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FRANÇAISE

*Liberté  
Égalité  
Fraternité*



*maîtriser le risque  
pour un développement durable*

# The air control toolbox and other CAMS policy products for air quality

Augustin COLETTE, INERIS

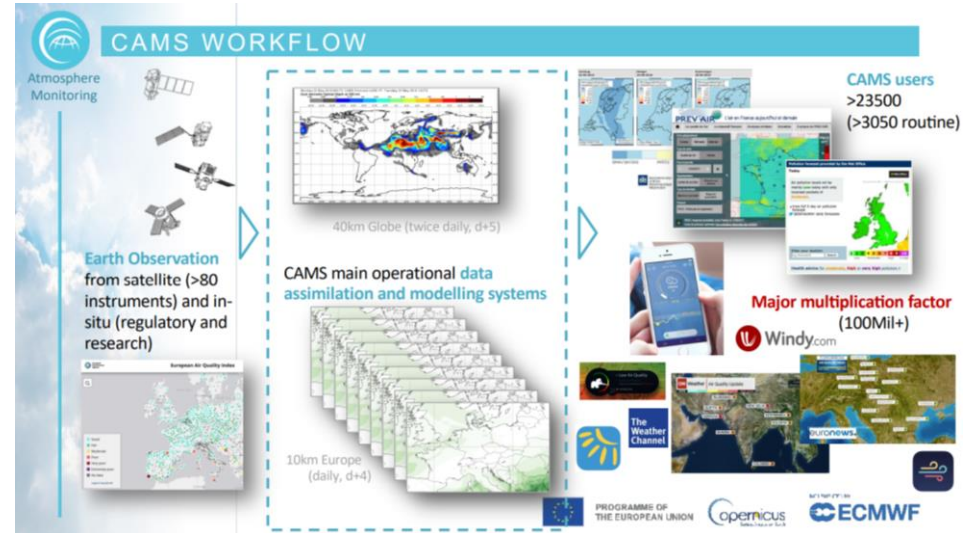
Concawe Symposium, January 10<sup>th</sup>, 2024.

# Copernicus Atmosphere Monitoring Service

The Copernicus Atmosphere Monitoring Service provides time critical, detailed, consistent, quality-controlled full, free and open information on air pollution and health, solar energy, greenhouse gases, and climate forcing anywhere in the world.

Copernicus is the flagship Earth-observation component of EU's space programme. The European Centre for Medium-Range Weather Forecasts (ECMWF) has been entrusted by the European Commission to operate CAMS (and C3S). To achieve this, CAMS relies on a number of contractors.

INERIS is one of those contractors, responsible for the production of European Forecast Production (with Météo-France) and the for the Policy Service (with Met Norway, NILU, and TNO).



# policy.atmosphere.copernicus.eu

The one-stop shop for public and free access to:

- Annual reports on the state of air quality
- Detailed analysis of major air pollution episodes in Europe
- Policy tools to better understand the drivers of air pollution
- Forecasts updated on a daily basis and relying on state of the art numerical models

Visit our website!

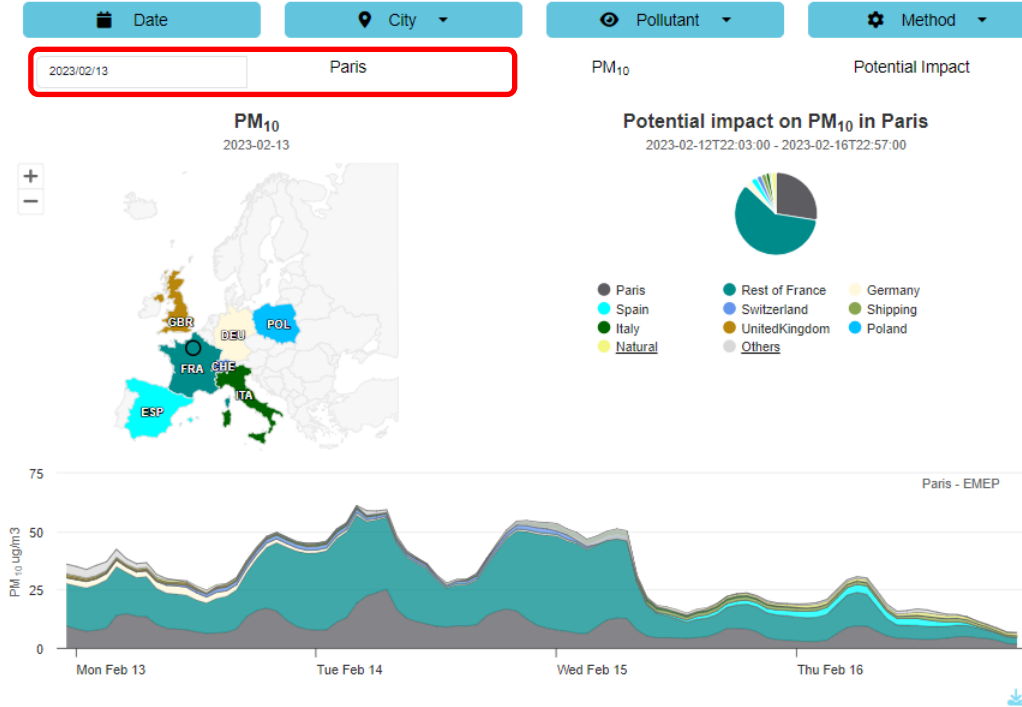


The screenshot shows the 'CAMS Policy Support' page on the Copernicus website. The header includes the Copernicus logo and navigation links. The main content area features a section titled 'Air pollution at target cities' with a map of Europe and a line graph showing PM10 levels over time. Below this, there is a 'Our services' section with three sub-sections: 'Air Control Toolbox', 'Air Pollution Forecasts', and 'Air Quality Reports', each with a brief description and a 'Data Access' button. The footer contains the Copernicus logo, a search bar, and social media links.

# CAMS Source Apportionment Tools

An interactive visit on the [CAMS Policy Products website](#)

# Selected examples for Particulate Matter



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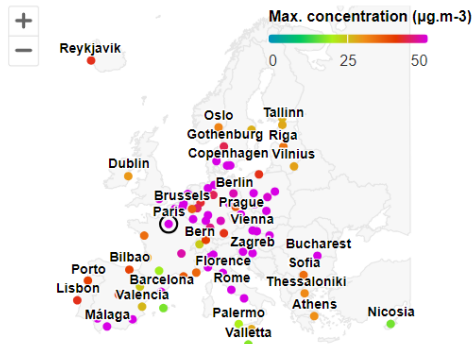
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Date: 2023/02/13 City: Paris Pollutant: PM<sub>10</sub> Model: EMEP

## PM<sub>10</sub> Daily Max.

2023-02-13 (EMEP)

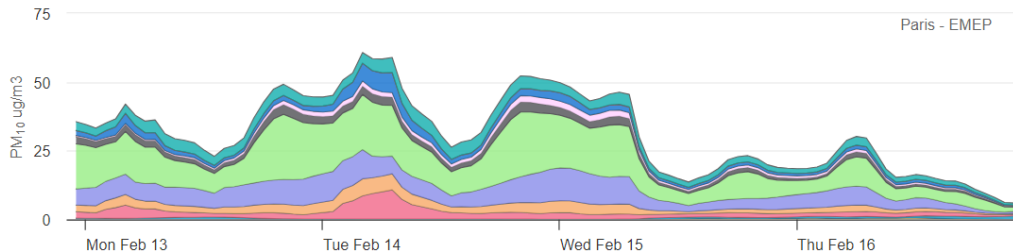


## Chem. spec. of PM<sub>10</sub> in Paris

2023-02-12T22:03:00 - 2023-02-16T22:57:00



- DUST
- NH4
- EC
- FFIRE
- SEASALT
- NO3
- SO4
- SOA
- POM
- PMw
- RESTPPM



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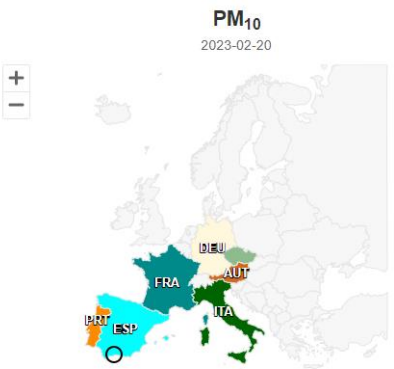
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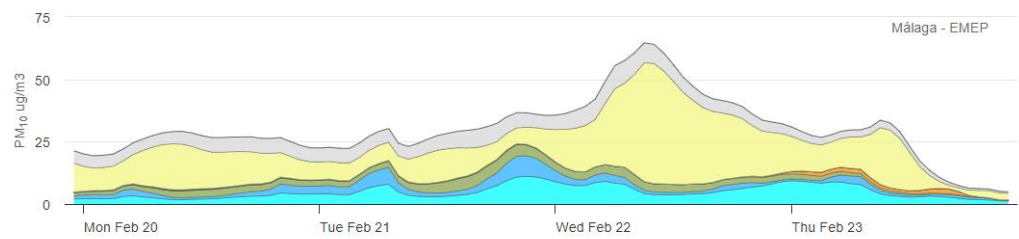
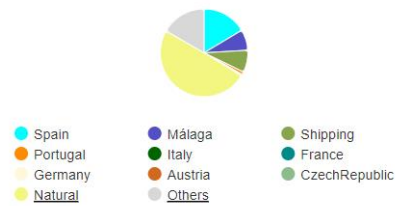
### FAQ

Date: 2023/02/20 City: Málaga Pollutant: PM<sub>10</sub> Method: Potential Impact



### Potential impact on PM<sub>10</sub> in Málaga

2023-02-19T22:03:00 - 2023-02-23T22:57:00



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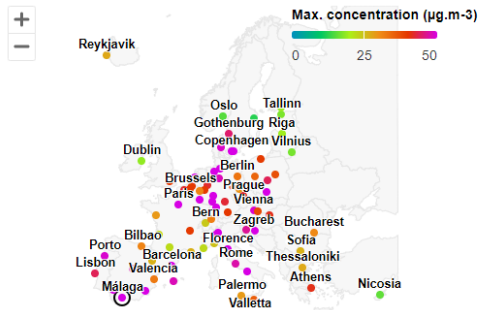
#### FAQ



Date: 2023/02/20 City: Málaga Pollutant: PM<sub>10</sub> Model: EMEP

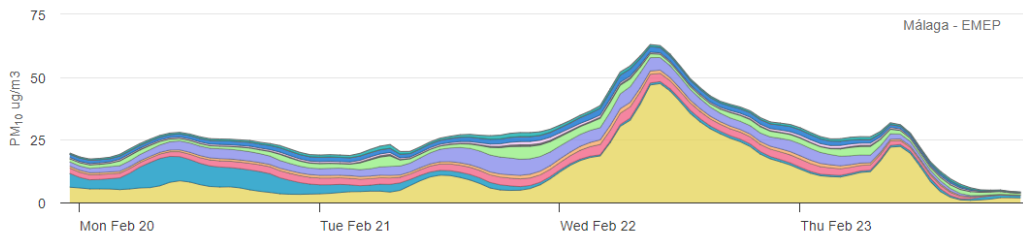
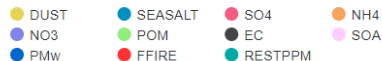
## PM<sub>10</sub> Daily Max.

2023-02-20 (EMEP)



## Chem. spec. of PM<sub>10</sub> in Málaga

2023-02-19T22:03:00 - 2023-02-23T22:57:00



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Year ▾

City ▾

Pollutant ▾

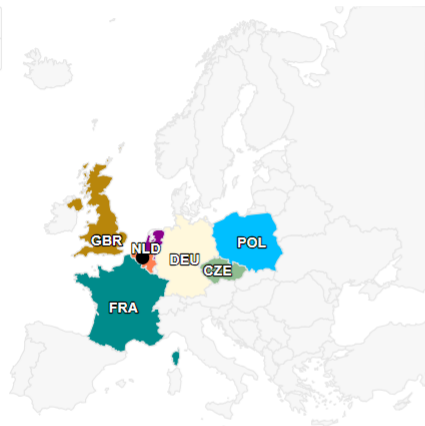
Method ▾

2022

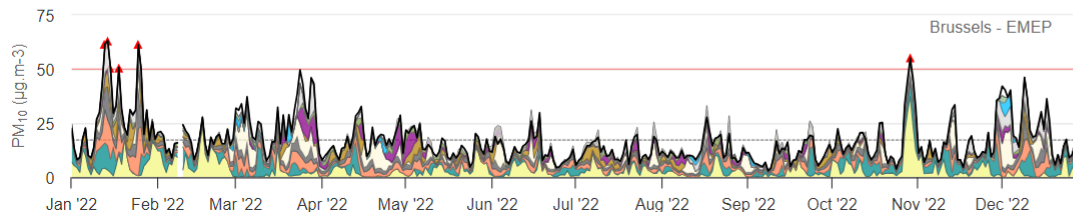
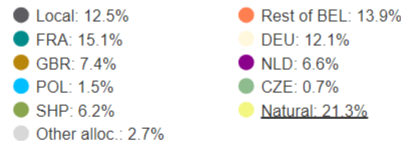
Brussels

PM10

Potential Impact



Sat Jan 01 2022 - Sat Dec 31 2022



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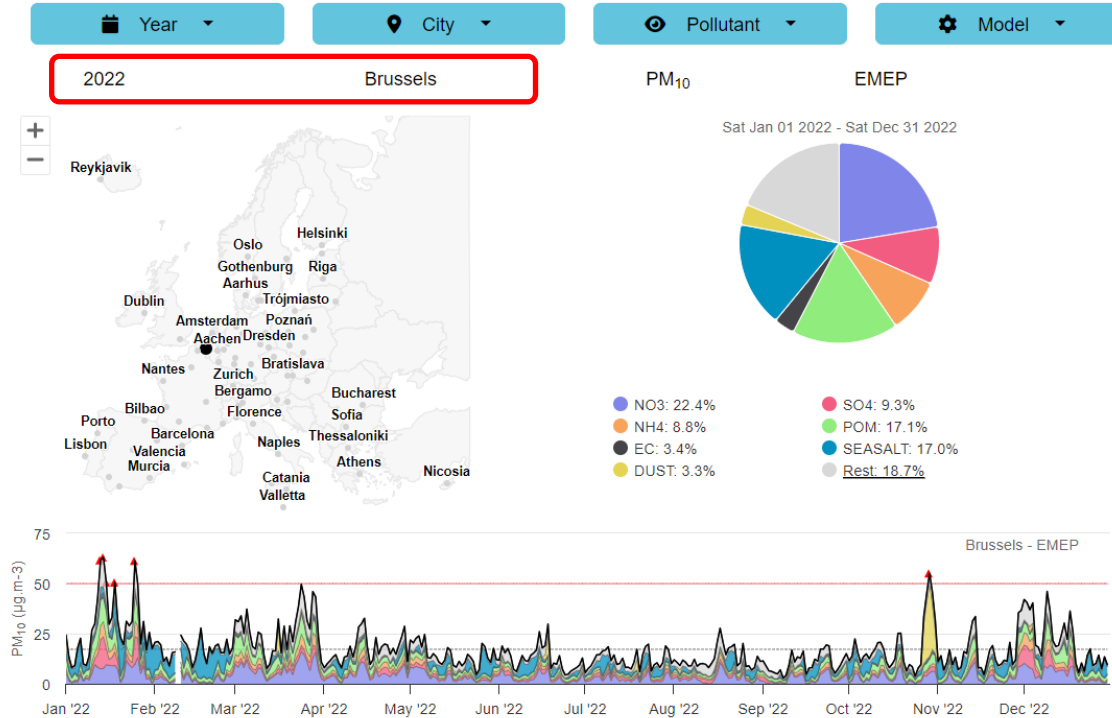
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# Focus on Ozone

**NO<sub>2</sub>**

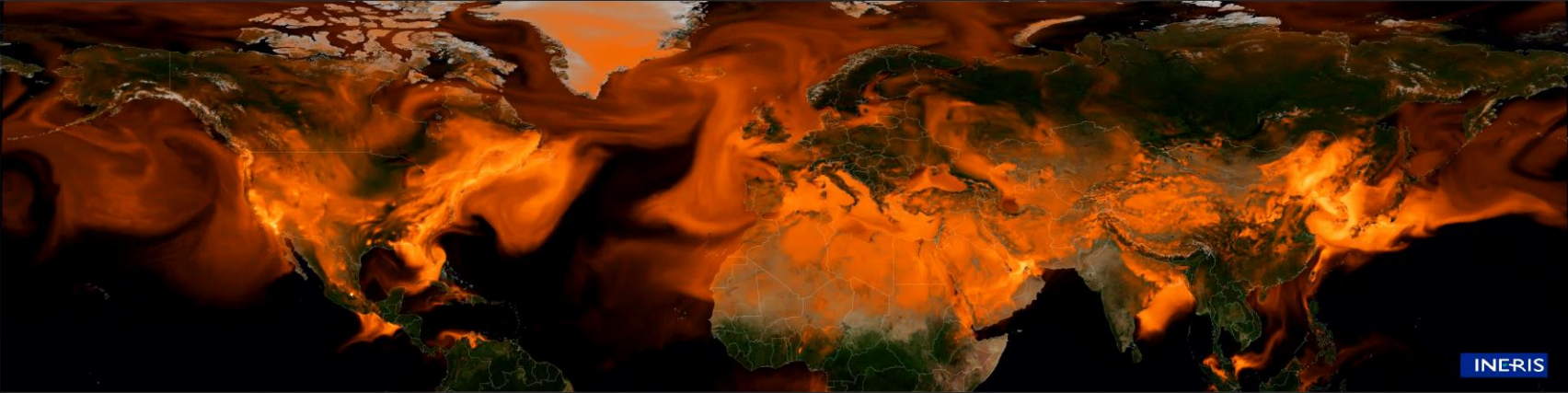
NO2 20140102 00 UT



INERIS

# Ozone

O3 20140702 00 UT



[Read More](#)

[Air pollution scenarios](#)

[Forecasts at target cities](#)

Pollutant

O3 (daily max)

Forecast Base Time

2023-07-10

Valid Time

2023-07-10

- Total concentration
- Anthropogenic fraction

- Concentration  Absolute difference  Relative difference

**Design your emission scenario**  
(uniform reduction)

Traffic

reduction: 0%      reduction: 100%

Industry

reduction: 0%      reduction: 100%

Residential

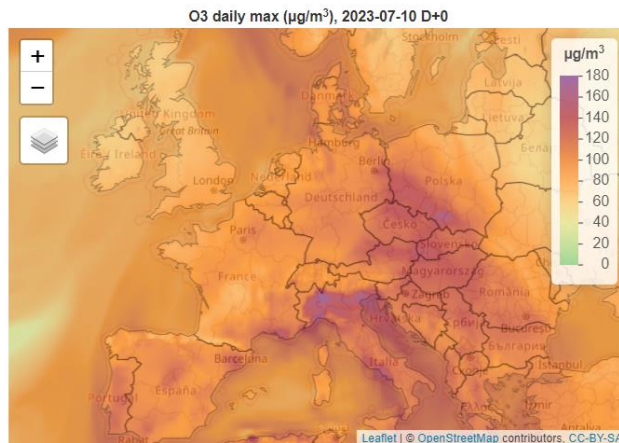
reduction: 0%      reduction: 100%

Agriculture

reduction: 0%      reduction: 100%

Shipping

reduction: 0%      reduction: 100%



O3 (daily max) reference concentration map, including all european and hemispheric anthropogenic sources as well as natural emissions .

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Pollutant:   
 Forecast Base Time:   
 Valid Time:

Total concentration  
 Anthropogenic fraction

Concentration  
 Absolute difference  
 Relative difference

**Design your emission scenario (uniform reduction)**

**Traffic**  
 reduction: 0%  reduction: 100%

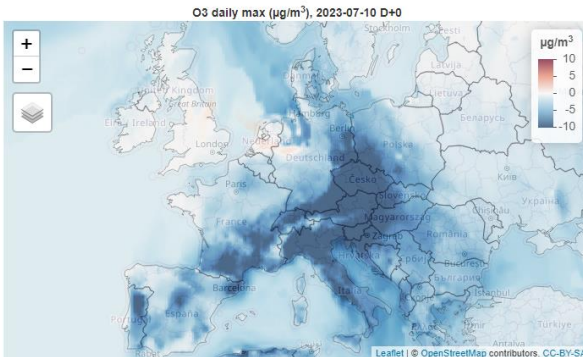
**Industry**  
 reduction: 0%  reduction: 100%

**Residential**  
 reduction: 0%  reduction: 100%

**Agriculture**  
 reduction: 0%  reduction: 100%

**Shipping**  
 reduction: 0%  reduction: 100%

**Other sectors**  
 reduction: 0%  reduction: 100%



O3 (daily max) map including the main anthropogenic sources (agriculture, industry, traffic, residential heating, shipping and other) with an Europe-wide uniform emission reduction of: agriculture: 0 % ; traffic: 50 % ; residential: 0 % ; industry: 0 % ; shipping: 0 % ; other: 0 % . The natural emissions (such as dust or sea salt) as well as other hemispheric sources are excluded.

**-50% Road Traffic**

# Air Control Toolbox

[Air pollution scenarios](#)

[Forecasts at target cities](#)

Pollutant:   
 Forecast Base Time:   
 Valid Time:

Total concentration  
 Anthropogenic fraction

Concentration  
 Absolute difference  
 Relative difference

**Design your emission scenario (uniform reduction)**

**Traffic**  
 reduction: 0%  reduction: 100%

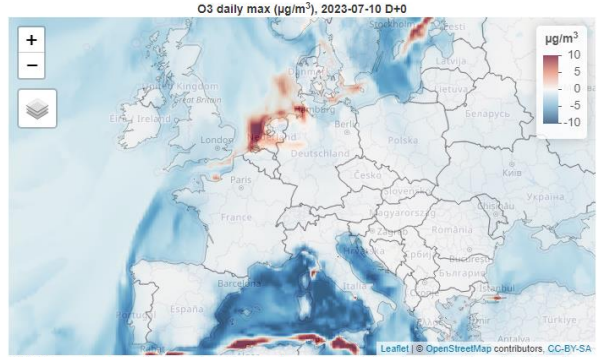
**Industry**  
 reduction: 0%  reduction: 100%

**Residential**  
 reduction: 0%  reduction: 100%

**Agriculture**  
 reduction: 0%  reduction: 100%

**Shipping**  
 reduction: 0%  reduction: 100%

**Other sectors**  
 reduction: 0%  reduction: 100%

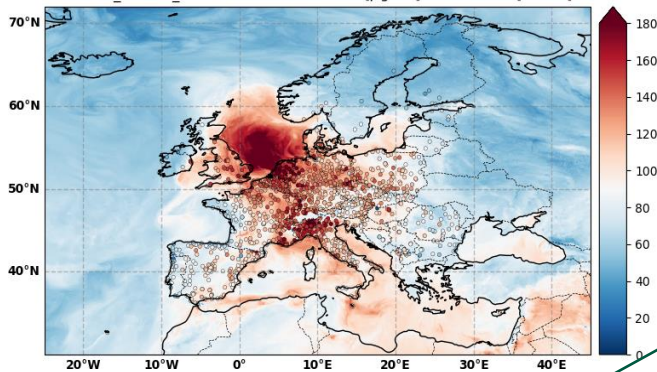


O3 (daily max) map including the main anthropogenic sources (agriculture, industry, traffic, residential heating, shipping and other) with an Europe-wide uniform emission reduction of: agriculture: 0 % ; traffic: 0 % ; residential: 0 % ; industry: 0 % ; shipping: 50 % ; other: 0 % . The natural emissions (such as dust or sea salt) as well as other hemispheric sources are excluded.

**-50% Shipping**

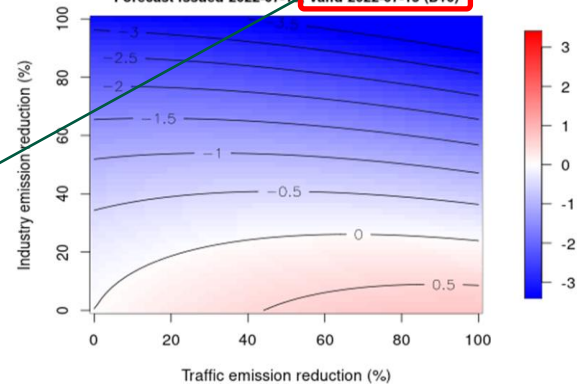


CAMS2\_40 ENS\_FC vs OBS: surface ozone [ $\mu\text{g}/\text{m}^3$ ]: 2022-07-19 [17UTC]

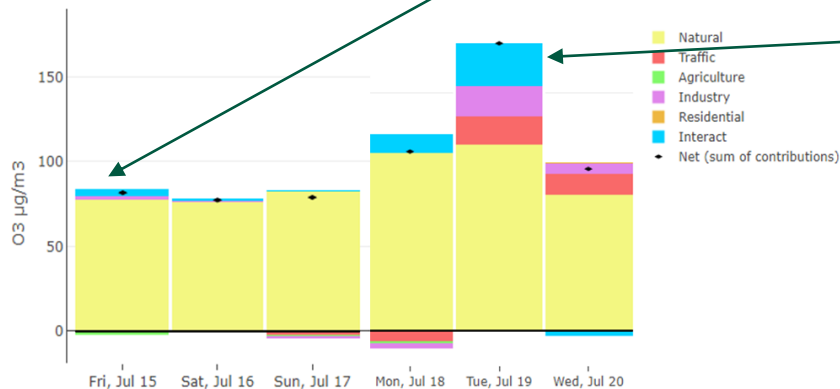


# Ozone Episode

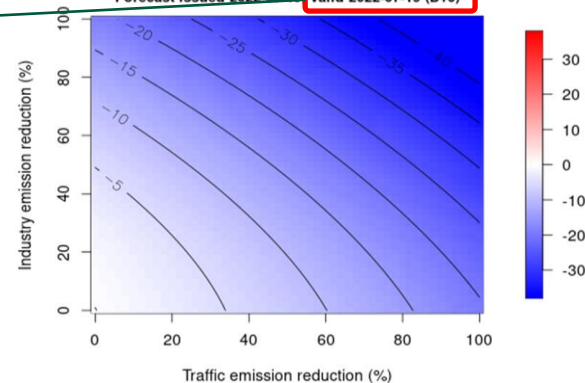
Chemical regime for daily max O3 concentrations in Amsterdam ( $\mu\text{g}/\text{m}^3$ )  
Forecast issued 2022-07-15 valid 2022-07-15 (D+0)



## Amsterdam, July 2022



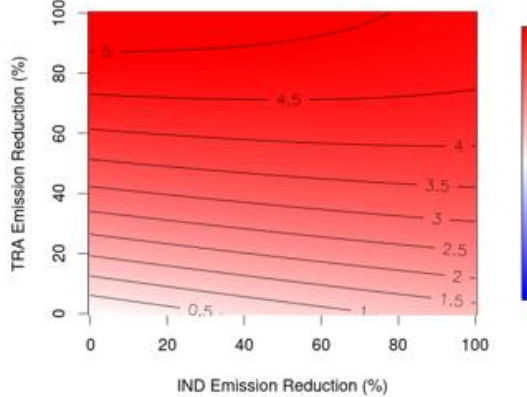
Chemical regime for daily max O3 concentrations in Amsterdam ( $\mu\text{g}/\text{m}^3$ )  
Forecast issued 2022-07-19 valid 2022-07-19 (D+0)



INERIS study, supported by Concawe  
To appear in Atmos. Env.

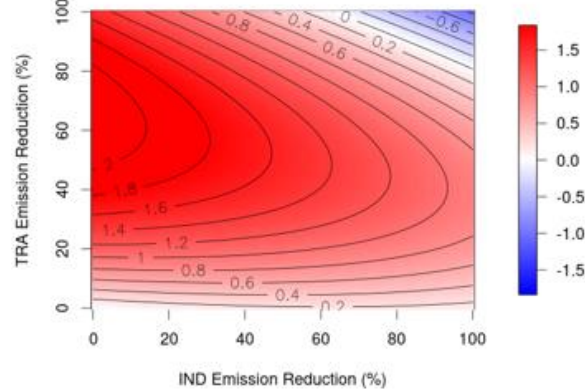
## Annual max average – 2019

Paris O3max annual avg 2019 (%) : Scenario - REF



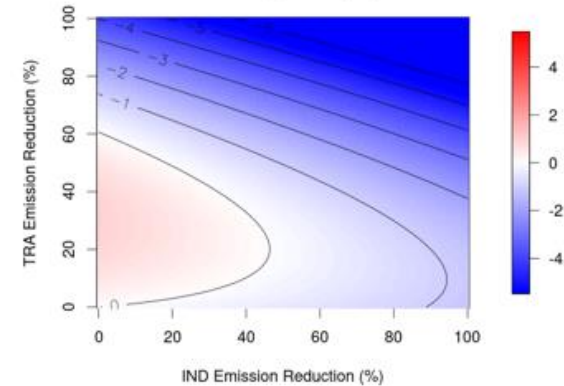
## SOMO35 – 2019

Paris SOMO35 2019 (%) : Scenario - REF



## Summer max average – 2019

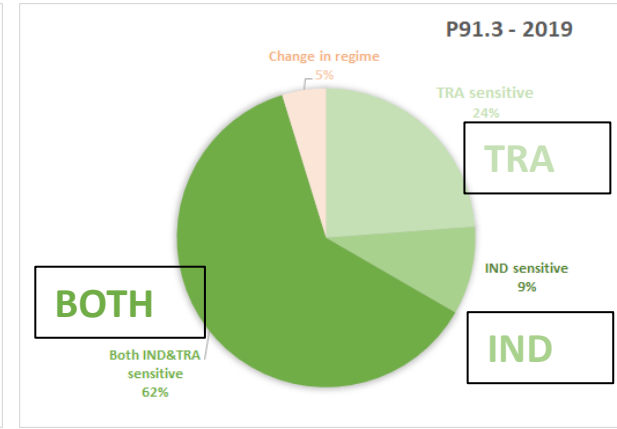
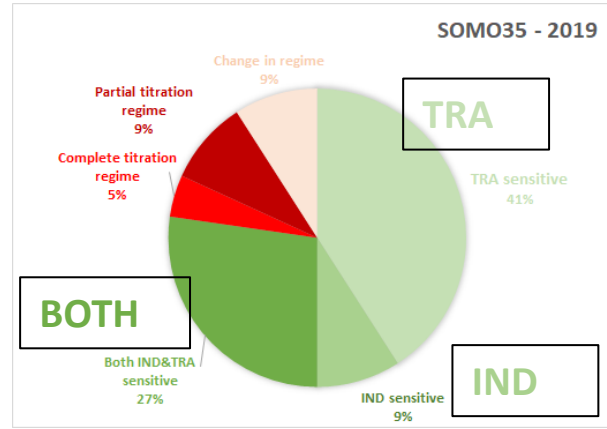
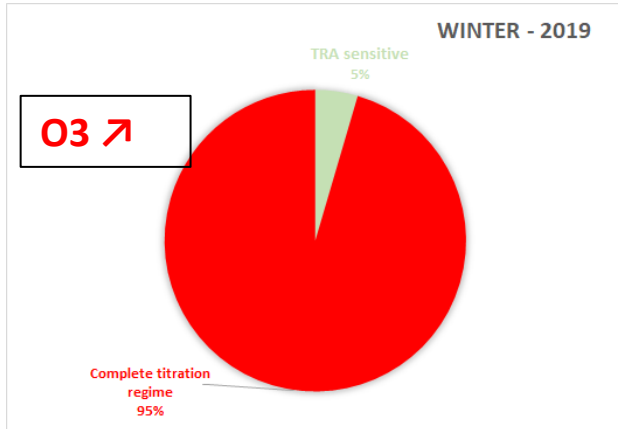
Paris summer O3max avg 2019 (%) : Scenario - REF



The response depends on the day, the location, and the ozone indicator

But overall, reducing Traffic/Industrial emissions mitigates more efficiently the peak than background ozone

INERIS study, supported by Concawe  
To appear in Atmos. Env.



The response depends on the day, the location, and the ozone indicator

But overall, reducing Traffic/Industrial emissions mitigates more efficiently the peak than background ozone

# Conclusion

A variety of modelled source apportionment diagnostics have been developed recently

Some of them are produced on a daily basis in operational forecast systems (CAMS)

These diagnostics can be used :

- To guide the interpretation of air pollutions episodes
- To design efficient mitigation policies
- To help improving the numerical models

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Data About us What we do

## CAMS Policy Support

Air pollution at target cities  
4-day forecast (08:00-19:00)

PM10 PM2.5 AQI

Paris

Max. temperature 18°C

100% 100% 100%

PM10 PM2.5 AQI

Our services

CAMS policy support provides a number of products and results that aim at supporting decision and policy making in the management of air pollution episodes and reporting under European Directives. Policy services are based on the air quality regional services (ARs) to national urban case products (describing the evolution of air quality in Europe and the relevance of the main anthropogenic sources, helping in designing appropriate and efficient policy responses to episode situations).

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