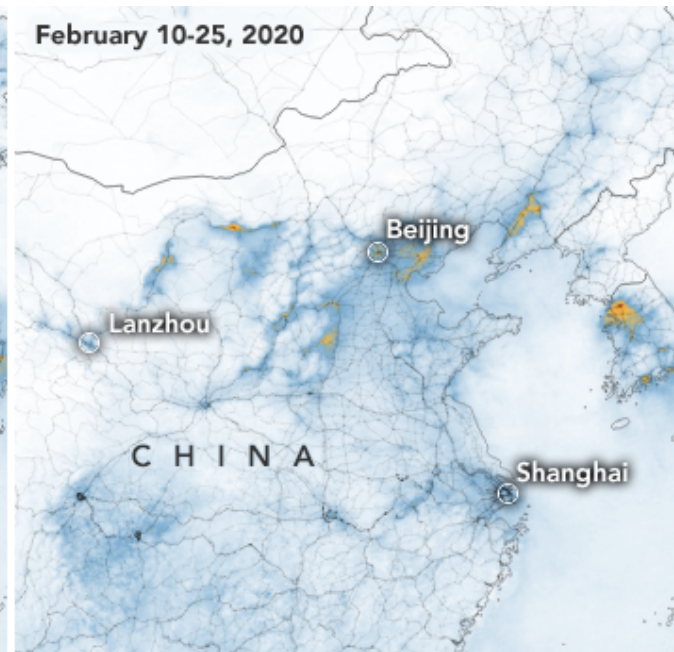
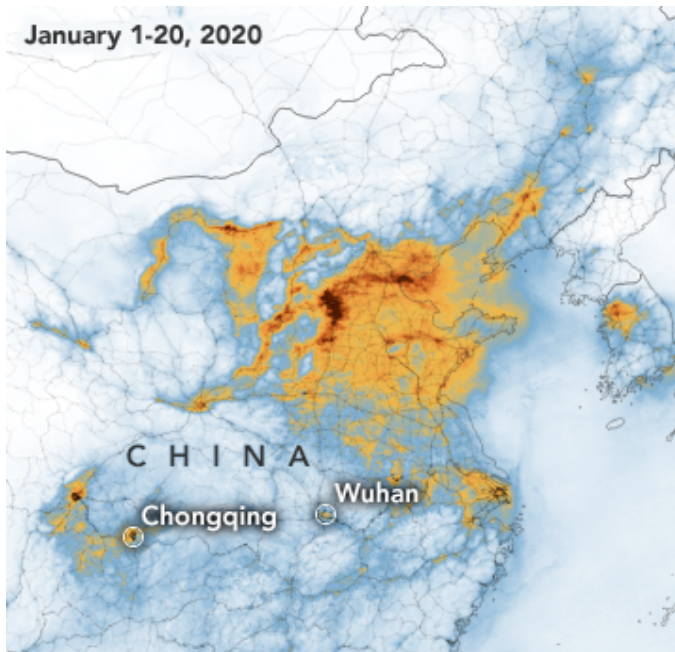


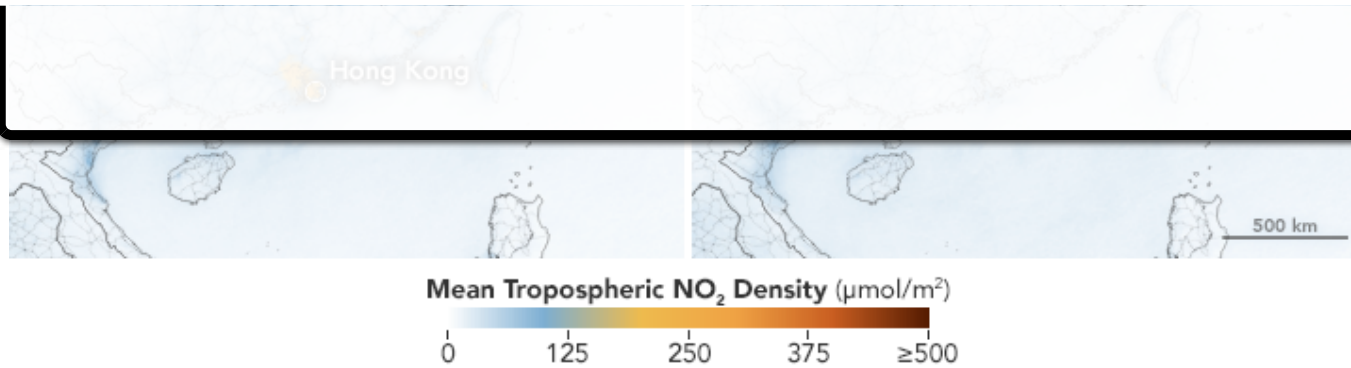


Airborne Nitrogen Dioxide Plummets Over China



NO₂ amounts have dropped with the coronavirus quarantine, Chinese New Year, and a related economic slowdown.

Image of the Day for March 2, 2020



January 1 - February 25, 2020

January 1 - 20, 2020

February 10 - 25, 2020



PNG



PNG

NASA and European Space Agency (ESA) pollution monitoring satellites have detected significant decreases in nitrogen dioxide (NO₂) over China. There is evidence that the change is at least partly related to the economic slowdown following the outbreak of coronavirus.

At the end of 2019, medical professionals in Wuhan, China, were treating dozens of pneumonia cases that had an unknown source. Days later, researchers confirmed the illnesses were caused by a new coronavirus (**COVID-19**). By January 23, 2020, Chinese authorities had shut down transportation going into and out of Wuhan, as well as local businesses, in order to reduce the spread of the disease. It was the first of several quarantines set up in the country and around the world.

The maps on this page show concentrations of nitrogen dioxide, a noxious gas emitted by motor vehicles, power plants, and industrial facilities. The maps above show NO₂ values across China from January 1-20, 2020 (before the quarantine) and

Instrument:
Sentinel-5P

Image of the Day

Atmosphere

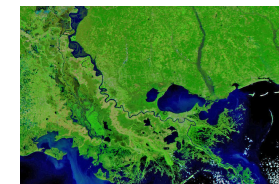
Life

Dust and Haze

Human Presence

Remote Sensing

View more Images of the Day:



Mar 1, 2020



Mar 3, 2020

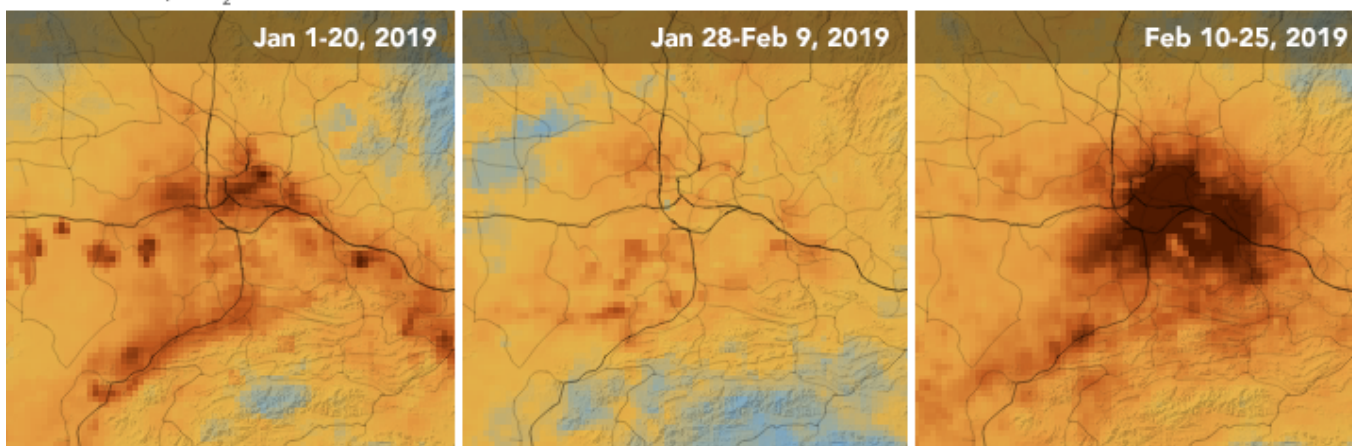
February 10-25 (during the quarantine). The data were collected by the Tropospheric Monitoring Instrument (TROPOMI) on ESA's **Sentinel-5 satellite**. A related sensor, the Ozone Monitoring Instrument (OMI) on NASA's **Aqua satellite**, has been making similar measurements.

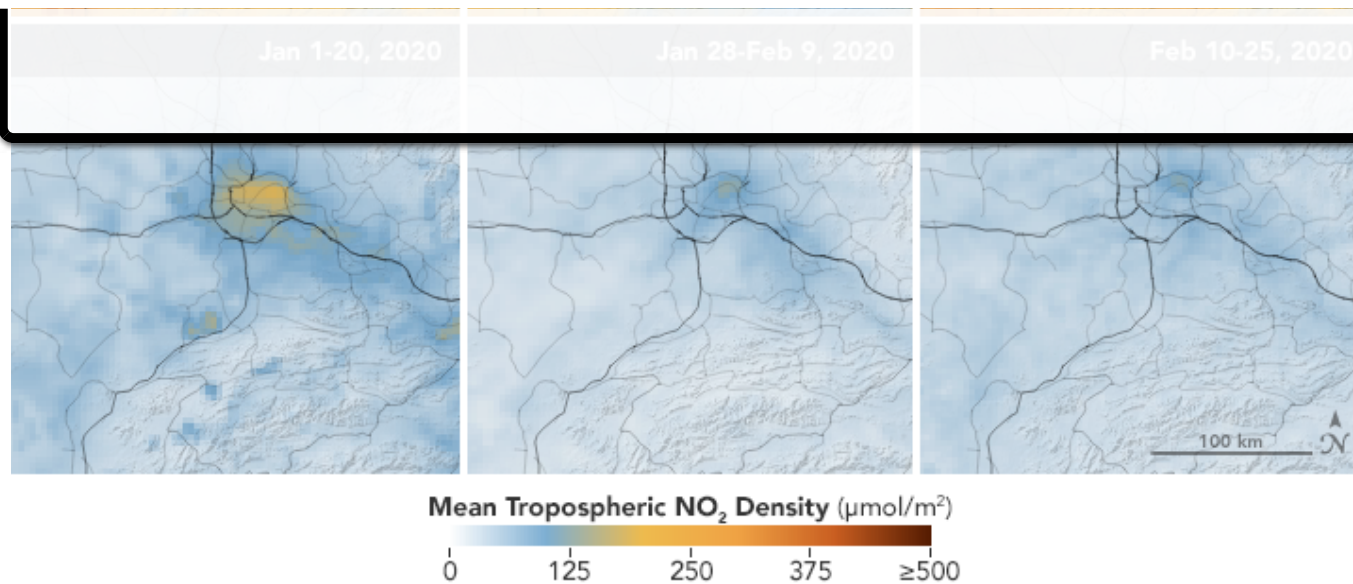
According to NASA scientists, the reduction in NO₂ pollution was first apparent near Wuhan, but eventually spread across the country. Millions of people **have been quarantined** in one of the largest such actions in human history. As of February 28, 2020, the virus **had been detected** in at least 56 countries.

“This is the first time I have seen such a dramatic drop-off over such a wide area for a specific event,” said Fei Liu, an air quality researcher at NASA’s Goddard Space Flight Center. Liu recalls seeing a drop in NO₂ over several countries during the economic recession that began in 2008, but the decrease was gradual. Scientists also observed a significant reduction around Beijing during the **2008 Olympics**, but the effect was mostly localized around that city, and pollution levels rose again once the Olympics ended.

Pollutant Drops in Wuhan—and Does not Rebound

Unlike 2019, NO₂ levels in 2020 did not rise after the Chinese New Year.





January 1, 2019 - February 25, 2020

The drop in nitrogen dioxide in 2020 also coincided with Lunar New Year celebrations in China and much of Asia. Generally, businesses and factories close from the last week in January into early February to celebrate the festival. **Past observations** have shown that air pollution usually decreases during this period and then increases once the celebration is over.

“There is always this general slowdown around this time of the year,” said Barry Lefer, an air quality scientist at NASA. “Our long-term OMI data allows us to see if these amounts are abnormal and why.” Launched in 2004, OMI has been collecting global data on NO₂ and various air pollutants for more than 15 years.

The maps above show NO₂ values over three periods in 2020: January 1-20 (before Lunar New Year), January 28-February 9 (around New Year celebrations), and

February 10-25 (after the event). The 2020 values are compared to the same periods in 2019 for reference. Lefer noted that the overall values in 2020 were lower than 2019 due to new environmental regulations that China has enforced over the past few years.

While the Lunar New Year may have played a role in the recent dropoff, researchers believe the decrease is more than a holiday effect or weather-related variation. In a preliminary analysis, NASA researchers compared NO₂ values detected by OMI in 2020 with the average amounts detected at this time of year from 2005-2019. In 2020, NO₂ values in eastern and central China were significantly lower (from 10 to 30 percent lower) than what is normally observed for this time period.

Additionally, Liu and colleagues have not seen a rebound in NO₂ after the holiday. “This year, the reduction rate is more significant than in past years and it has lasted longer,” she said. “I am not surprised because many cities nationwide have taken measures to minimize spread of the virus.”

Editor’s Note: For more information on NASA’s long-term measurements of nitrogen dioxide, [see this page](#).

NASA Earth Observatory images by [Joshua Stevens](#), using modified Copernicus [Sentinel 5P](#) data processed by the European Space Agency. Story by [Kasha Patel](#) with assistance from [NASA Aura](#) and [NASA SPoRT](#) science teams.



References & Resources

Business Insider (2020, January 25) [Transit going in and out of Wuhan, China is being shut down to contain coronavirus.](#) Accessed February 26, 2020.

CarbonBrief (2020, February 19) [Analysis: Coronavirus has temporarily reduced China's CO2 emissions by a quarter.](#) Accessed February 26, 2020.

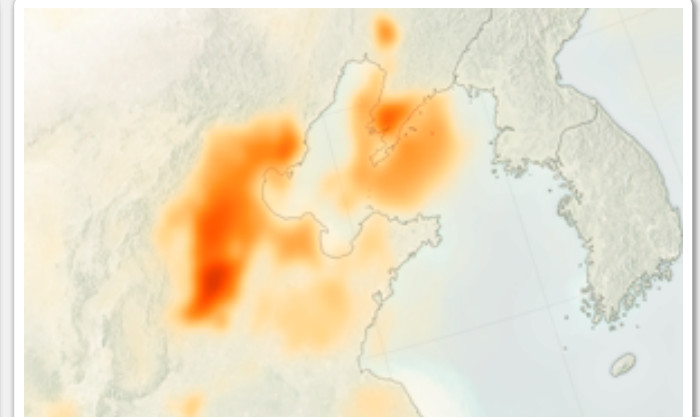
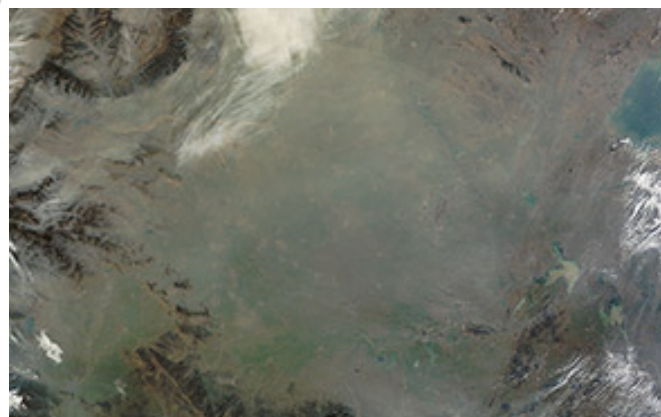
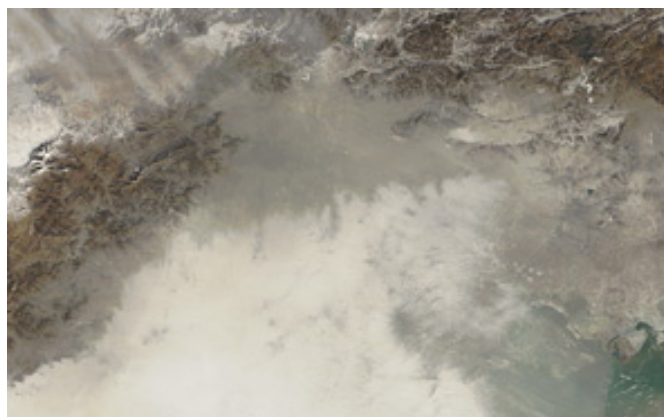
Feng. *et al.* (2012) [The chemical composition and sources of PM_{2.5} during the 2009 Chinese New Year's holiday in Shanghai.](#) *Atmospheric Research*, 118, 435-444.

NASA Earth Observatory (January 28, 2016) [A Decade of Change for Nitrogen Dioxide.](#)

Tan, P. *et al.* (2009) [Air pollution "holiday effect" resulting from the Chinese New Year.](#) *Atmospheric Environment*, 43 (13), 2114-2124.

South China Morning Post (2020, February 20) [China's capital shrouded in air pollution despite reduced emissions from coronavirus economic slowdown.](#) Accessed February 26, 2020.

You might also be interested in [\(view all\)](#)





Air Quality Suffering in China

Smog and haze-filled clouds blanketed Beijing and other parts of China.

Image of the Day

Atmosphere

Land

Dust and Haze

Human Presence

World of Change



Haze over Eastern China

A combination of dust and air pollution hovered over much of the coastal plain.

Atmosphere

Dust and Haze

Human Presence



Haze Shrouds Eastern China



Smog Puts Dozens of Chinese Cities on Red Alert

Authorities shut down schools and airports, and told citizens to stay indoors.

Image of the Day

Atmosphere

Dust and Haze

Human Presence

Remote Sensing

The haze particles blanketing eastern China harm human health, and they have a cooling effect on the climate.

Image of the Day

Atmosphere

Land

Dust and Haze

Human Presence

Snow and Ice



[Feeds](#)

[Contact](#)

[About](#)

[Image Use Policy](#)

[Privacy Policy](#)

Webmaster **Paul Przyborski**

NASA Official **Robert Levy**

The Earth Observatory is part of the **EOS Project Science Office** at **NASA Goddard Space Flight Center**