

The study air pollution in more details about NO₂.

NASA and European Space Agency (ESA) pollution monitoring satellites detected significant decreases in nitrogen dioxide (NO₂) over China from January 1, 2020 to February 25, 2020. The maps show concentrations of nitrogen dioxide, a noxious gas emitted by motor vehicles, power plants, and industrial facilities. Figure 1. and 2. presents NO₂ values across China from January 1-20, 2020(before the quarantine) and February 10-25, 2020(during the quarantine) *. The data were collected by the Tropospheric Monitoring Instrument (TROPOMI) on ESA's Sentinel-5P satellite. A related sensor, the Ozone Monitoring Instrument (OMI) on NASA's Aura satellite, has been making similar measurements*. This has not only occurred in China. Many scientists have been talking about air pollution being reduced greatly. This evidence absolutely shows the relation to anthropogenic pollution. People already realize that human activities such as burning of fossil fuels, deforestation, mining, pesticides, fertilizers, etc. are the main cause of air pollution. The question is how well of population distribution is fit with NO₂ distribution. When considering the population density in China in Figure 3., the three mega cities are Beijing (Capital), Shanghai (Financial hub in the east coast), Shenzhen (Industrial hub in the south coast). Hence, most of the people of China live in the east and south, but it does not fit with Figure 1. However, if considering the land use in China as in Figure 4., the Cropland use with the high NO₂ density areas are matched in Figure 1. There are many parameters that have relation to NO₂ and air pollution such as latitude (surrogate of solar zenith angle), temperature, ozone, HCHO (surrogate of chemical radicals), etc.

This project will present more details about NO₂ and air pollution in many perspectives. The project presents the relationships between NO₂ with

1. Population (surrogate of anthropogenic pollution)
2. Latitude (surrogate of solar zenith angle)
3. HCHO (surrogate of chemical radicals)
4. Temperature
5. Ozone

The expectation of this project is to propose the new parameters that have strong relationship with NO₂ and air pollution. This will help the earth scientists around the world to precisely predict the NO₂ and air pollution.

Public Data Resource:

1. <https://s5phub.copernicus.eu/dhus/#/home>
2. <https://urs.earthdata.nasa.gov>

The study will gather the data set within the past 2 years (2018-2019) for 3 regions: USA, Western Europe and Eastern Asia.

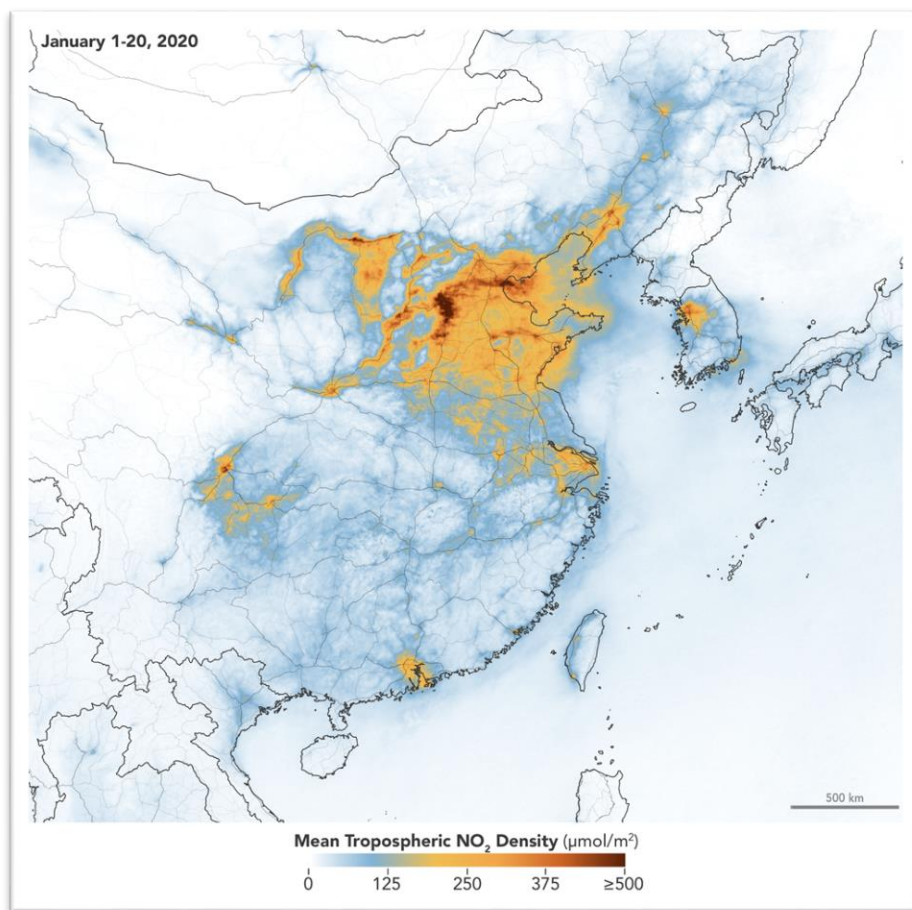


Figure 1. NO₂ Density over China (January 1-20, 2020)

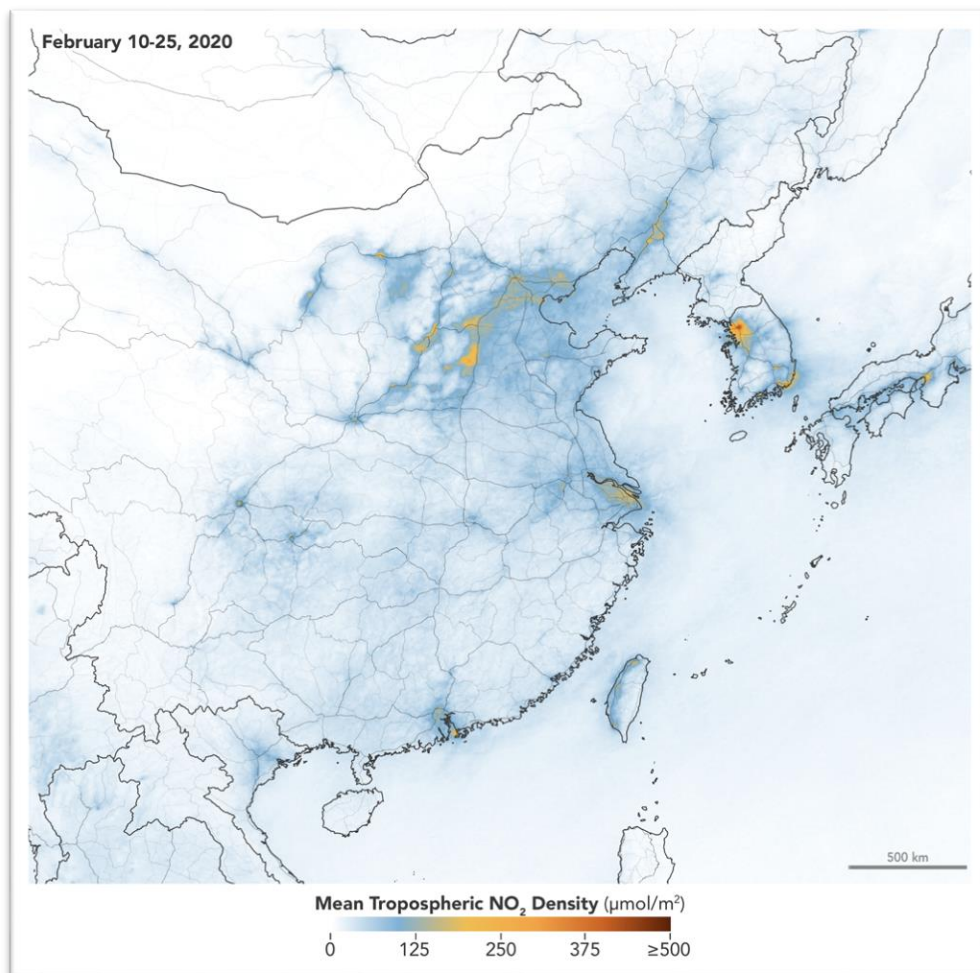


Figure 2. NO₂ Density over China (February 10-25, 2020)

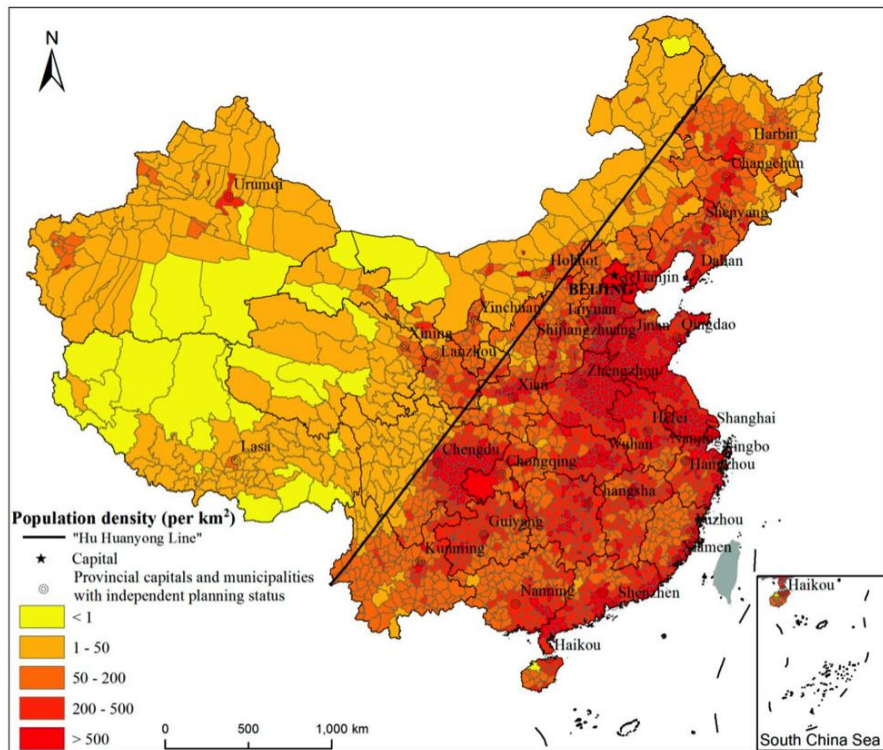


Figure 3. Population Density in China

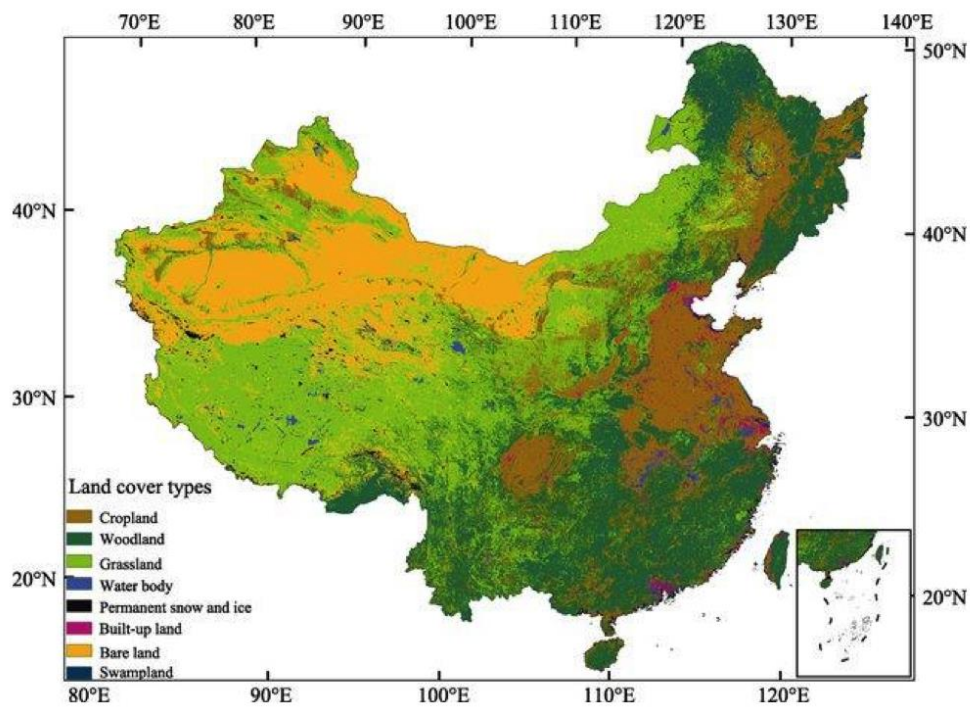


Figure 4. Land Use in China

Reference: * Airborne Nitrogen Dioxide Plummets Over China (2020).

<https://www.earthobservatory.nasa.gov/images/146362/airborne-nitrogen-dioxide-plummets-over-china>