

CAMS policy service

QA-QC of source receptor “allocation” products

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Atmosphere Monitoring

INERIS

 Norwegian
Meteorological
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TNO innovation
for life

 Copernicus
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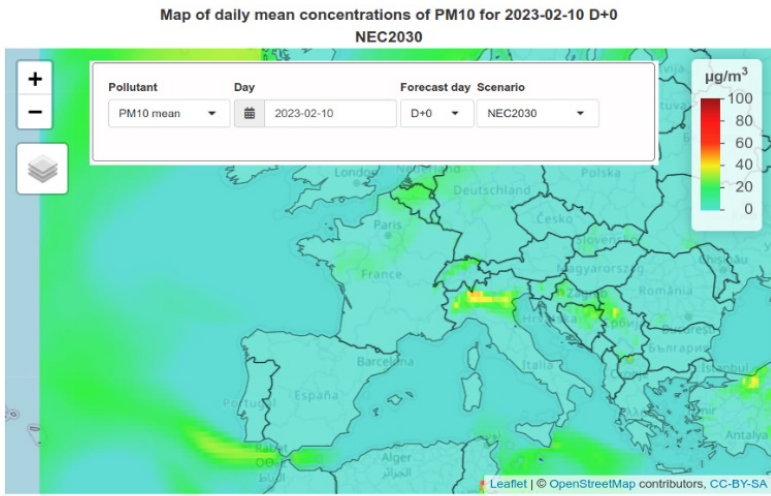
 European
Commission



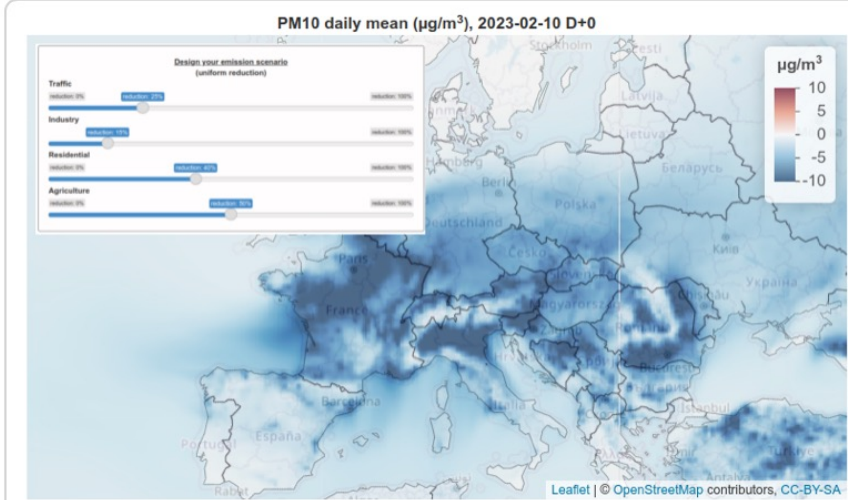


<https://policy.atmosphere.copernicus.eu>

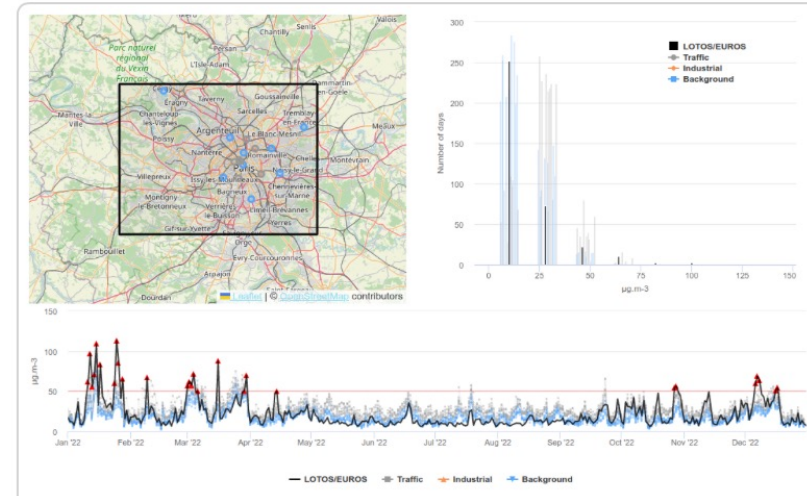
Website is renewed !!



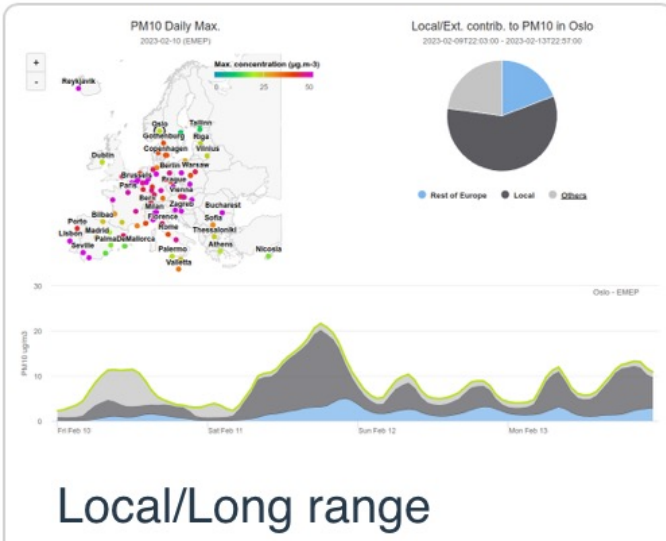
Policy scenarios



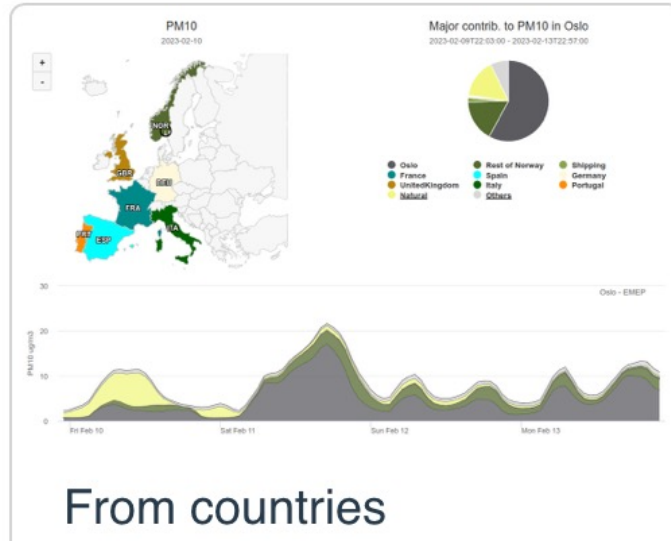
Air Control Toolbox



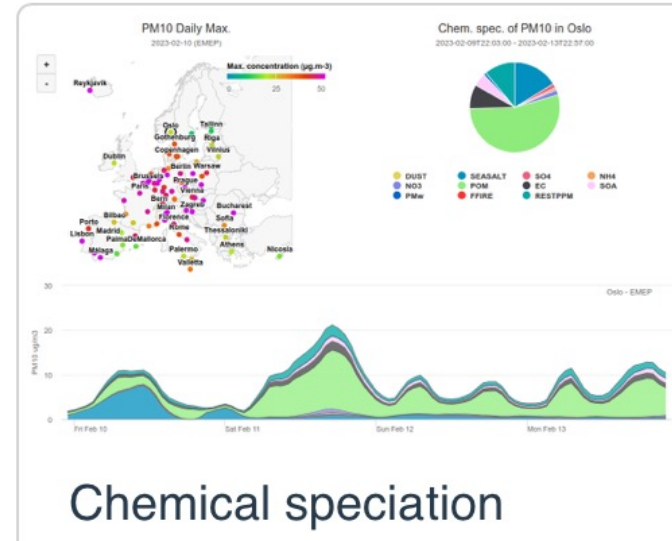
Annual Statistics



Local/Long range



From countries



Chemical speciation





New features since 2023 for CAMS policy products and website

- Receptors: More areas for which SA products are available (80 European cities)
- Sources: 31 countries, shipping, boundary conditions, fires, 4 sectors, natural
- Updated model versions and emissions, now consistent with CAMS regional model ensemble
- More intuitive, interactive guidance, hover context help, quicker load, cookies
- Fairmode terminology (*attempted*)
- Frequently asked question (FAQ) section for all products
- EEA Observations integrated for PM10 since 2019
Since 2022: traffic, industry, background categorization
«Delayed» near real time for local/long-range forecast





FAQ section on new website

Source Allocation/Contributions

This section is dedicated to the questions related to the Source Allocation/Contributions results

What is the purpose of the air pollution forecasts and the associated source allocation information?

How well do models compare with observations?

What are the differences between EMEP and LOTOS-EUROS models?

How can you attribute pollutants to different countries?

What is the difference between allocation, attribution and apportionment?

How reliable are the country attribution results?

Why does the sum of the contributions not always sum up to the total concentration?

What does contribution from *Others* and *Natural* in the different plots represent?

How are contributions from wildfires computed?

How much pollution is coming from intercontinental transport?

How are the city areas defined?

What is the resolution of the models used?

Are the results representative for urban locations?

What are the initial conditions for a given forecast? Are emissions from previous days considered?

Air Control Toolbox

This section is dedicated to the questions related to the Air Control Toolbox

What is the purpose of the ACT model?

Do the forecasts in the ACT tool compute the change in concentrations if we would mitigate as of today emissions?

In the *Air pollution scenarios* tab, how are the “*Total concentration*” and the “*Anthropic contribution*” obtained?

How is the relative difference calculated if I select “*Anthropogenic contribution alone*” in the *Air pollution scenarios* tab?

In the *Country scenario* tab, what are the two emission scenario menus “*Over Europe*” and “*Over Country*” and how are they applied to ACT ?

How are different contributions calculated in the *Sector allocation* tab?

What do the graphs in the *Chemical regimes* tab represent and how are they obtained?

Reports

This section is dedicated to the the questions related to the reports

When are published the Episode Reports?

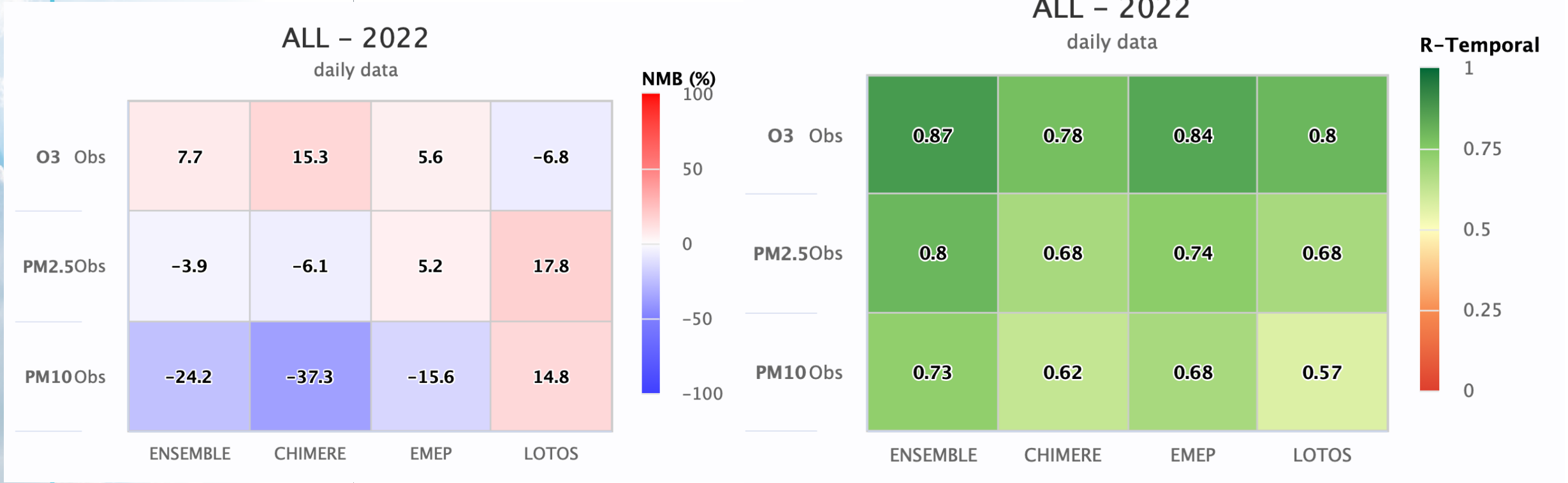
What is the purpose of three different annual reports ASRR, IAR, and AAR?



Atmosphere
Monitoring

QA / QC for CAMS policy products **Total concentrations**

Total concentration evaluation - bias and temporal correlation at non-urban sites for three CAMS policy models, year 2022



See M. Gauss on CAMS2-83 project, next session



QA / QC for CAMS policy products **CHEMICAL SPECIATION**

Atmosphere
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CAMS61 evaluation 2018 at non-urban sites

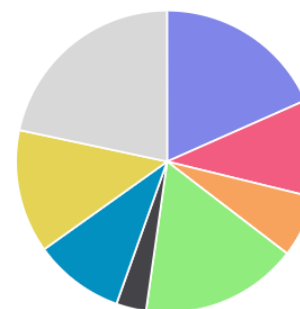
WORLD - All

		CHIMERE	EMEP-hmixKz	LOTOSEUROS
SO4	EBAS-d	-5.0	-29.6	-27.7
tNO3	EBAS-d	-9.7	-13.4	17.8
tNH	EBAS-d	-4.0	-12.7	-3.1
SS_PM10	EBAS-d	4.9	-12.2	96.3
EC_PM25	EBAS-d	17.8	13.4	80.5
OC_PM25	EBAS-d	-84.6	-32.7	13.4

NMB (%)

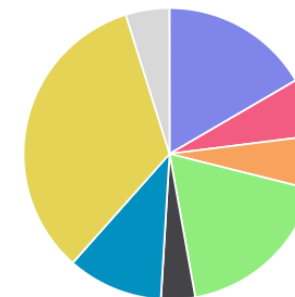
Example SA product 2022 for Rome EMEP

Sat Jan 01 2022 - Sat Dec 31 2022



- NO3: 18.4%
- SO4: 10.5%
- NH4: 6.6%
- POM: 16.8%
- EC: 3.2%
- SEASALT: 9.7%
- DUST: 13.2%
- Rest: 21.6%

Sat Jan 01 2022 - Sat Dec 31 2022

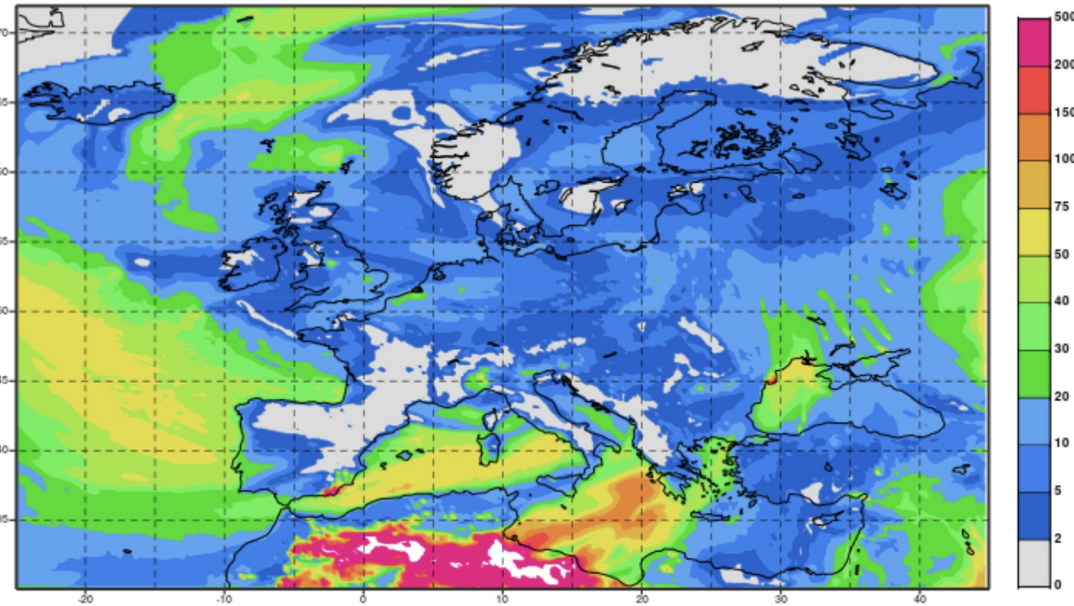


- NO3: 16.6%
- SO4: 6.4%
- NH4: 5.9%
- POM: 18.3%
- EC: 3.8%
- SEASALT: 10.6%
- DUST: 33.6%
- Rest: 4.8%

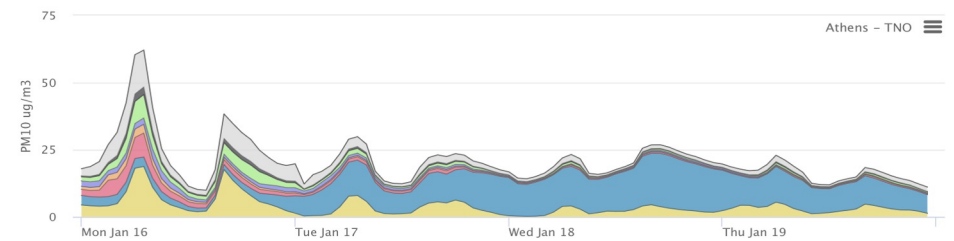
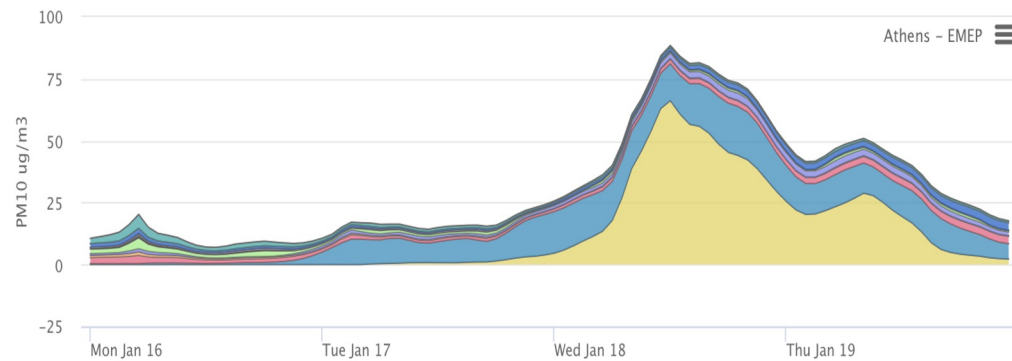
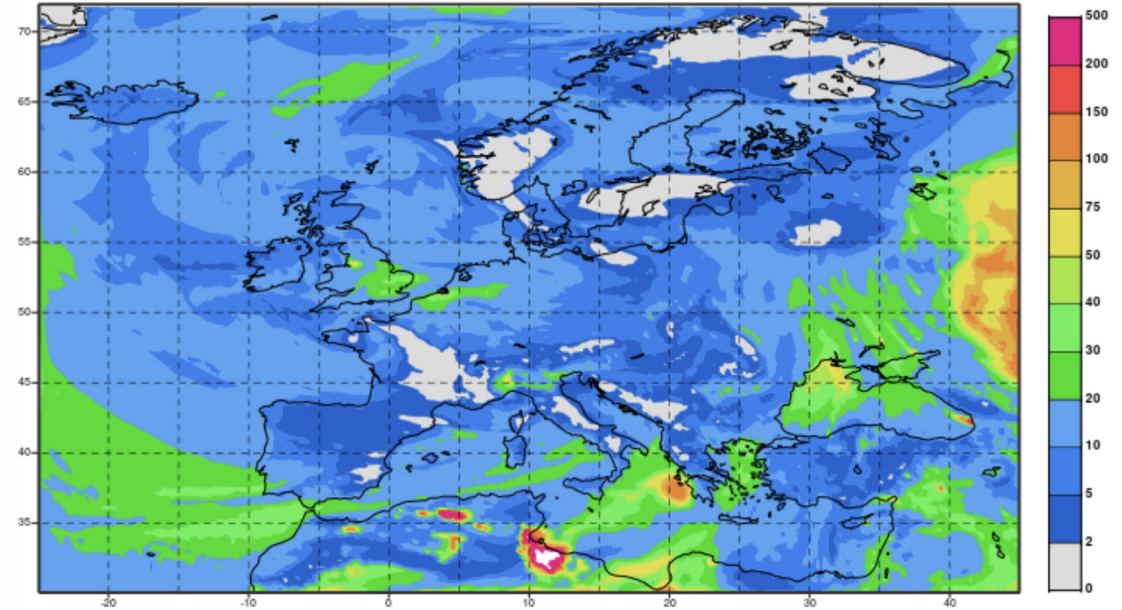


Other bias than SR methodology (see also Session on Dust exceedances Friday)

Monday 16 January 2023 00UTC CAMS Forecast t+036 VT: Tuesday 17 January 2023 12UTC
Model: EMEP Height level: Surface Parameter: PM10 Aerosol [$\mu\text{g}/\text{m}^3$]



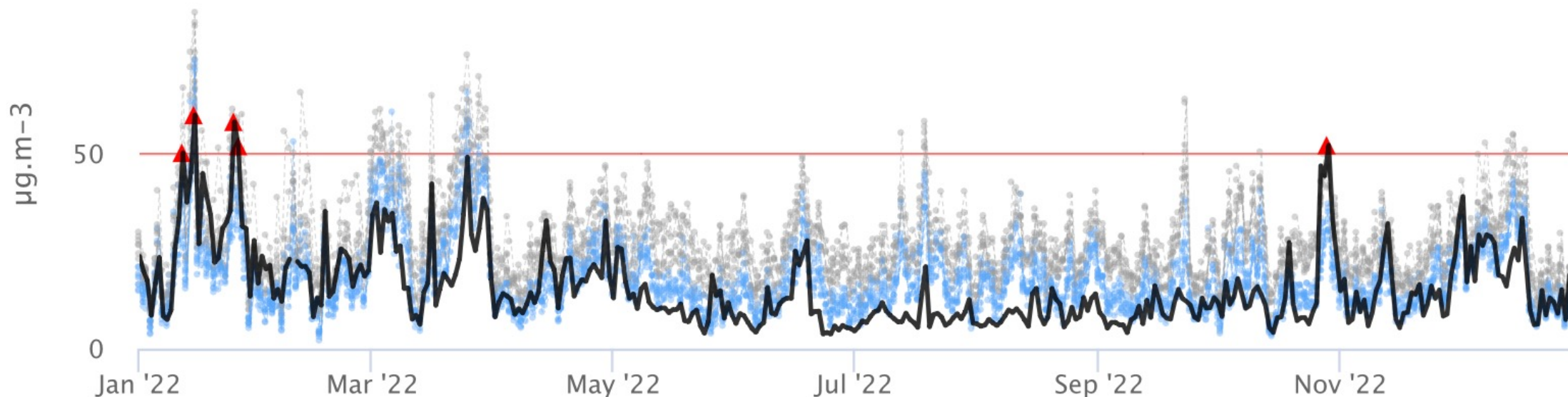
Monday 16 January 2023 00UTC CAMS Forecast t+036 VT: Tuesday 17 January 2023 12UTC
Model: LOTOS-EUROS Height level: Surface Parameter: PM10 Aerosol [$\mu\text{g}/\text{m}^3$]





QA / QC for CAMS policy products **Local versus Long Range Fraction**

Example: Annual time series of EMEP forecast 2022 against measurements in Paris SA receptor city area



— EMEP ■ Traffic ★ Industrial ◆ Background

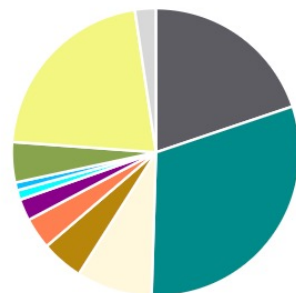
Station types for measurements



Example SA products 2022 for Paris

EMEP

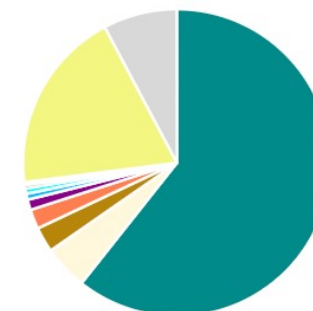
Sat Jan 01 2022 – Sat Dec 31 2022



- Local: 19.8%
- Rest of FRA: 30.6%
- DEU: 8.5%
- GBR: 4.7%
- BEL: 3.5%
- NLD: 2.4%
- ESP: 1.1%
- POL: 0.9%
- SHP: 4.5%
- Natural: 21.5%
- Other alloc.: 2.3%

Lotos-Euros

Sat Jan 01 2022 – Sat Dec 31 2022



- FRA: 60.7%
- DEU: 4.7%
- GBR: 2.7%
- BEL: 2.0%
- NLD: 1.1%
- POL: 0.6%
- ESP: 0.6%
- CZE: 0.4%
- ITA: 0.3%
- Natural: 19.2%
- Other contr.: 7.8%



Sources of uncertainty for SA allocation products

- Model specifics (resolution, natural emissions within domain, chemistry and transport and removal «physics»)
- Fire emission data are one day «old» in forecasts
- Local contribution is underestimated and variable within a city area
- Source Allocation method: More important differences between models appear for chemical species affected by non-linear chemistry (NH_4NO_3 , Ozone)
- Temporal variability of plumes, meteorology and chemical state (annual SA is more certain than daily SA)



Atmosphere
Monitoring

Outlook – Research in 2 EU projects



PMF (Weber et al, 2021)	AA (nmol.min ⁻¹ .µg ⁻¹)	DTT	PSAT
Biomass burning	0.17	0.13	Residential combustion (S2) + waste management (S9) - primary species
Primary traffic	0.14	0.21	Energy production (S1) + industrial comb. (S3) + road transport (S7) + other transports (S8) - primary species
Dust	0.01	0.11	Prod. Processes (S4) + agriculture (S10) + dust (model) - primary species
Primary Biogenic	0.02	0.13	-- not in CHIMERE yet ---
Aged sea salt	0.01	0.04	Sea salt (model) + other transports (S8) - primary + secondary
Nitrate rich	0.01	0.04	Road transport (S7) + agriculture (S10) + 40% NO ₃ ⁻ (model) - secondary
Sulfate rich	0.01	0.09	Energy prod. (S1)+ Residential comb. (S2) + Indus. Comb. (S3) + Prod proc. (S4) waste management (S9) traitement des déchets - secondary
MSA rich	0.02	0.12	--- not used ---

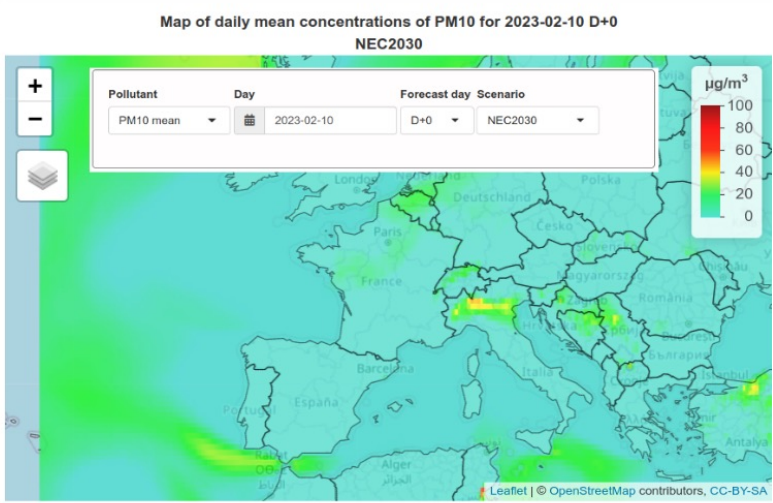
Aim: Quantify uncertainty in multiple (regional) **CAMS Policy Products & global forecasts**

Develop and apply different methods to quantify and provide guidance for using uncertainty information for the policy products, targeting different uncertainties separately (non-linearities/methodology, city definition, resolution, source attribution)

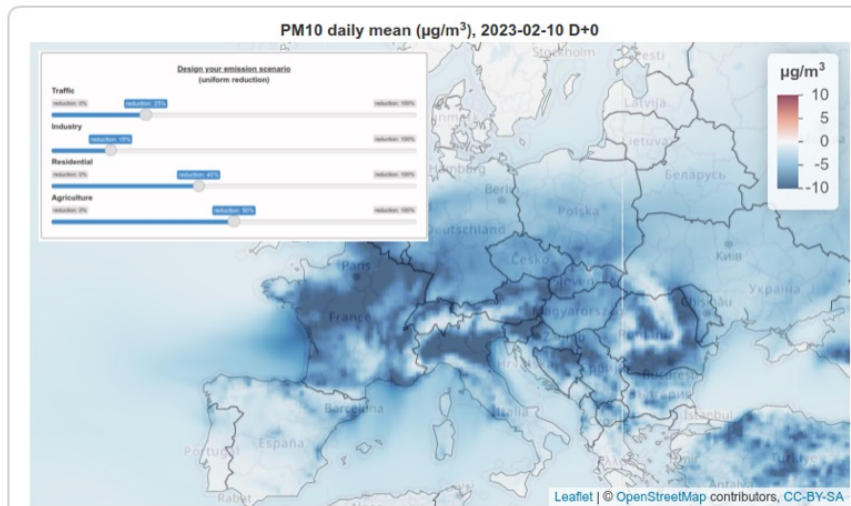


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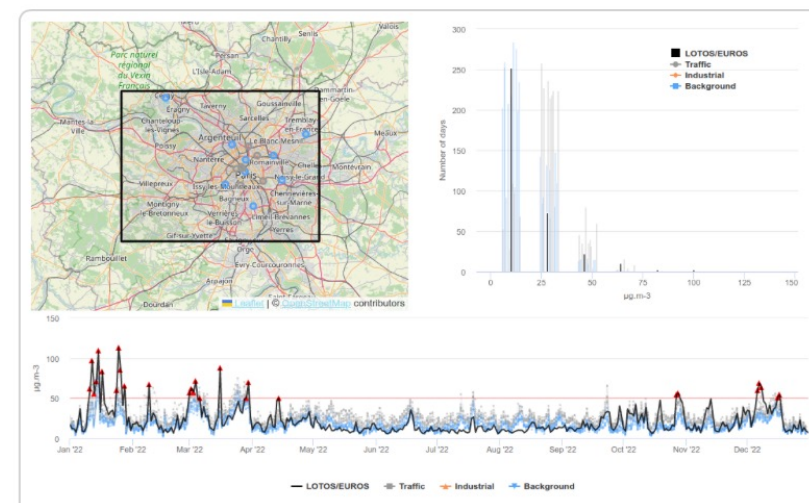
Thanks for attention



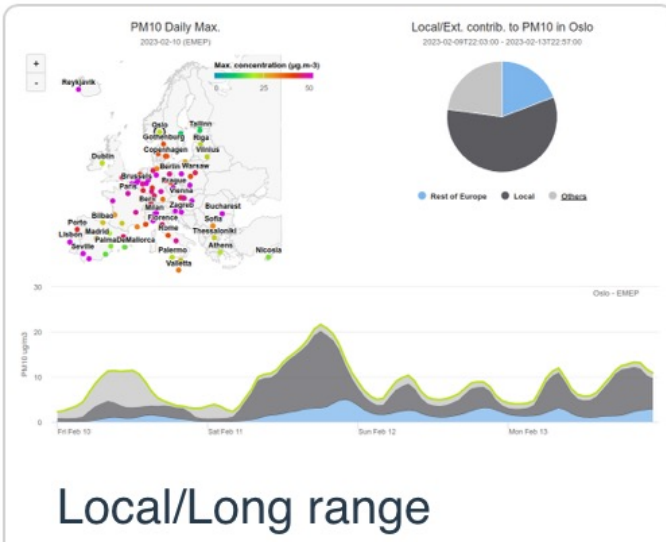
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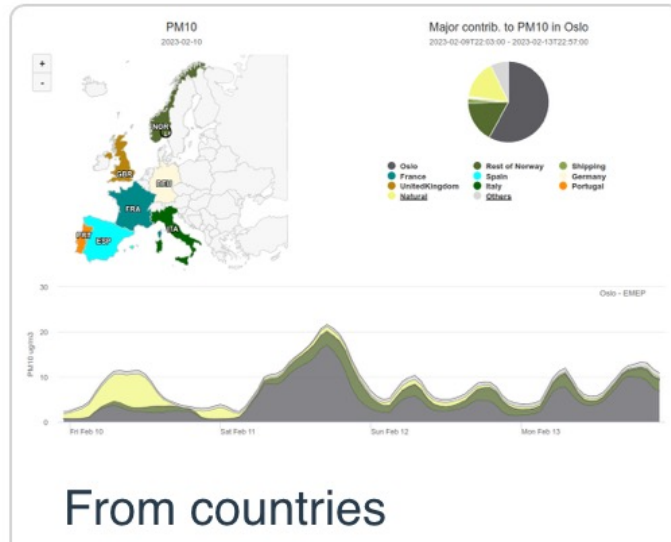
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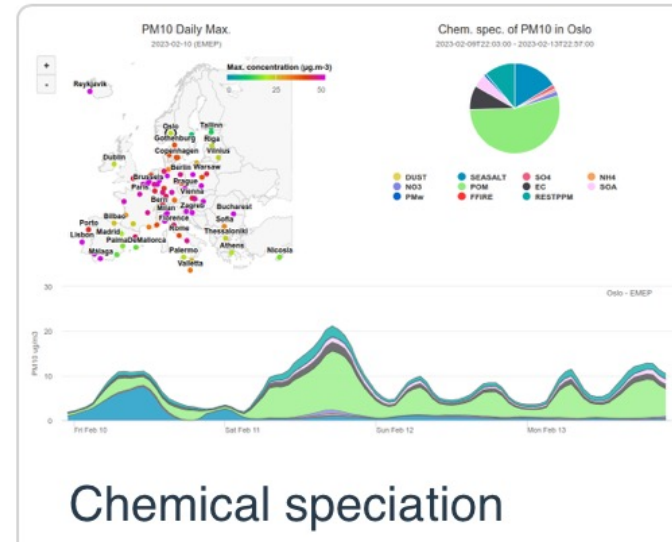
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