atm. Env., 167 (2017) 403-415 for the description of the model version used in this work. Additional resistance components because of weather effects have not been included in this dataset. Emissions from both inland shipping and deep sea shipping are included, but it should be noted that the coverage of inland shipping data may be poor, because the use and coverage of AIS in inland waterways is incomplete. For deep sea shipping AIS is mandatory, but for inland shipping it is voluntary. Note, that no distinction is made between national and international shipping.  The earlier years, 2000-2013, have been back casted based on 2016 activity data and using scaling factors for fleet size growth, energy efficiency improvements and ship size growth. These scaling factors are applied separately for various shipping segments. It should be noted that during back casting, evolution of energy efficiency (modern vessels consume less fuel for a power unit) runs backwards, increasing the energy demand.  Version history:  v1.1 - 0.25 by 0.25 deg grid with daily totals, obsolete  v2.1 - 0.1 by 0.1 deg grid with daily totals, bugfix for leap years |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | FMI |
| **Authors / contributors** | Jukka-Pekka Jalkanen, Lasse Johansson |
| **DOI** |  |

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| --- | --- |
| **Version name or file name** | **CAMS-GLOB-SHIP\_v1.1** |
| **Release date (MM/YYYY)** | 09/2018 |
| **publicly available or declared obsolete?** | Publicly available (0.25 by 0.25 deg grid) |
| **if publicly available: where?** | ECCAD database |
| **restricted?** | Obsolete, please refer to v3 of the data product |
| **acknowledgments?** | The user is recommended to reference the following work when using CAMS-GLOB-SHIP data:  Jalkanen et al., Atmos. Chem. Phys., 9 (2009) 9209  Jalkanen et al., Atmos. Chem. Phys., 12 (2012) 2641-2659  Johansson et al., Atmos. Chem. Phys., 13 (2013) 11375-11389  Johansson et al., Atm. Env., 167 (2017) 403-415 |
| **Description (any relevant text)** | This dataset is based on global vessel activity from years 2014-2018, constructed from both terrestrial and satellite data from Automatic Identification System (AIS). The applied method is the Ship Traffic Emission Assessment Mode (STEAM3), see Johansson et al., Atm. Env., 167 (2017) 403-415 for the description of the latest version. Additional resistance components because of weather effects have not been included in this dataset. Emissions from both inland shipping and deep sea shipping are included, but it should be noted that the coverage of inland shipping data may be poor, because the use and coverage of AIS in inland waterways is incomplete. For deep sea shipping AIS is mandatory, but for inland shipping it is voluntary. Note, that no distinction is made between national and international shipping.  The earlier years, 2000-2013, have been back casted based on 2016 activity data and using scaling factors for fleet size growth, energy efficiency improvements and ship size growth. These scaling factors are applied separately for various shipping segments. It should be noted that during back casting, evolution of energy efficiency (modern vessels consume less fuel for a power unit) runs backwards, increasing the energy demand. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | FMI |
| **Authors / contributors** | Jukka-Pekka Jalkanen, Lasse Johansson |
| **DOI** |  |

## European anthropogenic emissions – Greenhouse gases

### CAMS-REG-GHG information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

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|  |  |
| **Status** | Operational |
| **Description** | Anthropogenic emissions for greenhouse gases for the European domain, valid for 2000 to 2021 |
| **Product family** | Anthropogenic emissions |
| **Species** | CH4, CO2 (CO2\_ff and CO2\_bf) |
| **Geographical area** | Europe (-30.0, 60.0, 30.0, 72.0) |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux, point sources and area sources |
| **Horizontal resolution** | 0.1° x 0.05° longitude-latitude |
| **Time coverage** | 2000 – 2018 (v5.1), 2019 and 2020 (v6.1), 2021 (v7.1) |
| **Time resolution** | Annual with default profiles for monthly, daily, hourly on request |
| **Update frequency** | Annual (latest year),bi/tri-annual (full time series) |
| **Dissemination mechanism** | FTP, Data Server, ECCAD (up to v6.1), ADS (in progress) |
| **Data format** | NetCDF, CSV |
| **Dissemination time** | June 2021 (v5.1), December 2022 (v6.1), December 2023 (v7.1) |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
| **Reported data submissions** | 2023 submissions (v7.1), 2022 submissions (v6.1), 2020 submissions (v5.1) |
| **Shipping emissions** | STEAM v4.3 (2021), STEAM v3.5 (2019-2020), STEAM v2 (2000-2018) |
|  |  |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-REG-GHG\_v5.1 (2000-2018), CAMS-REG-GHG\_v6.1 (2019-2020), CAMS-REG\_v7.1 (2021) |
| **Responsible partner(s)** | TNO |
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### CAMS-REG-GHG version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-GHG\_v7.1** |
| **Release date (MM/YYYY)** | 12/2023 |
| **publicly available or declared obsolete?** | pending delivery, will be public |
| **if publicly available: where?** | ECCAD database, ADS (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2021. This version is an update of v5 and v6, providing the data for the latest year (2021) only. For the earlier years, no reprocessing of data is done and it is recommended to use the v5.1 and v6.1 versions. However it should be taken into account that each of the three versions is based on different reporting submissions, hence there could be inconsistencies between them. In 2024, a consistent time series will be made again. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Stijn Dellaert, Jeroen Kuenen, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |
| **Reference** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-GHG\_v6.1** |
| **Release date (MM/YYYY)** | 12/2022 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database, ADS (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2019 and 2020. This version is an update of v5.1, providing the data for 2019 and 2020. For the earlier years, no reprocessing of data is done and it is recommended to use the v5.1 version. However it should be taken into account that v5.1 and v6.1 are based on different reporting submissions, hence there could be inconsistencies between the years 2018 and 2019. |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Stijn Dellaert, Jeroen Kuenen, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |
| **Reference** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-GHG\_v5.1** |
| **Release date (MM/YYYY)** | 05/2021 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database, ADS (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various air pollutants for the European domain, valid for 2000-2018. This version is an update of v4.2, providing a consistent dataset for the full time series. |
| **Identified users? (optional)** | CAMS2\_40 |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Stijn Dellaert, Jeroen Kuenen, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |
| **Reference** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-GHG\_v4.2** |
| **Release date (MM/YYYY)** | 05/2020 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various greenhouse gases for the European domain, valid for 2000-2017. This version is an update of v2.2.1 and v3.1, providing a consistent dataset for the full time series. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Jeroen Kuenen, Stijn Dellaert, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** |  |

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| --- | --- |
| **Version name or file name** | **CAMS-REG-GHG\_v3.1** |
| **Release date (MM/YYYY)** | 02/2019 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various greenhouse gases for the European domain, valid for 2016.  This version contains emissions for a single year that do not fit directly v2.2.1 because of the different reporting year of national inventories.. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Jeroen Kuenen, Stijn Dellaert, Antoon Visschedijk, Hugo Denier van der Gon |
| **DOI** | 10.24380/m89g-j508 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-GHG\_v2.2.1** |
| **Release date (MM/YYYY)** | 06/2018 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various greenhouse gases for the European domain, valid for 2000-2015.  This version was an update of version 1.1 and in addition covering the full time series instead of only a single year. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Jeroen Kuenen, Stijn Dellaert, Antoon Visschedijk, Hugo Denier van der Gon |

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| --- | --- |
| **Version name or file name** | **CAMS-REG-GHG\_v1.1** |
| **Release date (MM/YYYY)** | 03/2018 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Anthropogenic emissions for various greenhouse gases for the European domain, valid for 2015 (single year) |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | TNO |
| **Authors / contributors** | Jeroen Kuenen, Stijn Dellaert, Antoon Visschedijk, Hugo Denier van der Gon |

## Global aviation emissions

### CAMS-GLOB-AIR information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-AIR\_v2.1** |
| **Status** | Operational |
| **Description** | Global aviation emissions |
| **Product family** | Aviation emissions |
| **Species** | CO2, CO, NOx, NMVOCs, SO2, BC, OC, NH3, and 18 speciated VOCs/groups of VOCs |
| **Geographical area** | Global |
| **Vertical coordinate** | 25 levels from surface to altitude 15 555 meters (every 610 meters) |
| **Vertical coverage** | Surface flux |
| **Horizontal resolution** | 0.5°x0.5° longitude-latitude |
| **Time coverage** | January 2000 – December 2023 |
| **Time resolution** | Monthly |
| **Update frequency** | Annual |
| **Dissemination mechanism** | ECCAD and ADS (in progress, up to 2020 so far) |
| **Data format** | NetCDF |
| **Dissemination time** | March 2019 (for 2000-2020 emissions); March 2021 (for 2021 emissions); November 2022 (for 2022-2023 emissions) |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-GLOB-AIR\_v2.1 |
| **Responsible partner(s)** | CNRS-LA |
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### CAMS-GLOB-AIR version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-AIR\_v1.1** |
| **Release date (MM/YYYY)** | 02/2019 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** |  |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | CNRS-LA |
| **Authors / contributors** | N. Elguindi, S. Darras, C. Granier |
| **DOI** |  |

## 

## European temporal profiles

### CAMS-REG-TEMPO information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
|  |  |
| **Status** | Operational |
| **Description** | Regional temporal profiles |
| **Product family** | Anthropogenic emissions |
| **Species** | CH4, CO2 , CO, NOx, NMVOCs, SO2, NH3, PM10, PM2.5 |
| **Geographical area** | Regional |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux (point sources and area sources) |
| **Horizontal resolution** | 0.05° x 0.1° longitude-latitude |
| **Time coverage** | January 2000 – December 2022 |
| **Time resolution** | Hourly, Daily, Weekly, Monthly |
| **Update frequency** | Annual |
| **Dissemination mechanism** | FTP, Data Server |
| **Data format** | NetCDF, CSV |
| **Dissemination time** | June 2023 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
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| **CAMS2\_61 version(s)** | CAMS-REG-TEMPO\_v4.1 |
| **Responsible partner(s)** | BSC |
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### CAMS-REG-TEMPO version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-TEMPO\_v4.1** |
| **Release date (MM/YYYY)** | 06/2023 |
| **publicly available or declared obsolete?** | Publicly available |
| **if publicly available: where?** | ECCAD (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Dataset of regional European emission temporal profiles to be used for air quality modelling purposes. The profiles were constructed considering the influences of local sociodemographic factors and climatological conditions. |
| **Identified users? (optional)** | CAMS2\_40 modellers |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J. |
| **DOI** |  |
| **Reference** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C.: Copernicus Atmosphere Monitoring Service TEMPOral profiles (CAMS-TEMPO): global and European emission temporal profile maps for atmospheric chemistry modelling, Earth Syst. Sci. Data, 13, 367–404, https://doi.org/10.5194/essd-13-367-2021, 2021. |

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| **Version name or file name** | **CAMS-REG-TEMPO\_v3.2** |
| **Release date (MM/YYYY)** | 06/2022 |
| **publicly available or declared obsolete?** | Publicly available |
| **if publicly available: where?** | ECCAD (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Dataset of regional European emission temporal profiles to be used for air quality modelling purposes. The profiles were constructed considering the influences of local sociodemographic factors and climatological conditions. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C |
| **DOI** |  |
| **Reference** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C.: Copernicus Atmosphere Monitoring Service TEMPOral profiles (CAMS-TEMPO): global and European emission temporal profile maps for atmospheric chemistry modelling, Earth Syst. Sci. Data, 13, 367–404, https://doi.org/10.5194/essd-13-367-2021, 2021. |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-TEMPO\_v3.1** |
| **Release date (MM/YYYY)** | 06/2020 |
| **publicly available or declared obsolete?** | Publicly available |
| **if publicly available: where?** | ECCAD |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Dataset of regional European emission temporal profiles to be used for air quality modelling purposes. The profiles were constructed considering the influences of local sociodemographic factors and climatological conditions. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C |
| **DOI** |  |
| **Reference** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C.: Copernicus Atmosphere Monitoring Service TEMPOral profiles (CAMS-TEMPO): global and European emission temporal profile maps for atmospheric chemistry modelling, Earth Syst. Sci. Data, 13, 367–404, https://doi.org/10.5194/essd-13-367-2021, 2021. |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-TEMPO\_v2.1** |
| **Release date (MM/YYYY)** | 09/2019 |
| **publicly available or declared obsolete?** | Publicly available |
| **if publicly available: where?** | ECCAD: <https://eccad3.sedoo.fr/#CAMS-REG-TEMPO> |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Dataset of regional European emission temporal profiles to be used for air quality modelling purposes. The profiles were constructed considering the influences of local sociodemographic factors and climatological conditions. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C |
| **DOI** | 10.24380/1cx4-zy68 |
| **Reference** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C.: Copernicus Atmosphere Monitoring Service TEMPOral profiles (CAMS-TEMPO): global and European emission temporal profile maps for atmospheric chemistry modelling, Earth Syst. Sci. Data, 13, 367–404, https://doi.org/10.5194/essd-13-367-2021, 2021. |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-REG-TEMPO\_v1.1** |
| **Release date (MM/YYYY)** | 03/2019 |
| **publicly available or declared obsolete?** | Declared obsolete |
| **if publicly available: where?** |  |
| **acknowledgments?** |  |
| **Description (any relevant text)** |  |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C. |

## Global temporal profiles

### CAMS-GLOB-TEMPO information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
|  |  |
| **Status** | Operational |
| **Description** | Global temporal profiles |
| **Product family** | Anthropogenic emissions |
| **Species** | CH4, CO2, CO, NOx, NMVOCs, SO2, NH3, PM10, PM2.5 |
| **Geographical area** | Global |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface temporal weight factors |
| **Horizontal resolution** | 0.1° x 0.1° longitude-latitude |
| **Time coverage** | January 2000 – December 2022 |
| **Time resolution** | Hourly, Daily, Weekly, Monthly |
| **Update frequency** | Annual |
| **Dissemination mechanism** | FTP, Data Server |
| **Data format** | NetCDF, Excel |
| **Dissemination time** | June 2023 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
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| **CAMS2\_61 version(s)** | CAMS-GLOB-TEMPO\_v4.1 |
| **Responsible partner(s)** | BSC |
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### CAMS-GLOB-TEMPO version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-TEMPO\_v4.1** |
| **Release date (MM/YYYY)** | 06/2023 |
| **publicly available or declared obsolete?** | Publicly available |
| **if publicly available: where?** | ECCAD (in progress) |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Dataset of global emission temporal profiles to be used for air quality modelling purposes. The profiles were constructed considering the influences of local sociodemographic factors and climatological conditions. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Granier, C., and Pérez García-Pando, C. |
| **DOI** |  |
| **Reference** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C.: Copernicus Atmosphere Monitoring Service TEMPOral profiles (CAMS-TEMPO): global and European emission temporal profile maps for atmospheric chemistry modelling, Earth Syst. Sci. Data, 13, 367–404, https://doi.org/10.5194/essd-13-367-2021, 2021. |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-TEMPO\_v3.1** |
| **Release date (MM/YYYY)** | 06/2021 |
| **publicly available or declared obsolete?** | Publicly available |
| **if publicly available: where?** | ECCAD |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Dataset of global emission temporal profiles to be used for air quality modelling purposes. The profiles were constructed considering the influences of local sociodemographic factors and climatological conditions. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C. |
| **DOI** |  |
| **Reference** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C.: Copernicus Atmosphere Monitoring Service TEMPOral profiles (CAMS-TEMPO): global and European emission temporal profile maps for atmospheric chemistry modelling, Earth Syst. Sci. Data, 13, 367–404, https://doi.org/10.5194/essd-13-367-2021, 2021. |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-TEMPO\_v2.1** |
| **Release date (MM/YYYY)** | 09/2019 |
| **publicly available or declared obsolete?** | Publicly available |
| **if publicly available: where?** | ECCAD: <https://eccad3.sedoo.fr/#CAMS-GLOB-TEMPO> |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Dataset of global emission temporal profiles to be used for air quality modelling purposes. The profiles were constructed considering the influences of local sociodemographic factors and climatological conditions. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C. |
| **DOI** | 10.24380/ks45-9147 |
| **Reference** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C.: Copernicus Atmosphere Monitoring Service TEMPOral profiles (CAMS-TEMPO): global and European emission temporal profile maps for atmospheric chemistry modelling, Earth Syst. Sci. Data, 13, 367–404, https://doi.org/10.5194/essd-13-367-2021, 2021. |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-TEMPO\_v1.1** |
| **Release date (MM/YYYY)** | 03/2019 |
| **publicly available or declared obsolete?** | Declared obsolete |
| **if publicly available: where?** |  |
| **restricted?** |  |
| **acknowledgments?** |  |
| **Description (any relevant text)** |  |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | BSC |
| **Authors / contributors** | Guevara, M., Jorba, O., Tena, C., Denier van der Gon, H., Kuenen, J., Elguindi, N., Darras, S., Granier, C., and Pérez García-Pando, C |

## Global biogenic emissions

### CAMS-GLOB-BIO information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
|  |  |
| **Status** | Operational |
| **Description** | Biogenic VOC emissions for various chemical species for the global domain, valid for 2000 to 2020 |
| **Product family** | Biogenic emissions |
| **Species** | isoprene, monoterpenes, sesquiterpenes and other speciated VOCs/groups of VOCs, CH4, CO |
| **Geographical area** | Global |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux (point sources and area sources) |
| **Horizontal resolution** | 0.25°x0.25° - 0.5°x0.5° longitude-latitude |
| **Time coverage** | January 2000 – December 2020 |
| **Time resolution** | Monthly averages, Monthly averaged daily profiles |
| **Update frequency** | Annual |
| **Dissemination mechanism** | ECCAD for v1.2; ADS (up to 2019) and ECCAD for v3.0 and v3.1 |
| **Data format** | NetCDF |
| **Dissemination time** | June 2021 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-GLOB-BIOv1.2; CAMS-GLOB-BIO\_v3.0; CAMS-GLOB-BIO\_v3.1 |
| **Responsible partner(s)** | CUNI |
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### CAMS-GLOB-BIO version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-BIO\_v3.1** |
| **Release date (MM/YYYY)** | 06/2021 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ADS and ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Calculated with MEGANv2.1 emission model, ERA5 meteorology, updated isoprene emission potential maps in Europe. Horizontal spatial resolution 0.25°x0.25°. Data for 2000-2020. |
| **Identified users? (optional)** | ECMWF, University of Oxford, Istanbul Technical University, University of Illinois, Yokohama City University, National Technical University of Athens |
| **Responsible partners(s)** | CUNI |
| **Authors / contributors** | Katerina Sindelarova, Jana Doubalova, David Simpson |
| **DOI** | 10.24380/cv4p-5f79 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-BIO\_v3.0** |
| **Release date (MM/YYYY)** | 09/2020 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ADS and ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Calculated with MEGANv2.1 emission model, ERA5 meteorology and annually changing land cover maps based on land cover data of ESA CCI project derived from satellite observations. Horizontal spatial resolution 0.25°x0.25°. Data for 2000-2019. |
| **Identified users? (optional)** | ECMWF, University of Oxford, Istanbul Technical University, University of Illinois, Yokohama City University, National Technical University of Athens |
| **Responsible partners(s)** | CUNI |
| **Authors / contributors** | Katerina Sindelarova, Jana Doubalova |
| **DOI** | 10.24380/xs64-gj42 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-BIO\_v2.2** |
| **Release date (MM/YYYY)** | 08/2019 |
| **publicly available or declared obsolete?** | obsolete |
| **if publicly available: where?** |  |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Calculated with MEGANv2.1 emission model, ERA5 meteorology, updated isoprene emission potential maps in Europe. Only isoprene emissions available. Horizontal spatial resolution 0.25°x0.25°. Data for 2000-2018. Declared obsolete due to erroneous calculation of input meteorological fields. |
| **Identified users? (optional)** | ECMWF, IPSL-LMD |
| **Responsible partners(s)** | CUNI |
| **Authors / contributors** | Katerina Sindelarova, Jana Doubalova, David Simpson |
| **DOI** | 10.24380/xze0-qc69 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-BIO\_v2.1** |
| **Release date (MM/YYYY)** | 08/2019 |
| **publicly available or declared obsolete?** | obsolete |
| **if publicly available: where?** |  |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Calculated with MEGANv2.1 emission model driven by ERA5 meteorology. Horizontal spatial resolution 0.25°x0.25°. Data for 2000-2018. Declared obsolete due to erroneous calculation of input meteorological fields. |
| **Identified users? (optional)** | ECMWF, IPSL-LMD, EPA, NILU, Center for Climate Research Singapore |
| **Responsible partners(s)** | CUNI |
| **Authors / contributors** | Katerina Sindelarova, Jana Doubalova |
| **DOI** | 10.24380/xfgm-3830 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-BIO\_v1.2** |
| **Release date (MM/YYYY)** | 06/2021 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Calculated with MEGANv2.1 emission model and ERA-Interim meteorology. Horizontal spatial resolution 0.5°x0.5°. Data for January 2000 - July 2019. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | CUNI |
| **Authors / contributors** | Katerina Sindelarova, Jana Doubalova |
| **DOI** | TBA |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-BIO\_v1.1** |
| **Release date (MM/YYYY)** | 08/2018 |
| **publicly available or declared obsolete?** | obsolete |
| **if publicly available: where?** |  |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Calculated with MEGANv2.1 emission model and ERA-Interim meteorology. Horizontal spatial resolution 0.5°x0.5°. Data for 2000-2017. Declared obsolete due to a shift in the horizontal spatial grid. |
| **Identified users? (optional)** | ECMWF, EPA, NILU, Center for Climate Research Singapore |
| **Responsible partners(s)** | CUNI |
| **Authors / contributors** | Katerina Sindelarova, Jana Doubalova |
| **DOI** | 10.24380/p4vh-2p59 |

## 

## Global volcanic emissions

### CAMS-GLOB-VOLC information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
| **Status** | Re-analysis |
| **Description** | Volcanic emissions of SO2 |
| **Product family** | Volcanic emissions |
| **Species** | SO2 |
| **Geographical area** | Global (106 point-sources/volcanoes) |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux (point-sources) |
| **Horizontal resolution** | 0.25°x0.25° longitude-latitude |
| **Time coverage** | 1 January 2005 – 31 December 2022 |
| **Time resolution** | Monthly |
| **Update frequency** | Annual (one year delay) |
| **Dissemination mechanism** | ADS (soon), ECCAD (up to 2019) |
| **Data format** | CSV |
| **Dissemination time** | 2024 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-GLOB-VOLC-2005-2022-V2 |
| **Responsible partner(s)** | Chalmers |
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### 

### CAMS-GLOB-VOLC version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-VOLC-2005-2021-V2** |
| **Release date (MM/YYYY)** | 01/2023 |
| **Publicly available or declared obsolete?** | Publicly available |
| **If publicly available: where?** | CAMS ADS, ECCAD database |
| **Acknowledgments?** | NASA Volcanic SO2 Climatology from Satellite Instruments (Krotkov, Carn, Fioletov, et al.), NOVAC collaboration of ground-based volcanic plume observations |
| **Description (any relevant text)** | Database of monthly emission of SO2 from 106 volcanoes |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | Chalmers |
| **Authors / contributors** | Arellano S. (Chalmers), the NOVAC collaboration (https://novac-community.org/), S. Darras (CNRS) |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-VOLC-2005-2019-v1** |
| **Release date (MM/YYYY)** | 01/2023(?) |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database, NOVAC database |
| **Acknowledgments?** | NOVAC collaboration of ground-based volcanic plume observations |
| **Description (any relevant text)** | Database of daily emission of SO2 from 32 volcanoes |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | Chalmers |
| **Authors / contributors** | Arellano S. (Chalmers), the NOVAC collaboration (https://novac-community.org/), S. Darras (CNRS), NASA Global SO2 Climatology |
| **DOI** |  |

## Global oceanic emissions

### CAMS-GLOB-OCE information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
|  |  |
| **Status** | Operational |
| **Description** | Natural emissions for various chemical species from the global ocean. |
| **Product family** | Oceanic emissions |
| **Species** | DMS, OCS, VSLHS (CH3I, CH2Br2, CHBr3) |
| **Geographical area** | Global |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux (point sources and area sources) |
| **Horizontal resolution** | 0.5°x0.5° (DMS and VSHLS) or 1.0°x1.0° (OCS) longitude-latitude |
| **Time coverage** | January 2000 - December 2022 |
| **Time resolution** | Daily or Monthly, depending on the species |
| **Update frequency** | Annual |
| **Dissemination mechanism** | FTP  ECCAD (v3.1 for DMS and VSLHS, v1.1 for OCS) ADS (v3.1 for DMS and VSLHS) (but only up to 2019) |
| **Data format** | NetCDF |
| **Dissemination time** | September 2023 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-GLOB-OCE\_v3.1 for DMS and VSLHS  CAMS-GLOB-OCE\_v1.1 for OCS |
| **Responsible partner(s)** | MET Norway |
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### CAMS-GLOB-OCE version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-OCE\_v3.1** |
| **Release date (MM/YYYY)** | 09/2023 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD: DMS and VSLHS |
| **acknowledgments?** | as described in ECCAD database |
| **Description (any relevant text)** | changes with respect to v2.1: Halogenated species were extended to 2022, i.e. now covering the period 2000-2022, DMS emissions were extended to 2022, i.e. from v3.1 covering the period 2000-2022  Meteorological data now based on ERA5  Emission totals in this version: Averaged over the 2000-2019 period, the annual global emissions are:  CH3I : 1.36 Gmol(I)/yr CH2Br : 0.89 Gmol(Br)/yr CHBr3 : 2.19 Gmol(Br)/yr  DMS: 25.7 Tg(S)/yr |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | MET Norway |
| **Authors / contributors** | Michael Gauss, Sinikka Lennartz, Birgit Quack |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-OCE\_v2.1** |
| **Release date (MM/YYYY)** | 09/2019 |
| **publicly available or declared obsolete?** | declared obsolete |
| **if publicly available: where?** | ADS: DMS and VSLHS (should be deleted from ADS) |
| **acknowledgments?** | as described in ECCAD/ADS database |
| **Description (any relevant text)** | changes with respect to v1.1: DMS and halogenated species were extended to 2018, i.e. from v2.1 covering the period 2000-2018  Bug fix for DMS (temperature dependence of gas exchange coefficient now properly included)  This version was still available on ECCAD until November 2020. |
| **Identified users? (optional)** |  |
| **Responsible partners(s)** | MET Norway |
| **Authors / contributors** | Michael Gauss, Sinikka Lennartz, Birgit Quack |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-OCE\_v1.1** |
| **Release date (MM/YYYY)** | 09/2018 |
| **publicly available or declared obsolete?** | still valid for OCS  declared obsolete for DMS and VSLHS |
| **if publicly available: where?** | ECCAD: OCS |
| **acknowledgments?** | as described in ECCAD/ADS database |
| **Description (any relevant text)** | first version of CAMS-GLOB-OCE  As of October 2021, only OCS is retained from this version.  There was an error in the DMS emissions (temperature dependence of gas exchange coefficient not properly included) |
| **Identified users? (optional)** | ETHZ |
| **Responsible partners(s)** | MET Norway |
| **Authors / contributors** | Michael Gauss, Sinikka Lennartz, Birgit Quack |
| **DOI** |  |

## Global emissions from soils

### CAMS-GLOB-SOIL information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
|  |  |
| **Status** | Operational |
| **Description** | NOx emissions from soils |
| **Product family** | Biogenic emissions |
| **Species** | NOx |
| **Geographical area** | Global |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux |
| **Horizontal resolution** | 0.5°x0.5° longitude-latitude |
| **Time coverage** | January 2000 – December 2022 |
| **Time resolution** | Monthly |
| **Update frequency** | Annual |
| **Dissemination mechanism** | ADS for v2.2, ECCAD for v2.4 |
| **Data format** | NetCDF |
| **Description (any relevant text)** | 2000-2022. Uses ERA soil temps, and updated CEDS inputs. Climatology updated to 2000-2022. |
| **Dissemination time** | December 2023 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
| **Acknowledgements** | Simpson, D., Benedictow, A., and Darras, S.: The CAMS soil emissions: CAMS-GLOB-SOIL, in: CAMS2\_61 – Global and European emission inventories. Documentation of CAMS emission inventory products, 59–70, https://doi.org/10.24380/q2si-ti6i5, 2023. |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-GLOB-SOIL\_v2.4 |
| **Responsible partner(s)** | MET Norway |
|  |  |
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### 

### CAMS-GLOB-SOIL version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-SOIL\_v2.4** |
| **Release date (MM/YYYY)** | 31/12/2023 |
| **publicly available or declared obsolete?** | ADS, ECCAD |
| **if publicly available: where?** | ADS, ECCAD databases |
| **Data Format** | NetCDF |
| **Description (any relevant text)** | 2000-2022. Same as 2022 release, but 2021-2022 added, and climatology updated to 2000-2022. |
| **Responsible partners(s)** | MET Norway |
| **Authors / contributors** | David Simpson, Sabine Darras, Anna Benedictow |
| **DOI** | 10.24380/kz2r-fe18 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-SOIL\_v2.4** |
| **Release date (MM/YYYY)** | 31/12/2022 |
| **publicly available or declared obsolete?** | ADS, ECCAD |
| **if publicly available: where?** | ADS, ECCAD databases |
| **Data Format** | NetCDF |
| **Description (any relevant text)** | 2000-2020. Uses ERA soil temps, and updated CEDS inputs. Climatology for 2000-2022. |
| **Responsible partners(s)** | MET Norway |
| **Authors / contributors** | David Simpson, Sabine Darras, Anna Benedictow |
| **DOI** | 10.24380/kz2r-fe18 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-SOIL\_v2.2** |
| **Release date (MM/YYYY)** | 03/2021 |
| **publicly available or declared obsolete?** | ADS, ECCAD, OBSOLETE |
| **if publicly available: where?** | ADS, ECCAD databases |
| **Data Format** | NetCDF |
| **Description (any relevant text)** | 2000-2018. Fixed small bugs in v2.1, and uses improved inputs. |
| **Responsible partners(s)** | MET Norway |
| **Authors / contributors** | David Simpson, Sabine Darras |
| **DOI** | 10.24380/kz2r-fe18 |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-SOIL\_v2.1** |
| **Release date (MM/YYYY)** | 08/2020 |
| **publicly available or declared obsolete?** | ADS, ECCAD, OBSOLETE |
| **if publicly available: where?** | ADS, ECCAD databases |
| **Data Format** | NetCDF |
| **Description (any relevant text)** | 2000-2018 |
| **Responsible partners(s)** | MET Norway |
| **Authors / contributors** | David Simpson |
| **DOI** |  |

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-SOIL\_v1.1** |
| **Release date (MM/YYYY)** | 03/2020 |
| **publicly available or declared obsolete?** | publicly available, OBSOLETE |
| **if publicly available: where?** | ECCAD database |
| **Data Format** | NetCDF |
| **Description (any relevant text)** | 2000-2015 |
| **Responsible partners(s)** | MET Norway |
| **Authors / contributors** | David Simpson |
| **DOI** |  |

## Global termite emissions

### CAMS-GLOB-TERM information for the CAMS Service product portfolio.

This table contains information on **the latest version** that is available to users.

|  |  |
| --- | --- |
|  |  |
| **Status** | Operational |
| **Description** | Global emissions from termites |
| **Product family** | Biogenic emissions |
| **Species** | CH4 |
| **Geographical area** | Global |
| **Vertical coordinate** | Surface |
| **Vertical coverage** | Surface flux (point sources and area sources) |
| **Horizontal resolution** | 0.5°x0.5° longitude-latitude |
| **Time coverage** | January 2000 – December 2000 (but representative for the period 2000-2017) |
| **Time resolution** | Monthly |
| **Update frequency** | Annual |
| **Dissemination mechanism** | ECCAD and ADS |
| **Data format** | NetCDF |
| **Dissemination time** | August 2018 |
| **Key performance indicator** | TBD |
| **Data access** | On-line catalogue |
|  |  |
|  |  |
| **CAMS2\_61 version(s)** | CAMS-GLOB-TERM\_v1.1 |
| **Responsible partner(s)** | CUNI |
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### 

### CAMS-GLOB-TERM version tracking

Any relevant information about versions that have been available in the past and that may still be in use (one separate table for each version, most recent version on top).

|  |  |
| --- | --- |
| **Version name or file name** | **CAMS-GLOB-TERM\_v1.1** |
| **Release date (MM/YYYY)** | 08/2018 |
| **publicly available or declared obsolete?** | publicly available |
| **if publicly available: where?** | ECCAD database and ADS server |
| **acknowledgments?** |  |
| **Description (any relevant text)** | Emissions are estimated based on the methodology of Sanderson (1996). Seasonality of the data was defined by precipitation fit to the measurements performed by Jamali et al. (2013). Data are available as monthly means on a global 0.5°x0.5° grid. |
| **Identified users? (optional)** | ECMWF |
| **Responsible partners(s)** | CUNI |
| **Authors / contributors** | Jana Markova, Katerina Sindelarova |
| **DOI** |  |