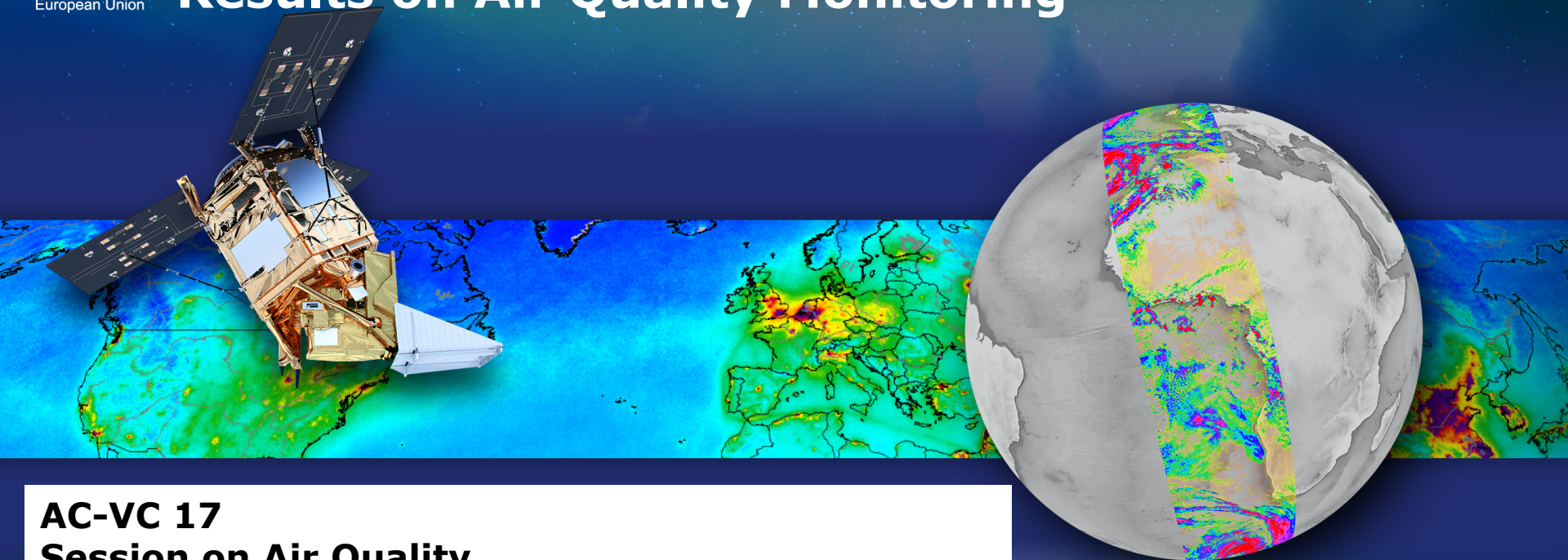




European Union

# Sentinel-5p Precursor Mission - Recent Results on Air Quality Monitoring



**AC-VC 17**

**Session on Air Quality**

**C. Zehner/ESA – Sentinel-5P, ALTIUS, and FLEX Missions Manager**

# Sentinel-5 Precursor: first atmospheric Sentinel Mission



- **Launched:** 13 October 2017, Plesetsk
- **Launcher:** Rocket
- **Main Payload:** TROPOMI (co-funded by The Netherlands and ESA) - Hyper-spectral push-broom imaging spectrometer, 4 spectrometers with 2D detectors with 4000 spectral channels
- **Orbit:** Altitude of 820 km, 227 orbit repeat cycle
- **Daily Global Coverage:** 13:30 ascending node crossing time
- **Spatial Sampling:** in nadir 5.5 x 3.5 km, 24 million ground pixels per day
- **Mission Control:** ESOC
- **TROPOMI Mission Planning:** KNMI
- **Ground Stations:** Svalbard and Inuvik
- **Operational Data Processing:** DLR
- **Mission Design Life Time:** ~7 years
- **Mission Objective:** provide measurements for Ozone, Air Quality, and Climate Monitoring and Forecasting



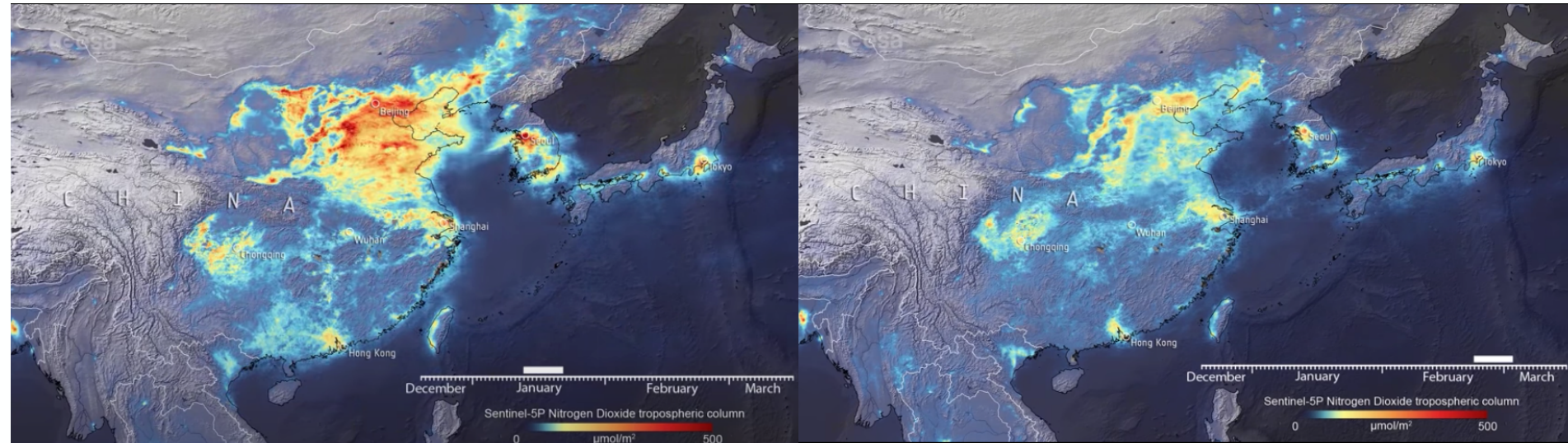


# COVID-19 impact as 'seen' by Sentinel-5P



[https://www.esa.int/Applications/Observing\\_the\\_Earth/Copernicus/Sentinel-5P/COVID-19\\_nitrogen\\_dioxide\\_over\\_China](https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-5P/COVID-19_nitrogen_dioxide_over_China)

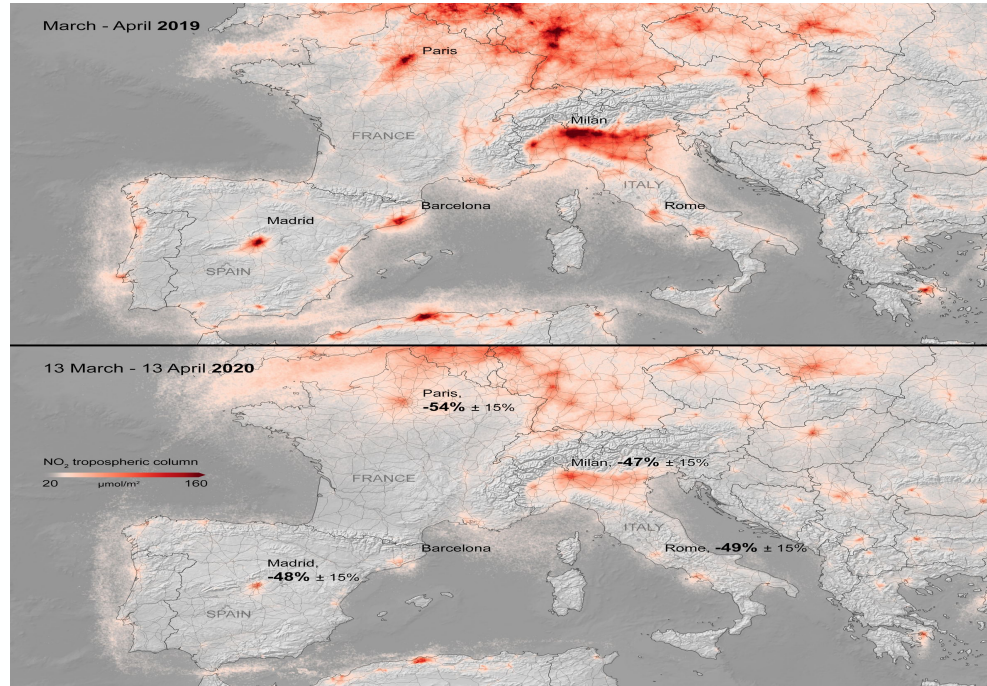
Nitrogen Dioxide concentrations over China – ESA Webportal story issued during March 2020



# COVID-19 impact as 'seen' by Sentinel-5P



[http://www.esa.int/Applications/Observing the Earth/Copernicus/Sentinel-5P/Air pollution remains low as Europeans stay at home](http://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-5P/Air_pollution_remains_low_as_Europeans_stay_at_home)

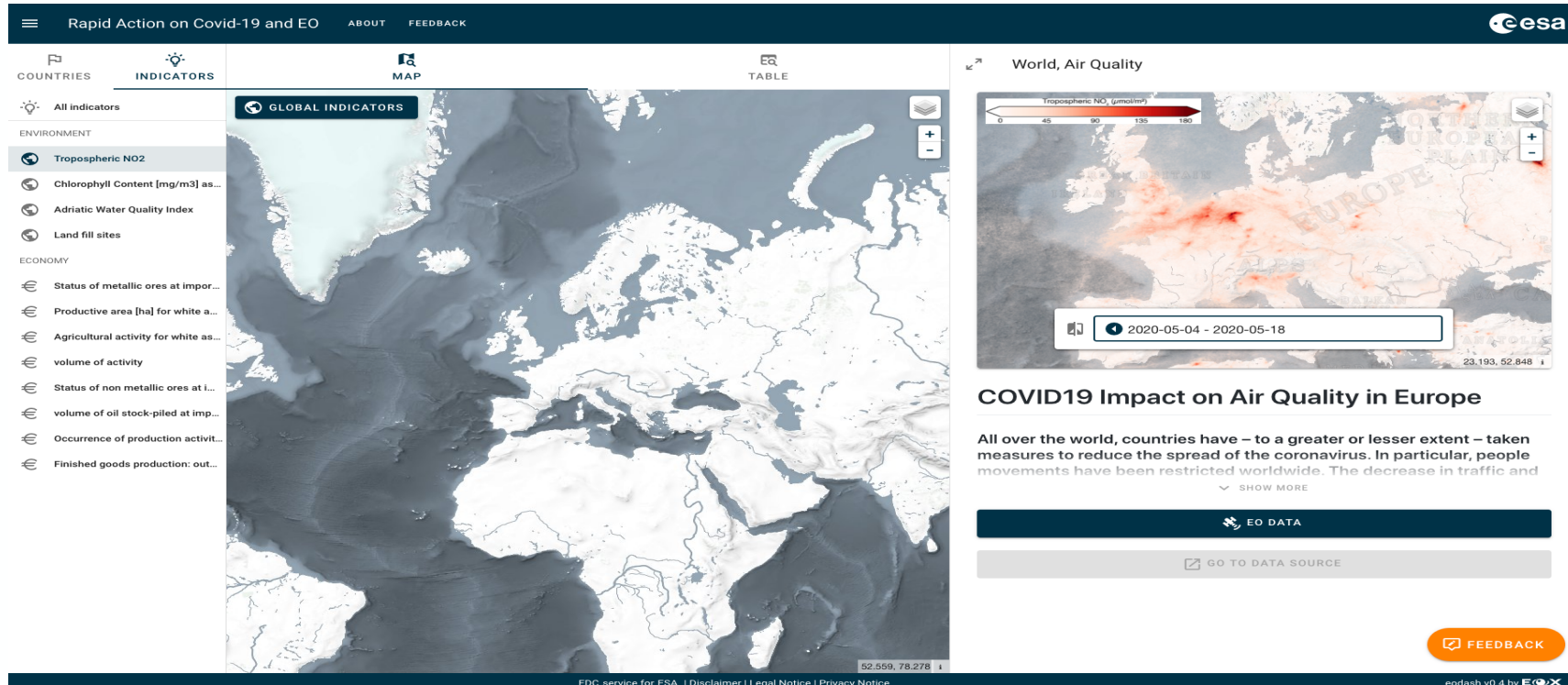


Copyright: Contains modified Copernicus Sentinel data (2019/20) / processed by KNMI



# ESA RACE Dashboard (<https://race.esa.int/>)

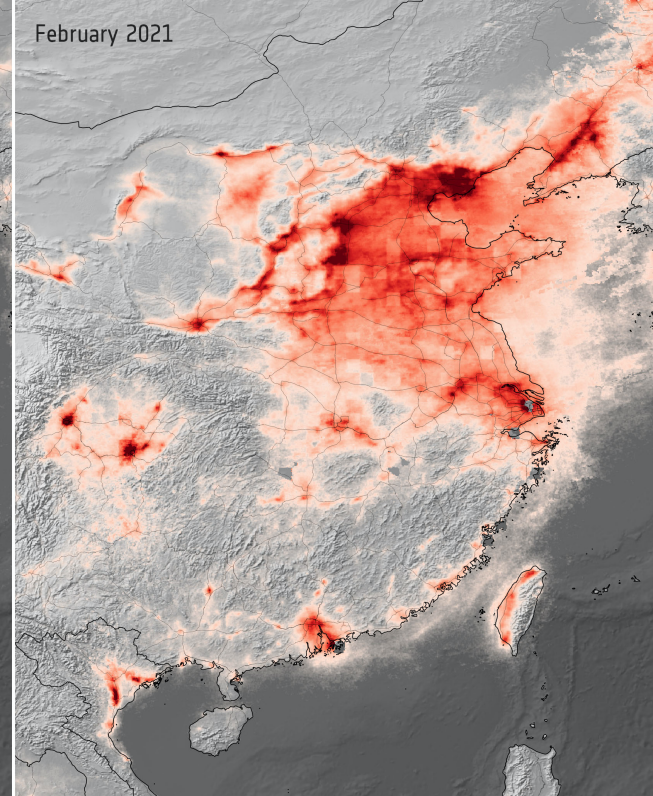
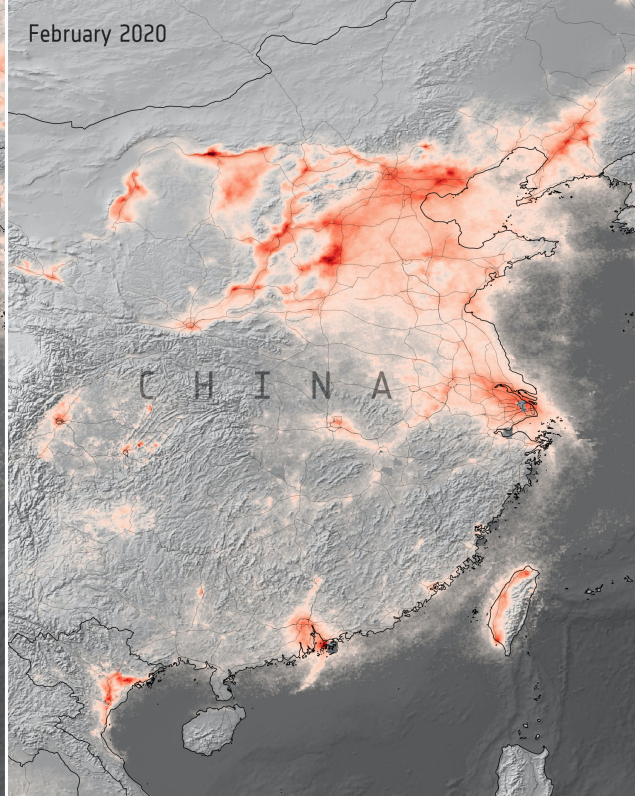
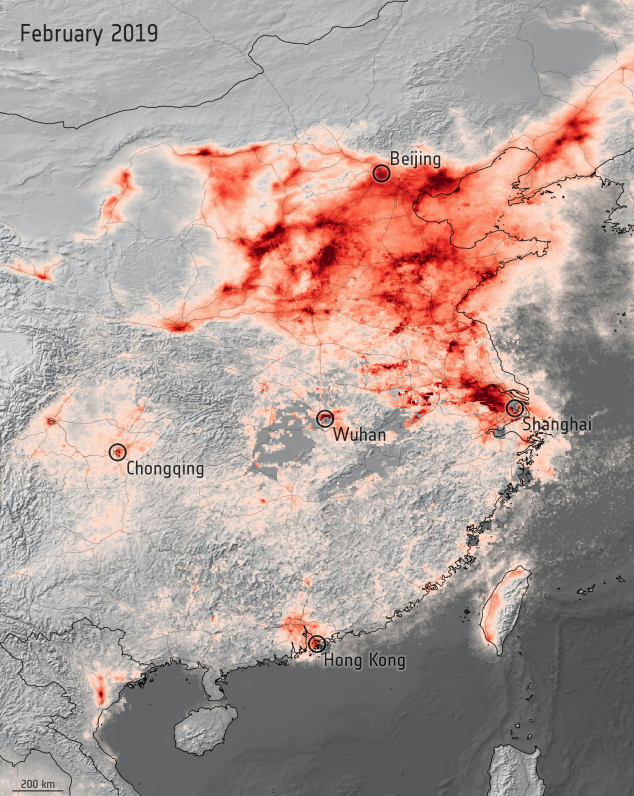
## Rapid Action on Coronavirus and EO for the EC



EDC service for ESA | [Disclaimer](#) | [Legal Notice](#) | [Privacy Notice](#)

esdash v0.4 by [EOX](#)





Nitrogen dioxide tropospheric column

20  $\mu\text{mol}/\text{m}^2$  250

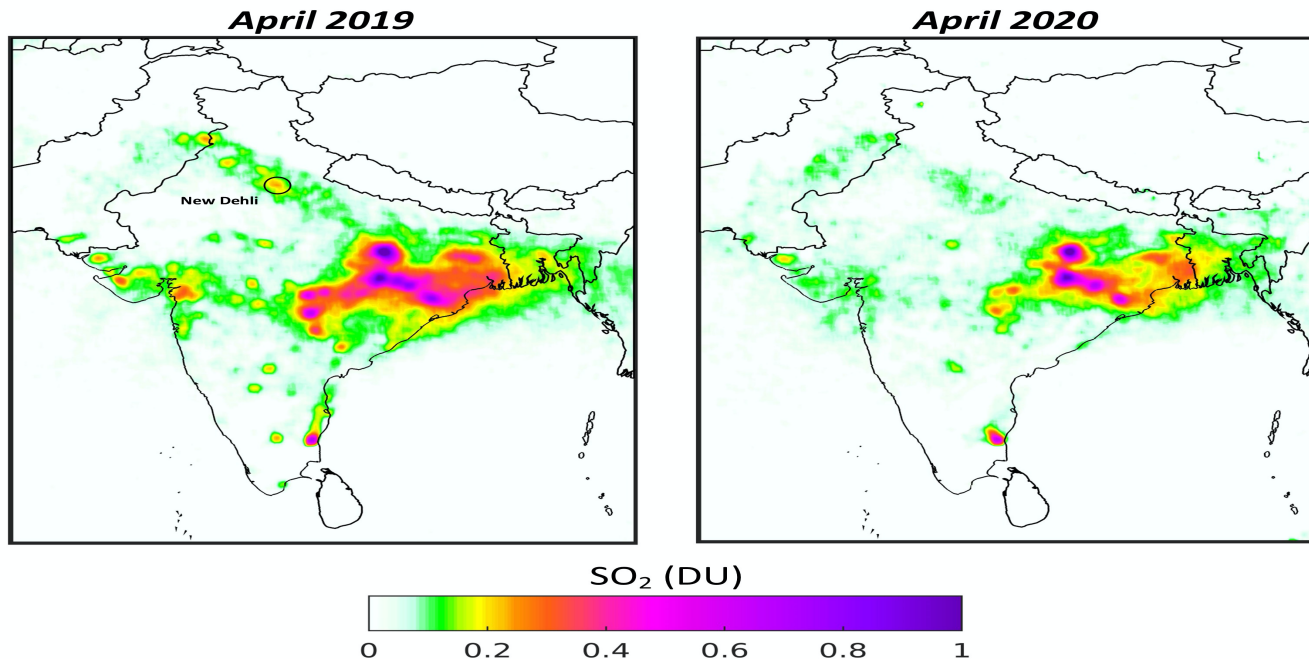
contains modified Copernicus Sentinel data (2019-21), processed by ESA



# COVID-19 impact as 'seen' by Sentinel-5P



## Sentinel-5P Sulphur Dioxide Measurements over India



Copyright: Contains modified Copernicus Sentinel data (2019/20) / processed by BIRA/IASB

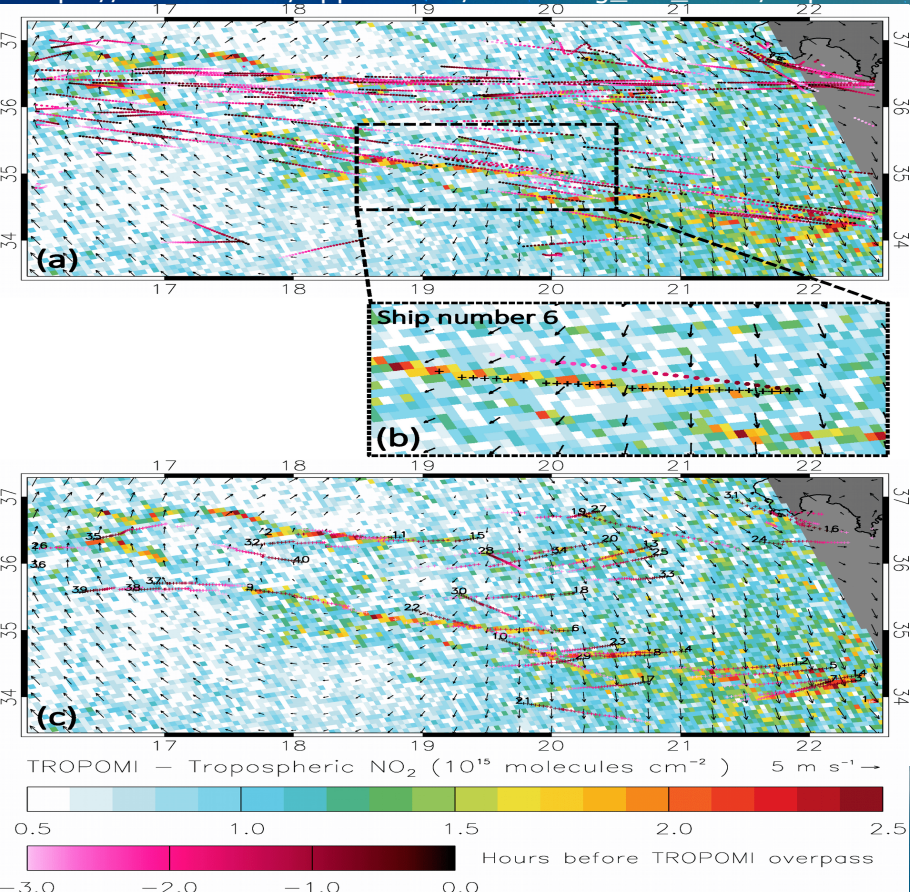
# Air pollution emission detection from single ships by Sentinel-5P



European Union



[https://www.esa.int/Applications/Observing\\_the\\_Earth/Copernicus/Sentinel-5P/Detecting\\_pollution\\_from\\_individual\\_ships\\_from\\_space](https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-5P/Detecting_pollution_from_individual_ships_from_space)



Sunglint

Copyright: Joseph A. Shaw and Michael Vollmer

Copyright: Contains modified Copernicus Sentinel data (July 2018) / processed by KNMI



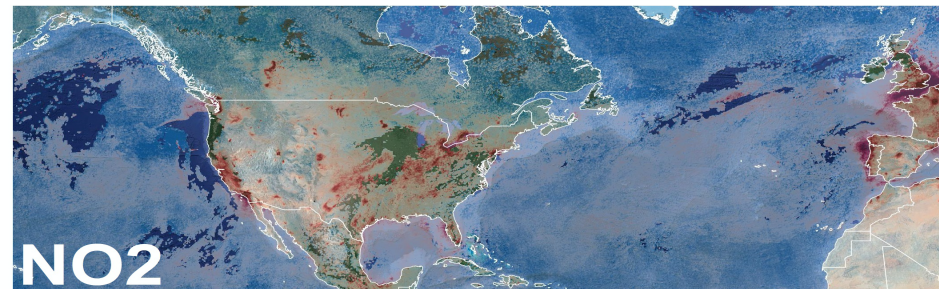
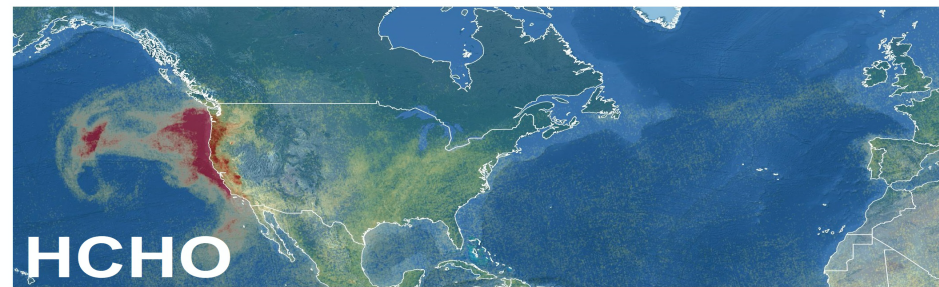
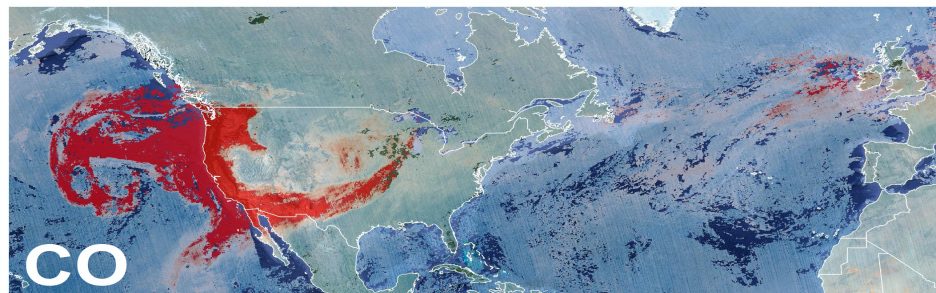
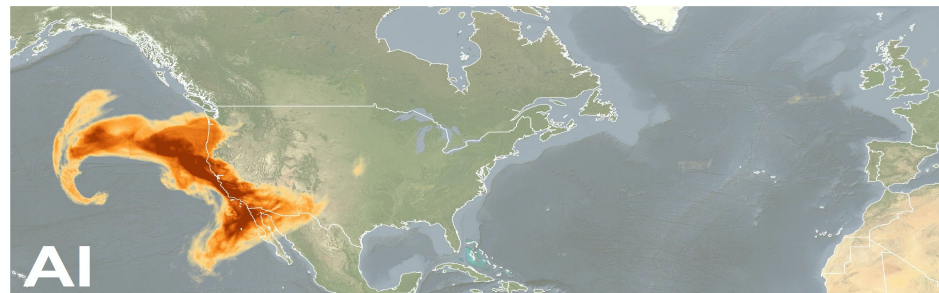
# 2020 Californian Fire Emissions measured by Sentinel-5P



European Union



<https://sentinels.copernicus.eu/web/sentinel/news/-/article/copernicus-sentinels-work-together-to-monitor-air-pollution-in-recent-us-wildfires>



**10-11-12 September 2020**

*Copyright: Contains modified Copernicus Sentinel data (2020) / processed by BIRA/IASB*

# Conclusions



- **Sentinel-5P Nitrogen Dioxide concentration measurements have been used as a showcase for COVID-19 impact monitoring from space**
- **Satellite data have to be used carefully (e.g. do not use single measurements) – Sentinel-5P Product Algorithm Laboratory (to provide averages to users – NO<sub>2</sub> and CO) - <https://maps.s5p-pal.com/>**
- **Sentinel-5P provides several species on Air Quality that can be used in synergistic way (e.g. fire monitoring)**