Atmosphere Monitoring

Analysis of DOD and Dust Emissions over Middle East by using CAMS

Richard Engelen
ECMWF

Copernicus

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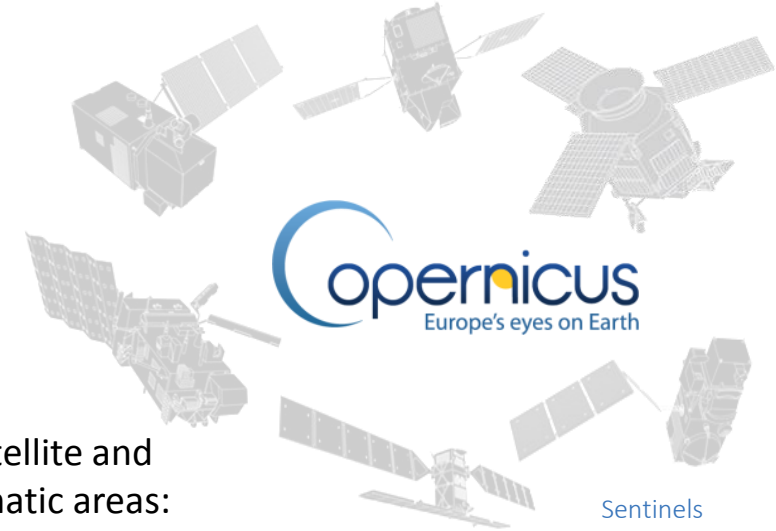

Sentinels

The Copernicus Services transform the wealth of satellite and in-situ data into value-added information for 6 thematic areas: **Atmosphere, Marine, Land, Climate, Emergency and Security**

Services

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Copernicus Atmosphere Monitoring Service

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Providing policy makers, businesses, scientists and citizens alike with reliable information about atmospheric composition.



Building up knowledge and boosting informed decision-making on topics such as air quality, health, solar energy, weather and climate.

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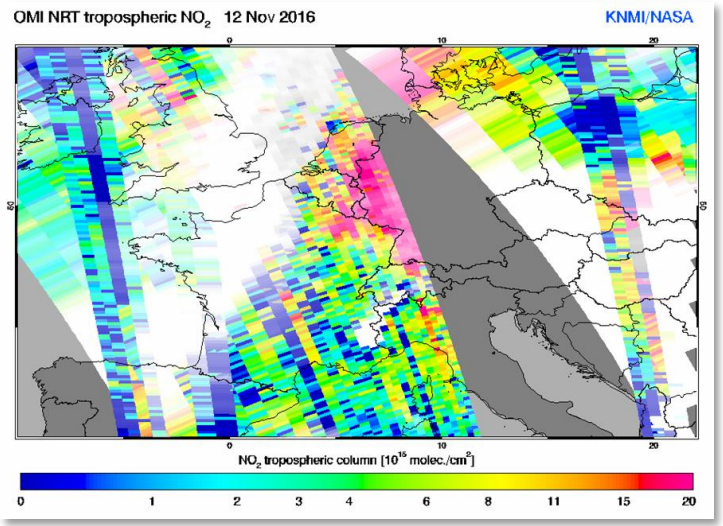
CAMS: Adding value to observations

European Environment Agency

In-situ observations



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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How do we do that?

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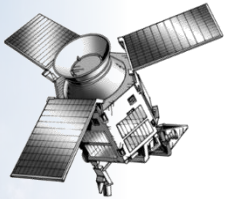
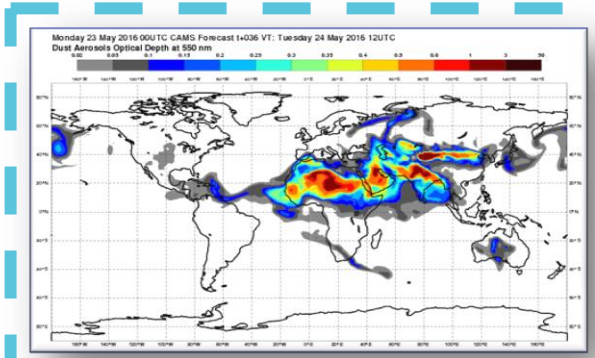
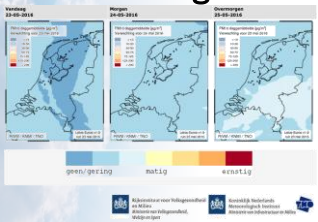
Space Agencies





In-situ observations

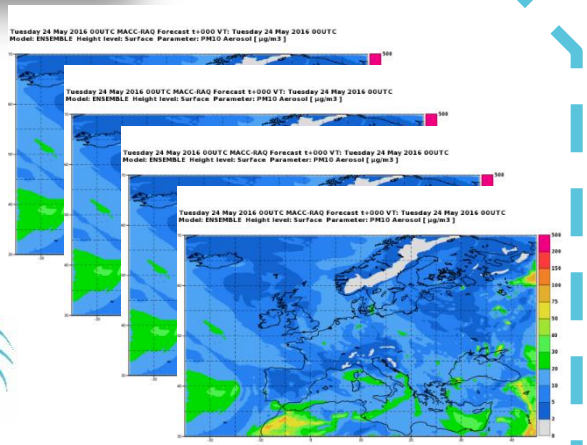
National agencies



SMEs

Citizens

Scientists



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Twice-daily forecasts from global system

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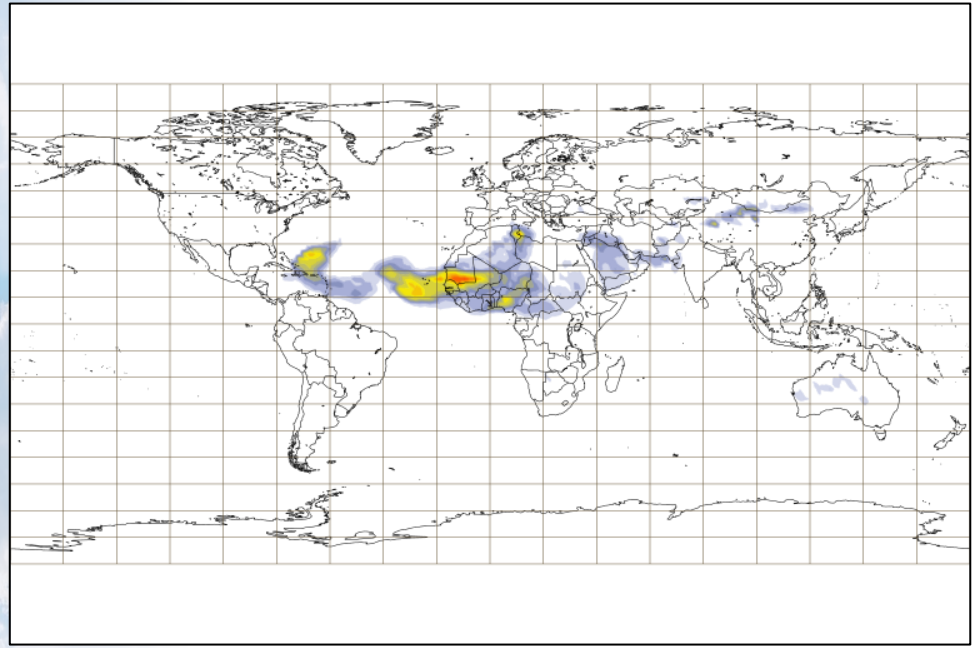

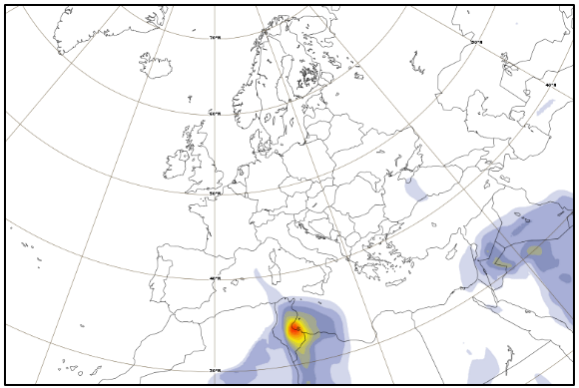

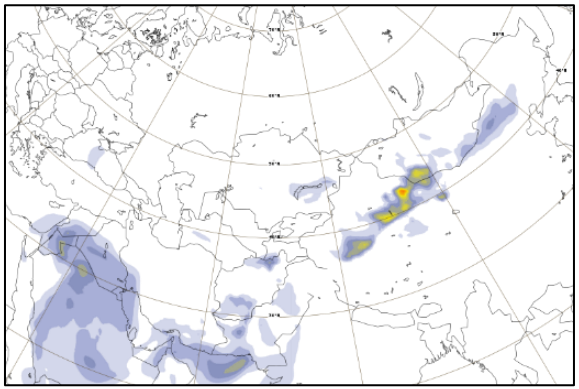

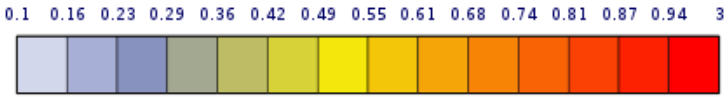

DOD

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From global to regional

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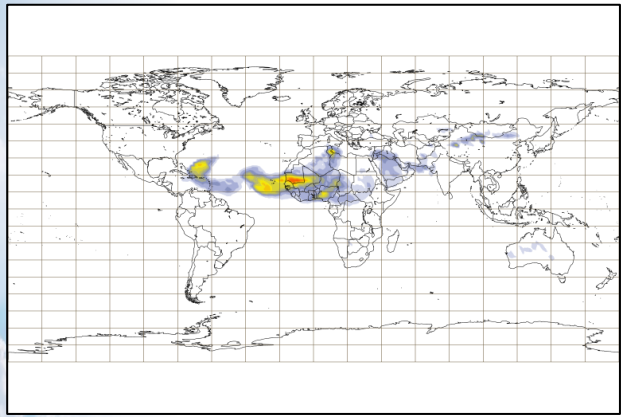

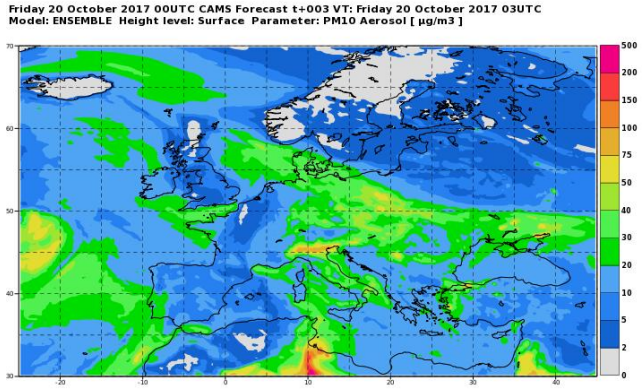

The CAMS global system provides boundary conditions for the daily CAMS regional ensemble forecasts.

Boundary conditions are also available for CAMS users running reginal models for other domains.

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Aerosol warning system (in development)

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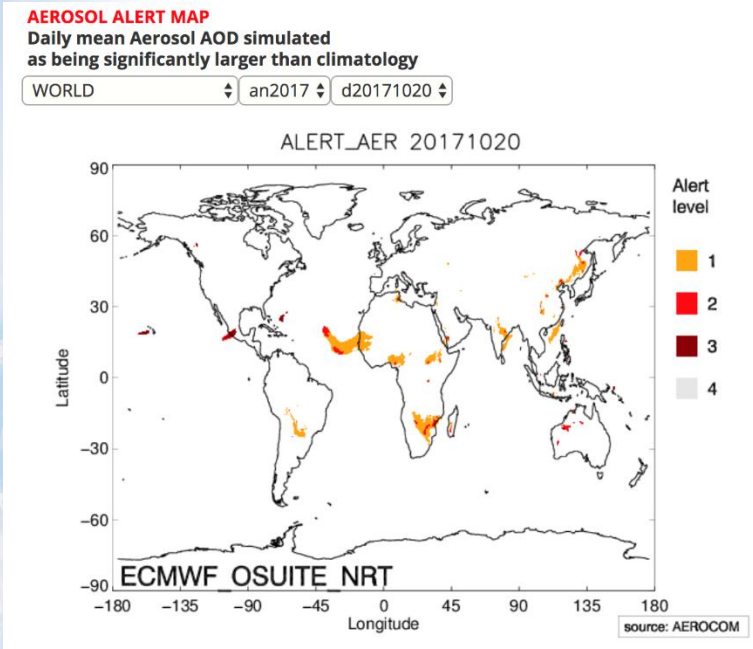

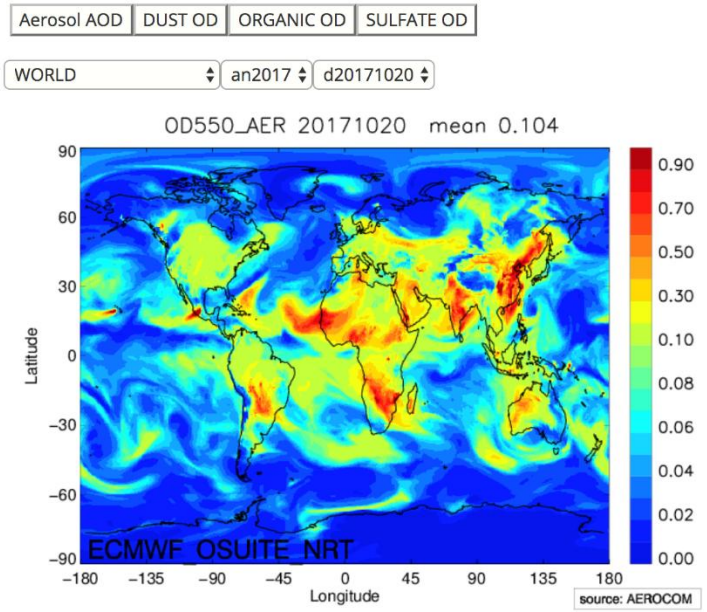

CAMS is testing an aerosol warning system that could send automatic emails in case of exceedances relative to climatology.

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Contributions to international frameworks

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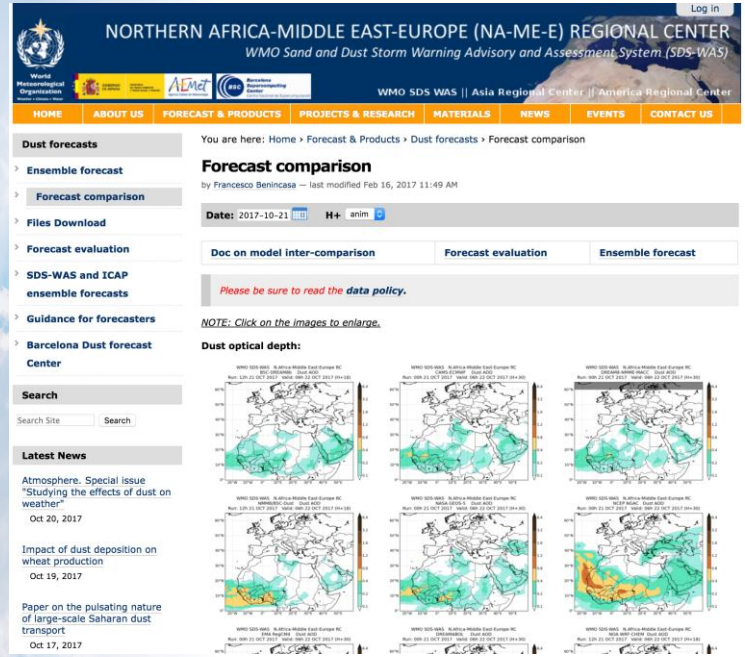
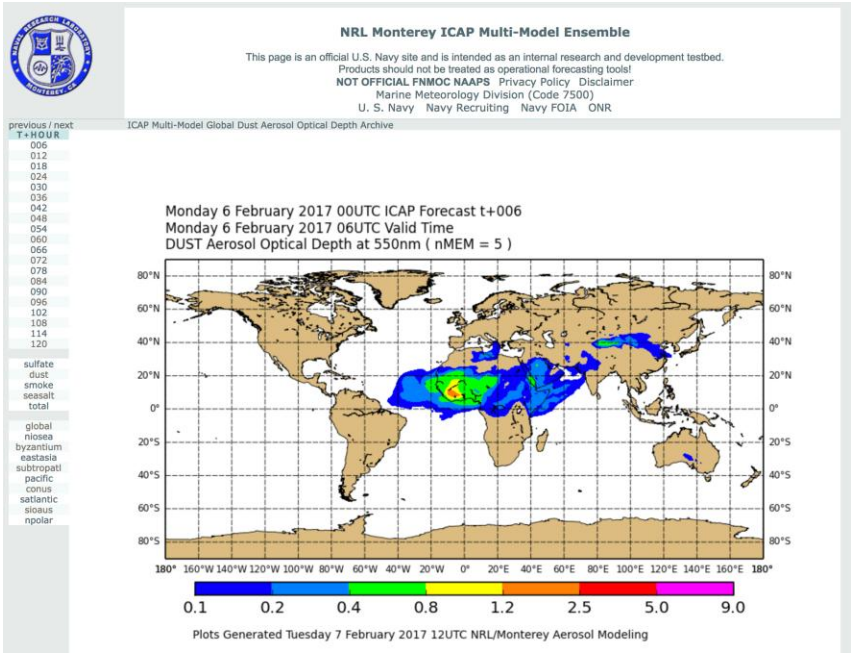
WMO SDS-WAS



ICAP



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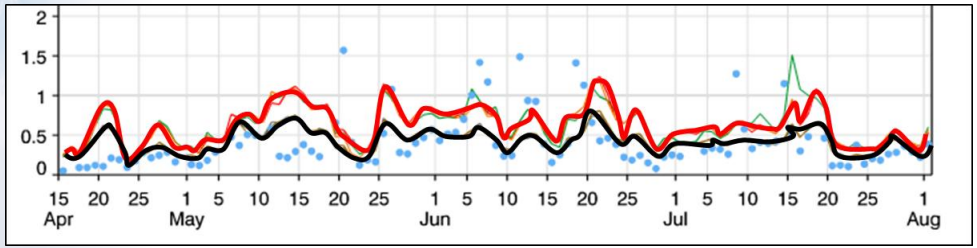
Under the hood

Dust emissions are based on the bare soil fraction, soil moisture content, wind speed above a threshold and a regionally-defined constant source potential (Morcrette et al. (2009), Ginoux et al. (2001)).

Online dry deposition velocities for all aerosol species as a function of particle size, surface friction, roughness length and soil type, following Zhang et al (2001).

Data assimilation uses observations from MODIS and PMAp to constrain total Aerosol Optical Depth. This means that speciation and size distribution are provided by model.



Total AOD at the Tamanrasset (Algeria) AERONET station

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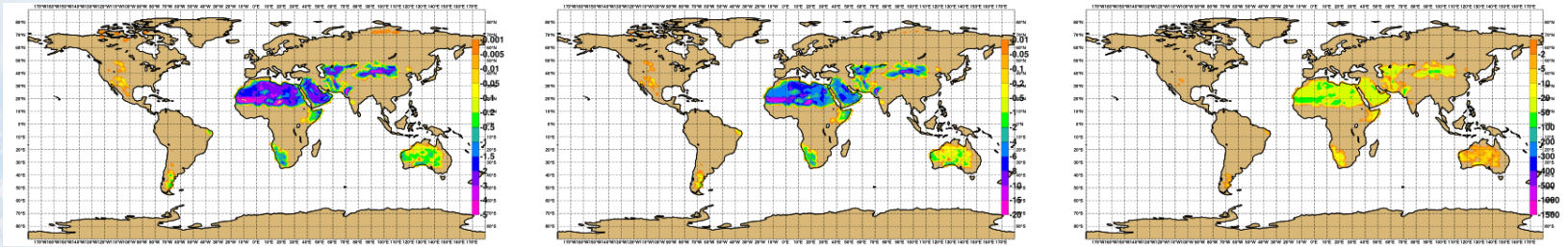
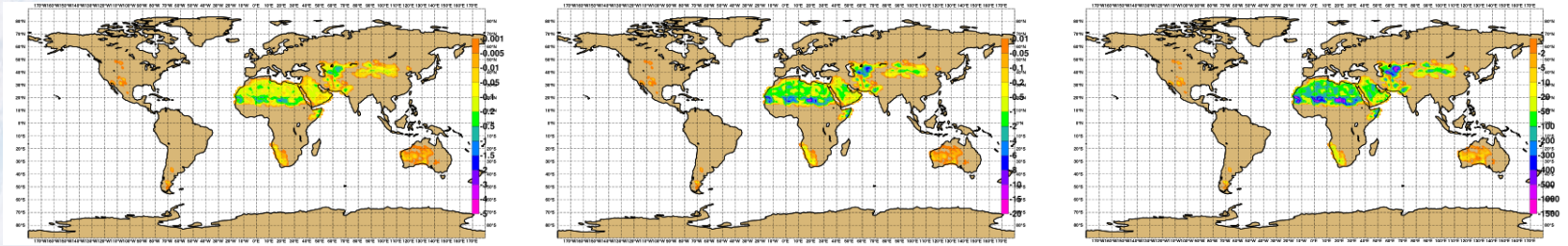
On-going developments

A new dust emission scheme is adapted from Nabat et al. (2012, ACP), which itself uses the work of Zakey et al. (2006, 2008), based on Marticorena and Bergametti (1995).

Old



New



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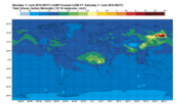
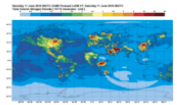


Global for chemical monoxide

This service prov chemical species observations

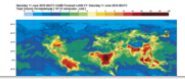
Parameter: Car



Global for chemical dioxide

This service prov chemical species observations

Parameter: Nitr



Global forecasts of assimilated chemical species - formaldehyde

More details

Global forecasts of chemical species - carbon monoxide

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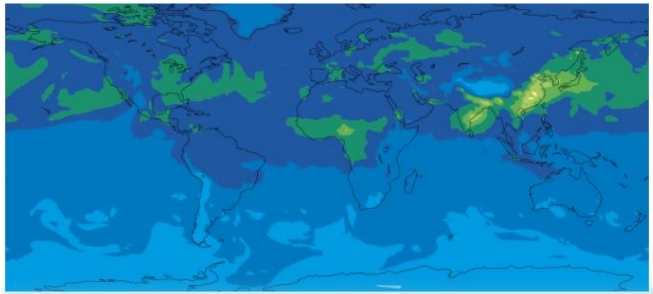

This service provides daily forecasts up to 5 days of chemical species

Theme: Air quality and atmospheric composition
Product family: Global forecasts
Parameter: Carbon monoxide
Geographical area: (-180, 180, -90, 90)
Time coverage:
Metadata: XML

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Using CAMS data

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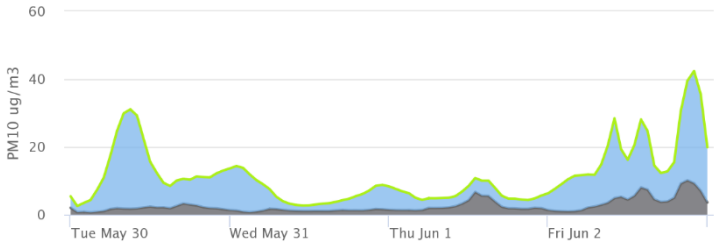
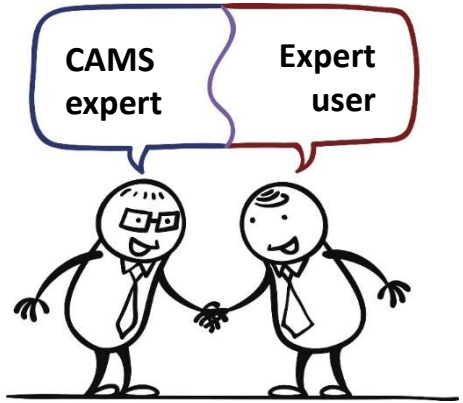


CAMS forecast charts and policy tools



Downstream applications

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To summarize

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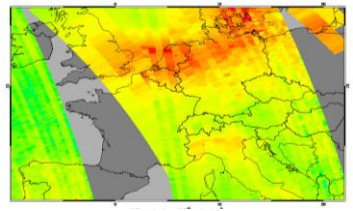
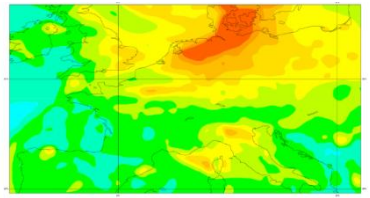
atmosphere.copernicus.eu





User-driven

Free and unrestricted data access

Making observations more meaningful to you

Provide information for past, present and future

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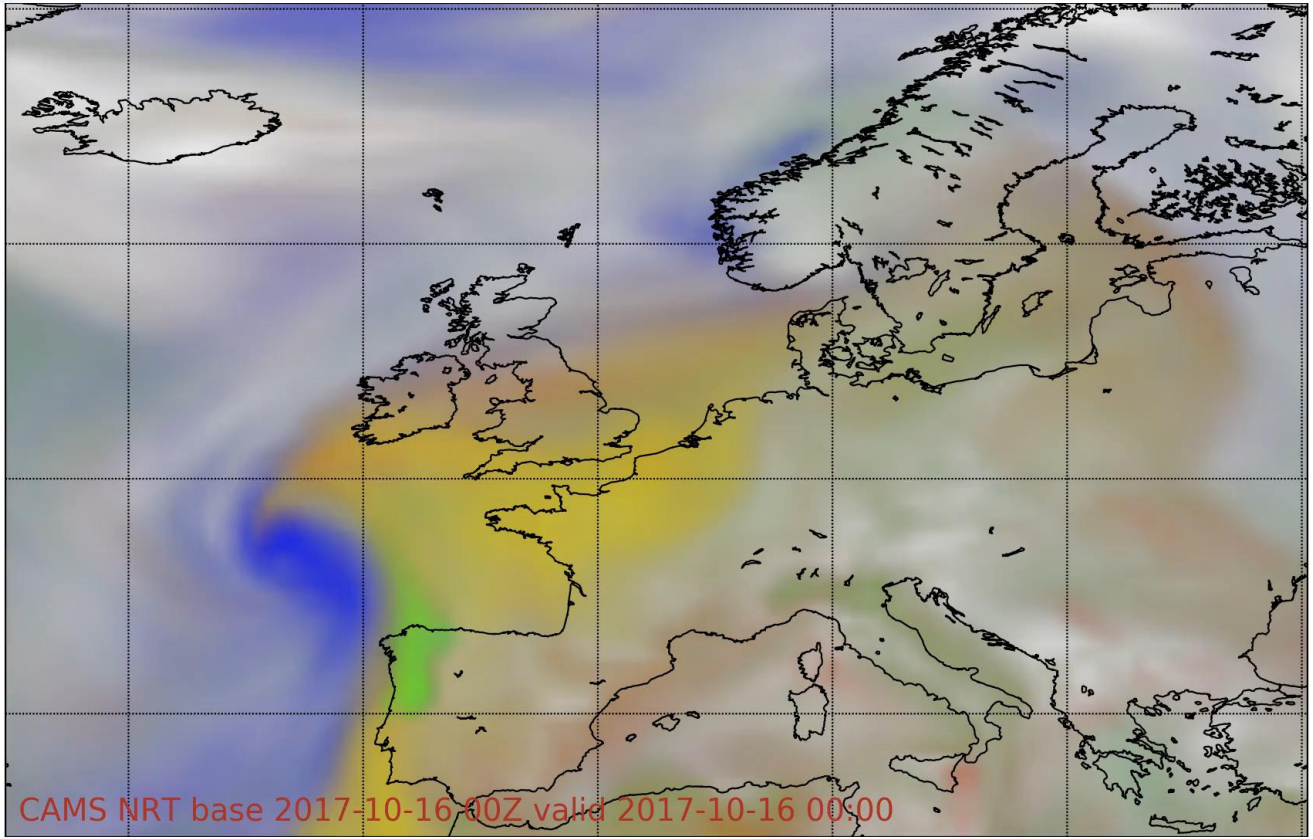
Recent example of dust mixed with smoke



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