ON SITE: Graduate student Chika Minejima discusses her research to reporter Sam Enriquez on top of the Georgia Tech University trailer.

PHOTO BY BARRY LEFER

Pollution study produces wealth of data

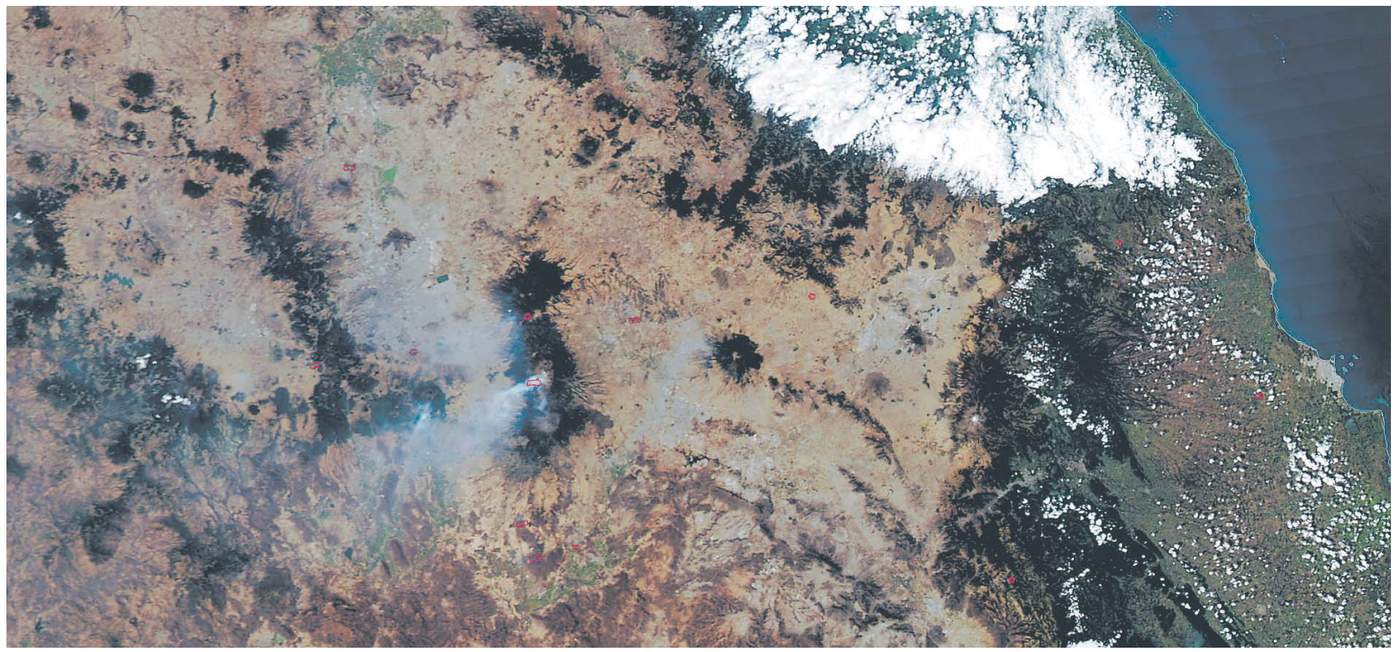

IMAGE COURTESY OF MODIS RAPID RESPONSE PROJECT AT NASA/GSFC

FROM ABOVE: A satellite image taken on March 5 shows clouds and smoke from fires near the Mexico City urban region and volcanoes.

BY SAM ENRIQUEZ
Los Angeles Times

Whether Mexico City has the most polluted air in the world is a matter of debate: Indignant Mexican officials lobbied to have it stricken from the Guinness Book of World Records this year after it held the title two years running.

What's not in question is its attraction to the hundreds of atmospheric scientists who last week wrapped up a month-long study of the reach and impact of the city's pollution: Where does it go? What does it become? What is its effect on climate and weather?

The answers could prove useful in cleaning up the air in other smog capitals, such as Beijing, New Delhi and Los Angeles.

"We don't want to say that Mexico City is polluting the whole world," said Eric Hintsa of the National Science Foundation, one of the sponsors of the US$25 million study. "But together, all the mega-cities are having an impact."

Picking Mexico City was a no-brainer, say scientists. The air here stinks.

Mexico City is surrounded by mountains. The valley cooks the effluence from an estimated 9 million vehicles, oil refineries, a volcano and hundreds of thousands of leaky propane tanks hooked to stoves.

More than 20 million people are crammed into an area slightly larger than Los Angeles, which has one-fifth as many people. And everybody seems to be burning something. Tiny particles lodge under contact lenses and deep in lungs, stoking allergies and worse. Colds last longer. And asthma sufferers really suffer.

It's got the whiff of the familiar to chemist Jeffrey Gaffney, 56, who grew up in Riverside, Calif., and is studying how soot affects weather for the U.S. Energy Department. Mexico City, he said, is a lot like Los Angeles in the 1960s and 1970s.

Although it has improved in the last few years, Mexico City's air quality most days still falls short of basic standards. This, despite the cleansing effect of a rainy season that runs from June to September.

Scientists already have tracked urban pollution as it moves from continent to continent — from China to the West Coast of the United States, from the Eastern Seaboard to Europe. This study examines regional movement.

Scientists and graduate students have been working 14-hour days to measure the giant plume of gases, dust and particles that rise out of Mexico City each day and generally drift to the northeast, sometimes as far as the Gulf of Mexico.

Over the course of hours, the emissions mix and are altered by sunlight to create so-called secondary pollutants — some only irritating, others carcinogenic. Using instrument readings from ground equipment, weather balloons, airplanes and NASA satellites, scientists hope to figure out how they form and how far they travel.

"I'm sure we'll learn things we didn't expect, answer some hypotheses and in some cases end up with more questions," said Sasha Madronich, a participating chemist from the National Center for Atmospheric Research in Boulder, Colo.

He and colleagues from U.S. and Mexican universities and labs have collected enough data to keep them busy for years — compiling, comparing and double-checking. They expect to announce their findings by 2007 or 2008, said Luisa Molina, a Massachusetts Institute of Technology chemist and one of the study's organizers.

Getting lab quality measurements in the field was one of many daunting tasks for the project, whose unwieldy name shortens to the acronym MILAGRO — miracle, in Spanish. But the first job was moving the equipment across the border.

"We got all the stuff to the border a month early but it was still delayed four to six weeks," said Barry Lefer, a geosciences professor at the University of Houston, who worked at a site about an hour's drive north of the city.

He spoke from the roof of the Technological University of Tecamac, where he pointed out some of the exotic gear that to the layman — and probably to customs officials — looked sinister: Sun photometers, cloud cameras, ambient particulate samplers, aerosol samplers and devices to measure solar radiation, ozone, temperature, humidity, wind and particles smaller than the width of a human hair.

Some are made by specialty manufacturers, others by hand.

Chika Minejima tinkered with her Thermal Decomposition Laser-Induced Fluorescence device set up on the roof of a nearby trailer. It looked like a prop in a sci-fi thriller but in fact measured trace amounts of a rare nitrate gas that neutralizes some pollutants overnight.

"I've been working on this for 3 1/2 years with another graduate student, who had been working on it three or four years before me," said Minejima, 28, who is studying at the University of California, Berkeley's College of Chemistry. "I inherited it and made it more sensitive."

In the equipment-packed trailer next door, Peter McMurry, head of mechanical engineering at the University of Minnesota, collected data for studying the transformation of airborne particles.

Clouds form when water condenses on these tiny specks. He and others want to understand how pollutants create new particles over the course of a day and to be able to predict, for example, whether they will trigger more or less rain in a region.

"My life's dream is to explain these processes," he said.

Some of the work was more old school. Robert Long, a graduate student in meteorology at Pennsylvania State University, was inflating an oversized weather balloon to carry an ozone monitor packed in a plastic foam six-pack holder sealed with duct tape.

"It will go up a little more than 20 miles and that will take about two hours," he said. "It will end up over the Gulf of Mexico."

The midday launch attracted a small group. When the balloon inflated to a diameter of about 8 feet, the plastic foam box was tied on with string. At the count of three, the balloon was released and flew skyward. And the box fell to the ground with a thud.

The scientists gathered briefly and came to a consensus: needs stouter string.

"Let's try it again," Long said.

PHOTO BY ANNE-MARIE SCHMOLTNER

MORE INFO

http://www.joss.ucar.edu/milagro/
http://mirage-mex. acd.ucar.edu/

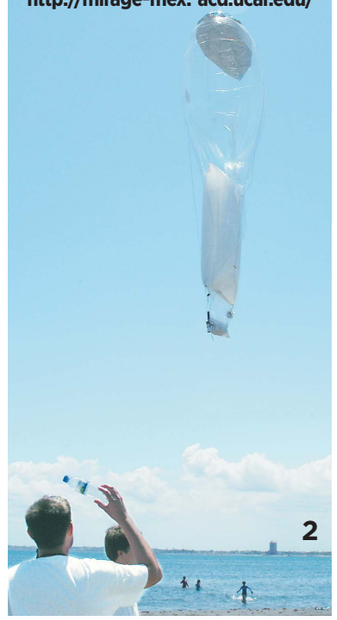

PHOTO BY ANNE-MARIE SCHMOLTNER

1.-Aerial photo taken on March 5 of looking back at Iztaccihuatl and Popocatepetl toward the southwest into the Mexico City Basin.

2.- Special helium balloons (Controlled Meteorological balloons) carry sophisticated solar-powered instruments that track the pollution as it travels. See Google Earth maps of their tracks online at http://www.science.smith.edu/cmet/GEindex.html. The photograph was of a test launch from the beach in Veracruz.

3.- A cloud camera.

PHOTO BY BARRY LEFER

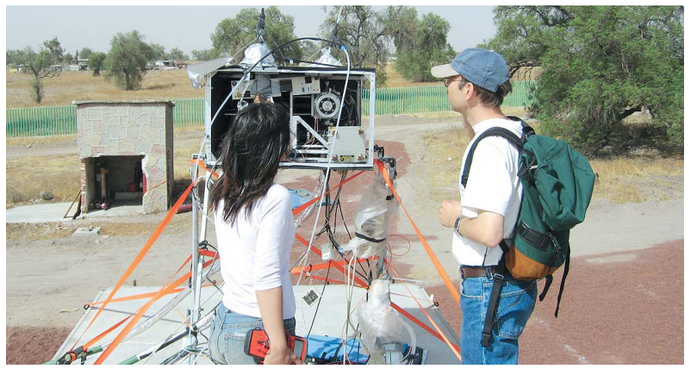

PHOTO BY BARRY LEFER

DEVICE: Chika Minejima explains her work to Eric Hentsa of the NSF.