



Atmosphere Monitoring

QA/QC of assessment of CAMS policy products: CAMS European Reanalyses

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Fairmode - 3rd March 2023 Frédérk.meleux@ineris.fr





CAMS assessment reports

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Interim Annual Assessment Report
for 2021

European air quality in 2021



Annual air quality assessment report 2020

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Every year, CAMS publishes two air quality assessment reports:

- 1) Interim report describing the status of air quality of the year before
- 2) Annual report focusing on the air quality of the year Y-2

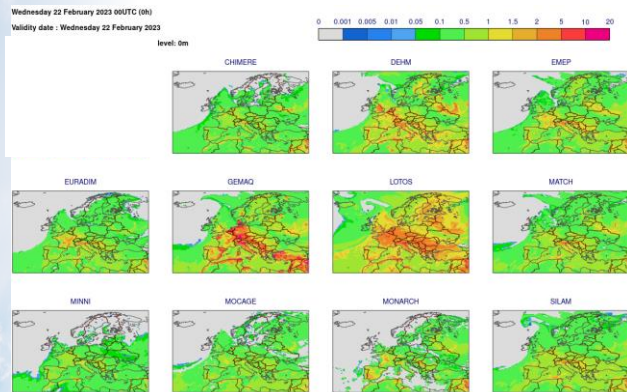
https://policy.atmosphere.copernicus.eu/aa_reports.php





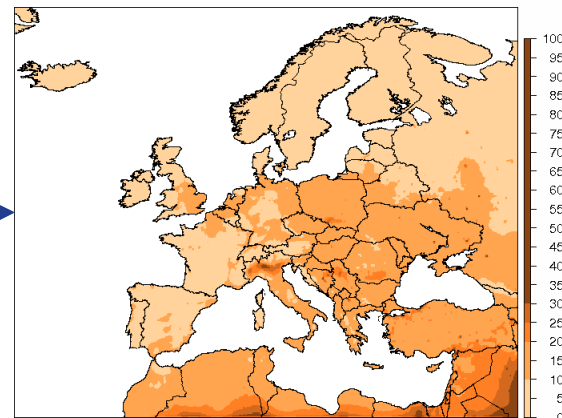
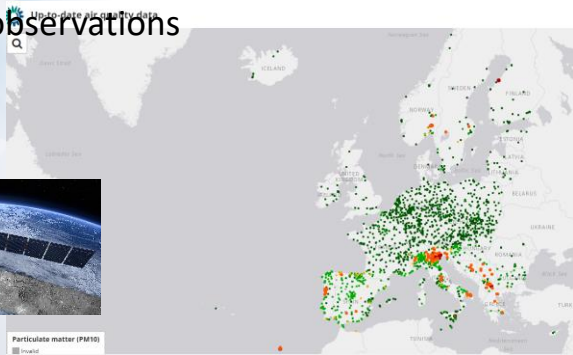
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CAMS regional models

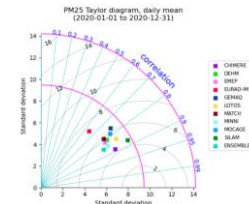
Up-to-date or validated in-situ background
observations



Ensemble reanalyse
hourly concentrations

~2/3 of stations

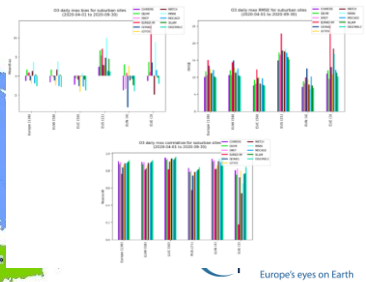
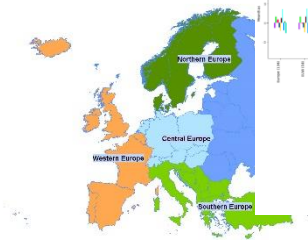
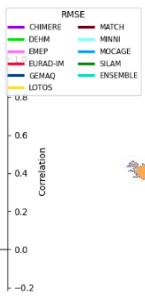
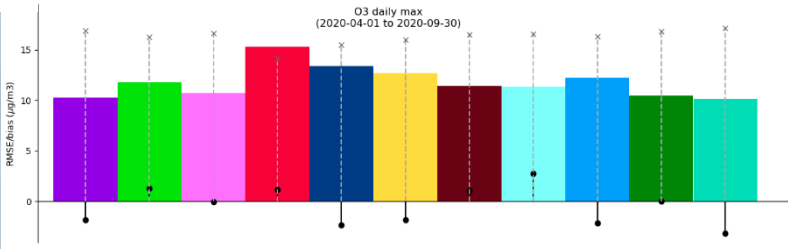
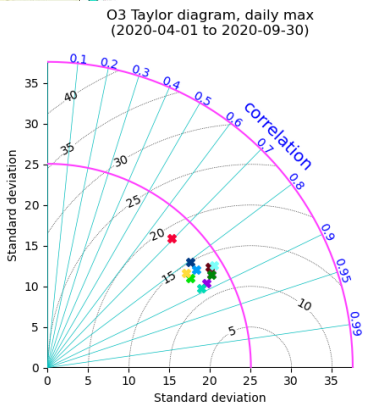
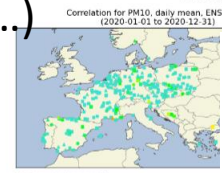
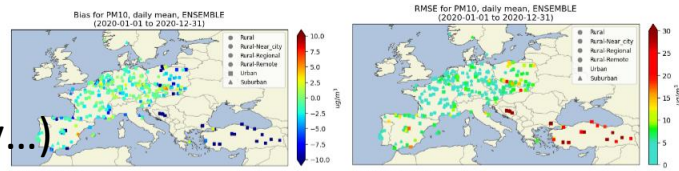
~1/3 of stations





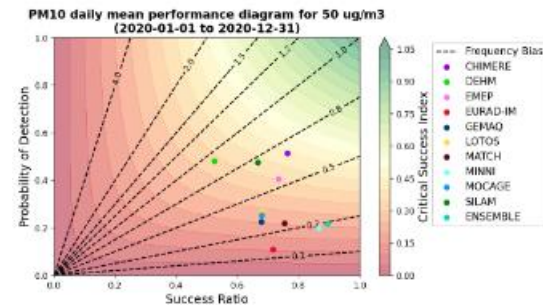
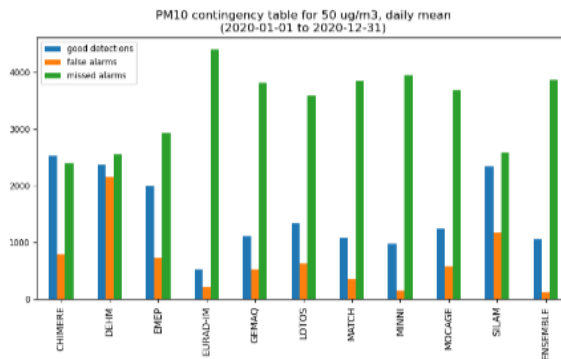
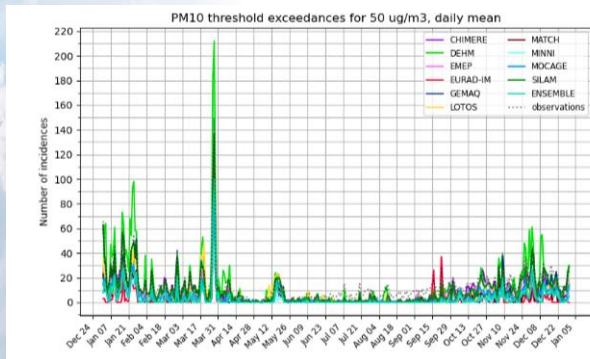
- Computations of Bias, RMSE, correlation with several representations:

- Scores at stations
- Scores per macro-regions (typology...)
- Aggregated scores (taylor diagram, bbplots ...)



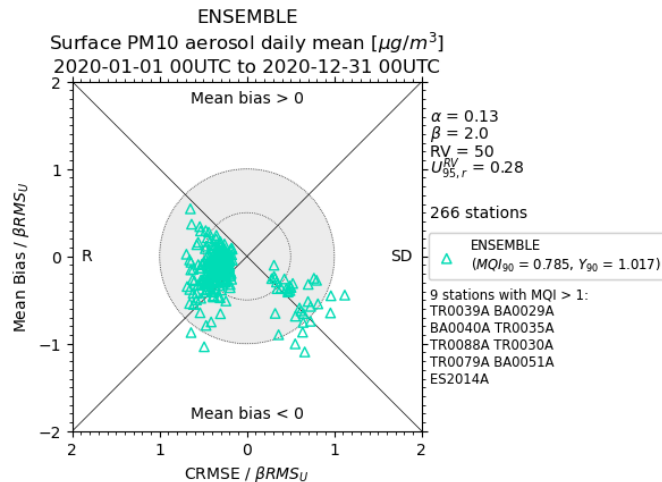
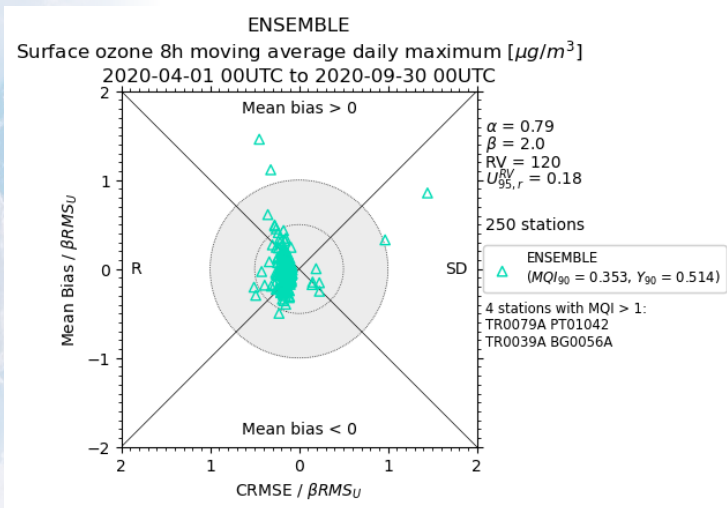


- Scores on detections of threshold exceedances
 - Ozone: 180 $\mu\text{g}/\text{m}^3$ (hourly mean)
 - PM10 : 50 $\mu\text{g}/\text{m}^3$ (daily mean)





- Fairmode metrics
 - Ozone and PM10
 - ENS is always in line with MQO



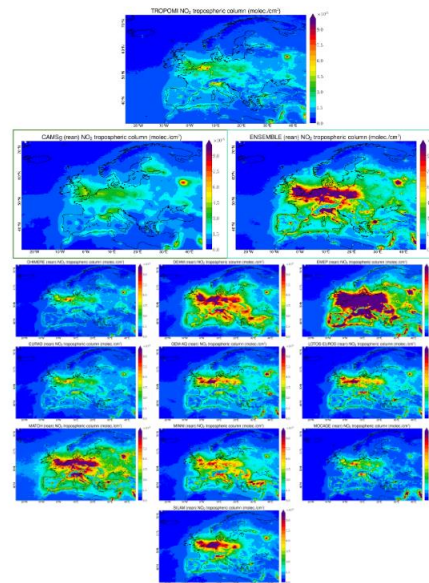
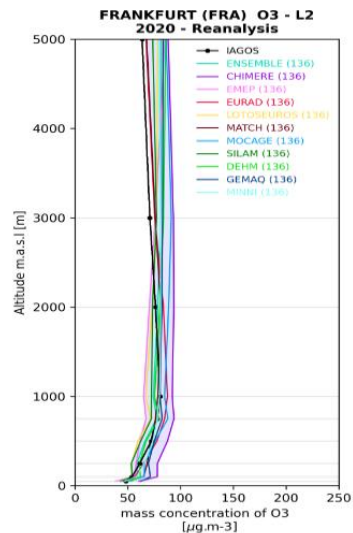
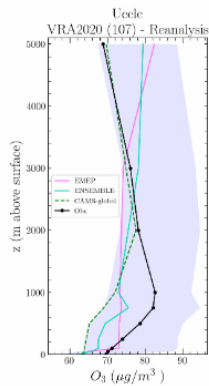
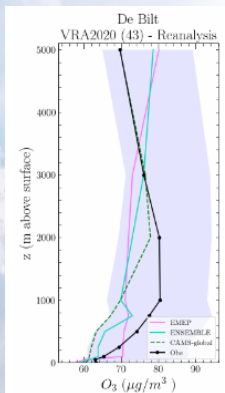


- Key performances indicators defined for O3, NO2, PM10 and PM2.5
 - RMSE for daily concentrations
 - Relative bias for annual averaged concentrations

Scores	KPI	2019	2020
RMSE of the ozone daily maximum of the ozone concentrations	<16 $\mu\text{g}/\text{m}^3$	12.71 $\mu\text{g}/\text{m}^3$	11.28 $\mu\text{g}/\text{m}^3$
RMSE of the NO ₂ daily maximum concentrations	<22 $\mu\text{g}/\text{m}^3$	23.81 $\mu\text{g}/\text{m}^3$	18.8 $\mu\text{g}/\text{m}^3$
RMSE of the PM ₁₀ daily mean concentrations	<18 $\mu\text{g}/\text{m}^3$	8.21 $\mu\text{g}/\text{m}^3$	8.24 $\mu\text{g}/\text{m}^3$
RMSE of the PM _{2.5} daily mean concentrations	<18 $\mu\text{g}/\text{m}^3$	6.36 $\mu\text{g}/\text{m}^3$	5.02 $\mu\text{g}/\text{m}^3$
Absolute value of the relative bias of the surface annual averaged NO2 concentrations	<35%	36.7 %	33.1 %
Absolute value of the relative bias of the surface annual averaged PM10 concentrations	<50%	14.7 %	17.3 %
Absolute value of the relative bias of the surface annual averaged PM2.5 concentrations	<50%	15.6 %	13.2 %



- Evaluation of the reanalyses above the surface with satellite data ozone sondes and IAGOS data





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CAMS regional EQC reports

Annual Evaluation and quality control reports are available on open-access (from 2015 to 2021):

<https://atmosphere.copernicus.eu/quality-assurance>



Annual EQC report for the interim reanalysis for 2021,
for each of the operational systems and the
ENSEMBLE

IRA2021

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Ref: CAMS283_2022SC1_083.2.1.1-2021_202208_EQC_IRA2021_v0.docx



Annual report on the evaluation of validated re-analyses
VRA2020

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Ref:
CAMS283_2022SC1_D83.2.1.1-2022_202311_Annual_verification_report_VRA2020_v0.pdf

Available in April

