**Finding Answers in the Clouds
News story originally written on May 21, 2008**

Scientists are sending tiny airplanes buzzing through the sky to discover how [air pollution](http://www.windows2universe.org/earth/Atmosphere/airpollution_intro.html) can impact [weather](http://www.windows2universe.org/earth/Atmosphere/weather.html), [climate](http://www.windows2universe.org/earth/climate/climate.html), and [global warming](http://www.windows2universe.org/earth/climate/ipcc_feb2007.html).

The tiny airplanes look like regular planes but they have only a wing span of eight feet and each little plane weighs less than 50 pounds. They do not have a pilot and are remote-controlled. Yet, these aircraft are not toys - they are complex research tools.

The team of scientists outfitted the little planes with miniature instruments to measure solar [radiation](http://www.windows2universe.org/physical_science/physics/radiation.html), cloud-drop size and concentrations, [particle](http://www.windows2universe.org/milagro/air/particulates.html) size and concentrations, turbulence, humidity and [temperature](http://www.windows2universe.org/earth/Atmosphere/temperature.html). Then, they flew the planes into the [clouds](http://www.windows2universe.org/earth/Atmosphere/cloud.html) of air pollutants above the Maldives Islands in the central Indian Ocean.

The Maldives are a good place to study air pollution. The pollution forms a haze of [particulates](http://www.windows2universe.org/milagro/air/particulates.html) and [cumulus clouds](http://www.windows2universe.org/earth/Atmosphere/clouds/cumulus.html). These hazy pollution clouds are called brown clouds. They can form naturally during large forest fires. But brown clouds are often [made by human activities](http://www.windows2universe.org/earth/Atmosphere/pollution_sources.html). The smoke from power plants, automobiles, factories and other sources all contribute to brown clouds. The pollution travels high in the [atmosphere](http://www.windows2universe.org/earth/Atmosphere/overview.html) and is carried by the [wind](http://www.windows2universe.org/earth/Atmosphere/wind.html). In the Maldives, the source of the brown cloud pollution is India.

The scientists wanted to look at brown clouds from the inside out. They wanted to better understand how pollution changes Earth's [albedo](http://www.windows2universe.org/earth/albedo.html), or amount of sunlight that is reflected back out into space. Albedo impacts the Earth's temperature, weather patterns, and the [climate](http://www.windows2universe.org/earth/climate/climate.html).

They discovered that more [air pollution](http://www.windows2universe.org/earth/Atmosphere/airpollution_intro.html) has increased the [albedo](http://www.windows2universe.org/earth/albedo.html) of the atmosphere. This means that more [sunlight is reflected](http://www.windows2universe.org/earth/climate/cli_energyalbedo.html) back to space. So air pollution may hide some of the impact of global warming by keeping the planet somewhat cooler. In addition, it suggests that as air pollution, which causes serious [health problems](http://www.windows2universe.org/earth/Atmosphere/health.html), is reduced, the [global climate](http://www.windows2universe.org/earth/climate/climate.html) will get even hotter.

The results of this research will help create more accurate [climate models](http://www.windows2universe.org/earth/climate/cli_models2.html) which will help us make more [accurate predictions](http://www.windows2universe.org/earth/climate/cli_models4.html) of what Earth’s climate in the future will be like.

# Pollution Speeds up Snow Melt in Europe and Asia

[Climate](http://www.windows2universe.org/earth/climate/climate.html) scientist Mark Flanner, an assistant professor at the University of Michigan led a study that looked into rates of springtime [snow](http://www.windows2universe.org/earth/polar/cryosphere_snow1.html) melt in Europe, Asia, and North America. The study found that the snow melts in the spring more quickly in Europe and Asia than in North America.

Flanner and his colleagues think that [aerosols](http://www.windows2universe.org/earth/Atmosphere/particulates.html), especially black carbon and mineral dust might be responsible for this difference. The countries in Europe and Asia produce high levels of black carbon and mineral dust, which are types of air pollution. These particles blow across these two continents and affect the land surface and [atmosphere](http://www.windows2universe.org/earth/Atmosphere/overview.html).

Black carbon and mineral dust tend to warm snow-covered surfaces by [absorbing energy from the sun](http://www.windows2universe.org/earth/climate/cli_energyalbedo.html). Particulates that fall to the surface also reduce snow's [albedo](http://www.windows2universe.org/earth/albedo.html), which is its ability to reflect sunlight back into the atmosphere. This means even more energy from the sun is absorbed by the land.

This study has affected how scientists can interpret [climate models](http://www.windows2universe.org/earth/climate/cli_models2.html) about North America, Europe, and Asia. Over North America, [carbon dioxide](http://www.windows2universe.org/physical_science/chemistry/carbon_dioxide.html) (CO2) had more of an impact on springtime snow cover than black carbon and organic matter, but in Europe and Asia, as hypothesized, the particulates had almost as much of an effect as CO2.

"While this research does not fully explain why springtime land temperatures and snow cover are changing so much faster over Eurasia than North America, it does suggest that snow darkening from black carbon, a process lacking in most climate models, is playing a role," Flanner said.

Because snow covers much of the Northern Hemisphere during spring, Flanner and his colleagues expect to see some of the strongest climate change signals in these areas during the spring.