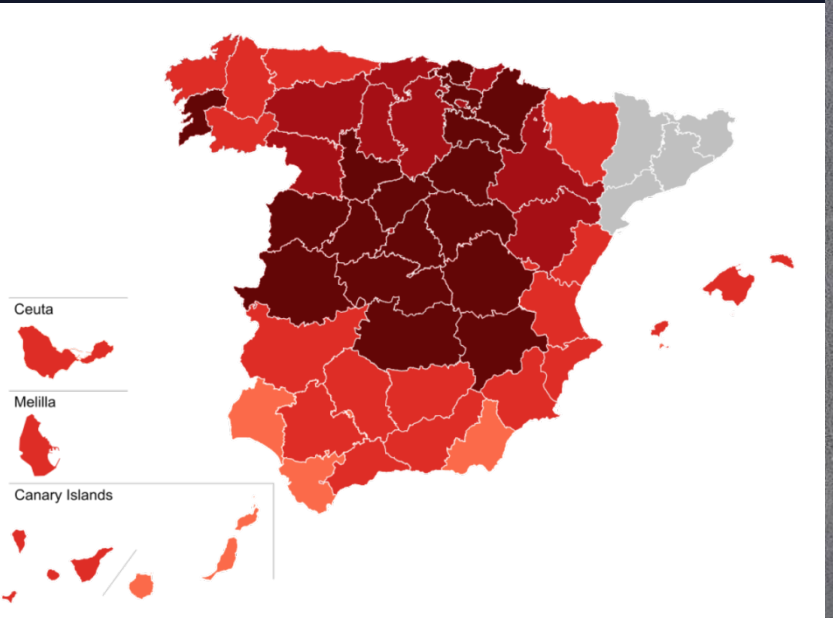
# Παγκόσμια Κλιματική Αλλαγή και Υγεία

## COVID-19

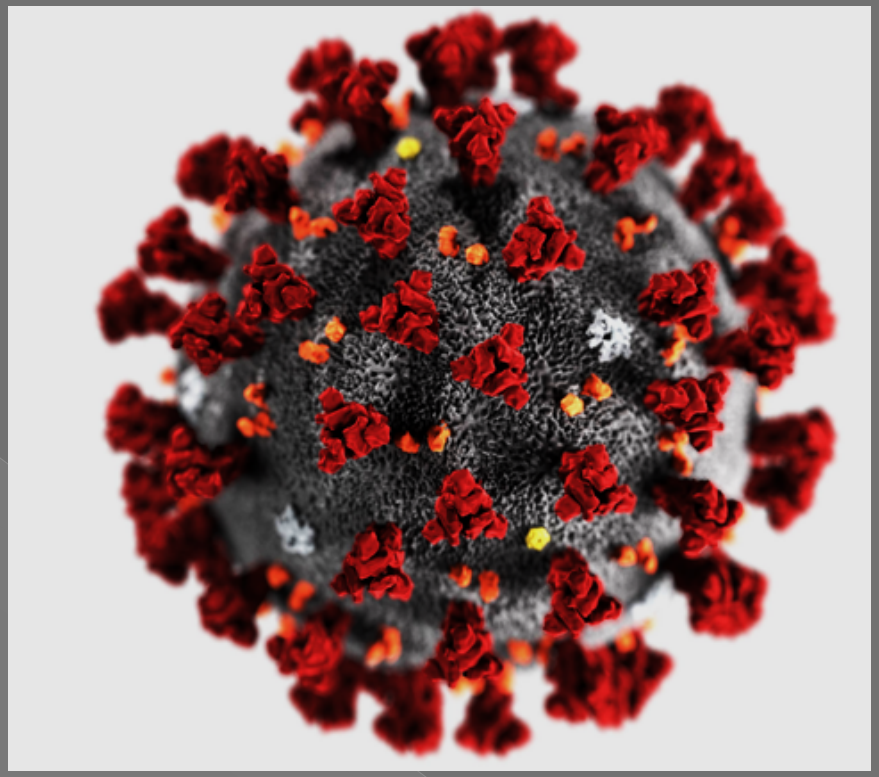


## 2019-2020

Α. Παπαγιάννης (ΣΕΜΦΕ)

29/04/2020

# Climate Change vs COVID-19



https://www.esa.int/Applications/Observing_the_Earth/Space_for_our_climate/Monitoring_climate_change_from_space2

# *Παγκόσμια Κλιματική Αλλαγή*

**Η αργή και σταθερή μεταβολή του γήινου κλίματος, τόσο μέσω των φυσικών, όσο και των ανθρωπογενών επιδράσεων**

## Αντίθετα:

**Η πανδημία του COVID-19 συνδέεται με μια ταχύτατα εξαπλούμενη νόσο σε παγκόσμο επίπεδο**

**(<5 μήνες → >2 .000.000 κρούσματα)**

**Έτος 2020: Δασικές πυρκαγιές Αυστραλία, πανδημία Covid-19.**

**Έτος 2019: Μέση θερμοκρασία της Γης > 1.1°C από την προ-βιομηχανική εποχή 1850, αύξηση Τωκεανών [τα τελευταία 10 έτη ήταν τα πλέον θερμά σε παγκόσμιο επίπεδο].**

## *Παγκόσμια Κλιματική Αλλαγή*

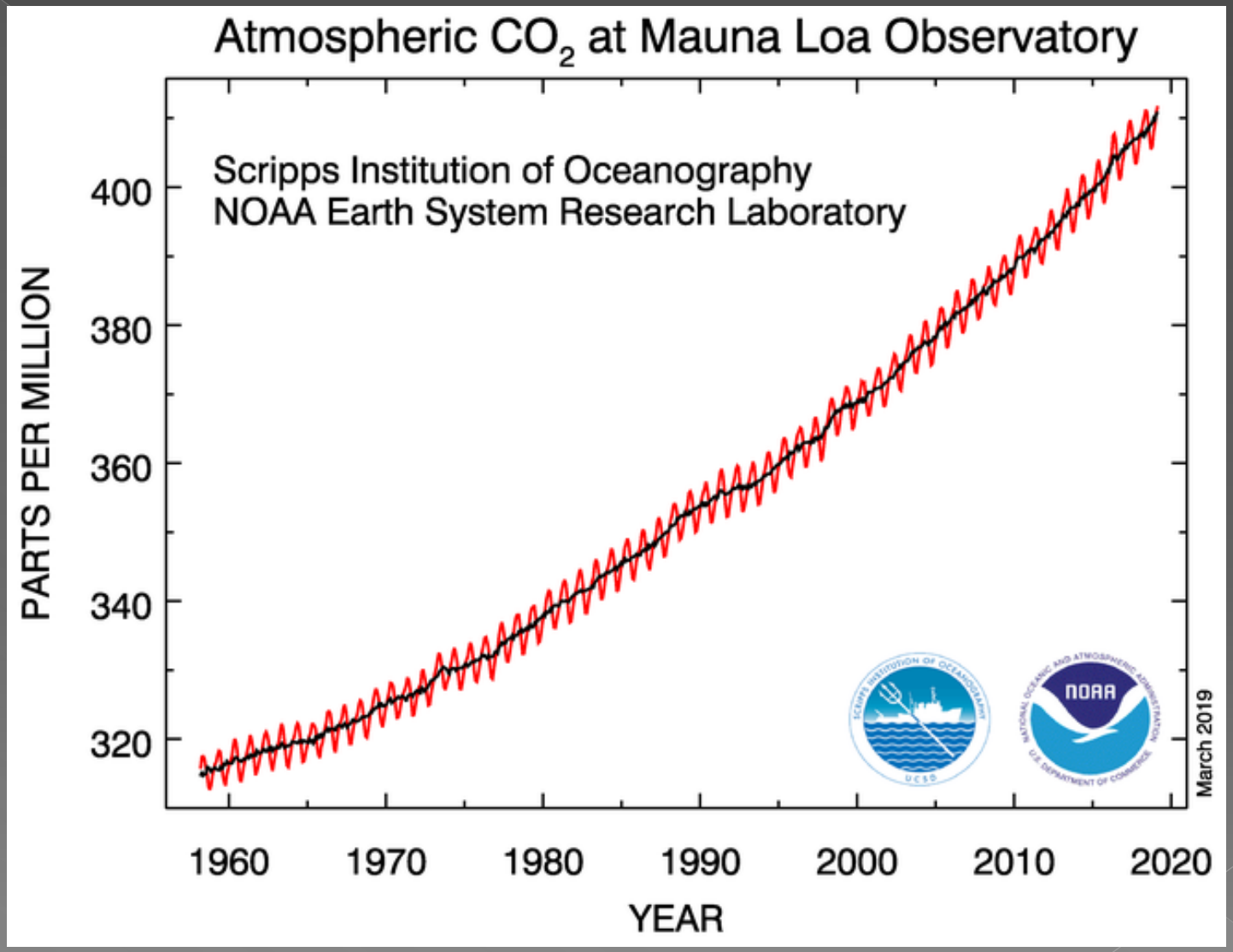
## Paris Agreement

"The Paris Climate Agreement aims to hold global warming to well below 2°C and to "pursue efforts" to limit it to 1.5°C. To accomplish this, countries have submitted Intended Nationally Determined Contributions (INDCs) outlining their post-2020 climate actions (Rogelj 2016)".

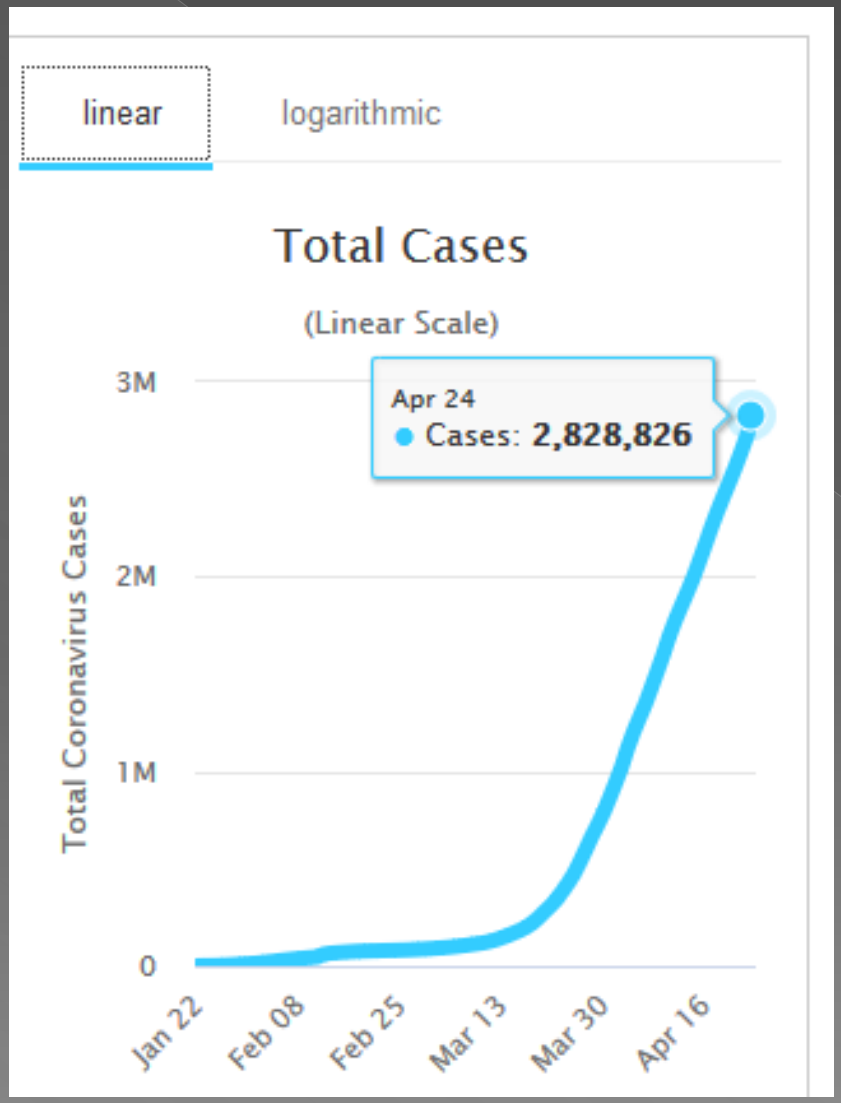
*In October of 2018, the Intergovernmental Panel on Climate Change issued its starkest warning yet: we have around 12 years to avoid the worst effects of anthropogenic climate change. The consumption of fossil fuels, the reckless destruction of forests and other natural ecosystems, and the release of powerful greenhouse gases have already caused around 1.0 °C of warming above preindustrial levels.Continuing at the current rate, we are likely to reach 1.5 °C by 2030 – and all the evidence suggests that a world beyond 1.5 °C is not one we want to live in…..*

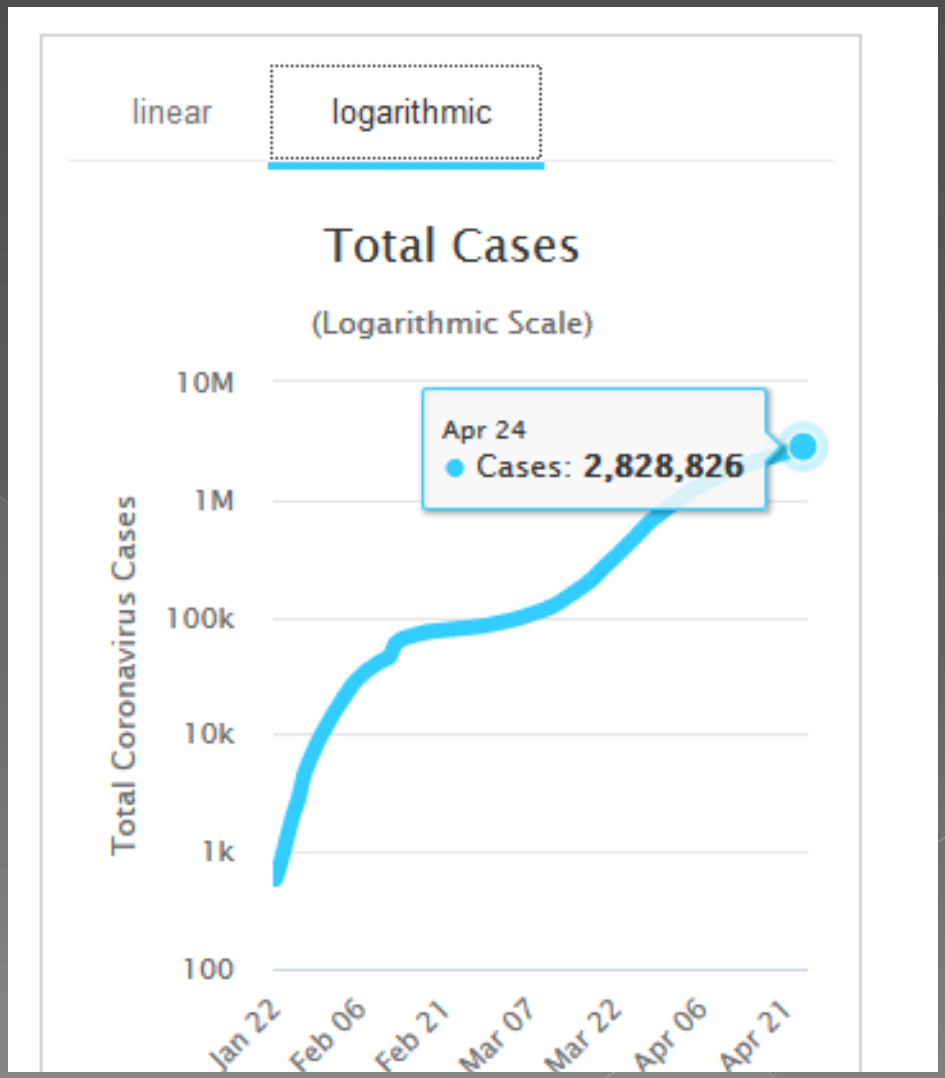
**https://link.springer.com/content/pdf/10.1007%2F978-3-030-05843-2.pdf ( free download)**

# Φαινόμενο του θερμοκηπίου



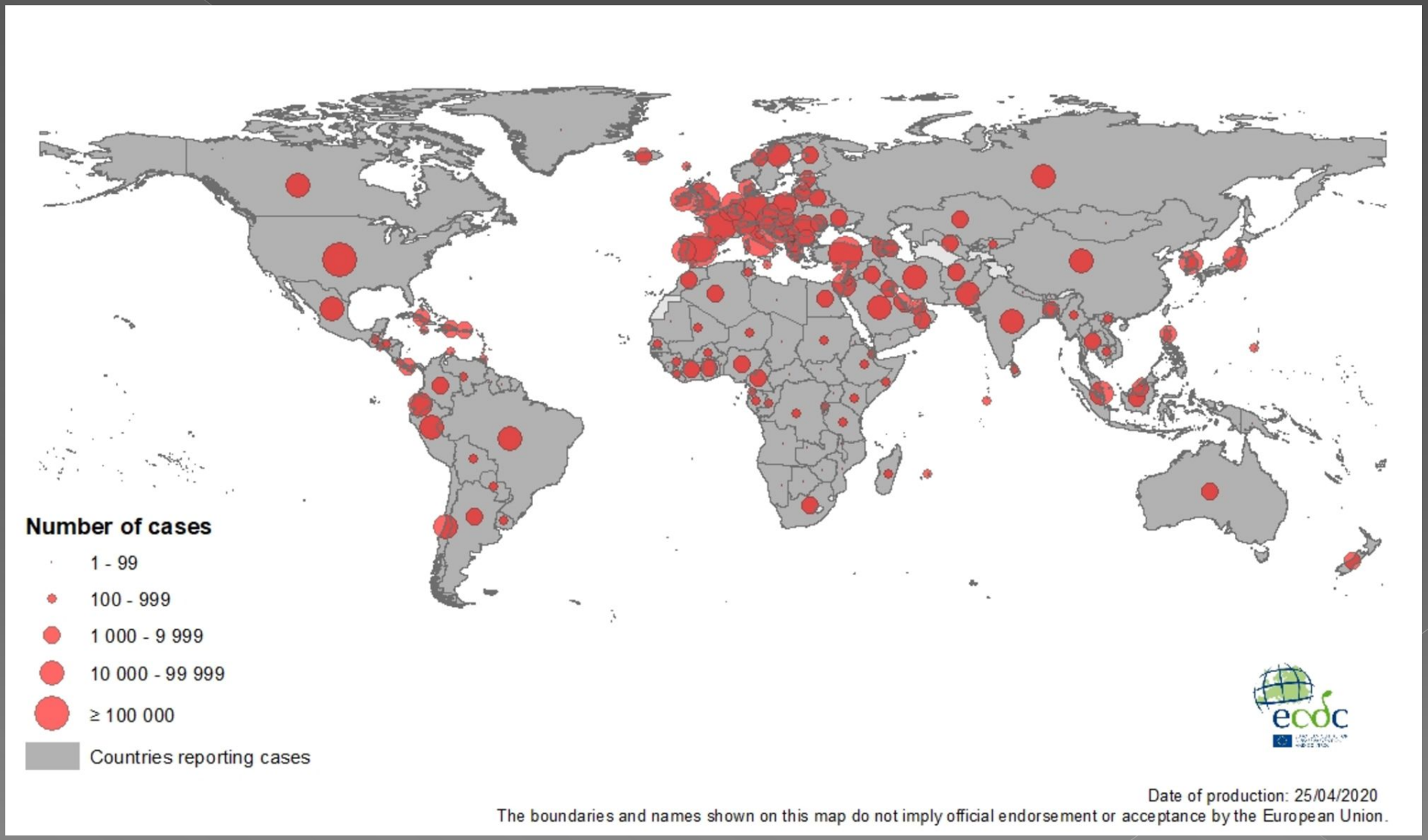
# COVID-19


linear
logarithmic
Total Cases
(Linear Scale)
Apr 24
Cases: 2,828,826
Total Coronavirus Cases
3M
2M
1M
0
Jan 22
Feb 08
Feb 25
Mar 13
Mar 30
Apr 16

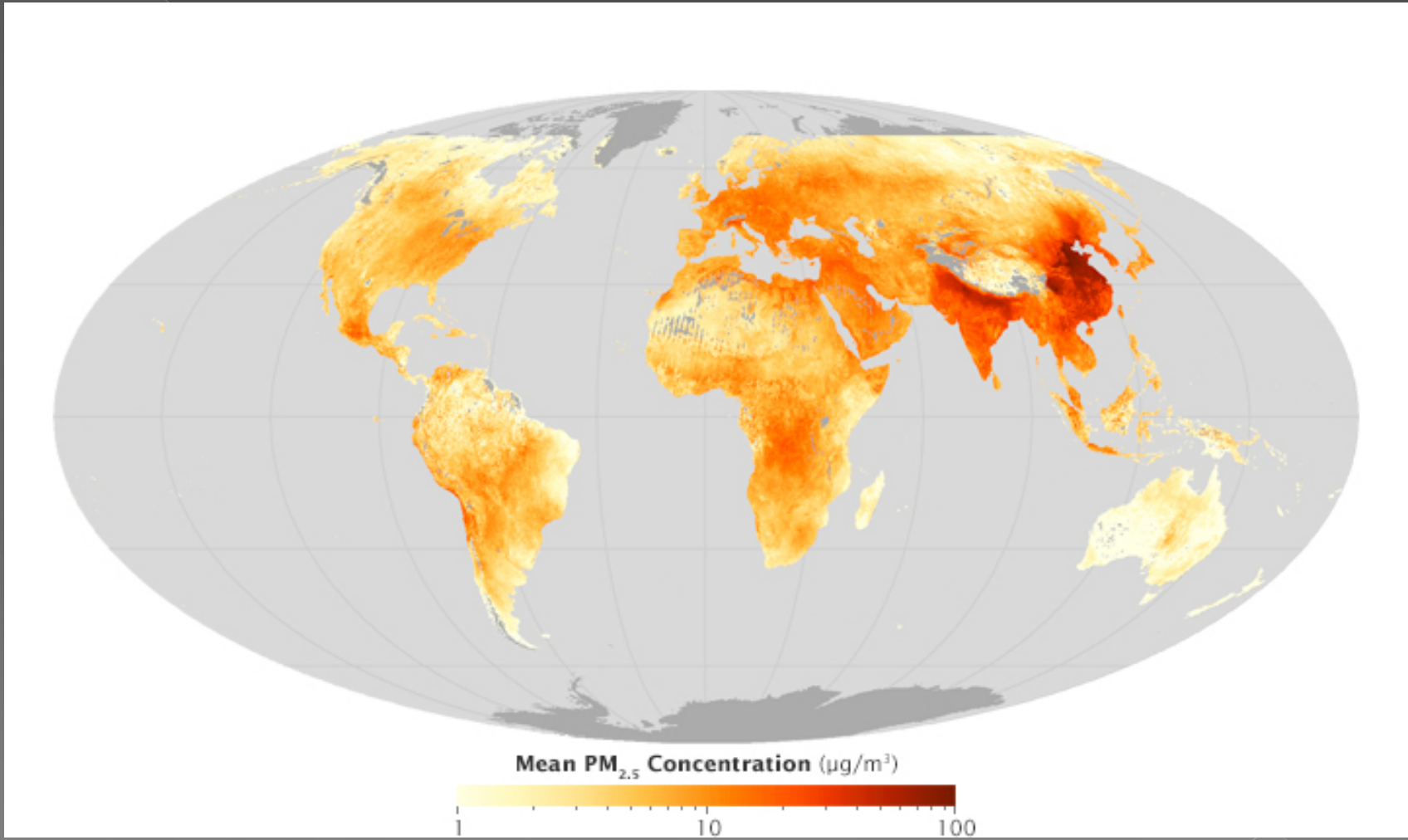

linear
logarithmic
Total Cases
(Logarithmic Scale)
Apr 24
Cases: 2,828,826
Total Coronavirus Cases
10M
1M
100k
10k
1k
100
Jan 22
Feb 06
Feb 21
Mar 07
Mar 22
Apr 06
Apr 21

| ΕΡΩΤΗΜΑ | ΠΚΑ | COVID-19 |
|---|---|---|
| Πόσο γρήγορα αντέδρασε η Παγκόσμια Κοινότητα; (ανάλογα με τις επιπτώσεις)-Λήψη μέτρων | Αργά (μακροπρόθεσμος στόχος) | Γρήγορα-πολύ γρήγορα (βραχυπρόθεσμος-μακροπρόθεσμος στόχος) |
| Ταχύτητα διάδοσης | Μερικές 10-ετίες | Μερικές εβδομάδες |
| Ζημιά στην Παγκόσμια οικονομία ($) | Αρκετά τρισεκατομμύρια | Αρκετά τρισεκατομμύρια |
| Ανθρώπινα θύματα (+ air pollution) | X * 1.000.000 | > 200.000 |
| Άμεσα/έμμεσα θιγόμενοι | (35/800) * 1.000.000 | > 3.000.000 (1.000.000 .000 confined) |
| Υπάρχουν αρνητές; | Αρκετοί | Λίγοι-Αρκετοί |
| Πληγείσες περιοχές | Αστικές – Μη αστικές | Αστικές - Πυκνοκατοικημένες |
| Επιδρά στην υγεία; | ΝΑΙ (άμεσα\έμμεσα) | ΝΑΙ (άμεσα) |
| Βελτίωση του συστήματος Υγείας | Όχι | Ναι |
| Περιορισμοί μετακινήσεων | Όχι | Μάλλον Ναι |
| Καθημερινότητα | Σχεδόν «as usual" | Νέα καθημερινότητα; |

# COVID-19 cases

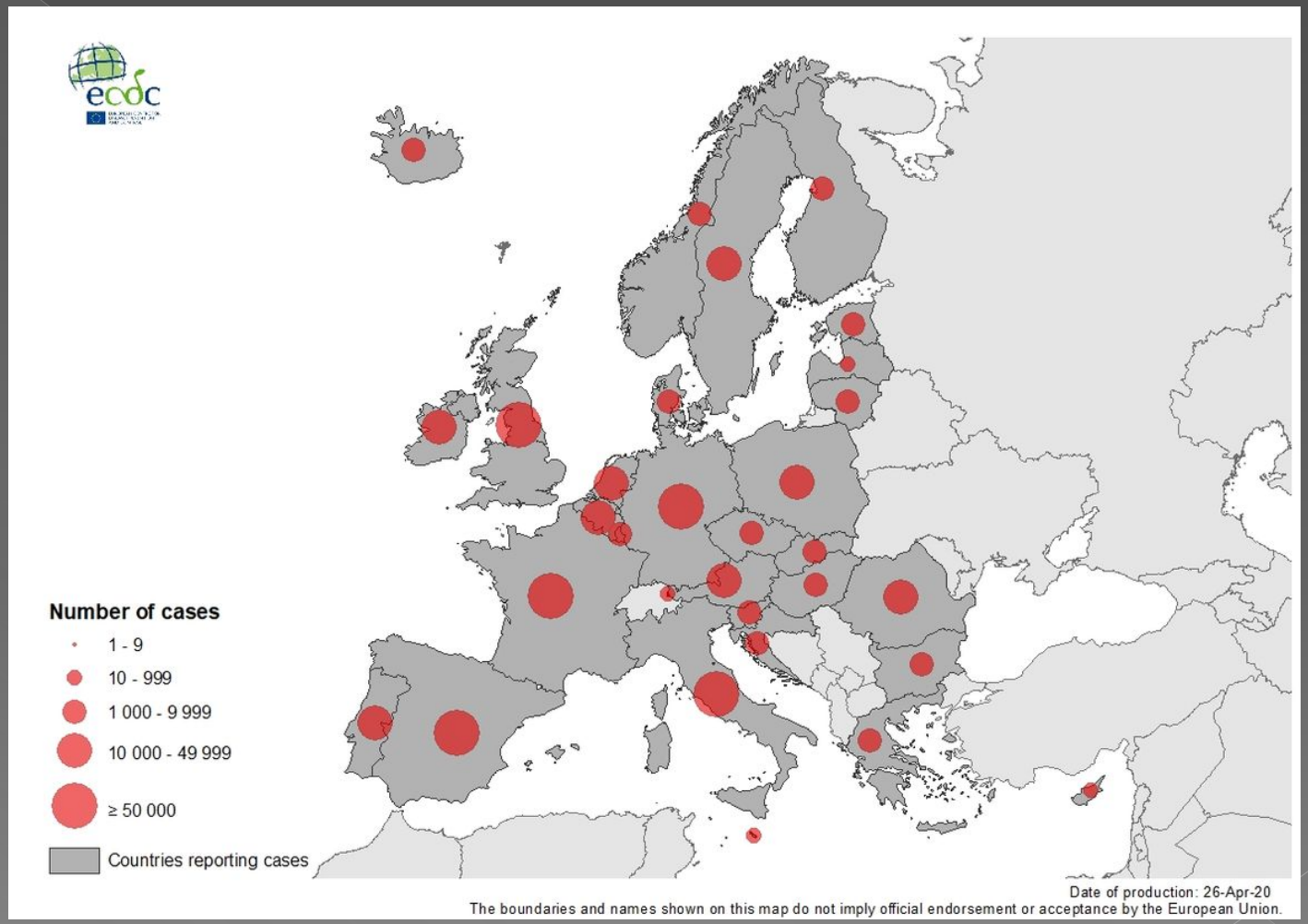


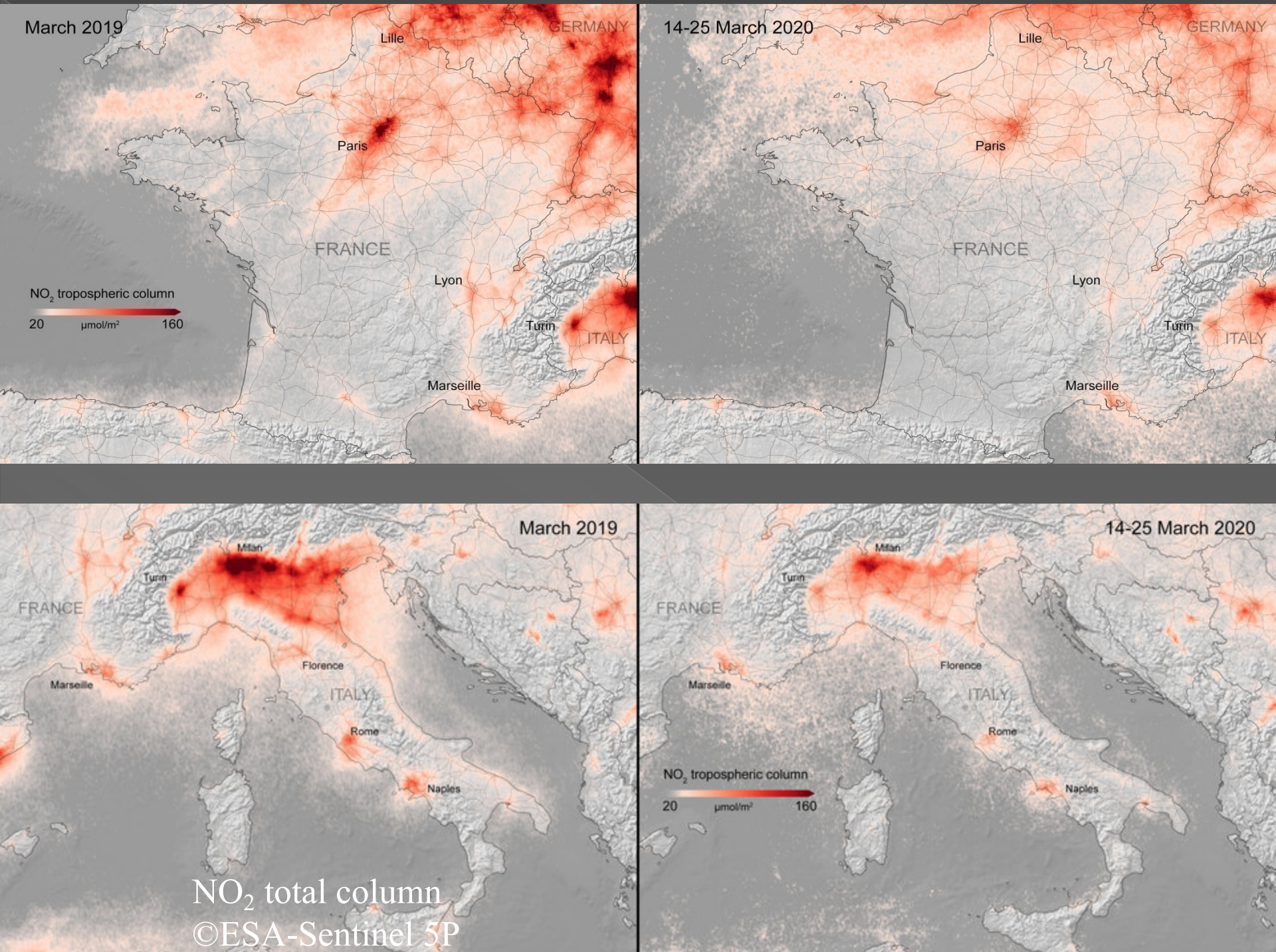
# Air Pollution $PM_{2.5}$




©NASA

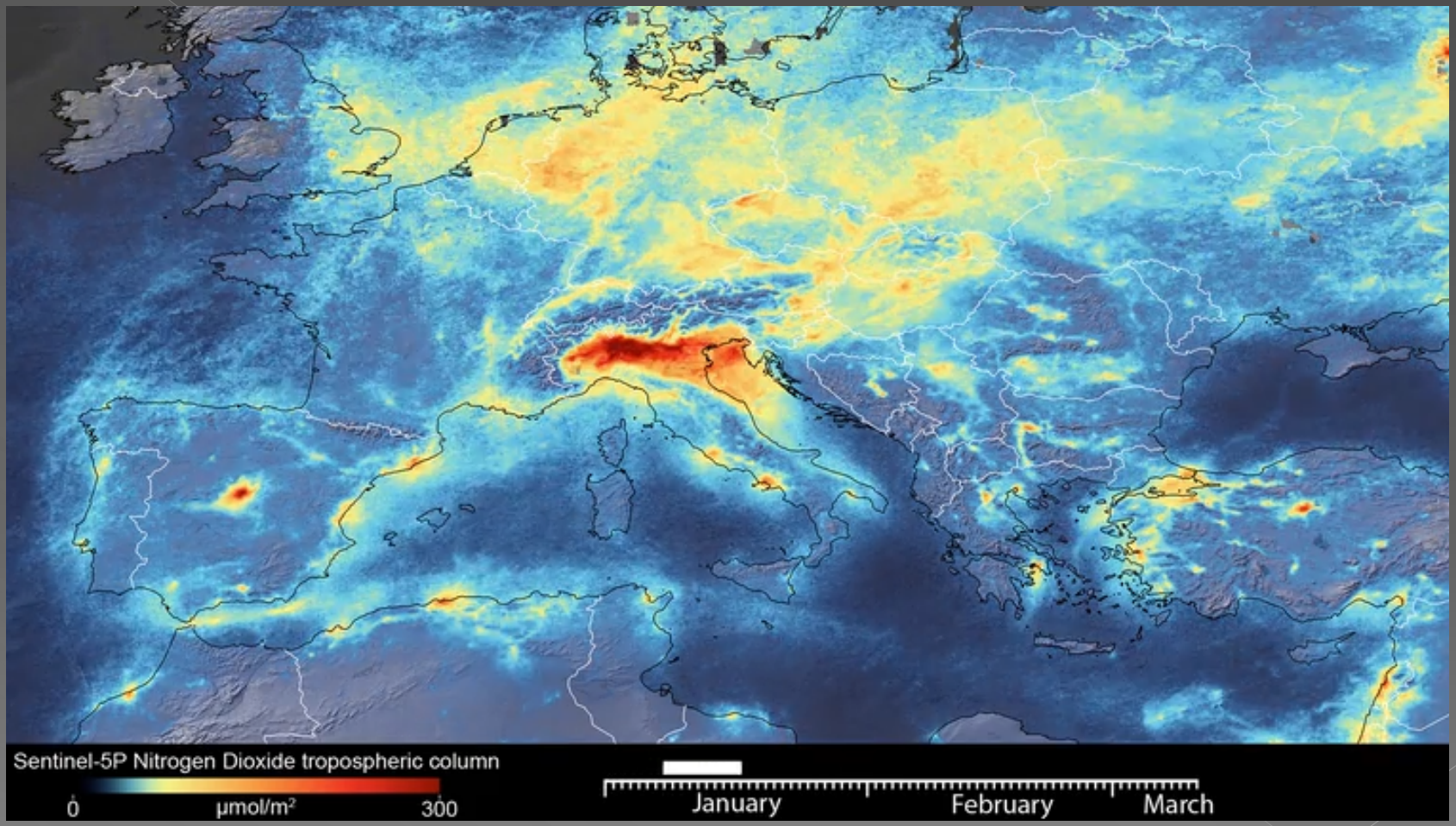
# COVID-19 cases [Europe]






$NO_2$ total column
©ESA-Sentinel 5P

# Air pollution ($NO_2$)




©ESA-Sentinel-5P

# Air pollution ($NO_2$)

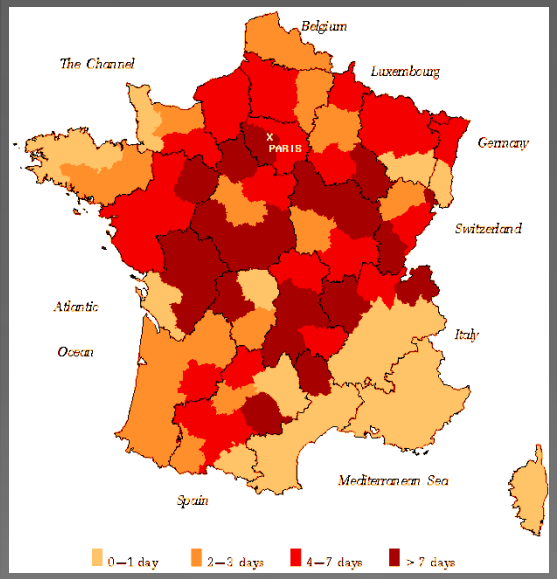
©ESA-Sentinel-5P

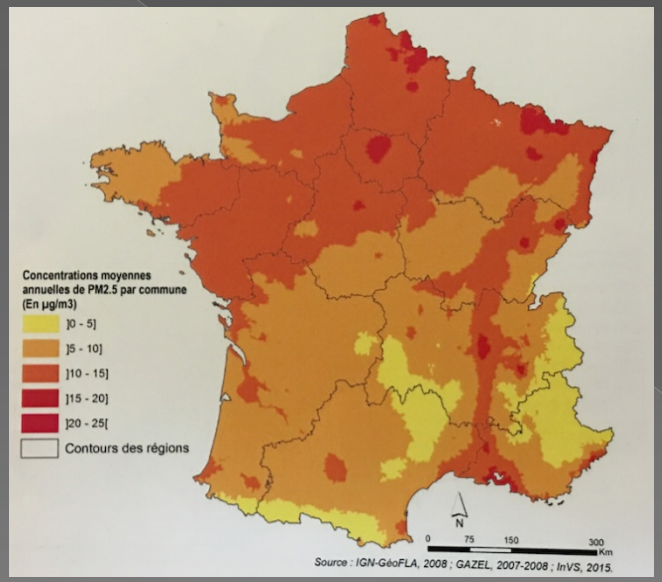
# Υπάρχει συσχέτιση μεταξύ αέριας ρύπανσης και θανάτων από τον COVID-19;

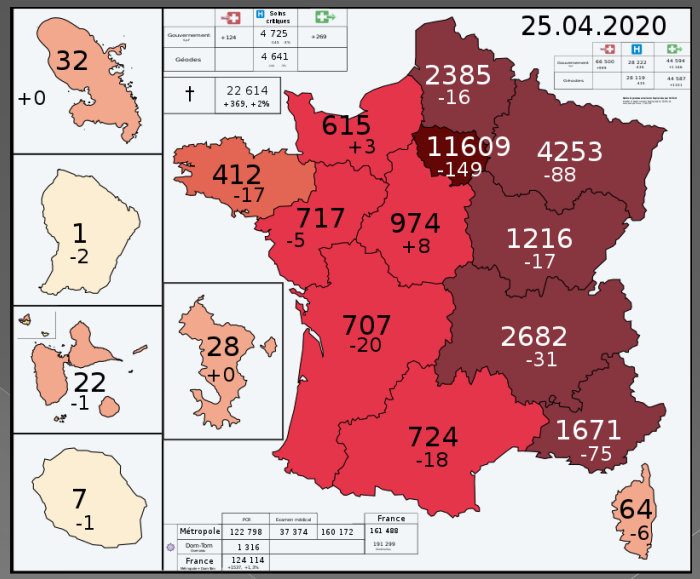
Καύσωνας + Air pollution

August 2003 France 2008

Covid-19 (25.04.2020)



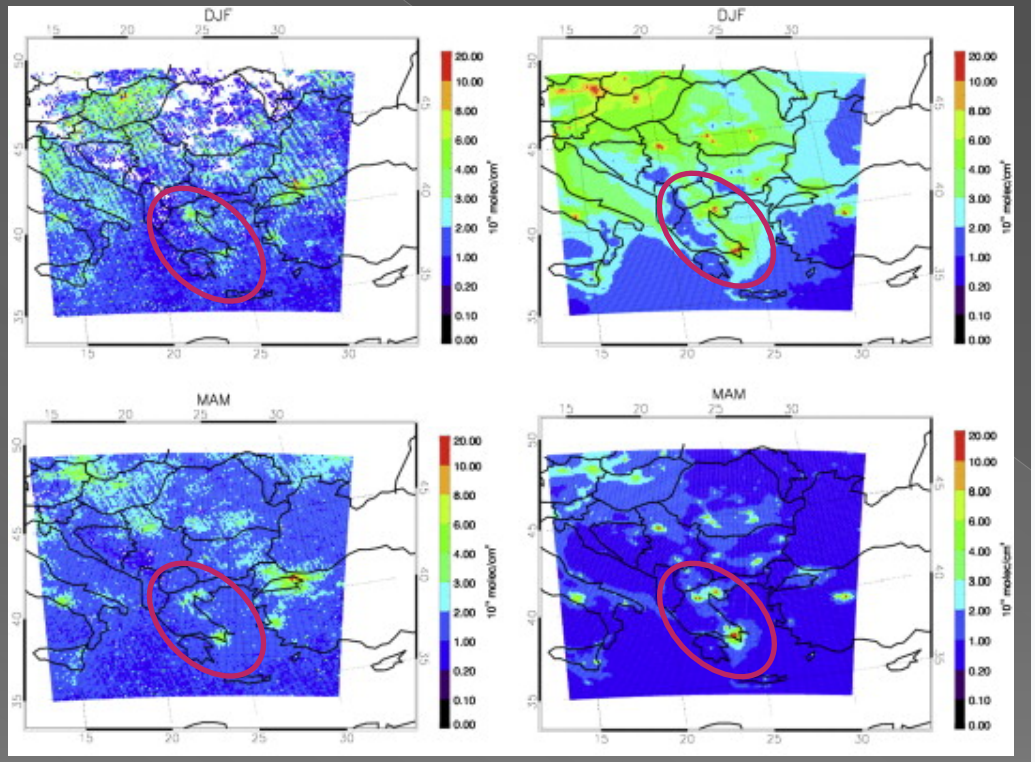




18.000 θάνατοι
70.000 θάνατοι (Ευρώπη)

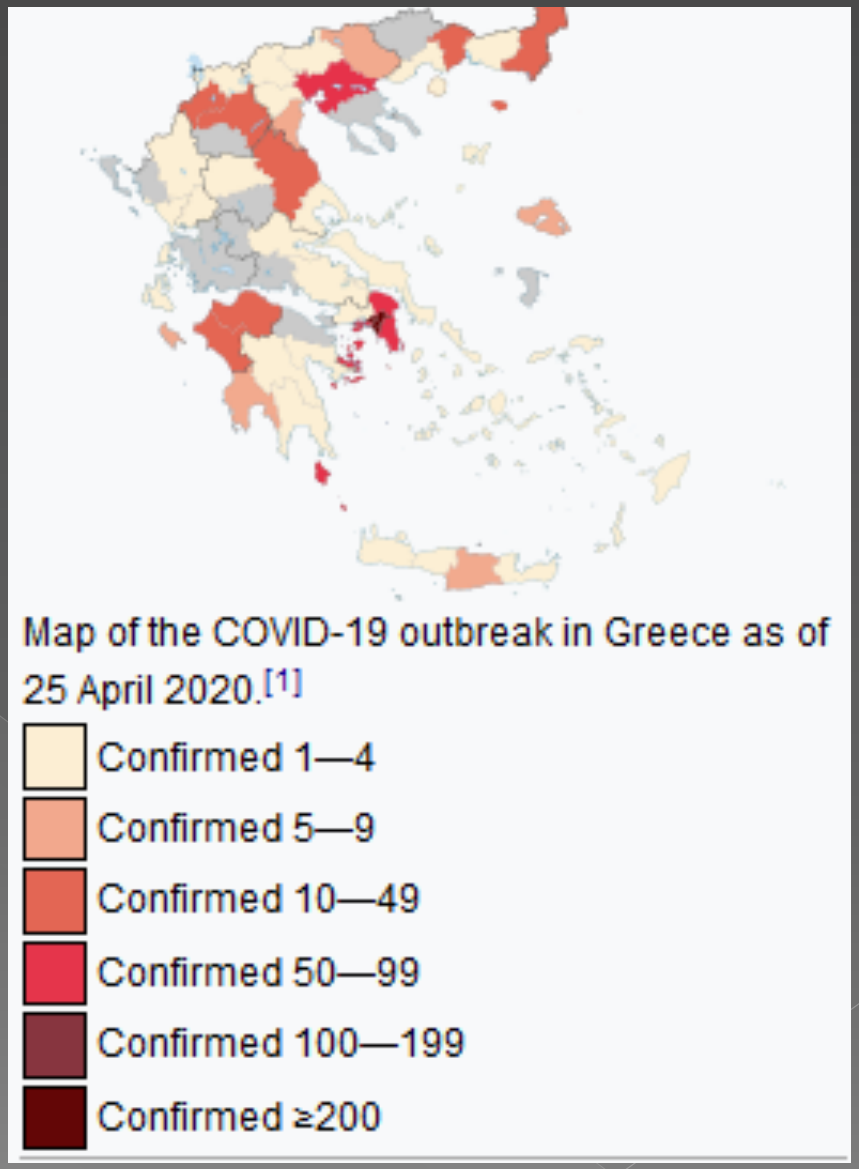
> 22.614 θάνατοι
> 100.000 θάνατοι (Ευρώπη)

Foulliet, A., et al., 2006, doi: 10.1007/s00420-006-0089-4

https://commons.wikimedia.org/w/index.php?curid=88644318

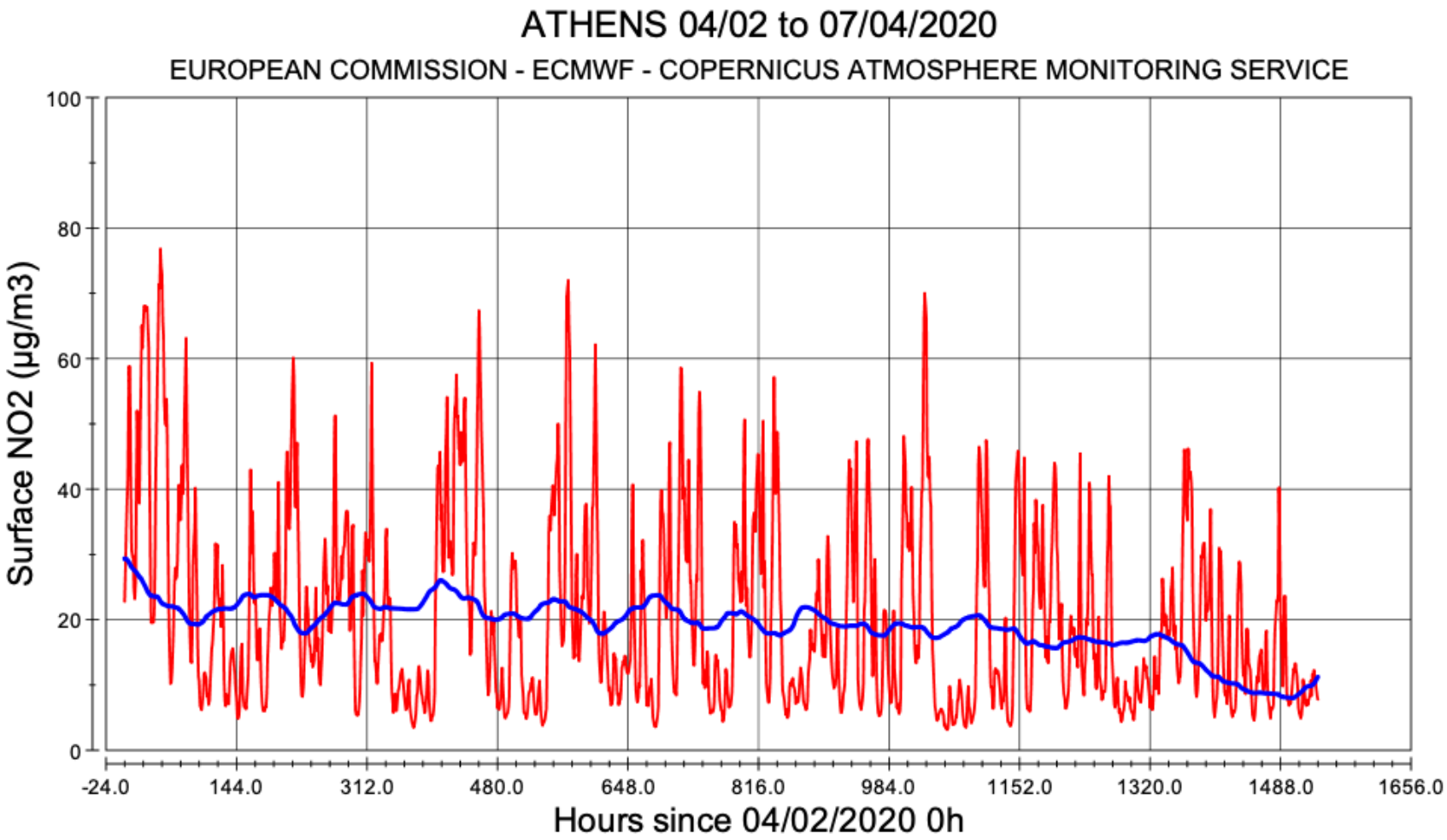


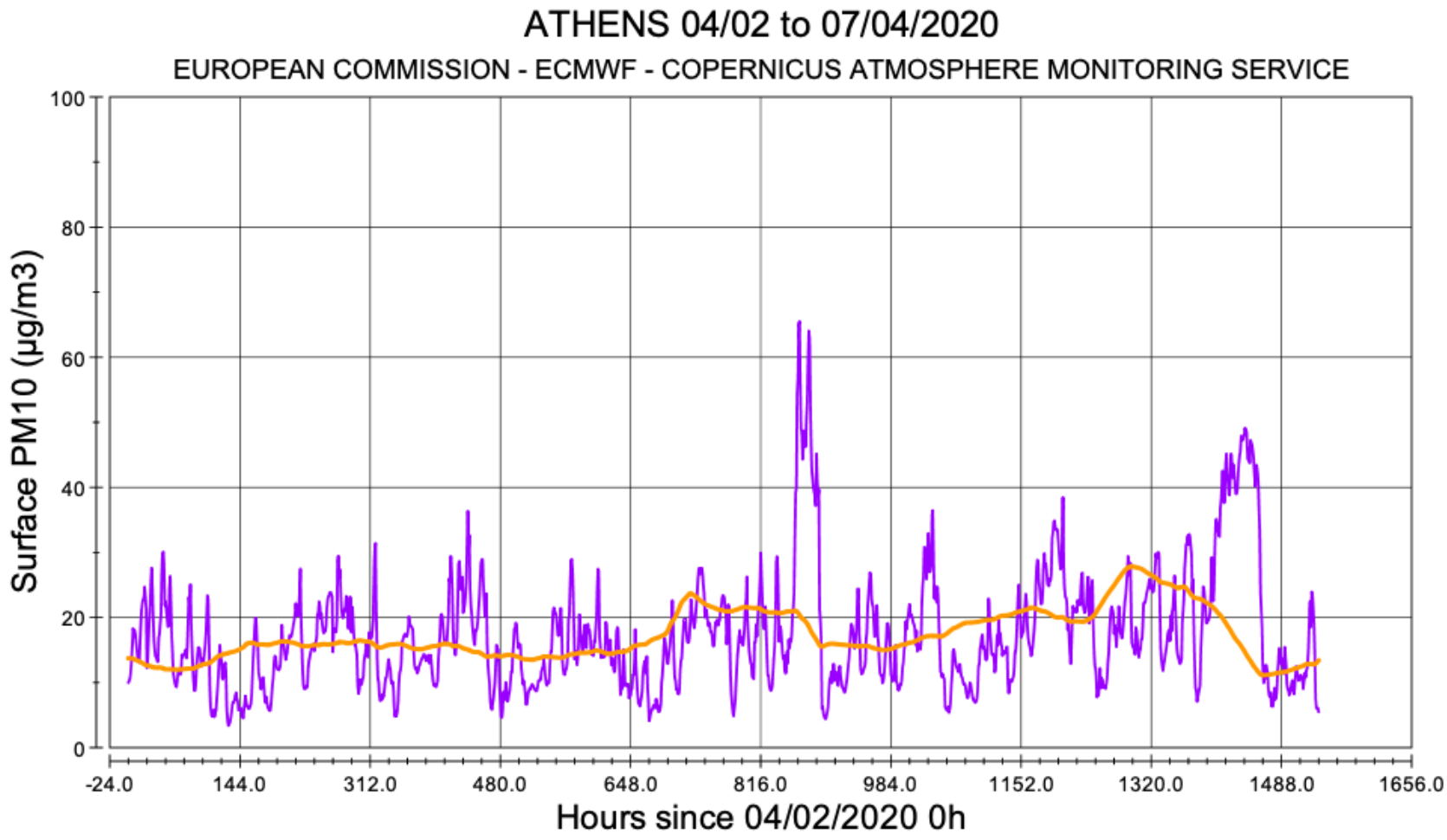

OMI Model



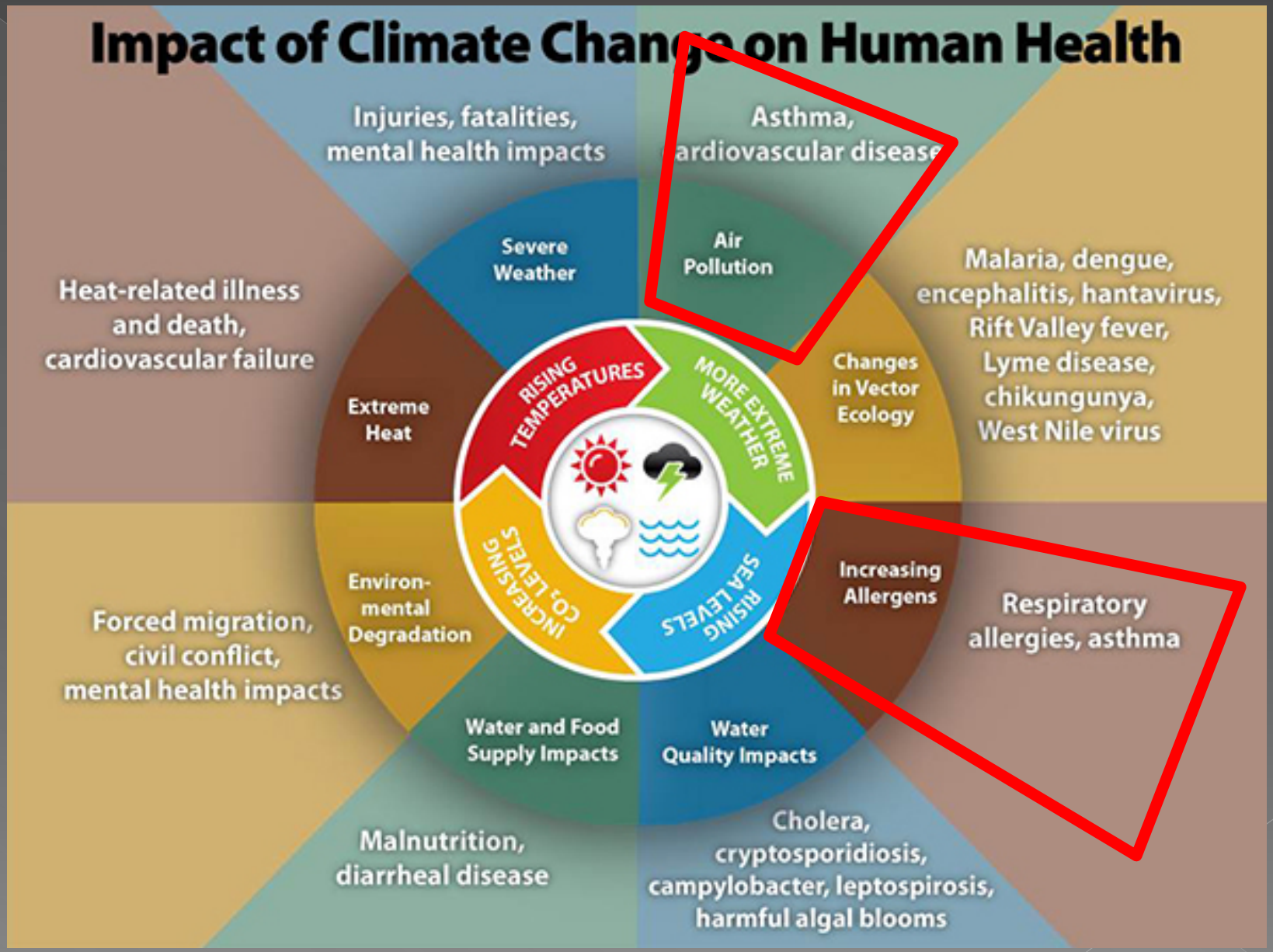

Zirichidou, I., et al., Atmos. Res., **122**, 55-66, 2013.

https://covid19.gov.gr/covid19-live-analytics/


ATHENS 04/02 to 07/04/2020
EUROPEAN COMMISSION - ECMWF - COPERNICUS ATMOSPHERE MONITORING SERVICE
Surface NO2 (µg/m3)
100
80
60
40
20
0
-24.0
144.0
312.0
480.0
648.0
816.0
984.0
1152.0
1320.0
1488.0
1656.0
Hours since 04/02/2020 0h

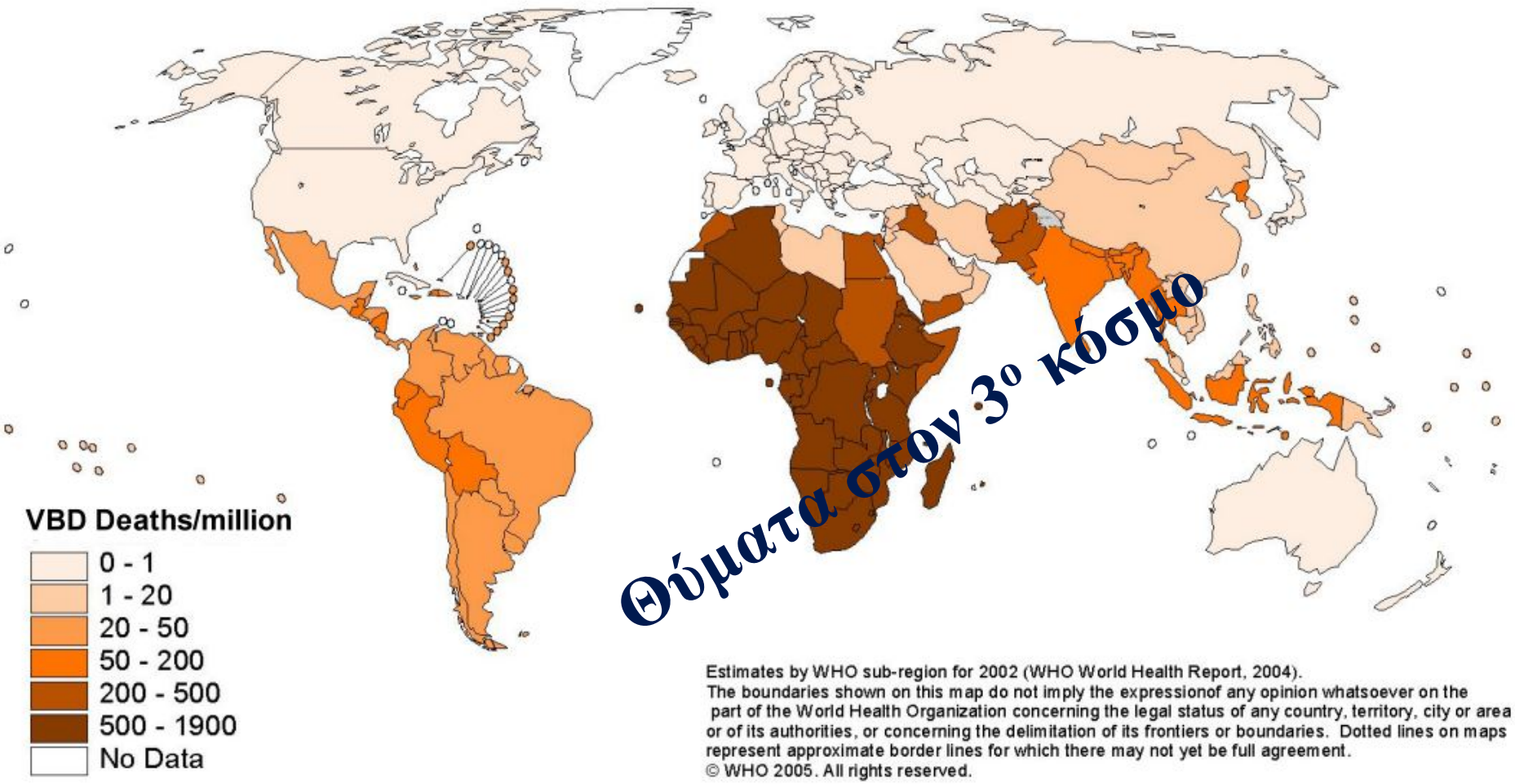

ATHENS 04/02 to 07/04/2020
EUROPEAN COMMISSION - ECMWF - COPERNICUS ATMOSPHERE MONITORING SERVICE
Surface PM10 (µg/m3)
100
80
60
40
20
0
-24.0
144.0
312.0
480.0
648.0
816.0
984.0
1152.0
1320.0
1488.0
1656.0
Hours since 04/02/2020 0h

WMO Climate Risks, Extreme Events and Related Impacts
ESTIMATED 821 MILLION UNDERNOURISHED PARTLY DUE TO DROUGHT (SOURCE: FAO)
+35 MILLION PEOPLE AFFECTED BY FLOODS (SOURCE: CRED/UNISDR)
OCEAN ACIDIFICATION IS ONGOING (SOURCE: UNESCO-IOC)
CLIMATE CHANGE THREATENS PEATLAND ECOSYSTEMS (SOURCE: UN ENVIRONMENT)
+1600 DEATHS ASSOCIATED WITH HEATWAVES AND WILDFIRES
OUT OF 883,000 INTERNAL DISPLACEMENTS, 32% ARE LINKED TO FLOODS AND 29% TO DROUGHTS (SOURCE: UNHCR)
DECREASE IN GLOBAL OCEAN OXYGEN CONTINUES
+2 MILLION PEOPLE DISPLACED BY WEATHER & CLIMATE-LINKED DISASTERS (SOURCE: IOM)



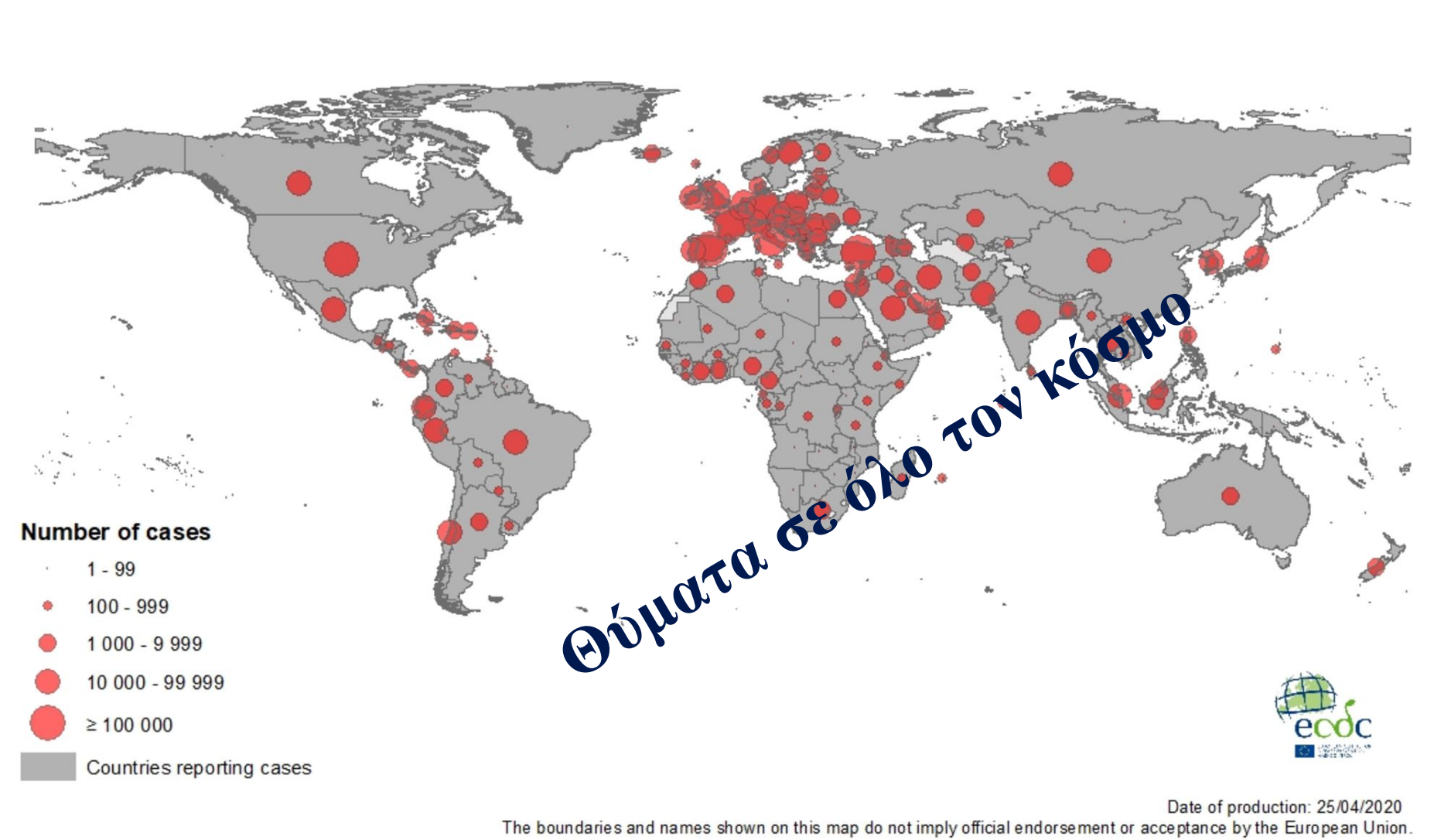

https://www.who.int/globalchange/climate/summary/en/index6.html

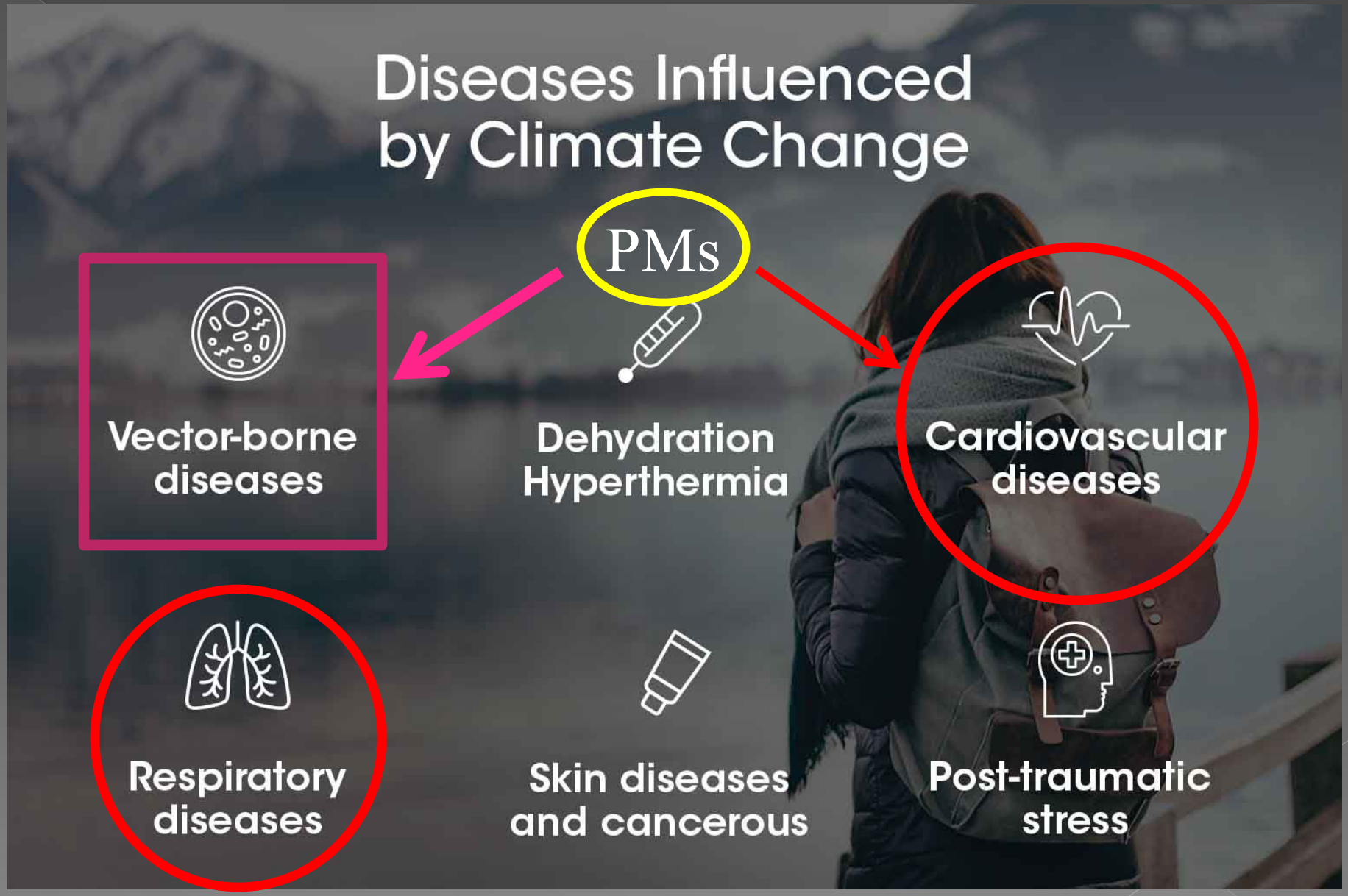
# Deaths from vector-borne disease




www.who.int

# COVID-19 cases






www.sanofi.com

# 2030 Climate Plans: no COVID-19 scenario

The second most exposed element is the plan to achieve either 40% or more than 50% GHG emissions reduction targets compared to 1990 levels by 2030. **The European Commission's Climate Plan aims at defining mandatory trajectories over the next three decades (2030-2040-2050).**

**There is, however, an urgent need for including in the modelling exercise the implications of a global sanitary-economic crisis of the magnitude of COVID-19.**

The European Commission must define new scenarios that include lower industrial outputs, crises in strategic sectors (i.e. aviation, automobile, tourism, etc.), lower carbon prices and other fundamental, socio-demographic developments which would result from a potential 5-year long recession.

The recent Climate Action Plan inception assessment is a perfect opportunity to consider recession scenarios and their societal implications.

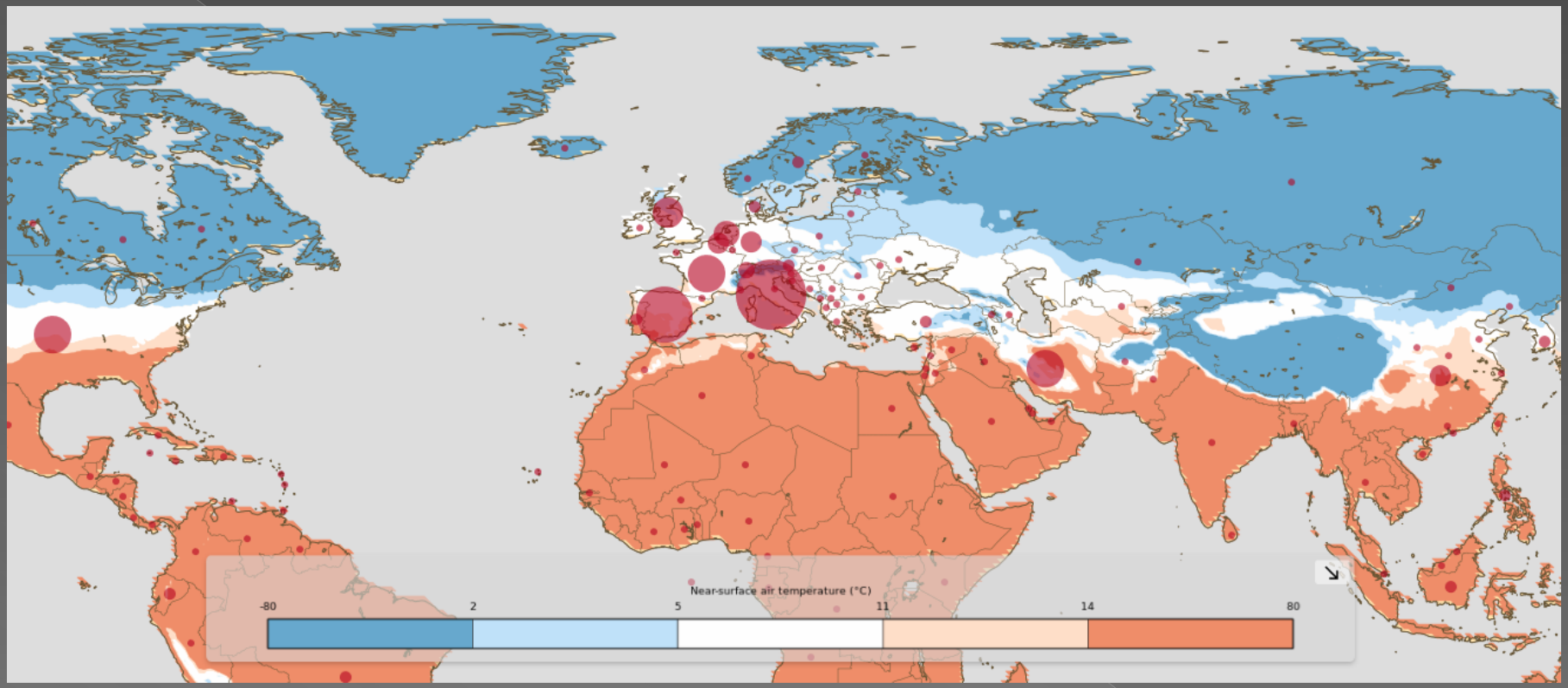
https://www.cerre.eu/news/covid-19-crisis-crash-test-eu-energy-and-climate-policies

CAMS is continually monitoring air quality in Europe and around the world using satellite and ground-based observations and advanced numerical models. In the context of the worldwide COVID-19 crisis, there is increased interest in changing air quality.
The main reasons are:
air quality, being partly determined by emissions of pollutants from human activities (and partly by changes in weather), is an indicator of the level of these activities. In situations of prolonged lockdown and over time, the expectation is that average levels of air pollution will go down.
COVID-19 is an infectious respiratory disease and air quality (including pollens) affects respiratory health. Therefore, air quality information is especially important during this period.

There is a debate among the epidemiological research community as to whether the **virus SARS-CoV-2 (coronavirus) can remain viable on aerosols for three hours or more. Our data can support this research by providing information about the distribution and evolution of fine particulate matter just above the surface**

CAMS, Copernicus, EU

# COVID-29 και Θερμοκρασία




Should a solid relation between virus spread and weather be confirmed, having information about the expected climate conditions for the coming month would help inform the governments about the most suitable interventions

# COVID-19 και ΠΚΑ

PAPER 1 (Neeltje van Doremalen, et al., NEJM, 18.04.2020) [not peer reviewed yet]

At present, it is not established that air pollution could play a role in the spread of SARS-CoV-2 (coronavirus). A study was published on 17 March 2020 (https://www.nejm.org/doi/10.1056/NEJMc2004973), indicating that in lab experiments, the virus can remain viable on an aerosol surface for three hours. To what extent this happens in the real world is being investigated by epidemiologists.
Air pollution, including pollens, can affect cardio-pulmonary health and immune responses. It is currently uncertain whether there are co-mortality or co-morbidity factors between air pollution and the development and severity of COVID-19 in patients. Active research is developing on this topic as well, and findings from the medical community will be shared here as they become available.

PAPER 2 (Setti et al., 2020, MedRxiv (not peer reviewed yet)
www.medrxiv.org/content/10.1101/2020.04.15.20065995v2.full.pdf

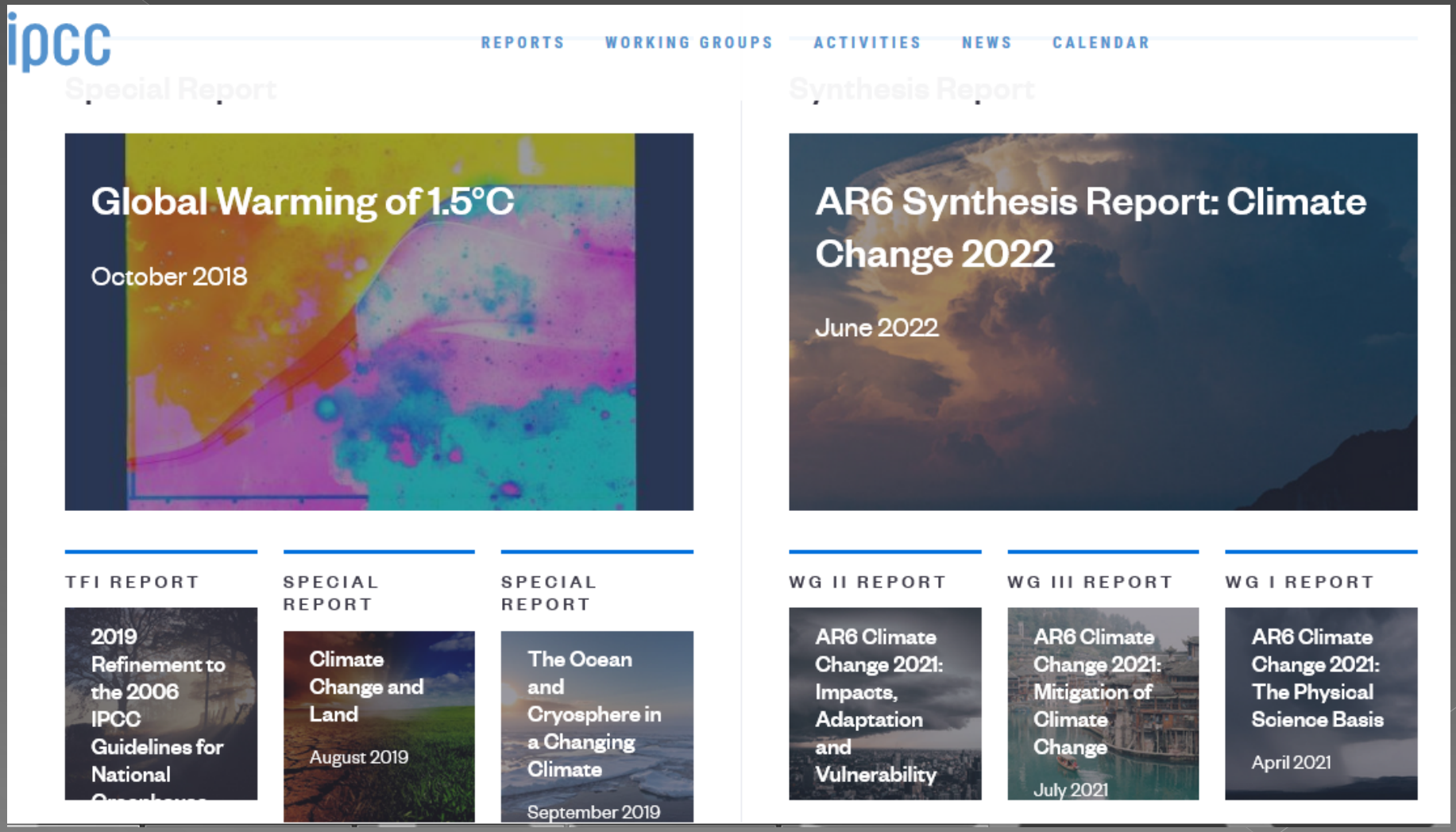
"We can confirm to have reasonably demonstrated the presence of SARS-CoV-2 viral RNA by detecting highly specific RtDR gene on 8 filters in two parallel PCR analyses. This is the first preliminary evidence that SARS-CoV-2 RNA can be present on outdoor particulate matter, thus suggesting that, in conditions of atmospheric stability and high concentrations of PM, SARS-CoV-2 could create clusters with outdoor PM and, by reducing their diffusion coefficient, enhance the persistence of the virus in the atmosphere."

# Θεμελιώδη Ερωτήματα για μετά την COVID-19 εποχή

1. Η διεθνής κινητοποίηση και η όποια αλληλεγγύη υπήρξε μεταξύ των κρατών στην εποχή του COVID-19, μπορεί να αποτελέσει προηγούμενο για τη συνεργασία των κρατών στην εφαρμογή μέτρων για τον μετριασμό της ΠΚΑ;

2. Η πολιτική των κρατών μετά την περίοδο της «επόμενης ημέρας» του COVID-19 θα είναι φιλικότερη προς το περιβάλλον και την ανθρώπινη υγεία;

- Μείωση εκπομπών σωματιδίων και αερίων που προκαλούν αναπνευστικά και καρδιολογικά προβλήματα σε πυκνοκατοικημένες αστικές περιοχές του πλανήτη [μεταφορές, βιομηχανική δραστηριότητα, νέες τεχνολογίες, ΑΠΕ, κλπ.],
- Μείωση των μετακινήσεων σε πλανητική κλίμακα (μαζικός τουρισμός, συνέδρια)
- Οικονομική ανάκαμψη (με ποιό κόστος και ποιές ενέργειες;)
- Αντιμετώπιση της ανεργίας
- Μείωση/ανακύκλωση απορριμμάτων,
- Εκμετάλλευση φυσικών πόρων (ορυκτά καύσιμα, μεταλλεύματα, υδάτινα αποθέματα, κλπ.)


ipcc
REPORTS
WORKING GROUPS
ACTIVITIES
NEWS
CALENDAR
Special Report
Synthesis Report
Global Warming of 1.5°C
October 2018
AR6 Synthesis Report: Climate Change 2022
June 2022
TFI REPORT
2019 Refinement to the 2006 IPCC Guidelines for National
SPECIAL REPORT
Climate Change and Land
August 2019
SPECIAL REPORT
The Ocean and Cryosphere in a Changing Climate
September 2019
WG II REPORT
AR6 Climate Change 2021: Impacts, Adaptation and Vulnerability
WG III REPORT
AR6 Climate Change 2021: Mitigation of Climate Change
July 2021
WG I REPORT
AR6 Climate Change 2021: The Physical Science Basis
April 2021

https://www.dw.com/en/living-planet-mapping-the-link-between-covid-19-and-air-pollution/av-53217333

7 min

https://www.youtube.com/watch?v=0XhzBSMBpuY

8 min

# Selected videos

https://www.youtube.com/watch?v=gOf5FFqe0Y4
https://www.youtube.com/watch?v=fNjyfLz9UMM
https://www.youtube.com/watch?v=y4BgmS-WqJM