STORY BY
Lucas Laursen

GRIMY SKIES The plane's particle sensor includes an intake tube under the wing that slows air down so that it can be measured. The device picked up high particle levels over the Gulf of Thailand [left].

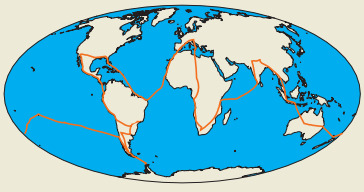
TOOL KIT

The Soot Surveyor

Circumnavigating the world to map the polluted skies

In the atmosphere, soot traps heat like carbon dioxide does. But unlike CO_2, soot stays near its source and falls to Earth in weeks, so it's considered low-hanging fruit in the fight against global warming. The first step to reducing atmospheric soot is to find it, which scientists have been doing since the 1980s with a particle-measuring tool called an aethalometer. A tube catches outside air and sends it to the instrument's main box, where the air passes through a particle-catching filter. The device shines light of different wavelengths through the filter, and a sensor and processor analyze how the particles block light. This reveals their concentration and their origin: whether they came from fossil fuel burning or wood fires.

Earlier this year, Slovenian pilot Matevž Lenarčič flew around the world with a small aethalometer prototype that Aerosol—a company that makes environmental instruments—might adapt to hitch a ride on commercial flights. Scientists could send such devices on many existing routes, producing the most detailed soot map to date.

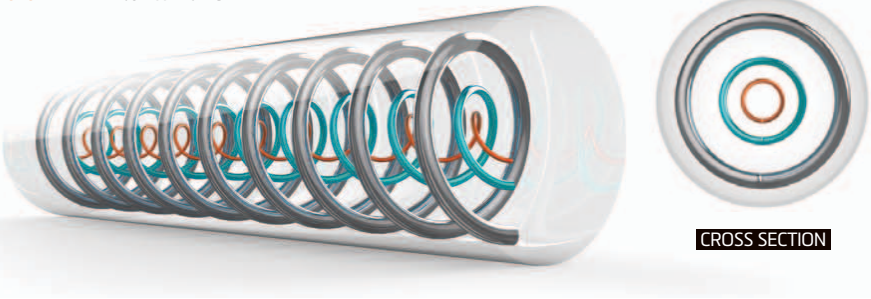


AROUND THE WORLD ON 36.8 MPG

To limit emissions while he flew across the globe measuring soot, pilot Matevž Lenarčič tweaked both his flight path and his plane. Flying high reduces drag, but thin air has less oxygen for a combustion engine. So Lenarčič replaced his Pipistrel Virus's stock engine with a turbo one to get enough power at high altitudes (he hit 29,413 feet next to Everest). For endurance while crossing oceans, he added fuel tanks to the wings. Lenarčič averaged 36.8 miles per gallon, about double the typical efficiency of small planes.

Information Autobahn

STORY BY Amber Williams



CROSS SECTION

By twisting light beams, engineers could produce the fastest Internet ever. Today, for the speediest broadband, fiber-optic cables transmit information in pulses of light. Since the early 2000s, physicists have been working to make data travel even faster by bouncing light off a liquid crystal to twist it. Several coiled beams can nest within one another and move through the same space at the same time. A recent demonstration by Alan Willner, an engineer at the University of Southern California, moved 100 terabits (the equivalent of 2,600 DVDs) per second through the air—the fastest data transfer in free space ever. But before the tech will work commercially, engineers need to finish developing a new cable that can carry the light.

COURTESY MATEVŽ LENARČIČ (2); ILLUSTRATION BY DAVVI