

Atmosphere Monitoring

The Copernicus Atmosphere Monitoring Service

Regional air quality





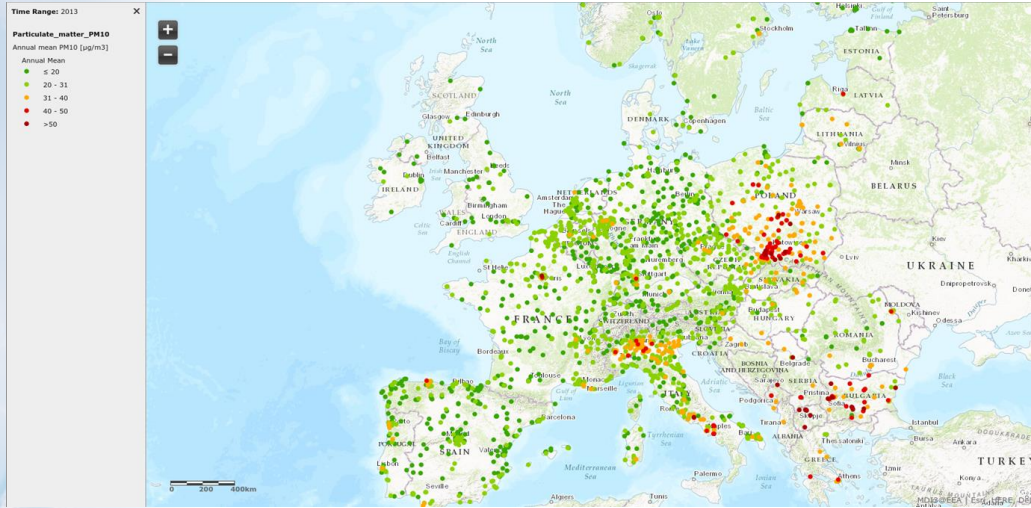
O u t l i n e

- CAMS (incomplete intro)
- Regional AQ
- Data access
- Downstream services – examples
 - Riga AirText
 - PASYFO
- Arctic Fires 2018
- Conclusions



Atmosphere
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CAMS: Adding value to observations



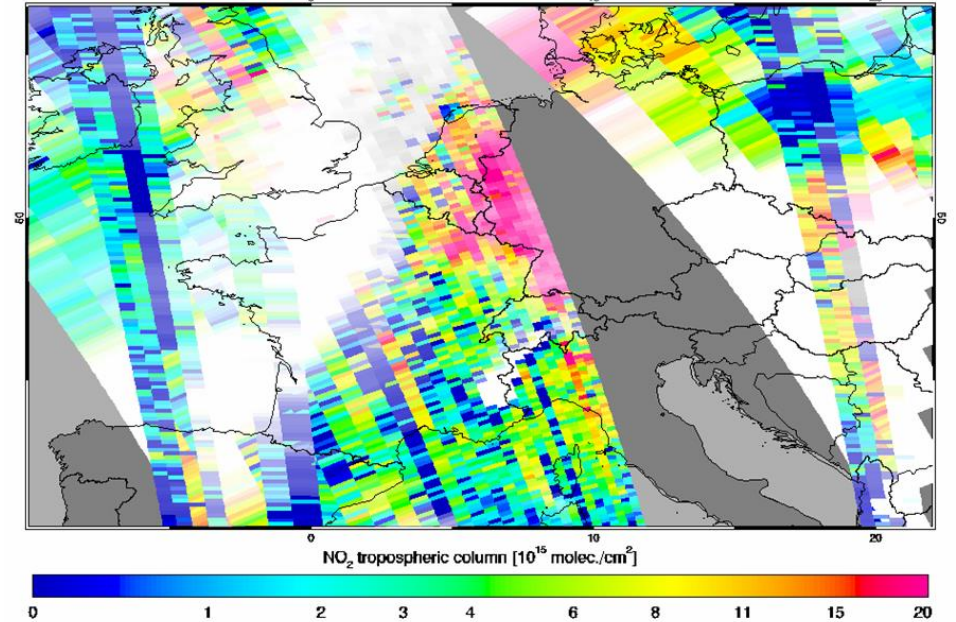
In-situ observations

European Environment Agency



OMI NRT tropospheric NO₂ 12 Nov 2016

KNMI/NASA



Satellite observations

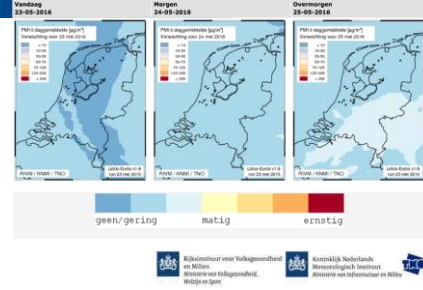
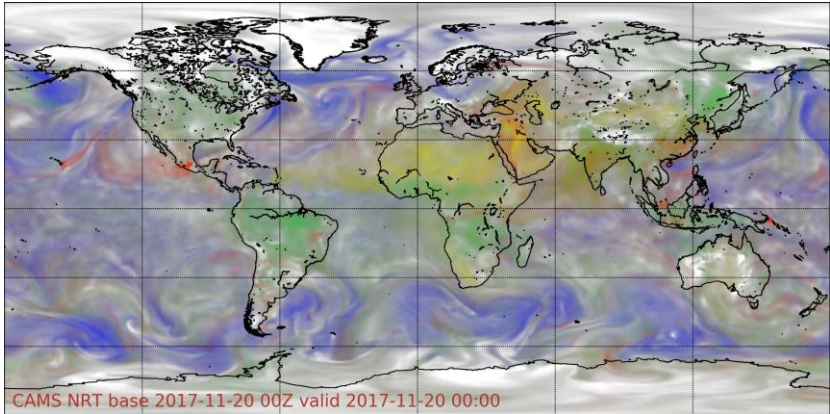
CAMS adds value to today's observations, providing consistent information anywhere in Europe (and the rest of the world).

CAMS forecasts allow you to anticipate the situation of tomorrow.

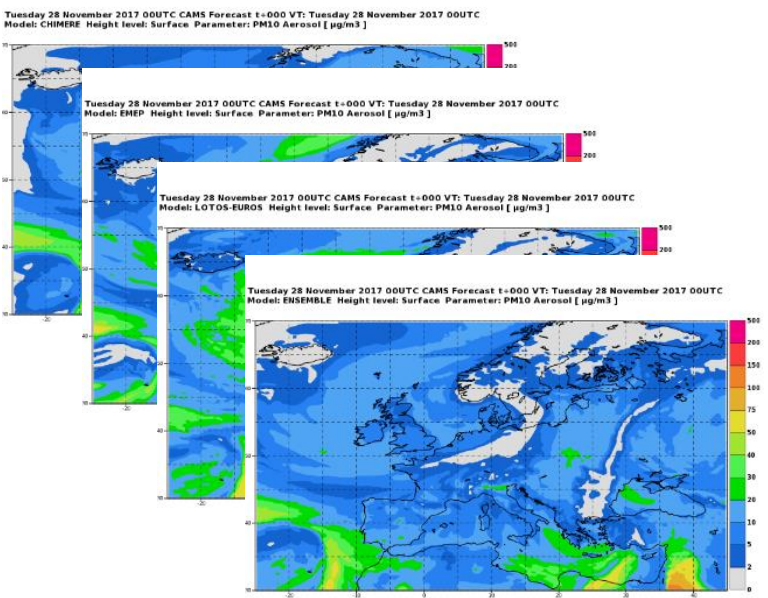


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Transforming
observations into
user-driven services.

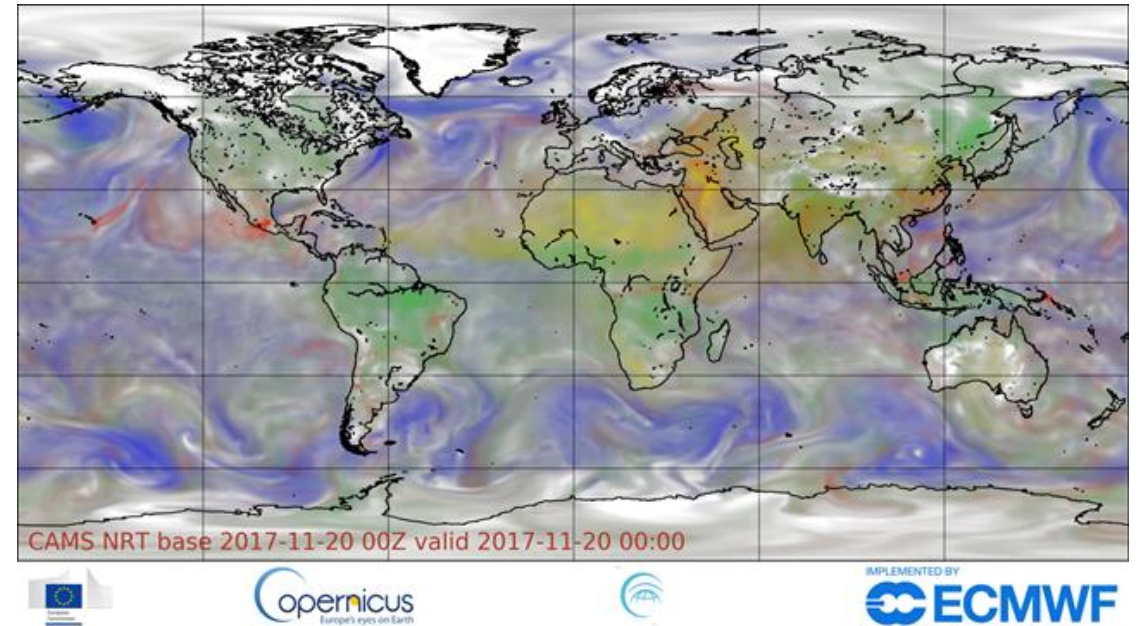
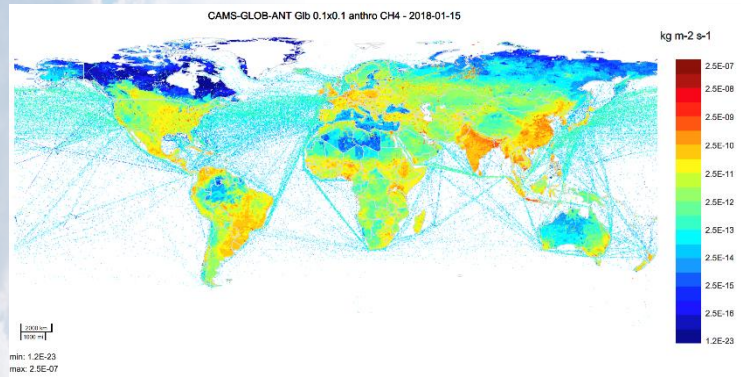
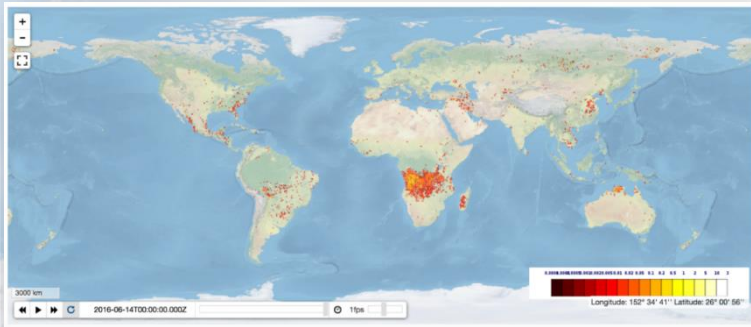




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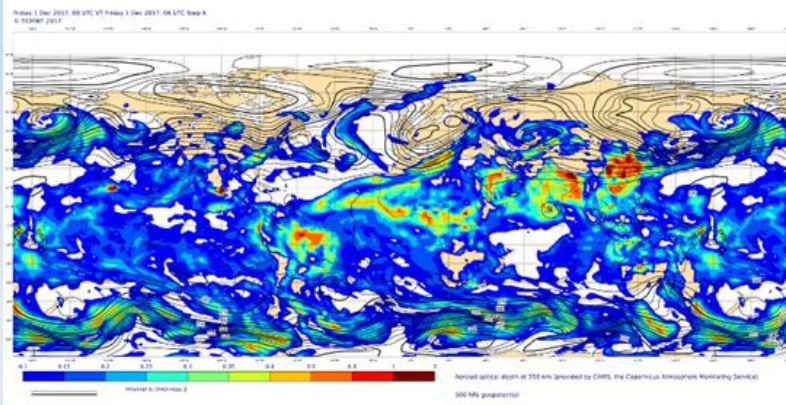
Global monitoring and forecasts

Daily forecasts of global atmospheric pollution are produced using detailed emission inventories and actual emission estimates from wildfires and biomass burning.



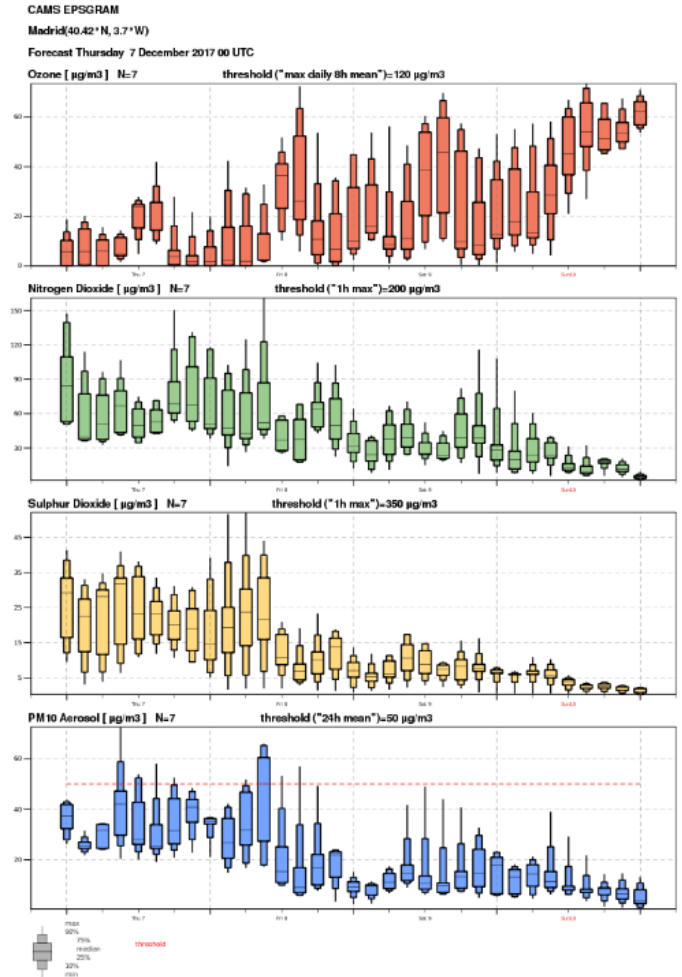
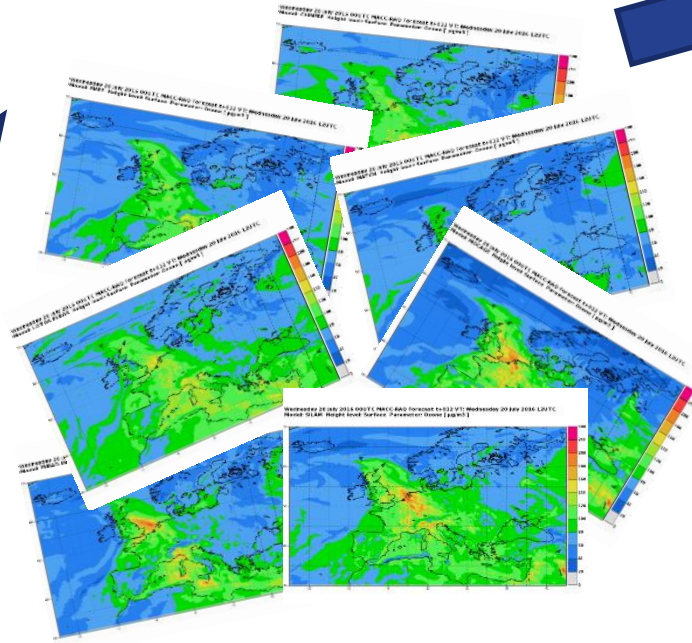
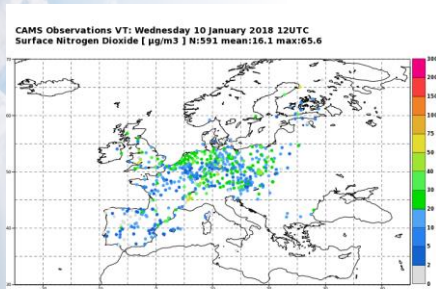


Regional monitoring and forecasting



The ensemble median based on 7 AQ models outperforms any individual model and provides an uncertainty estimate.

- Same emissions
- Same boundary conditions
- Same meteorology
- Use of regulatory air quality observations



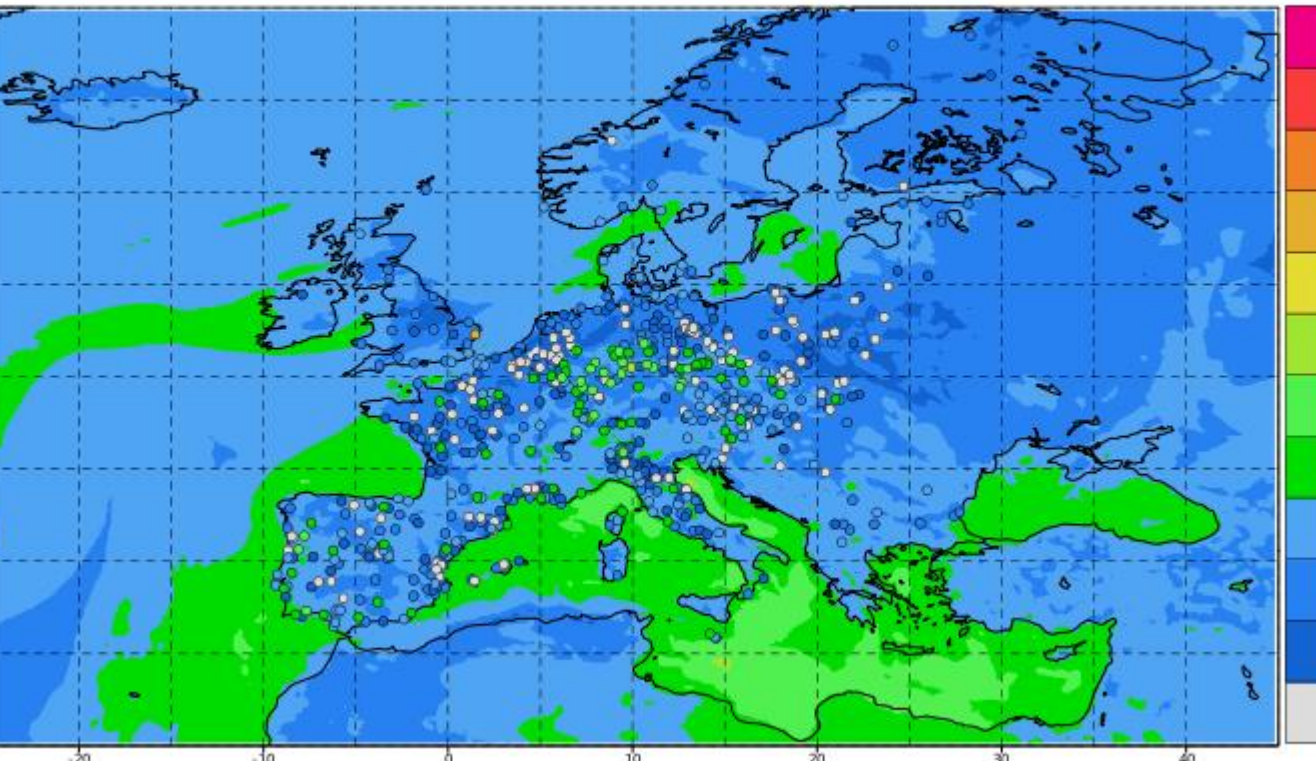


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Validated forecasts

- <http://www.regional.atmosphere.copernicus.eu/>
- Daily evaluation against ~1000 stations over Europe
- Maps, scores, Taylor diagrams, etc..

Monday 17 September 2018 00UTC CAMS Verification t+000 VT: Monday 17 September 2018 00UTC
Model: ENSEMBLE Median Height level: Surface Parameter: Ozone [$\mu\text{g}/\text{m}^3$]

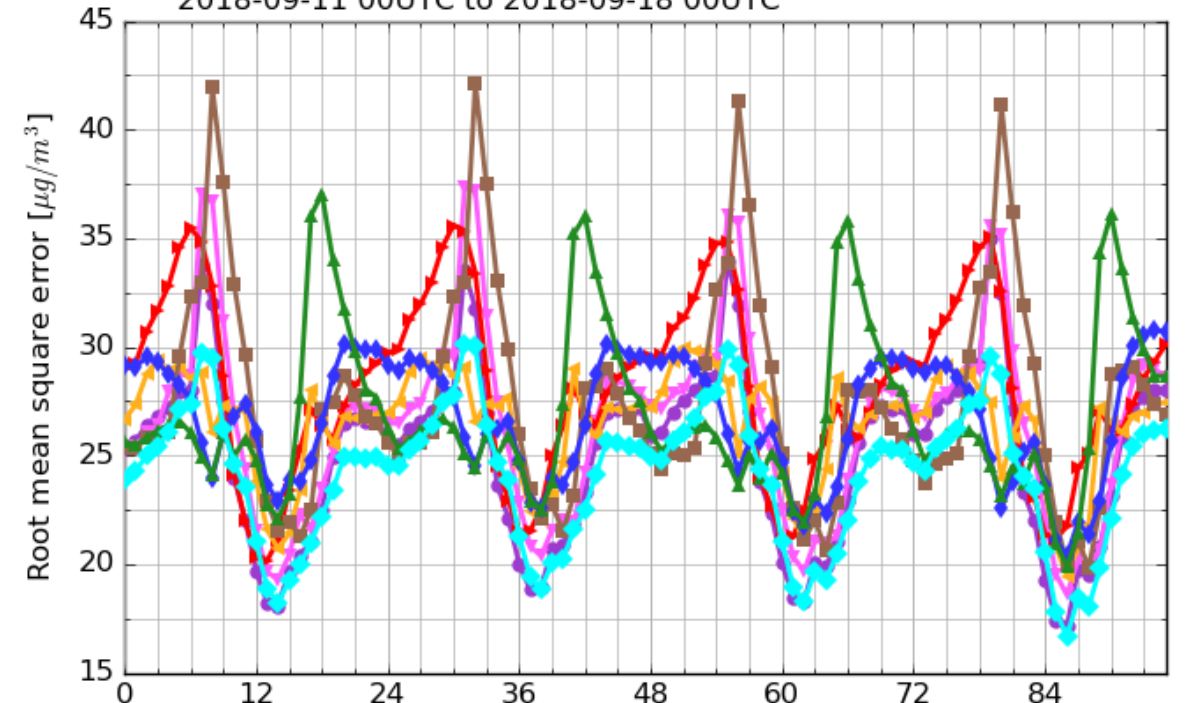


CAMS - Verification - Europe

Surface ozone forecast

Root mean square error [$\mu\text{g}/\text{m}^3$]

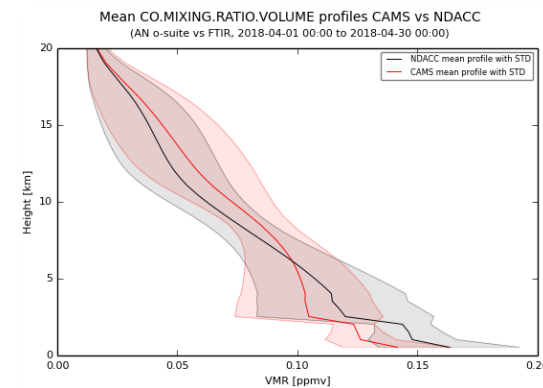
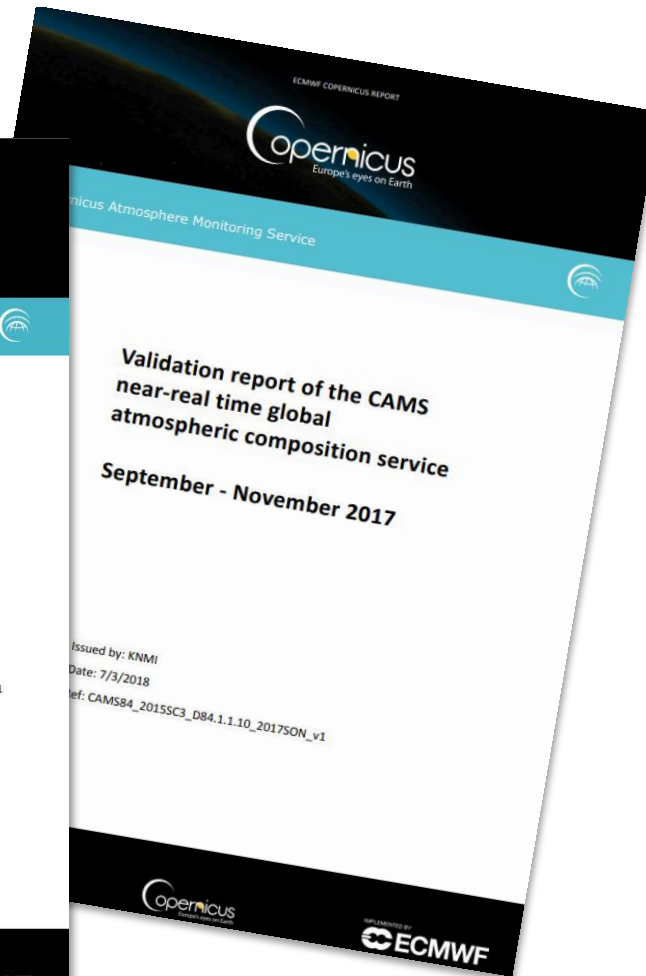
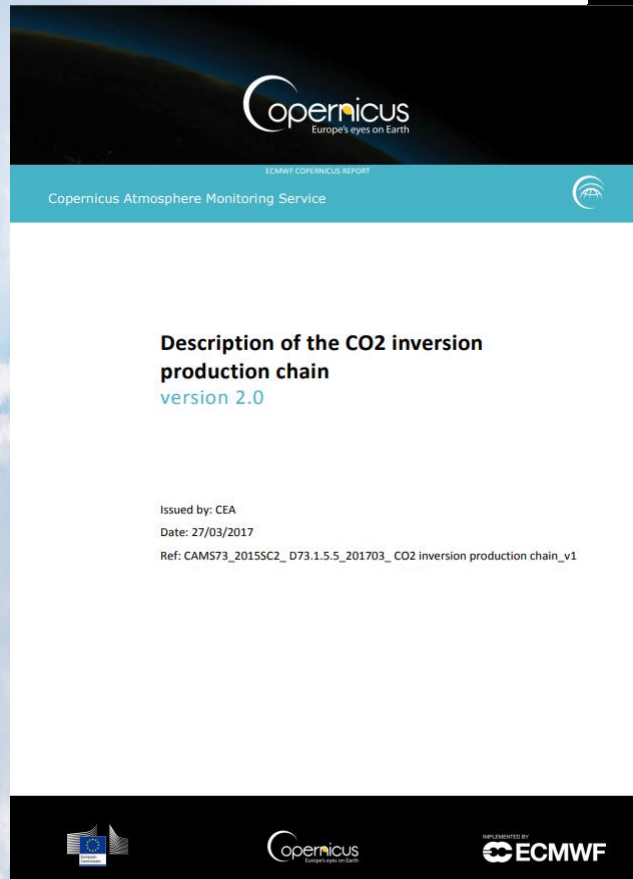
2018-09-11 00UTC to 2018-09-18 00UTC



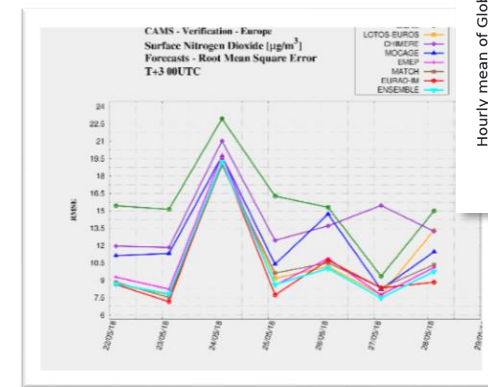
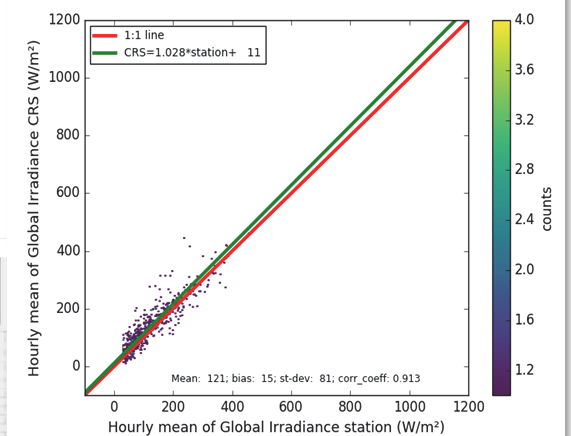


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Documentation & quality control



CABAUW (Lat:51.972 Lon:4.927) -1 m



CAMS provides detailed information about how its products are produced and what the quality is.

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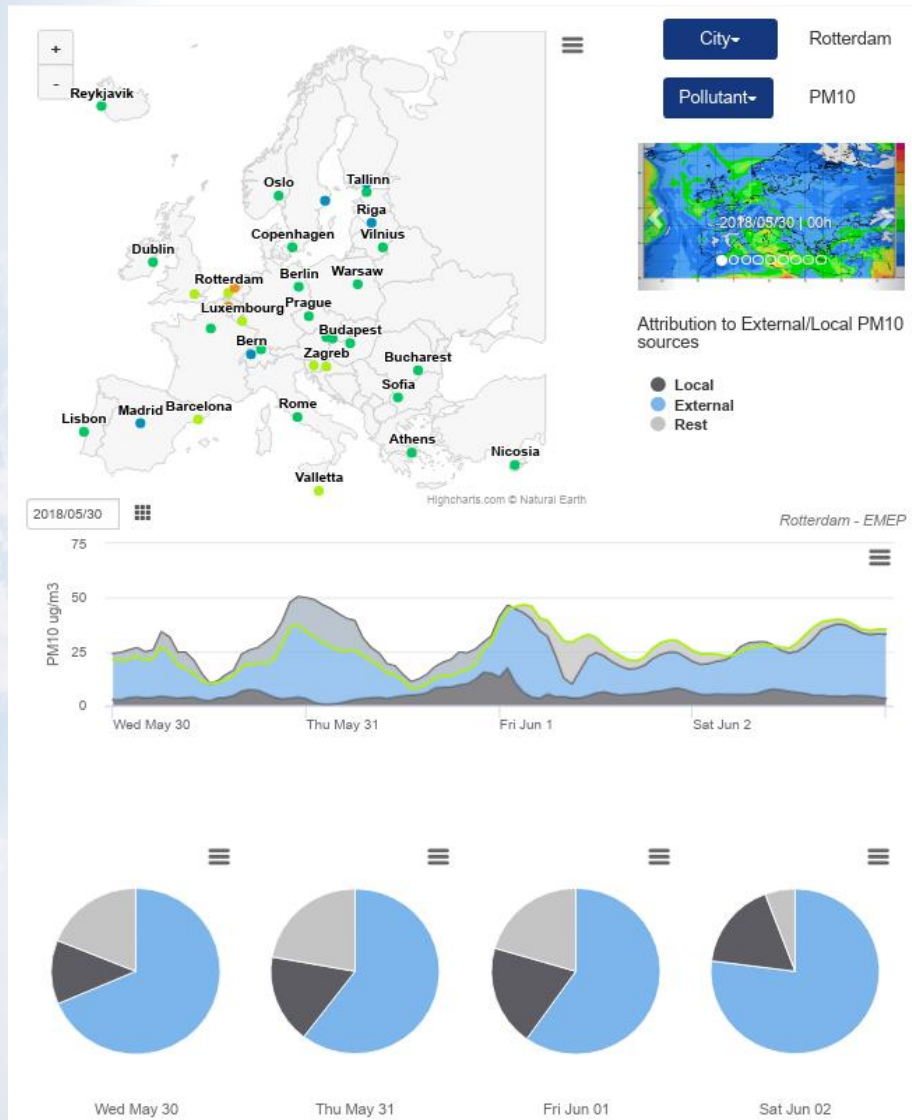
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Europe's eyes on Earth

European
Commission

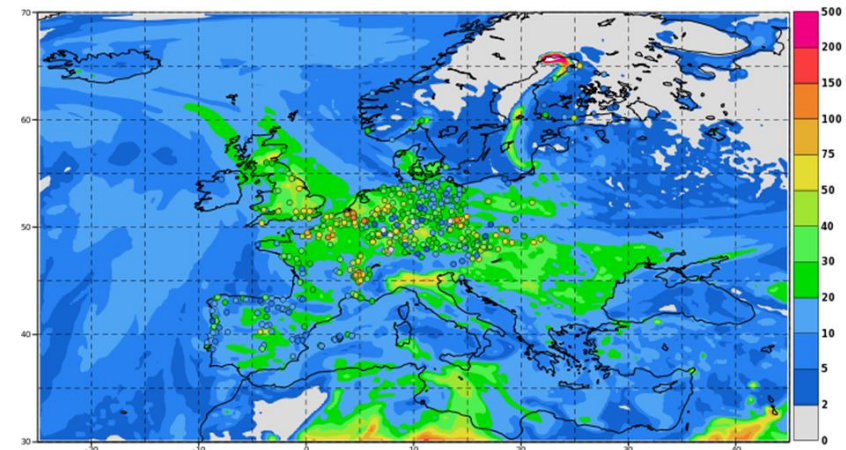


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Air Quality Policy tools



Tuesday 06 December 2016 00UTC CAMS Verification t+012 VT: Tuesday 06 December 2016 12UTC
Observations + LOTOS-EUROS Forecast Surface PM10 Aerosol [µg/m³]



CAMS policy tools

Support for policy makers dealing with pollution episodes

<http://policy.atmosphere.copernicus.eu/>



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Accessing the Products

<http://atmosphere.copernicus.eu/catalogue>





Implemented by ECMWF as part of The Copernicus Programme

Atmosphere Monitoring Service

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[DATA](#) ► [CATALOGUE](#)

Catalogue

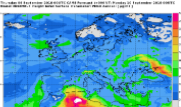
[Reset](#) [Search](#)

CURRENT FILTERS:

✕ [Product family: Regional forecasts](#) ✕ [Parameter: PM10](#)

PRODUCT FAMILY

- ☐ Anthropogenic emissions
- ☐ Climate forcings
- ☐ Fire emissions
- ☐ Global analyses
- ☐ Global forecasts
- ☐ Global reanalyses
- ☐ Greenhouse gas fluxes



European-scale air quality ensemble - PM10

This service provides the ensemble scale air quality forecasts for Europe. The maps provided are scale phenomena, they do not detail level.

Policy products

The CAMS Policy Portal provides an overview of the information and services available that could be of interest for policy makers. Information, products and tools are intended to identify the how different sources have contributed to any exceedance of air quality limits and to help in the design of policies to prevent incidents of severe air pollution.

[Policy tools](#)

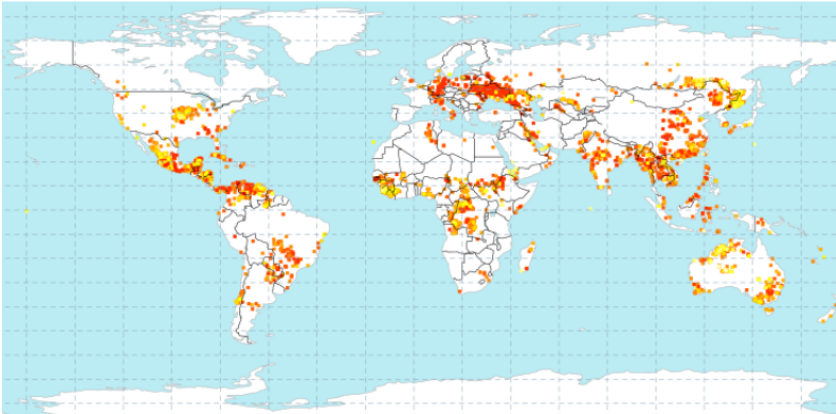
Daily analyses and forecasts

Forecast charts:

- [Reactive gases](#)
- [Aerosols](#)
- [European air quality](#)
- [Ozone layer](#)
- [CO2](#)

Analyses charts:

- [Fire monitoring](#)



The CAMS catalogue is the main interface to all data sets





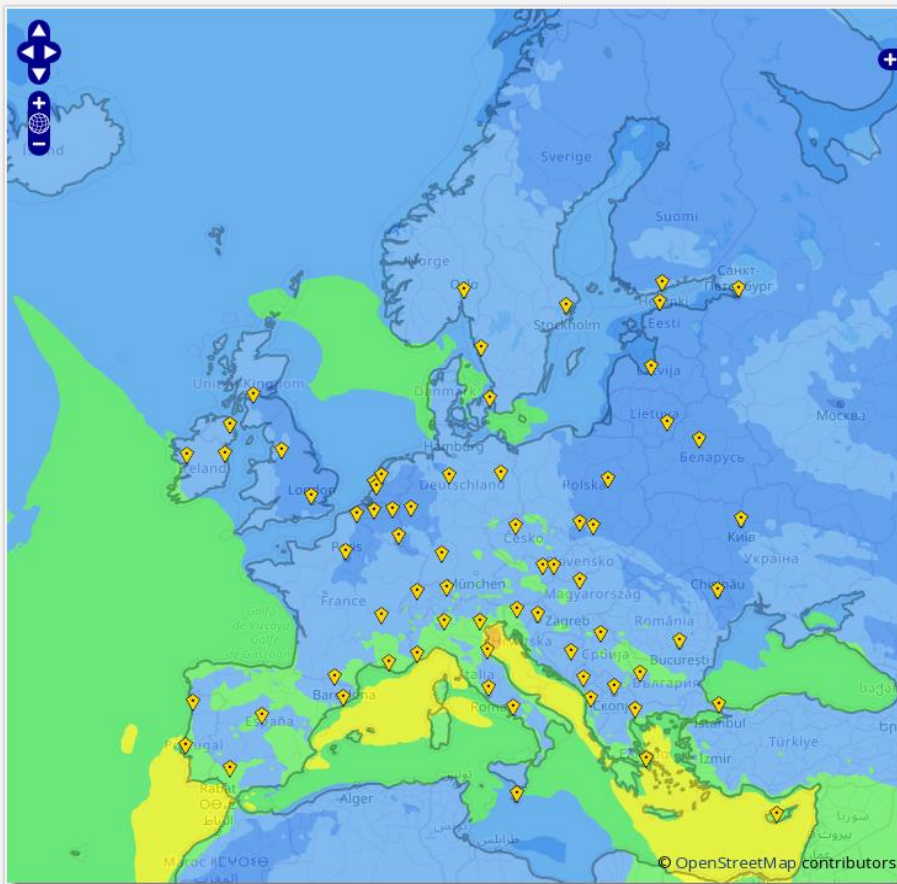
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Regional Air Quality portal

NEWS: RAGWEED POLLEN AVAILABLE

[Read more ...](#)

AIR QUALITY in Europe: [Ensemble modelling](#)



EUROPEAN AIR QUALITY SERVICES



OTHER AIR QUALITY MAPS

- ENSEMBLE MODEL
 - HOURLY FORECASTS
 - HOURLY ANALYSES
 - DAILY MEAN AND MAXIMUM
 - EPSGRAMS
- PARTNER MODELS
 - HOURLY FORECASTS
 - HOURLY ANALYSES
 - DAILY MEAN AND MAXIMUM
- REANALYSES
 - ENSEMBLE REANALYSIS
 - SIGNIFICANT EVENTS
- NRT OBSERVATIONS



DATA DOWNLOAD

- ONLINE DATA
- ARCHIVES
- REANALYSIS DATA
- WEB SERVICES
- CATALOGUE OF SERVICES



VERIFICATION RESULTS

- FORECAST VS OBS
- ANALYSIS VS OBS
- ANALYSIS VS FORECAST
- MEAN SCORES
- TIME SERIES
- TAYLOR DIAGRAMS



DOCUMENTATION



Forecast and analysis charts



Data download



Quality assessments



Documentation



Atmosphere

Form for data access

EUROPEAN AIR QUALITY - DOWNLOAD ONLINE DATA



CAMS Regional Air Quality - Online data (less than 30 days old)

Select a model :

ENSEMBLE

Select a type for your data :

ANALYSIS

Select a species :

CO

Select a type of level :

Surface

Select a time step package :

From -24H to -1h

Select a reference time :

2017-10-10T00:00:00Z

Select a format for your data :

NetCDF

Get data :

☒ In order to download CAMS data products, the CAMS data license available [here](#) must be accepted

DOWNLOAD [Info](#)

CAMS provides big data with the corresponding technical and scientific expertise to support expert users. In doing so, we allow the CAMS information to reach millions of users in and outside Europe.



Downstream applications

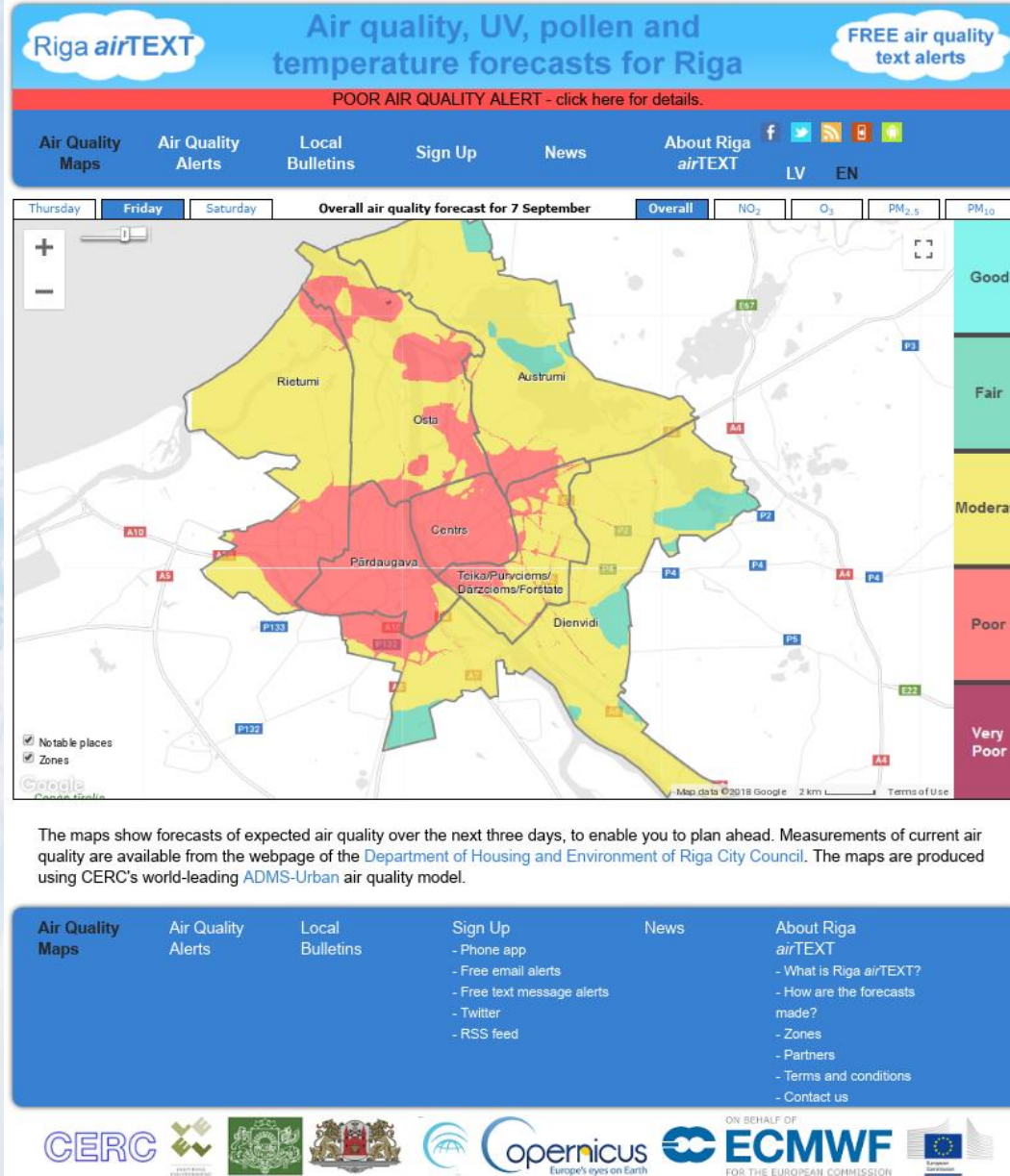


https://download.regional.atmosphere.copernicus.eu/services/CAMS50?token=__M0bChV6QsoOFqHz31VRqnpr4GhWPtcpaRy3oeZjBNSg__&grid=0.1&model=ENSEMBLE&package=ANALYSIS_CO_SURFACE&time=-24H-1H&referencetime=2017-10-10T00:00:00Z&format=NETCDF&licence=yes



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Example of AQ service using CAMS data



CERC

Free air pollution, UV, pollen and temperature forecasts

Local forecast models need information on how much pollution flows into and out of the domain to provide an accurate service.

This is provided by CAMS European air quality forecasts.

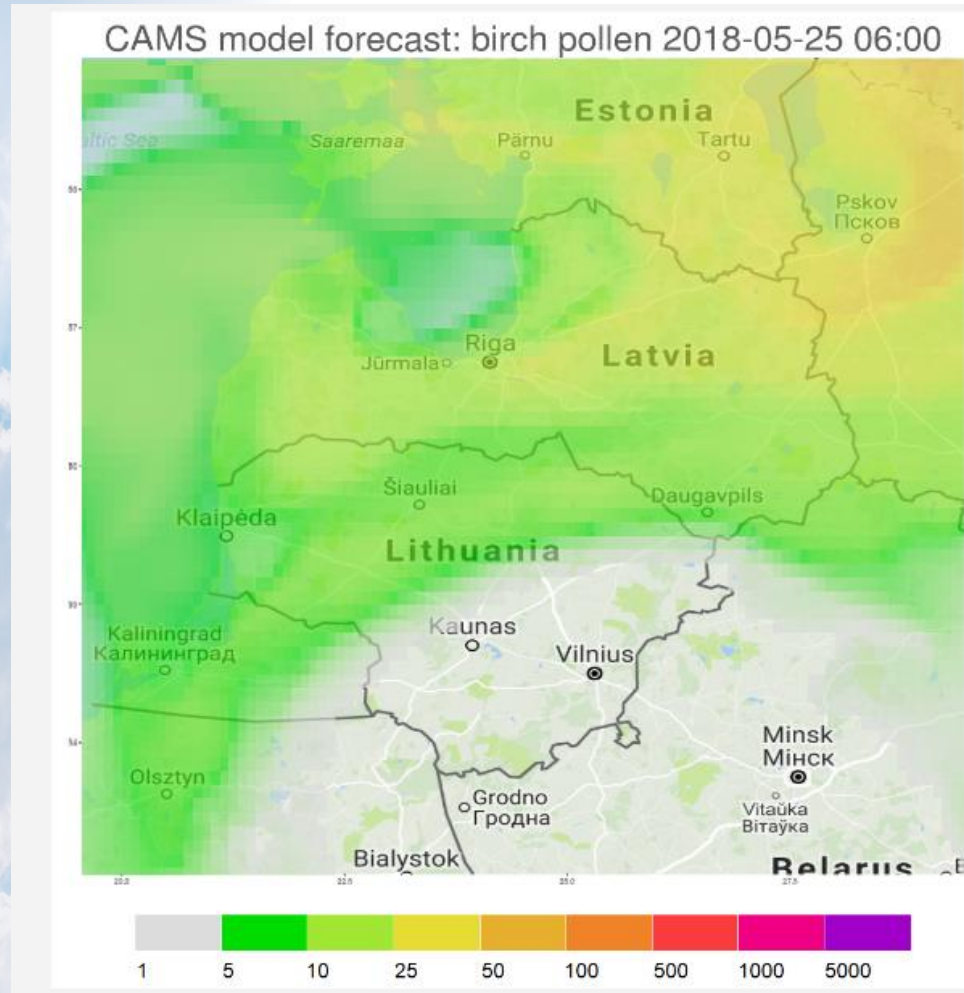
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Example of AQ service using CAMS data



PASYFO



The aim of PASYFO is to provide a high-resolution regional system for predicting the personal allergy symptoms of pollen-sensitive people using personalised sensitivity information.

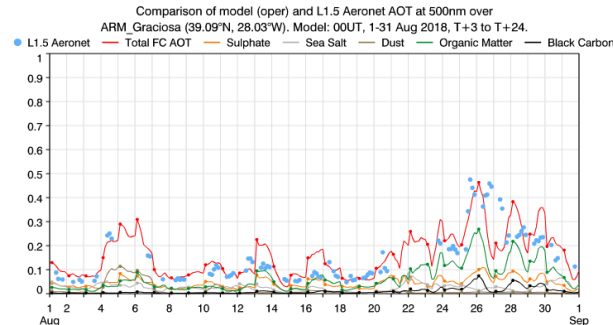
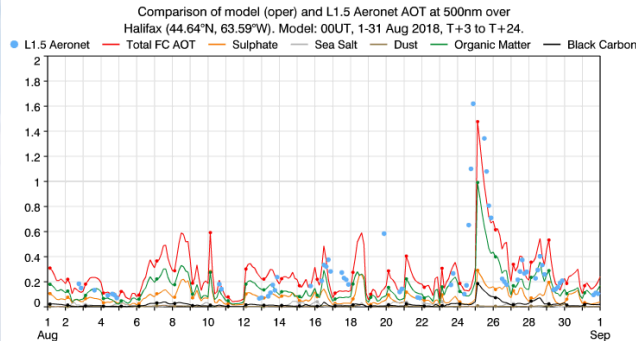
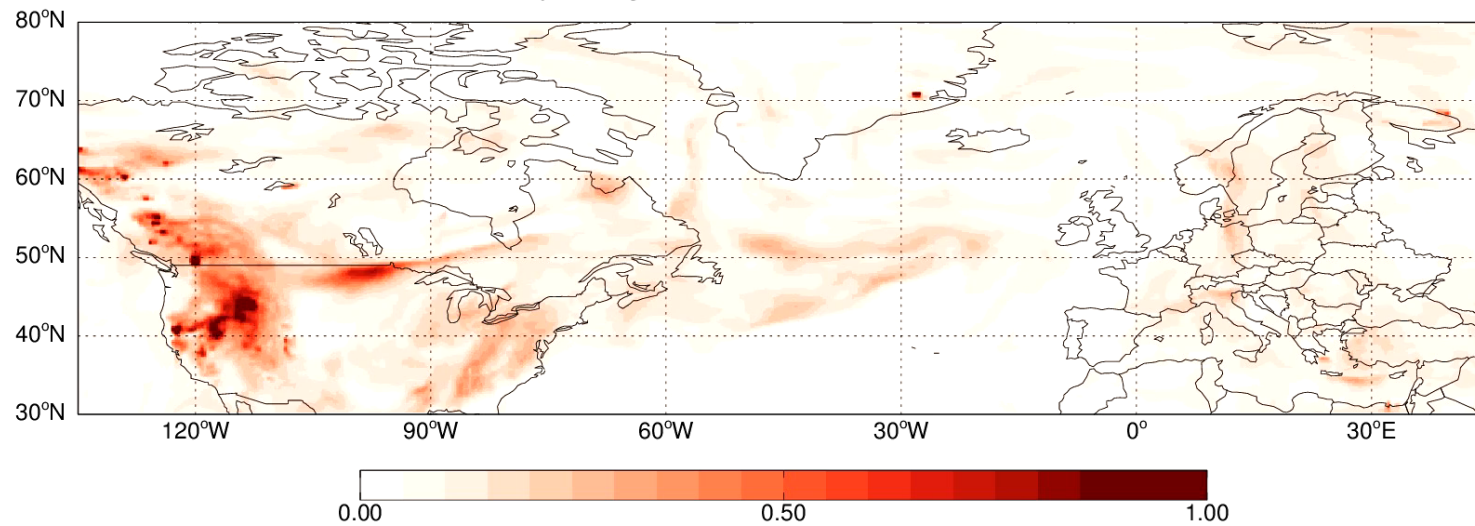
CAMS European pollen forecasts are used to provide the up-to-date information on pollen for the European domain.



Smoke transport from western Canada to Europe

CAMS continuously monitors fire emissions and the transport of smoke (aerosols and chemical species) over long distances. Fire emission in North America and Siberia can affect visibility and air quality in Europe.

CAMS Analysis Organic Matter AOD at 550nm: 20180801, 00z



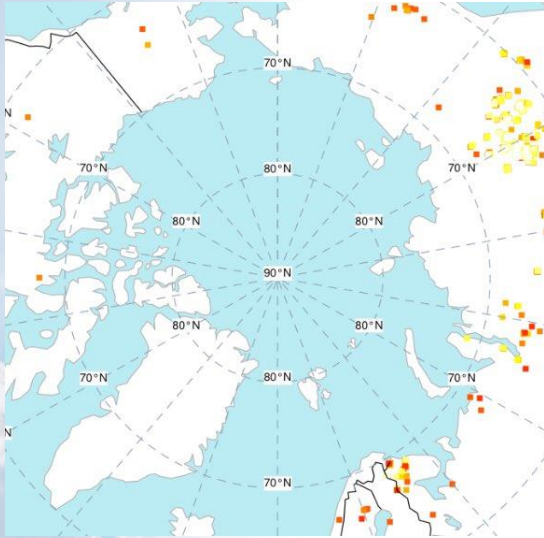
The output is also validated against independent observations.



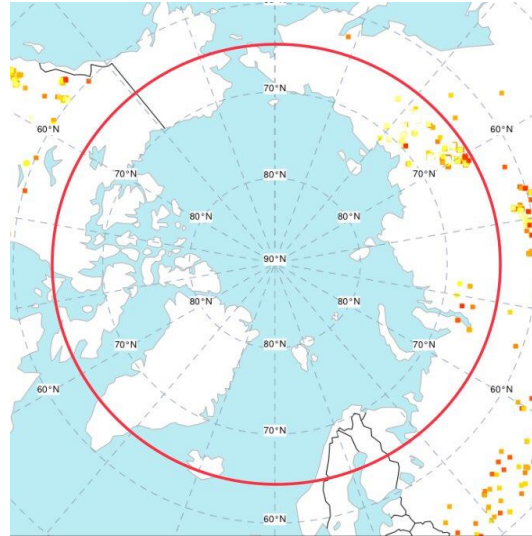
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Wildfire emissions within the Arctic Circle for 2018

21 July 2018



17 August 2018

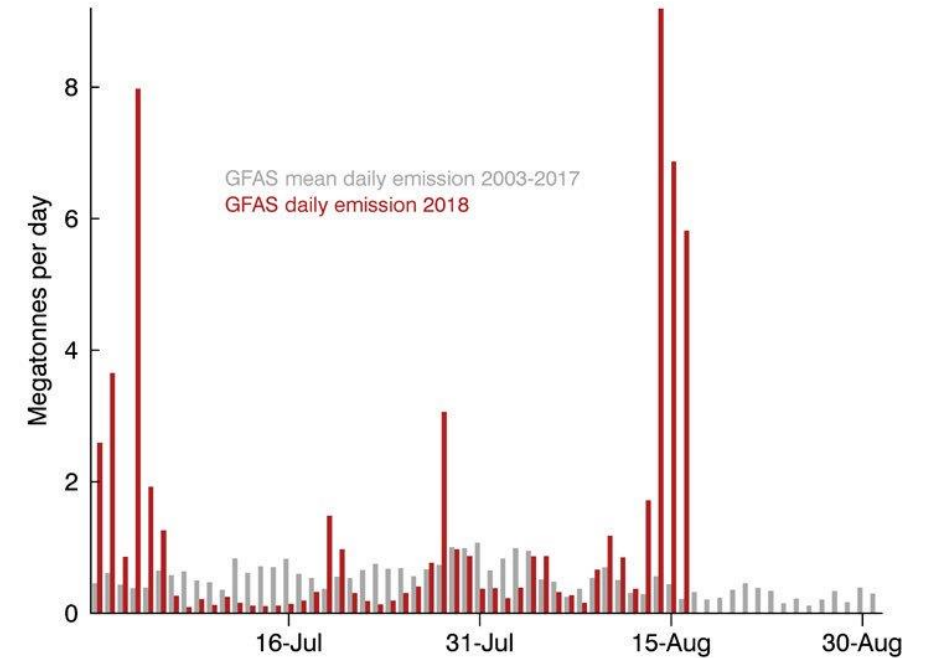


Higher than average fire activity in the Arctic Circle this year compared to 2003-2017.

Mainly in Siberia (Yakutia) but also in Alaska and the European Arctic, including northern Sweden and Finland.

Estimated fire emissions form input to CAMS global and regional forecasts.

CAMS Daily Fire CO₂ Emissions (GFASv1.2) for Arctic Circle





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To summarize



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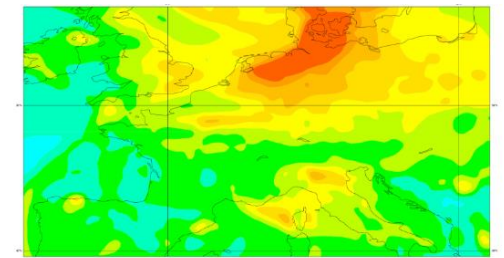
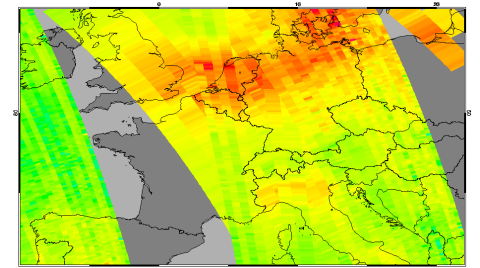
atmosphere.copernicus.eu

User-driven

Free and unrestricted data access

Making observations more meaningful to you

Provide information for past, present and future



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<http://atmosphere.copernicus.eu>

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Today's air quality forecasts

Europe Worldwide

euronews.

Daily CAMS air quality forecast on Euronews

Latest News

Better forecasting can help combat air pollution worldwide

In a comment paper, published in the September 6th issue of Nature, scientists are

Tweets by @CopernicusECMWF

Copernicus ECMWF @CopernicusECMWF

This week in @nature Head of the Copernicus Atmosphere Monitoring Service (@CAMS) @VHPeuch

vodafone UK 20:06 30%

Copernicus ECMWF 95 Tweets

Tweets Media Favourites

Our Dr @m_parrington & #Copernicus Atmosphere Monitoring Service mentioned in @uktropicalpeat #Indonesia #fires blog

Extensive peatland fires choke Southe... tropicalpeat.wordpre...

Copernicus ECMWF @C... 18/09/2015

#Copernicus Atmosphere Monitoring Service tracks Asia's #fires atmosphere.copernicus.eu/news/copernicu... #CAMS #haze

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Copernicus Europe's eyes on Earth

Copernicus Atmosphere Monitoring Service

You are receiving this email because you have registered for the Copernicus newsletters. Copernicus is the European Commission's flagship Earth Observation programme that freely provides governments, scientists and industry with the tools and information to make better, evidence-based decisions.

ECMWF is delivering two key parts of the programme, the Copernicus Atmosphere Monitoring Service (CAMS) and the Copernicus Climate Change Service (C3S) and assisting with a third Copernicus Emergency Management Service - Floods (CEMS).

SAVE THE DATE

Copernicus Atmosphere Monitoring Service - General Assembly

Date: 14 - 16 June 2016

Location: Electra Palace Hotel, Athens, Greece

Register: <http://atmosphere.copernicus.eu/events/cams-general-assembly>

1st CAMS General Assembly

Join us to hear about the latest developments and shape future work. The days will cover:

- Service updates
- User requirements and feedback gathering
- Brainstorming
- Provider-led sessions

CAMS General Assembly

The Copernicus Atmosphere Monitoring Service is holding its inaugural General Assembly over three days, 14 - 16 June 2016, for providers, users and potential users alike. The General

copernicus-support@ecmwf.int