

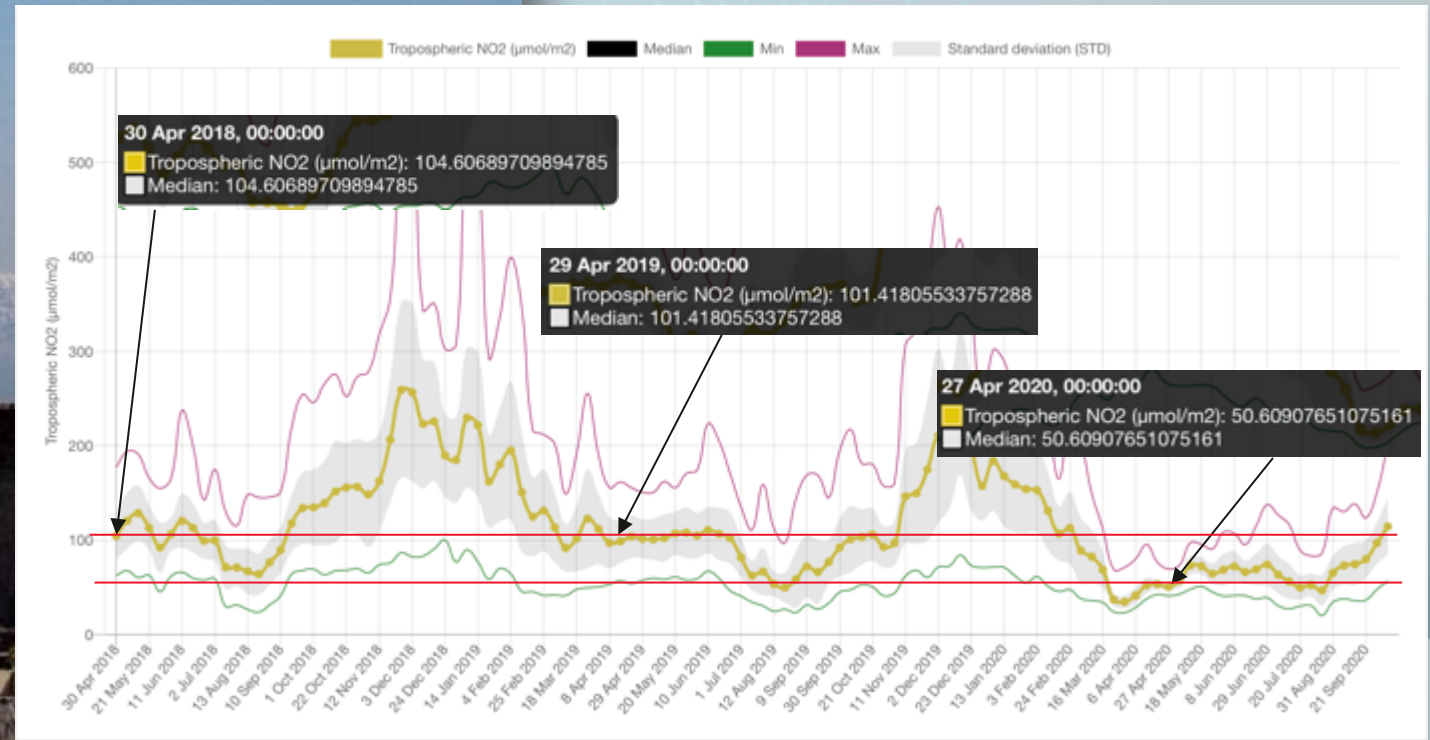
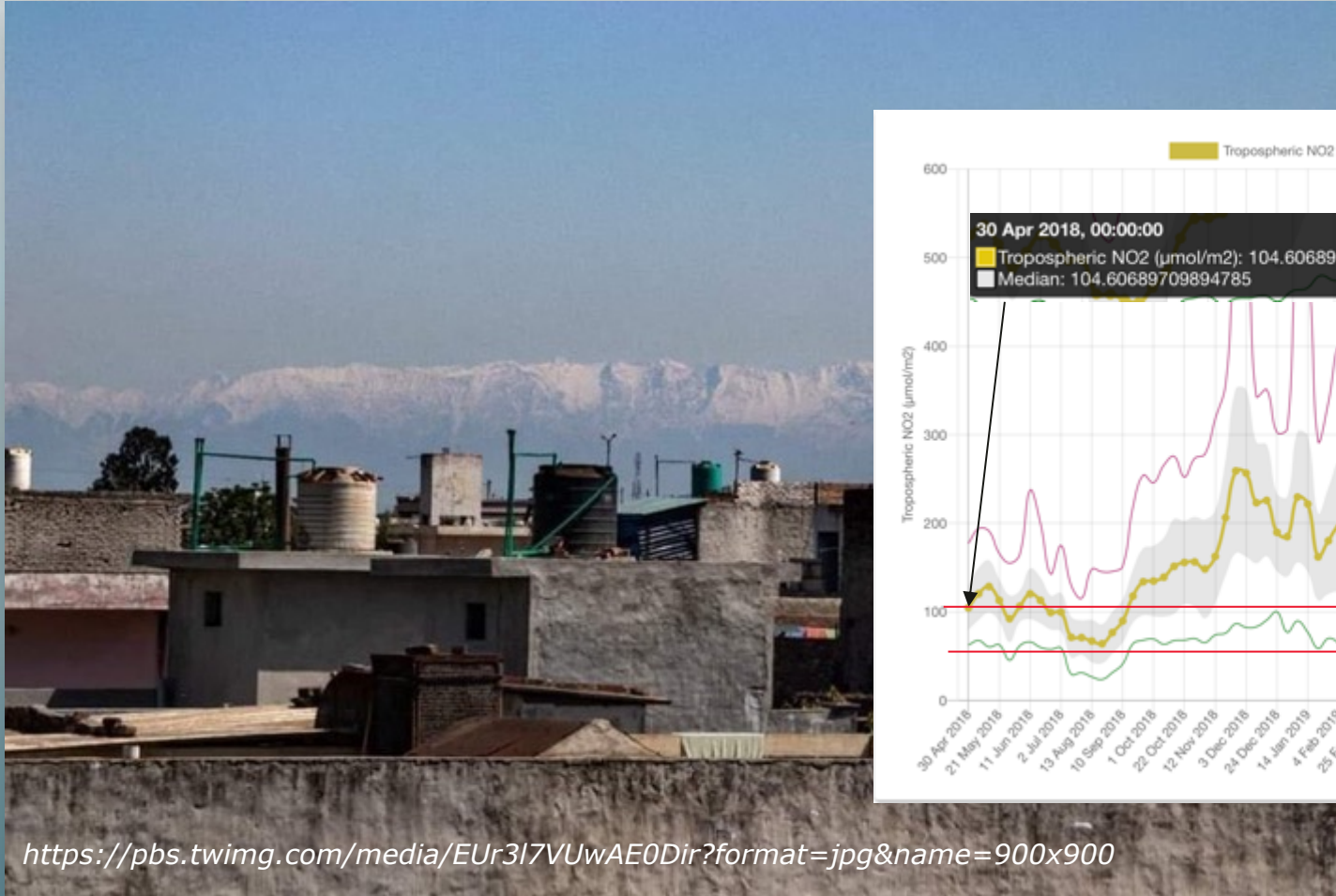


Rapid Action on COVID-19 and EO

Anca Anghelea, 03 November,
Space for Intelligent Health Workshop

Effects of policy measures during COVID-19 pandemic

After decades, peaks of the Himalaya clearly visible from areas ~300 km away in northern India and Nepal.



<https://pbs.twimg.com/media/EUR3l7VUwAE0Dir?format=jpg&name=900x900>

Rapid Action on Covid-19 and EO

Joint initiative of ESA and EU

race.esa.int

WHAT

Communicate the effects of the lockdown on the environment and the economy

HOW

EO data from Copernicus Sentinels and Third Party Missions

WHEN

Rapid delivery: from idea to launch in 2 months

WHO

Made in Europe, by ESA & EU industry, on EO Platforms leveraging AI4EO



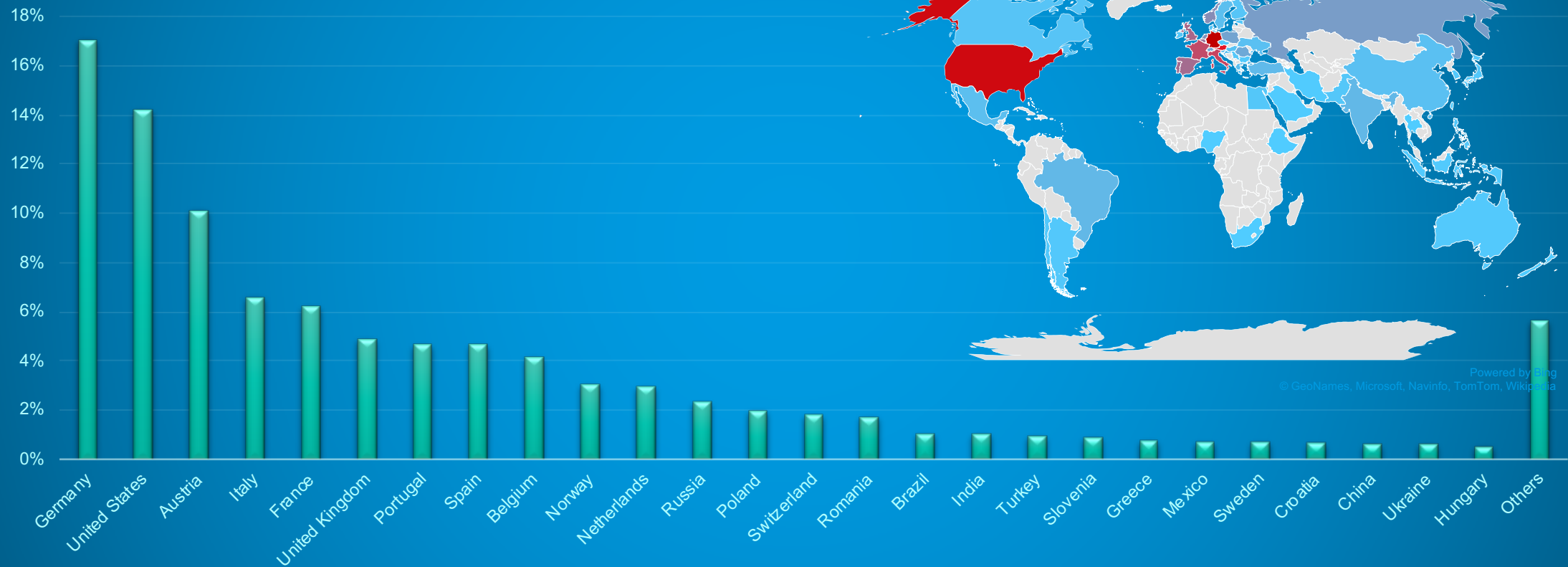
Global observations attract global reach



Total visits ~ 103.100

% of total visits

% of total visits



Powered by Bing
© GeoNames, Microsoft, Navinfo, TomTom, Wikipedia

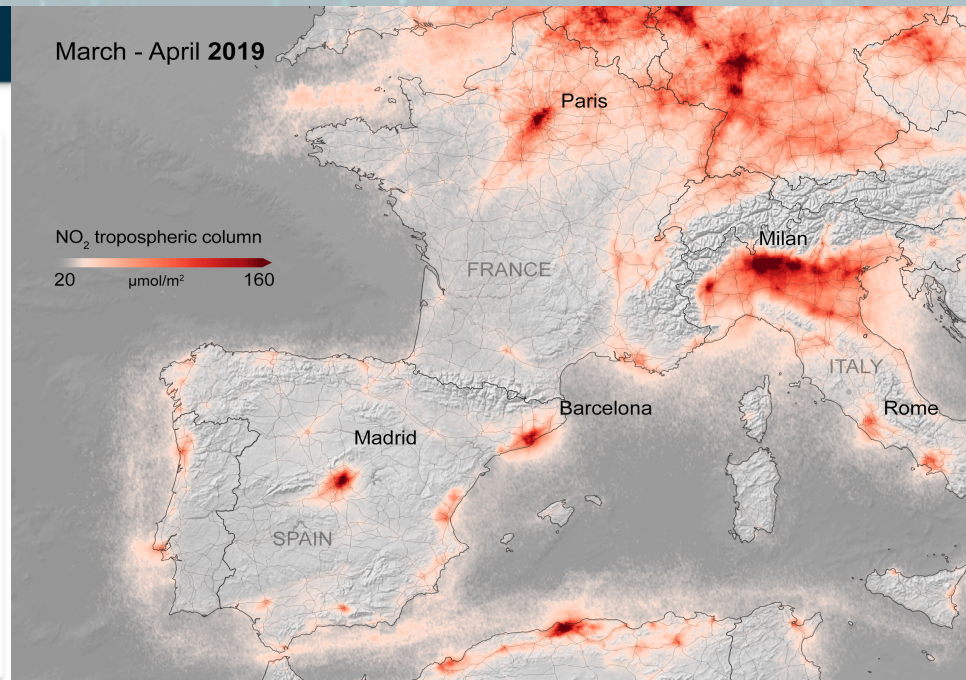
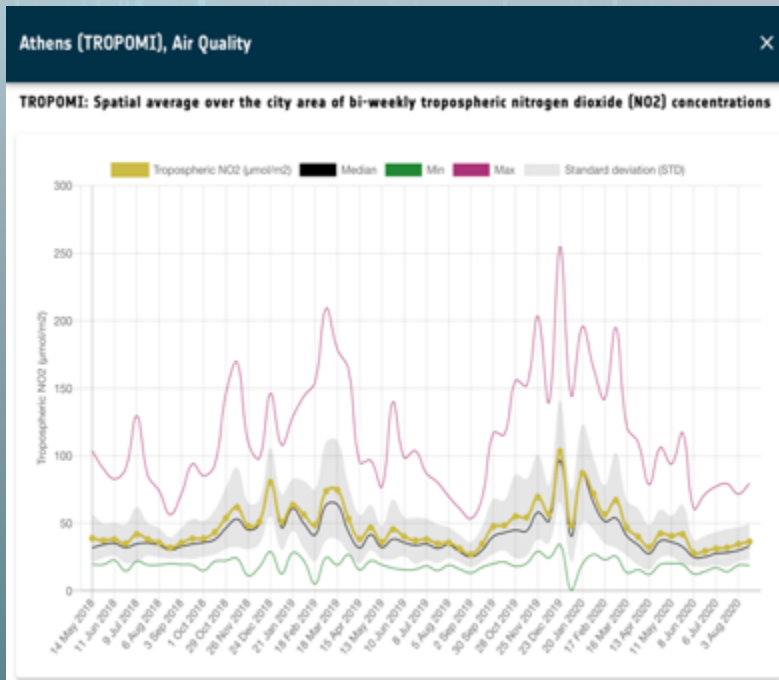


- **Distribution** - frequency and pattern of health events in a population.
- **Determinants** - causes and other factors that influence the occurrence of health-related events.
- **Specified populations** - the collective health of people in a community or other area and the impact of health events on that population.
- **Application** - data from scientific methods of descriptive and analytic epidemiology for directing public health action : planning how to control and prevent disease in the community.



SENTINEL-5p TROPOMI – Air Quality, Stratospheric Ozone Layer and Climate Change Monitoring and Forecasting. The climate change theme is relevant to the Copernicus Climate Change Service (C3S).

Measurements from the TROPOMI instrument on the Copernicus Sentinel-5P are being used to map air pollution worldwide.

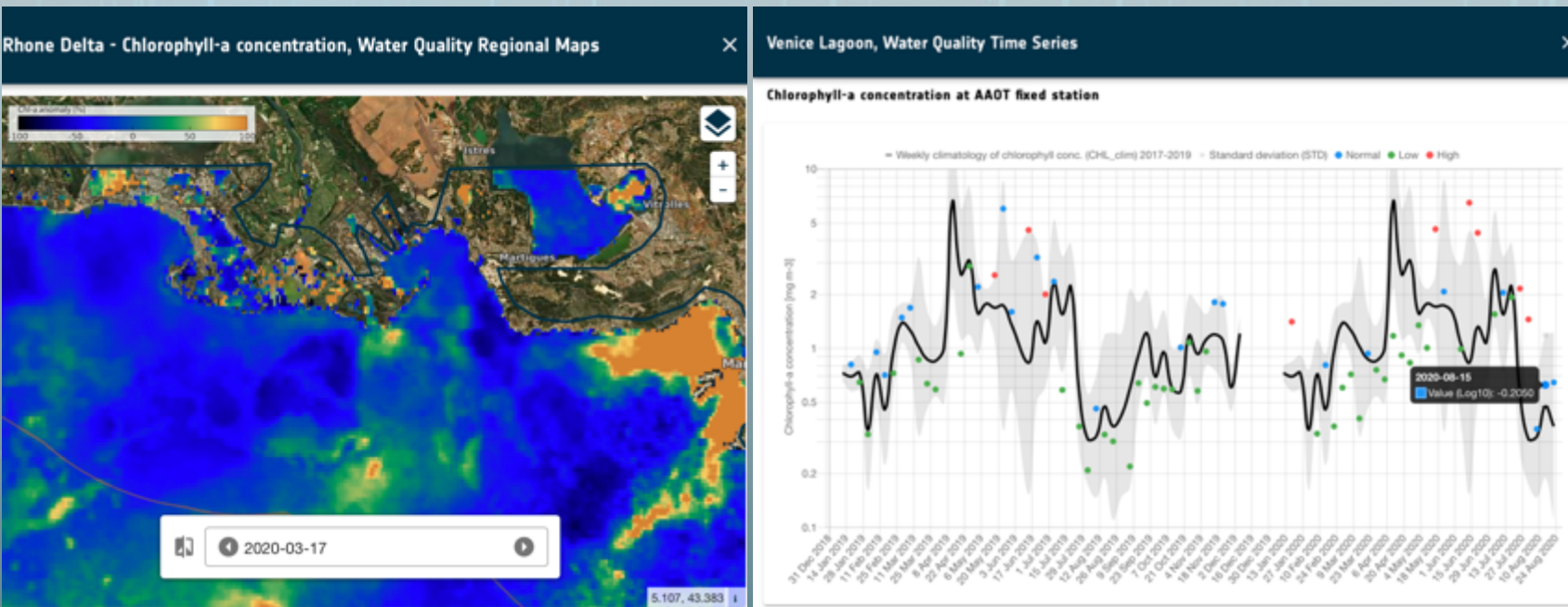


The NO₂ concentrations vary from day to day due to changes in the weather (such as wind speed, cloudiness, etc).

Combined data over a specific period of time (e.g. over 14 days) partially averages out meteorological variability, making it more clearly visible how human activity affects the NO₂ levels.

SENTINEL-3 – to measure sea surface topography, sea and land surface temperature, and ocean and land surface colour

Monitoring the deviation from a climatological mean of Chlorophyll-a concentration provides information about the effects of natural factors and human activities on inland and coastal water quality

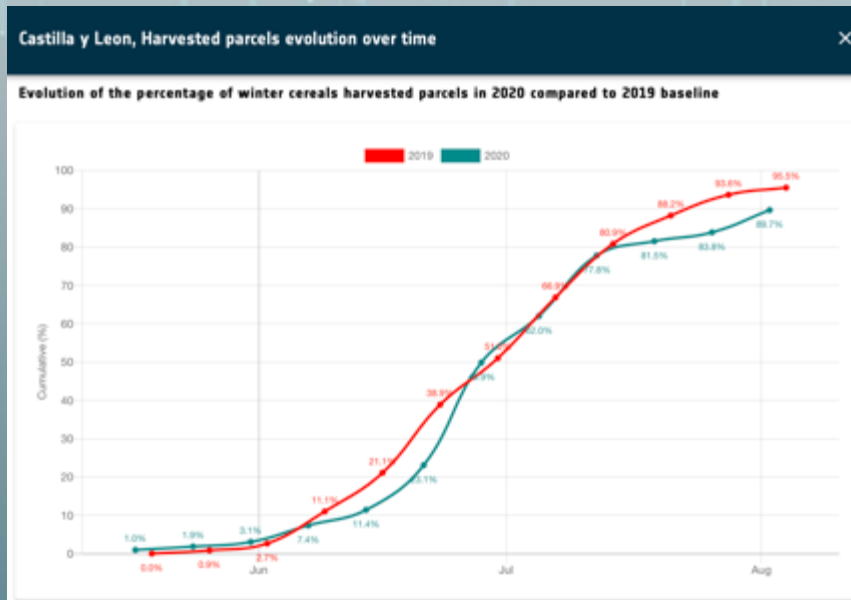
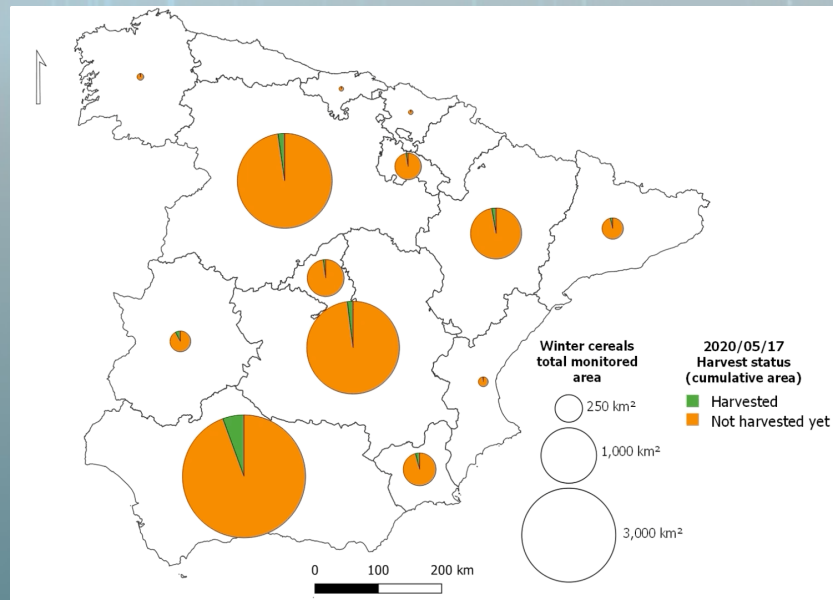


- **Green dots** : weekly values lower than the climatological mean (black), good water quality.
- **Blue dots** : weekly values greater than the climatological mean but still inside the climatological variability, regular water quality.
- **Red dots** : values beyond the climatological variability, poorer water quality.

Risks to Global Food Security and Health

The pandemic poses several major threats to food availability (adequacy of the supply of food) and stability (can accessibility of food at all times for people).

- **Agricultural production – large scale mechanisation difficult for nonstaple foods**
 - Although farmers in poorer countries are generally younger than in rich countries, health systems are usually weaker, and preexisting health challenges may increase people's vulnerability to COVID-19.



Impact on labour intensive harvesting of **vegetables & fruits** (Germany-Spain)

Verification of delay or disruption of **winter crop** harvesting in Spain at national scale

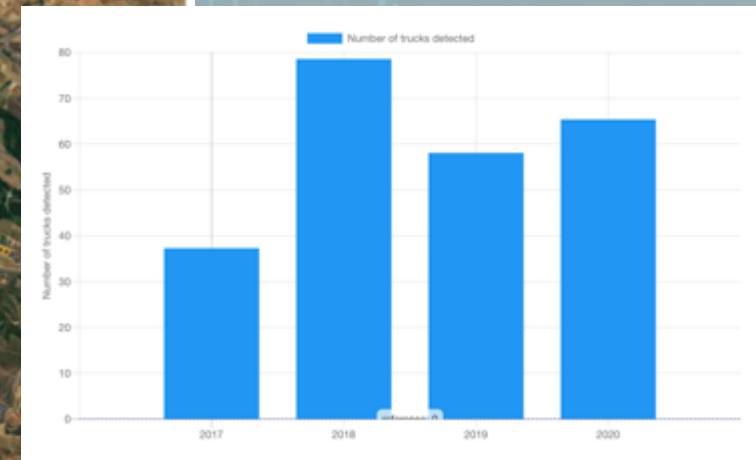
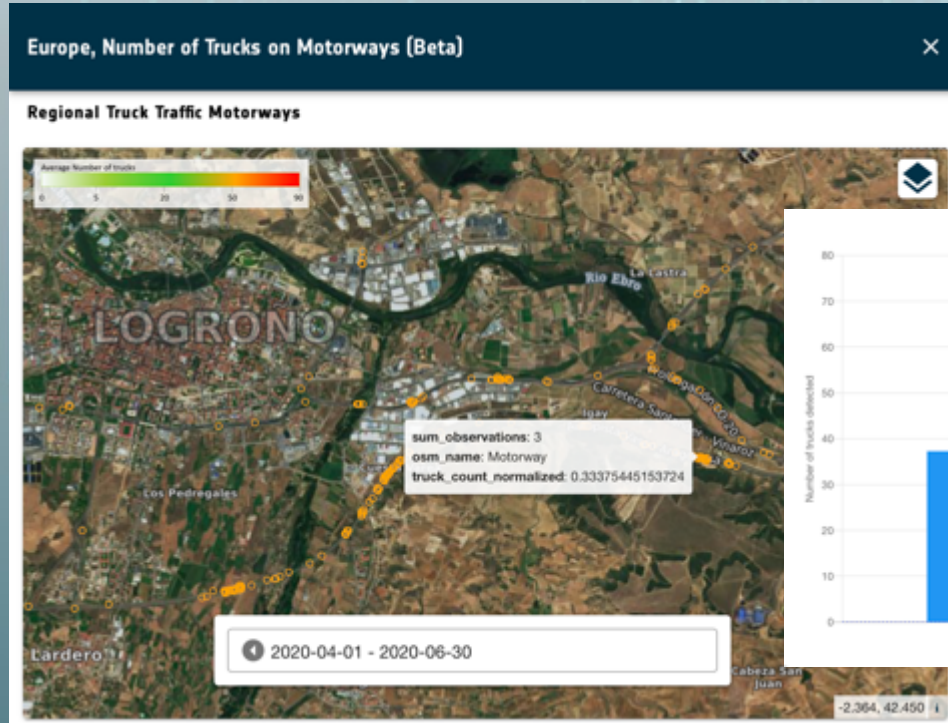
Goal: Monitoring the impact of lock-down, border closures & transport restriction on food production and supply chains

Winter cereals monitored over Spain during 2020. The size of the circles represent the monitored productive area of winter cereal. Scientists from the Université catholique de Louvain, Belgium, used data from the Copernicus Sentinel-1 and 2 missions, and machine learning to monitor the crops on a weekly basis.

Risks to Global Food Security and Health

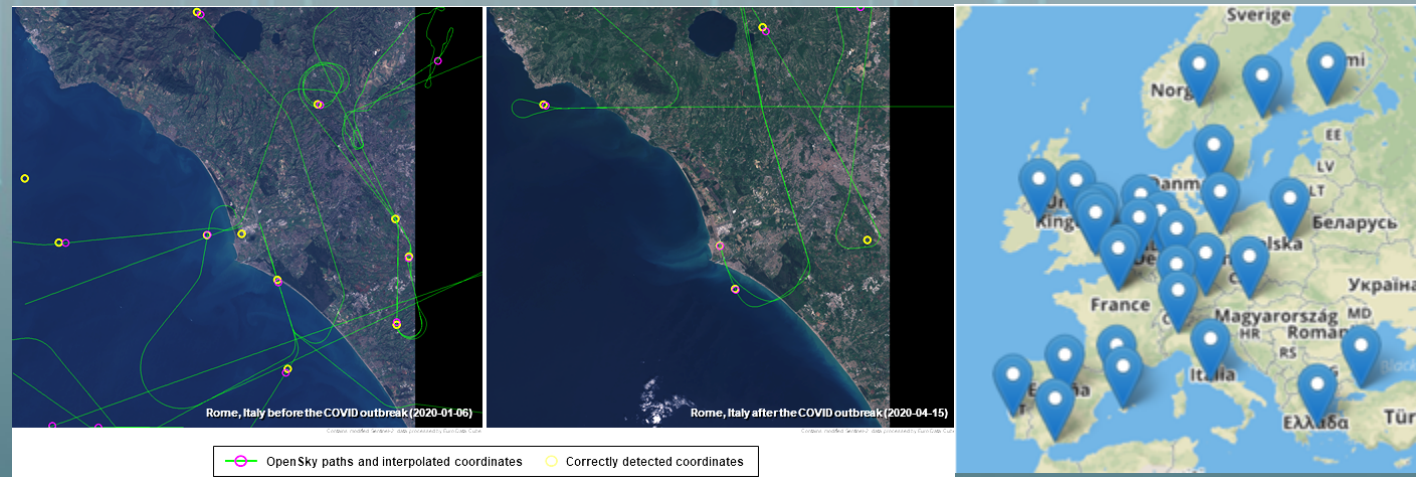
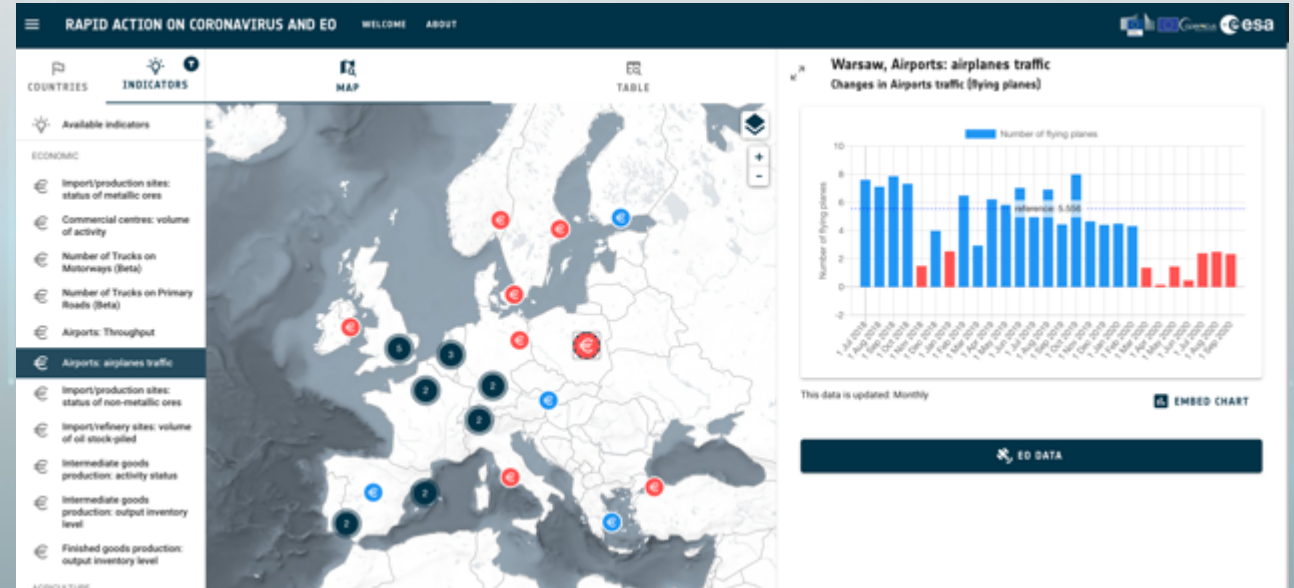
- **Supply chain disruptions & trade restrictions**

- impacts on food distribution in low-income countries tend to be worse for tens of millions of informal small- and medium-sized food-sector operations. These are typically labor intensive, with many people having to work close together in dense areas and crowded marketplaces, where the risk of COVID-19 transmission is extremely high, while social distancing measures directly affect the operation of food businesses and markets.



- Information on international mobility can shed light on the
 - when and where** of the health-event:
 - Track unusual temporal and spatial occurrences
 - How the disease spreads
 - Effectiveness of containment strategies**
 - Cascade economic effects**

Detection of flying airplanes in Sentinel-2 imagery using ML



More research is needed to understand: how environmental conditions impact the COVID-19 pandemics & how COVID-19 related policy measures affect the environment

statistics relating air pollution to the number of positive cases, deaths or mortality rate do not capture the complexity of the seeding and spreading dynamics sufficiently

Is COVID-19 spread dependent on weather conditions?

Less than 1 year of COVID-19 observation of cases in Europe: conclusions on seasonal variability cannot be made at this stage.

Does long-term exposure to air pollution play a role in the outcomes of COVID-19 for those infected?

The significance of the impact of environmental conditions on the COVID-19 pandemic has still not been established

<https://ec.europa.eu/jrc/en/science-update/do-environmental-factors-influence-covid-19-outbreaks>

Open EO Science contributing data relevant for Health



- Continuous updates in collaboration with industrial and institutional partners
- Expansion at global level with partnering agencies (NASA, JAXA) : richer data, more frequent observations, more reliable models
- Continue to provide updates through recovery stages

68
ECONOMIC
€

28
AGRICULTURE
🌿

36
ENVIRONMENT
🌍

31
COMPANIES

race.esa.int



<https://race.esa.int>

Anca.anghelea@esa.int