


Whose Air Is It Anyway?
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Air is arguably the closest and most important biological connection we have with the rest of the world. We breathe air into our bodies every few seconds. Like it or not, we share the air we breathe with the people around us, whether friends or strangers.

"Yuck!" you may say. But it's how our world is constructed. As a species, we have developed to live this way. One atmospheric chemist pointed out, "Air may not look like much, but try breathing something else."

We share the air we breathe not only with other people but also with the rest of our environment -- automobiles, airplanes, factories, plants, animals, lakes, oceans -- you name it. Air moves as wind from one place to another. The air we breathe and the stuff that's in it have come from somewhere else.



Moving air carries a wide range of substances, including moisture, dust, bacteria and viruses. Air also contains trace gases such as ozone, nitrogen oxides and sulfuric acid. It stands to reason that we need to know where our air comes from and what happens to it before it gets to us.

Image to left: Smoke and air pollution, such as that seen over eastern China by NASA's Moderate Resolution Imaging Spectroradiometer (MODIS), can travel and affect air around the world. Credit: NASA

Do you know where your air has been? NASA wants to know. Scientists working with data from NASA's Earth-observing satellites have discovered, to their surprise, that air pollution is an intercontinental traveler. Dust from the Sahara Desert has turned up on coral reefs in Florida. Air pollution from the northeastern United States sometimes reaches Europe. Smoke from Asian fires crosses the Pacific Ocean all the way to southern California. And in 1997, sea salt and frozen plankton picked up by Hurricane Nora in the Pacific made it to the Midwest.

The point is that many areas will not have clean air until others do.

NASA Goddard's Anne Thompson tracks ozone, one of the air's most toxic pollutants. Ozone consists of three oxygen atoms. Its effect on the lungs is somewhat akin to a slow burn. Thompson and her colleagues want to be able to predict ozone concentrations and distribution.

"What we're trying to do is to parse out what ozone comes from natural causes and what ozone comes from human activity," Thompson said. "It's extremely hard to separate natural and manmade sources of gases. The precursors of ozone, such as nitrogen oxides, are not labeled 'I came from an aircraft engine,' 'I came from the stratosphere,' 'I came from the ground,' or 'I came from lightning.' You have to measure other related chemicals that fingerprint the source."

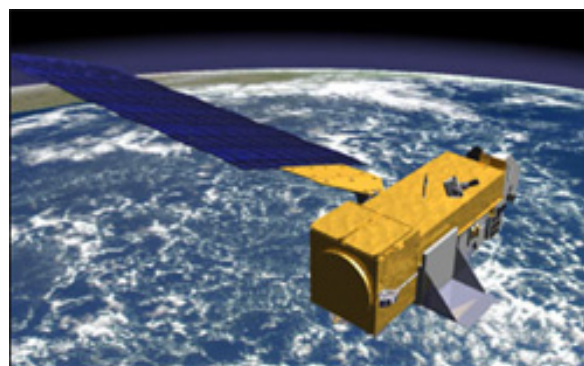
Thompson notes that she has developed a healthy respect for how variable the atmosphere is. "Weather systems in the troposphere are constantly moving and mixing the air, and at the same time, chemical reactions are changing the air's chemical composition," she said.

Image to right: NASA's Aura satellite is studying the Earth's ozone, air quality and climate. Credit: NASA

NASA's Aura satellite, which launched into orbit in July, is giving Thompson's work a big boost by helping scientists map tropospheric ozone and its precursors.

"With its high-technology instruments, Aura is probing deep into the Earth's atmosphere on a global scale," said Goddard's Ernest Hilsenrath, deputy project scientist for the Aura mission.

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