

**living planet
symposium** | **BONN**
23–27 May
2022



Atmosphere Monitoring

EO Science for societal challenges

CAMS response to COVID-19

Vincent-Henri Peuch (ECMWF)



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 **ECMWF**





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LOOKING BACK AT THE RACE AGAINST COVID

☰
RAPID ACTION ON CORONAVIRUS AND EO
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COUNTRIES

Available countries

- Albania
- Austria
- Belgium
- Bosnia and Herzegovina
- Bulgaria
- Croatia
- Cyprus
- Czechia
- Denmark
- Egypt
- Estonia
- Finland
- France

Show archived indicators

INDICATORS

- Global Indicators
- CAMS Air Quality
- CMEMS Water Quality
- Crude Oil Storage Index (EU)
- Number of Trucks (Beta)
- Population
- TROPOMI CO
- TROPOMI NO2
- TROPOMI SO2
- C3S Data
- Vessel density
- WSF Evolution

MAP

World, CAMS Air Quali...
CAMS daily averaged PM2.5

NO2 | **PM 2.5** | PM10 | O3

2,630, 46,654

[EMBED MAP](#)
[ADD TO CUSTOM DASHBOARD](#)

CAMS time series in scope of COVID-19

Time series of surface concentrations of the key air pollutants (**NO2, PM2.5, PM10 and ozone**) are useful to assess their variability and to monitor possible trends in their evolution. For the capitals and the other largest cities in Europe (50 in total), a time series starting on 1 February 2020 is provided. The values are representative of areas of 10 km x 10

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QUESTIONS REGARDING COVID AND AIR POLLUTION

- To what extent are air pollution and weather affecting the severity of the covid-19 disease?
- To what extent are air pollution and weather affecting the spread of the sars-cov-2 virus?
- How did lockdown and other restrictive measures affect air composition? What are the consequences on health and climate?

**WMO COVID-19 Research Board
Task Team Members**



WMO SECRETARIAT SUPPORT

				Ben Zaitchik – JHU (Chair) Judy Omumbo – AAS (Co-Chair) David Farrell – CIMH Ken Takahashi Guevara – SENAMHI
				Juli Tirtanj – NOAA Rosa Barciela – UK Met Office Yun Gao – CAMS Emily YY Chan – CUHK
				Sophie Gurny – WHO Masahiro Hashizume – UTokyo Rachel Lowe – LSHTM Nick H. Ogden – PHAC
				Vincent-Henri Peuch – ECMWF Paulo Saldiva – FMUSP Xavier Rodo – ISGlobal Tong Zhu – PKU

WMO Secretariat Support

Joy Shumake-Guillemot
Lu Ren
Jürg Luterbacher
Rosa von Borries

Website:
<https://community.wmo.int/activity-areas/health>



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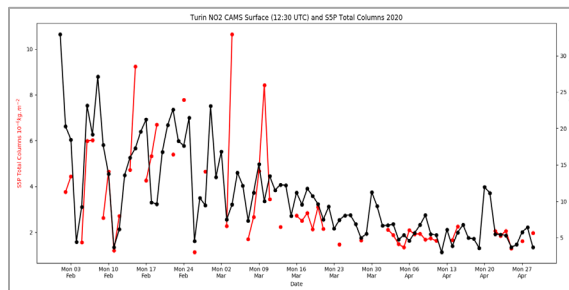
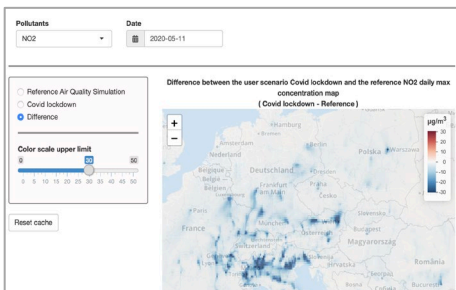
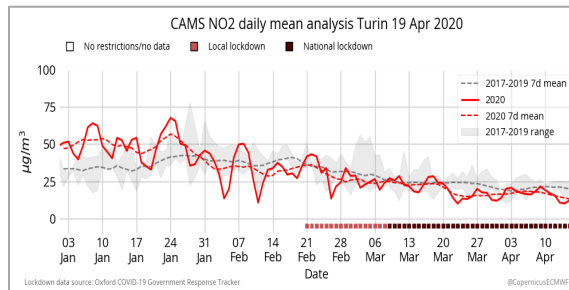
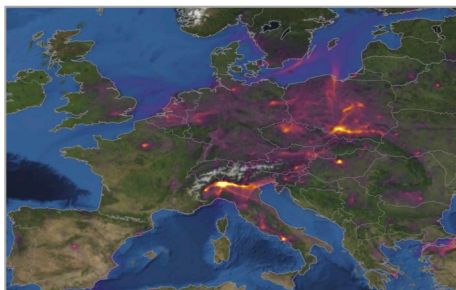


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CAMS COVID-19 MINISITE

Maps and animations
of the latest situation
in Europe.

Forecast model estimate
of reduction in air
pollution is expected on
a daily basis accounting
for weather effects.



Air pollution across
Europe compared to
2017-2019 and as a
function of lockdown
measures.

How consistent are
surface and satellite
measurements?

<https://atmosphere.copernicus.eu/european-air-quality-information-support-covid-19-crisis>



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«Le virus pourrait être transporté par la pollution»

CHRONIQUE «LE FIL VERT»

Par Aude Massiot — 24 mars 2020 à 07:06

CAMS Nitrogen Dioxide (NO2) analysis, 2 February 2020 08UTC

Le Monde

NOS VIES CONFINÉES

bonnes nouvelles, initiatives solidaires...

Je découvre

PLANÈTE - CORONAVIRUS ET PANDEMIE DE COVID-19

Coronavirus : la pollution de l'air est un « facteur aggravant », alertent médecins et chercheurs

Les épandages agricoles ont été à l'origine de pics de pollution en Ile-de-France et dans le Grand-Est ce week-end. Un collectif appelle l'Etat à les « limiter drastiquement ».

Par Philippe Wasth et ... Publié le 30 mars 2020 à 10:00 - Mis à jour le 31 mars 2020 à 09:00

Lecture 5 min.

euronews.

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Home » Asuntos europeos » Europa » La red de satélites Copernicus analiza los parámetros que podrían favorecer el avance de Covid-19

REDACCIÓN DE BRUSELAS

La red de satélites Copernicus analiza los parámetros que podrían favorecer el avance de Covid-19

Por Ana LAZARO Última actualización: 31/03/2020

tiempo.com

El Tiempo en...

Madrid 34° 19'

YODAS | ACTUALIDAD | CIENCIA | PREDICCIÓN | REVISTA

Inicio > Ram > No hay indicios claros de un incremento de contaminantes en Europa

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Air pollution

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Air pollution in China back to pre-Covid levels and Europe may follow

Cleaner skies were a silver lining of pandemic but data indicates air quality receding as lockdowns eased

- Coronavirus - latest updates
- See all our coronavirus coverage

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No hay indicios claros de un incremento de contaminantes en Europa

Buenas noticias para Europa: Copernicus no detecta aún indicios claros de un incremento de sustancias contaminantes en el Viejo Continente.

Francisco Martín León

LA VANGUARDIA

Vida

Directo

Coronavirus: rebotes en España

Directo

Elecciones en el País Vasco y en Galicia

CORONAVIRUS CONTAMINACIÓN

Sistema Copérnico descarta relación contaminación con propagación coronavirus

f t w

Corriere Nazionale

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CULTURA MOTORI SALUTE SCIENZE SCUOLA SOCIETÀ TECNOLOGIA

AMBIENTE, NAZIONALE

Copernicus conferma: italiani in casa, inquinamento in calo

25 MARZO 2020 by CORNAZ

Effetto Coronavirus: il Paese è meno inquinato

Da metà febbraio riduzione settimanale del 10% sulle concentrazioni superficiali biossido di azoto

IN PUBBLICO

IN PUBBLICO

Publicato il: 18/03/2020 15:43

Effetto Coronavirus: si riduce l'inquinamento sul nostro Paese, soprattutto al nord. Un'osservazione superficiale del biossido di azoto (NO2) mostra un graduale trend di riduzione: circa il 10% in meno a settimana nelle ultime quattro o cinque settimane. Ed è attribuibile proprio agli effetti delle misure prese contro



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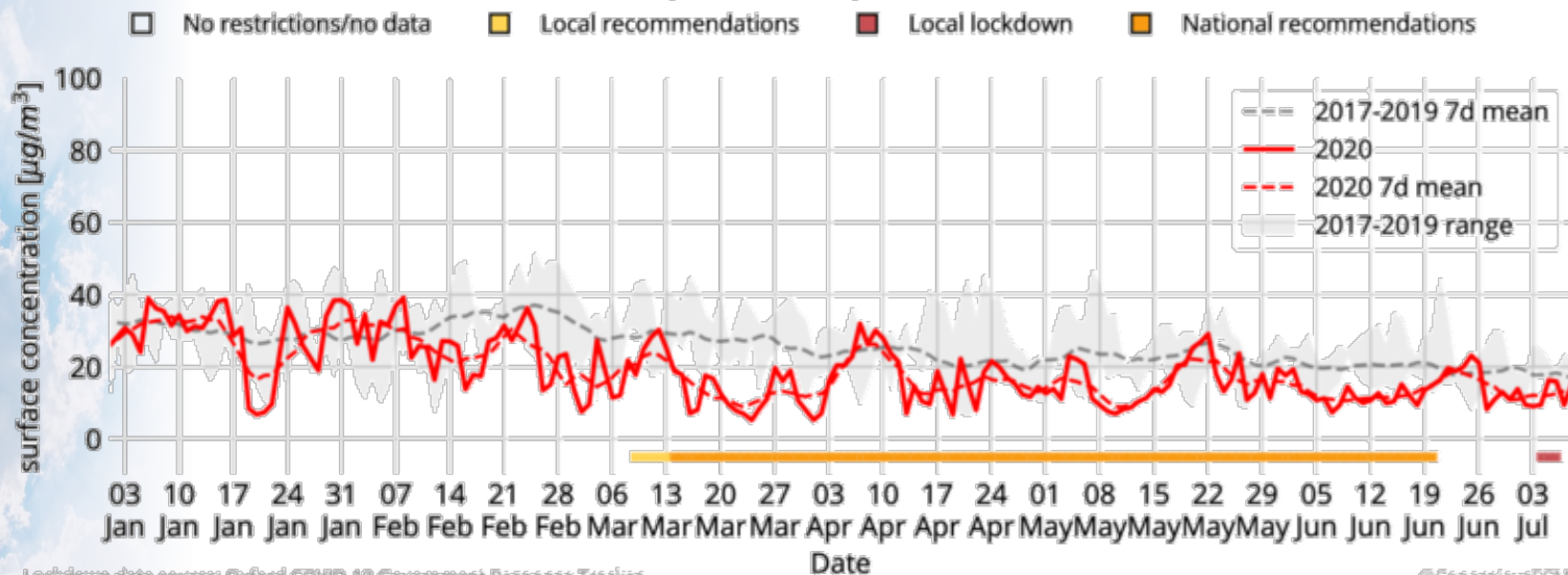


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INTERPRETATION OF COVID-19 "SIGNALS"

Analyses based on surface observations obtained from the EEA in NRT.

CAMS NO2 daily mean analysis Barcelona 08 Jul 2020



@CopernicusECMWF



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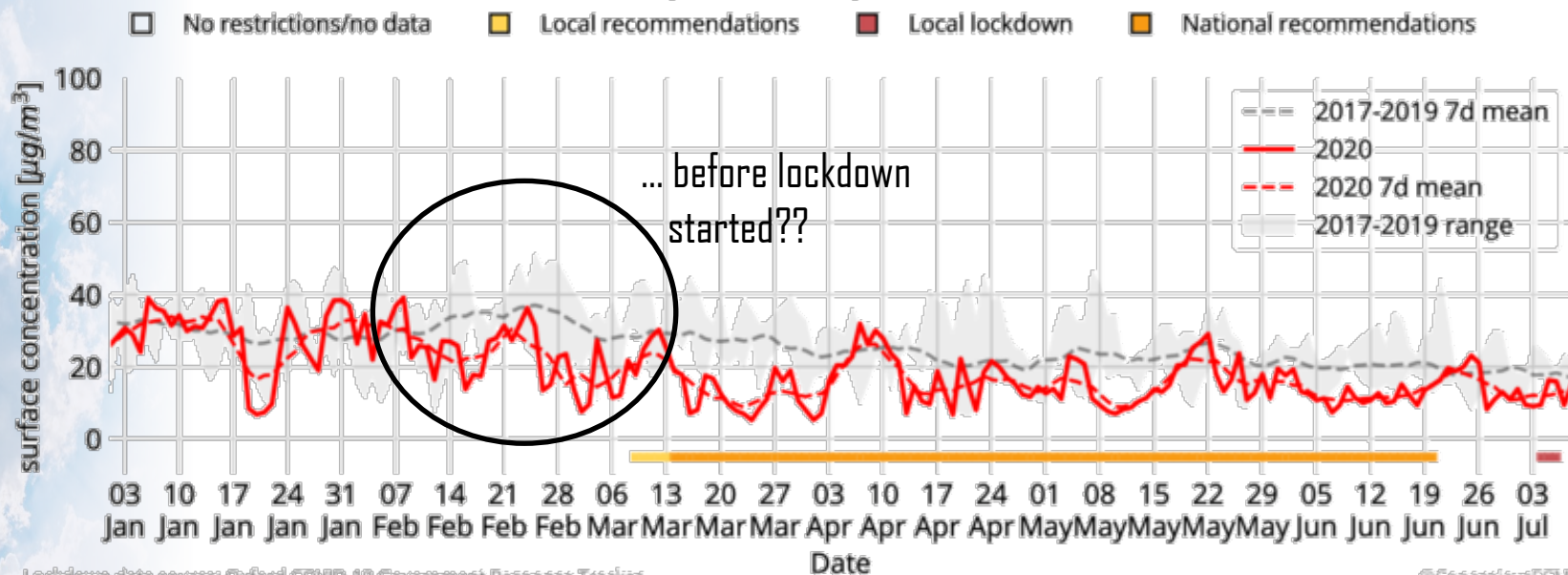




INTERPRETATION OF COVID-19 "SIGNALS"

Analyses based on surface observations obtained from the EEA in NRT.

CAMS NO2 daily mean analysis Barcelona 08 Jul 2020



Lockdown data source: Oxford COVID-19 Government Response Tracker

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SENTINEL-5P NO₂

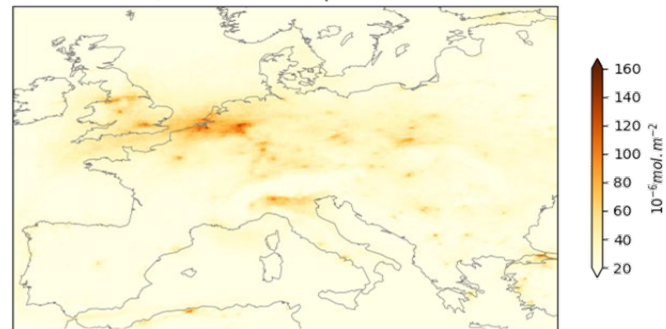
2020

2019

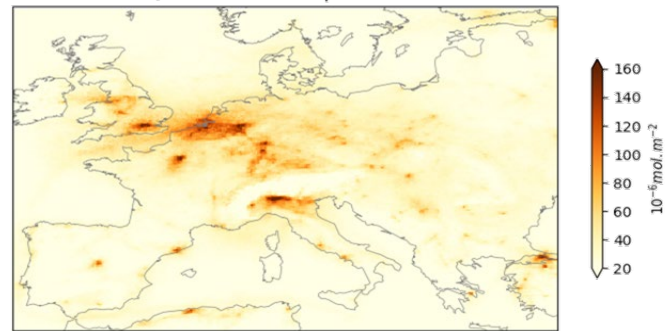
15 Mar

30 Apr

b) From Mar. 15 to Apr. 30 2020



d) From Mar. 15 to Apr. 30 2019



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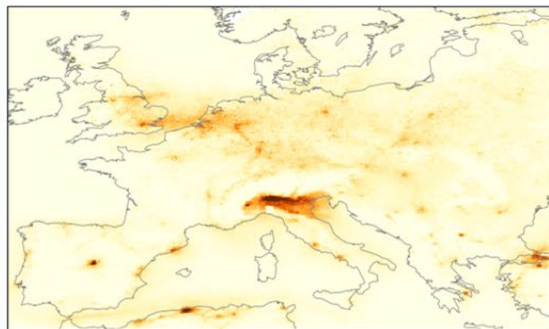
SENTINEL-5P NO₂

1 Feb

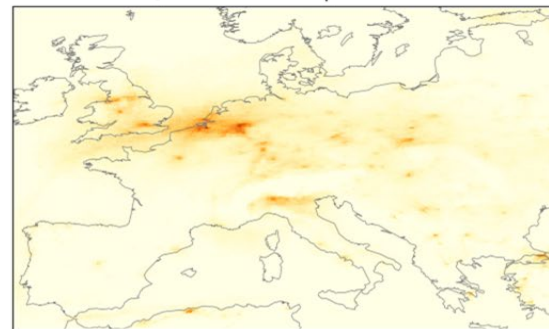
15 Mar

30 Apr

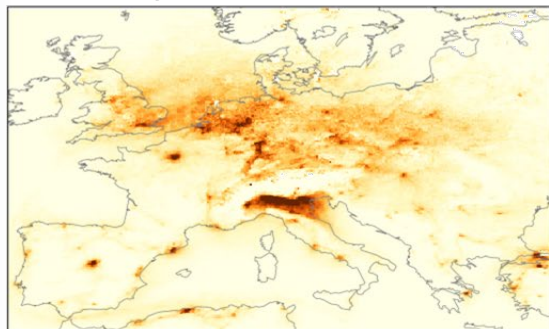
a) From Feb. 1 to Mar. 15 2020



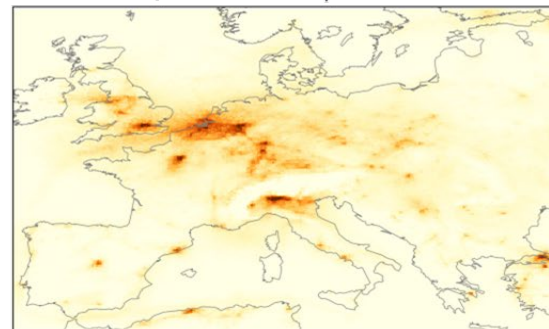
b) From Mar. 15 to Apr. 30 2020



c) From Feb. 1 to Mar. 15 2019



d) From Mar. 15 to Apr. 30 2019



2020

2019



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SENTINEL-5P NO₂

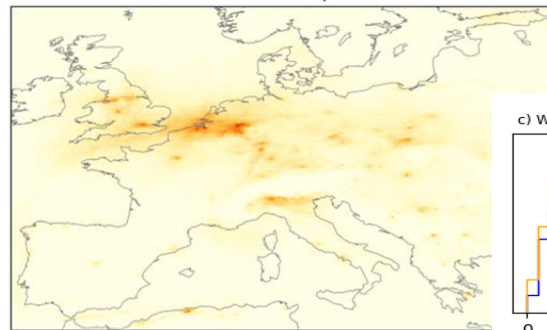
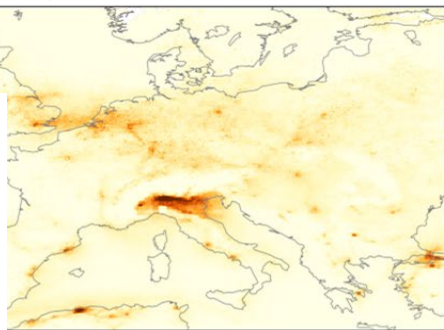
1 Feb

15 Mar

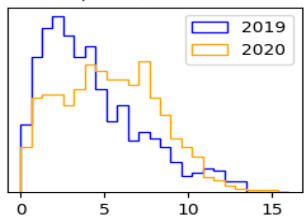
30 Apr

a) From Feb. 1 to Mar. 15 2020

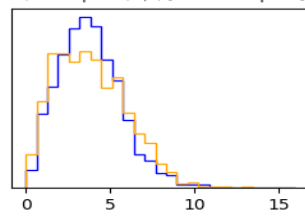
b) From Mar. 15 to Apr. 30 2020



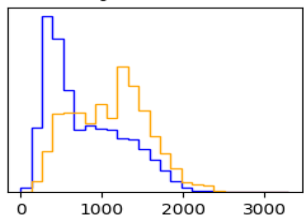
a) WindSpeed (m/s) [Feb 1 to Mar 15]



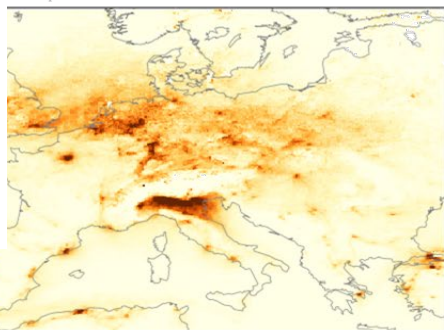
c) WindSpeed (m/s) [Mar 15 to Apr 30]



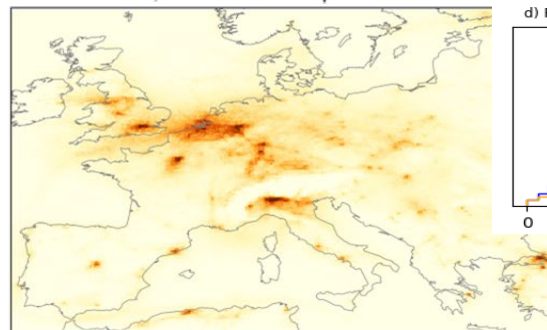
b) PBL Height (m) [Feb 1 to Mar 15]



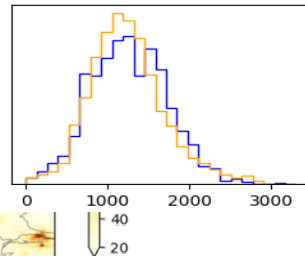
c) From Feb. 1 to Mar. 15 2019



d) From Mar. 15 to Apr. 30 2019



d) PBL Height (m) [Mar 15 to Apr 30]



February 2020 was exceptional: +1.4 degree hotter than previous record in Europe (C3S)



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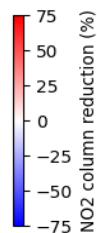
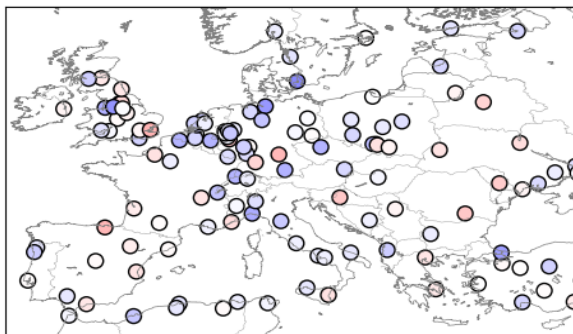
NO₂ REDUCTION ESTIMATIONS CITIES > 0.5M

1 Feb

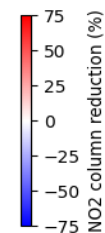
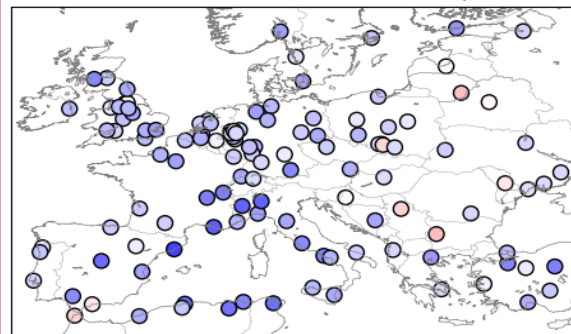
15 Mar

30 Apr

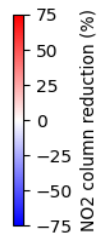
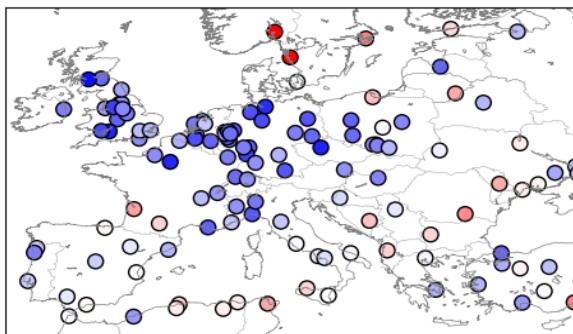
a) [2020 BAU Sim.] minus [2020 S5P] (Feb 1 to Mar 15)



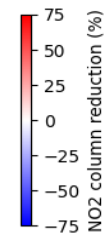
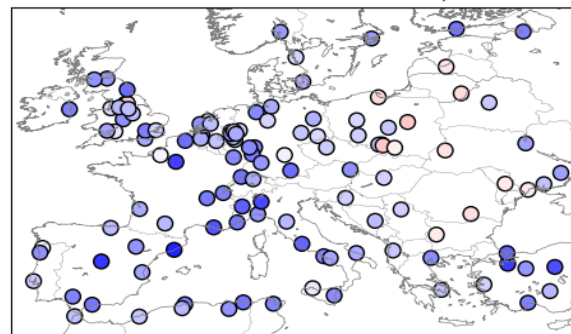
b) [2020 BAU Sim.] minus [2020 S5P] (Mar 15 to Apr 30)



c) [2019 S5P] minus [2020 S5P] (Feb 1 to Mar 15)



d) [2019 S5P] minus [2020 S5P] (Mar 15 to Apr 30)



[J. Barré et al., ACP., 2020]

“weather-
adjusted”
interpretation

[BAU_2020] - [OBS_2020]

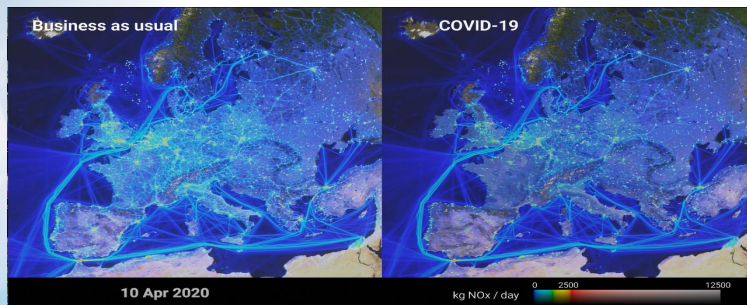
“direct”
interpretation

[OBS_2019] - [OBS_2020]



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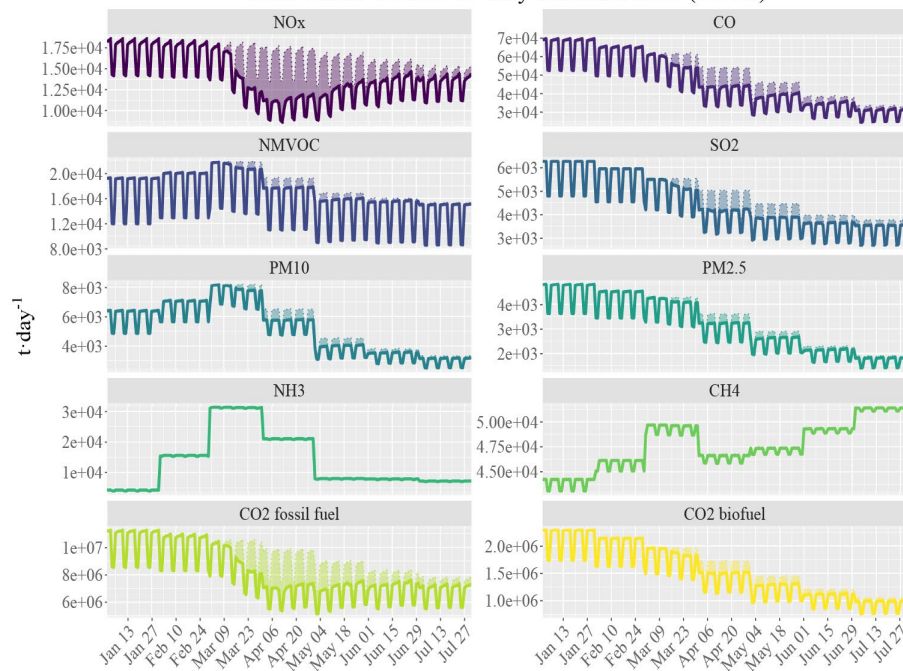
CAMS EUROPEAN DAILY EMISSIONS FOR THE LOCKDOWN



Daily, sector and country dependent emission change factors that can be combined with CAMS emissions for air quality modelling covering 2020.

[M. Guevara et al., ACP, 2020]

BAU versus COVID-19 daily emissions 2020 (EU-28)



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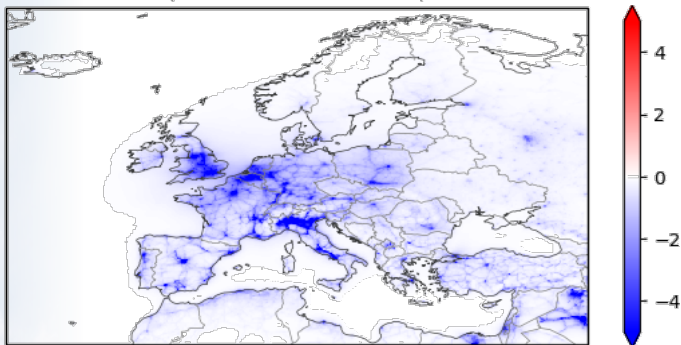


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CAMS MULTI-MODEL LOCKDOWN EMISSIONS HINDCAST

Up to 60% reduction in NO₂

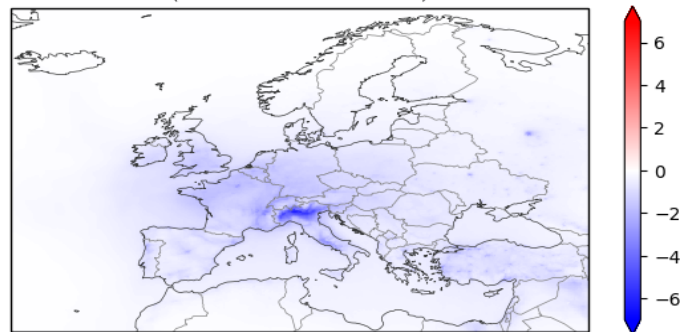
NO₂ concentration mean difference, ENSEMBLE (absolute diff. in ug/m³)
Lockdown scenario minus Reference
(2020-03-01 to 2020-04-30)



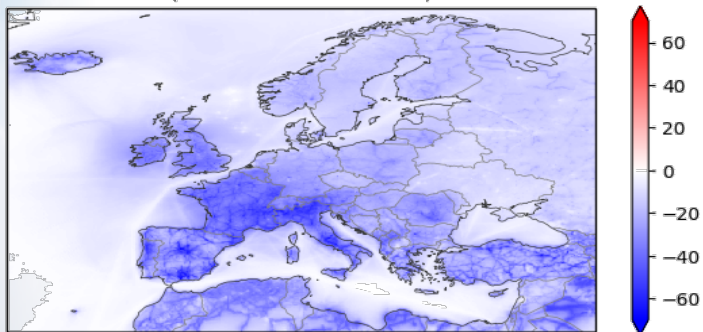
Absolute

Up to 20% reduction in PM₁₀

PM₁₀ concentration mean difference, ENSEMBLE (absolute diff. in ug/m³)
Lockdown scenario minus Reference
(2020-03-01 to 2020-04-30)

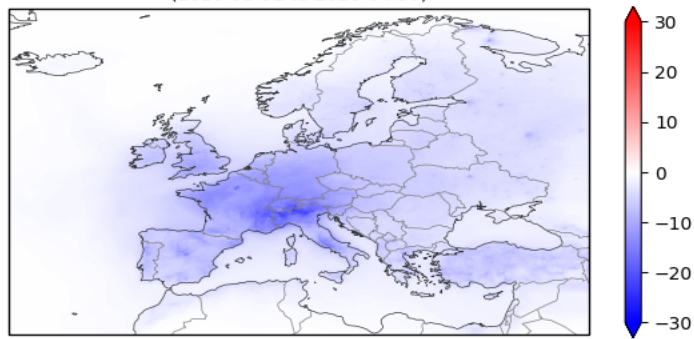


NO₂ concentration mean difference, ENSEMBLE (relative diff. in %)
Lockdown scenario minus Reference
(2020-03-01 to 2020-04-30)



Relative

PM₁₀ concentration mean difference, ENSEMBLE (relative diff. in %)
Lockdown scenario minus Reference
(2020-03-01 to 2020-04-30)

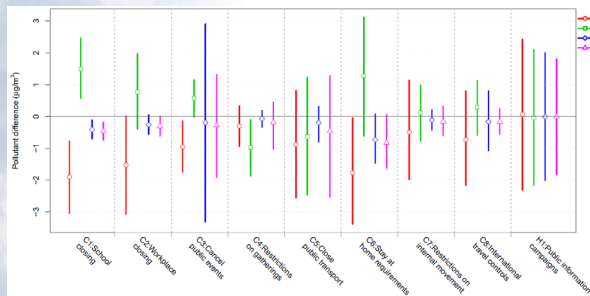




COVID MEASURES, AIR QUALITY AND HEALTH

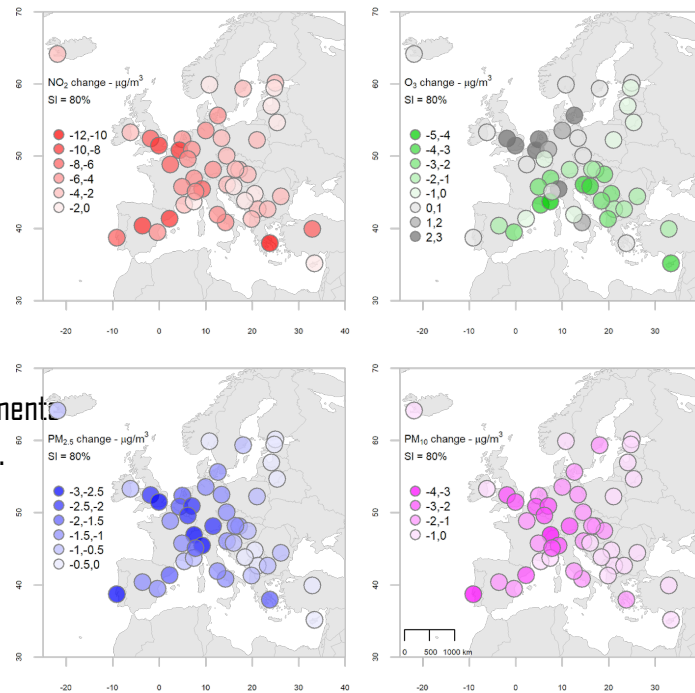


Overall, around **800 lives** have been saved in Europe due to temporary improvements in air quality due to the lockdown measures taken between March and July 2020.



Included on Stringency Index	
C1	School closing
C2	Workplace closing
C3	Cancel public events
C4	Restrictions on gathering
C5	Close public transport
C6	Stay at home requirements
C7	Restriction on internal movement
C8	International travel controls
H1	Public information campaigns

[R. Schneider et al., Sci. Rep., 2021]



Change in concentration of NO₂, ozone, and particulate matter (PM_{2.5} and PM₁₀) estimated at 80% SI score across 47 cities in Europe. NO₂ and PMs are expressed by daily mean and O₃ by daily maximum 8h-mean.



PR
THI



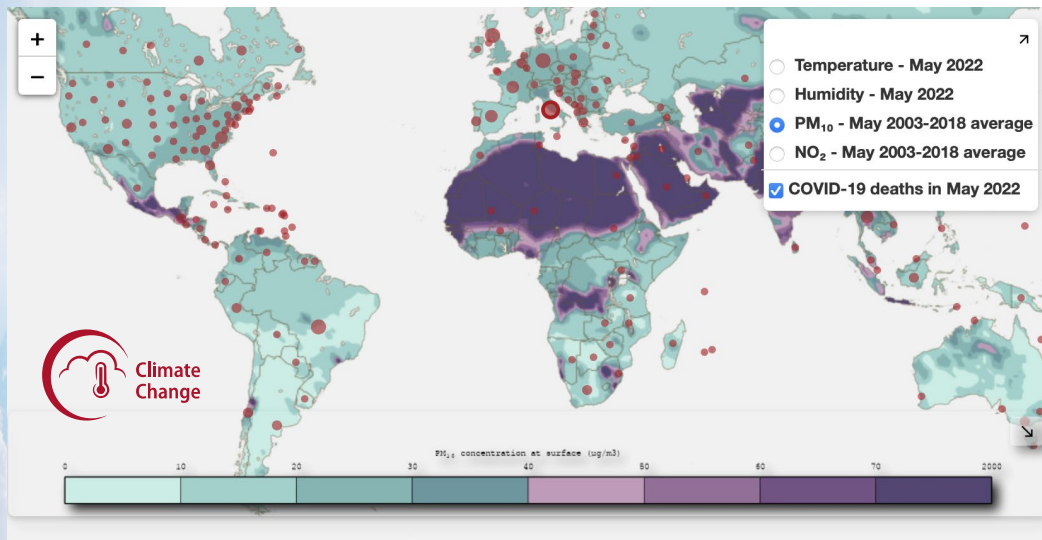
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DATA IN ACTION: EO-BASED SERVICES FOR HEALTH



The 'Monthly climate explorer for COVID-19' app of C3S provided easy access to air pollutants, temperature and humidity.

As part of the JRC-led Knowledge Centre on Earth Observation (KCEO), CAMS has been tasked to implement a **Copernicus Thematic Hub on Health**. Stay tuned!



Air pollution, air quality
and wildfires



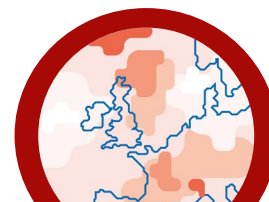
Impact of COVID-19



Ozone layer and
UV radiation



Pollens



Keep in touch with CAMS!



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We look forward to seeing you on our booth in the centre of the exhibition area, attached to the central ESA booth...

#OneECMWF



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