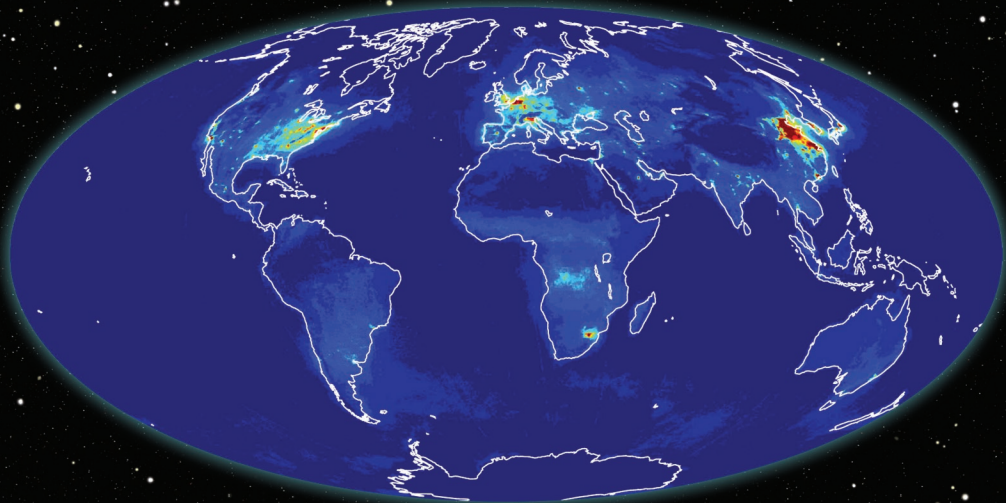
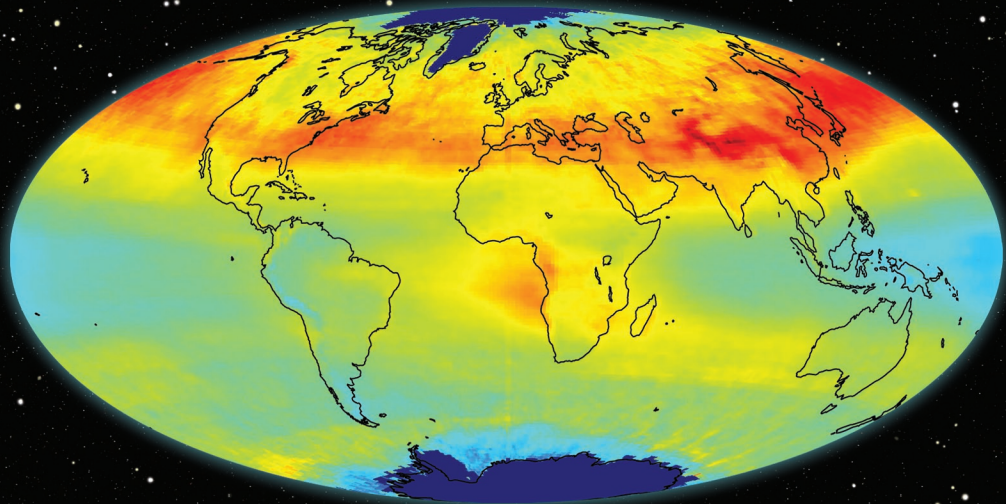


Aerosols



Nitrogen Dioxide (NO<sub>2</sub>)



Tropospheric Ozone (O<sub>3</sub>)

## Observing Air Quality from Space

---

NASA satellites help scientists monitor both regional and global air quality. These images show 2005 satellite measurements of three of the Environmental Protection Agency's criteria pollutants—nitrogen dioxide ( $\text{NO}_2$ ), tropospheric ozone ( $\text{O}_3$ ), and particulate matter (aerosols). These satellite observations reveal pollution sources and also show that some pollutants can travel long distances; **nearly everyone on the planet lives downwind from a pollution source.**

*Tropospheric  $\text{NO}_2$*  forms when fuel is burned at high temperatures or during lightning discharges, and is an important precursor to the formation of ozone.  $\text{NO}_2$  is short-lived in the atmosphere so its concentrations—see predominantly blue image—are highest near sources such as major industrialized areas and agricultural burning in Africa. The Ozone Monitoring Instrument (OMI) on Aura measures  $\text{NO}_2$  concentrations.

Most *tropospheric ozone* originates when volatile organic hydrocarbons and  $\text{NO}_2$  react in the presence of sunlight. (Some ozone comes down from the stratosphere.) Unlike  $\text{NO}_2$ , tropospheric ozone can travel well downwind from its source. Ozone spreads out over the Atlantic and Pacific oceans from industrial sources in the U.S. and Southeast Asia, and off both coasts from agricultural burning sources in Africa—see blue/green/yellow/red image. In order to measure tropospheric ozone from space, scientists measure the total amount of ozone from the top to the bottom of the atmosphere using OMI and subtract the ozone above the troposphere measured by the Microwave Limb Sounder (MLS) on Aura.

Each day, a blanket of tiny particles including dust, smoke and human-produced pollution drifts through the Earth's atmosphere filtering out some of the sunlight headed for Earth. The dominant sources of these aerosols—see predominantly beige image—are smoke from fires burning in Africa, South America, Southeast Asia, industry in China, and desert dust. The Moderate Resolution Imaging Spectroradiometer (MODIS) on Terra and Aqua measures aerosol concentration.

---

Tropospheric  $\text{NO}_2$  ( $10^{15}$  molecules/cm<sup>2</sup>)



Tropospheric  $\text{O}_3$  Mixing Ratio (ppbv)



Aerosol Optical Thickness

