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SEDENA SUPERVISES AIR QUALITY MEGASTUDY

The military collaborates in the work efforts for the *MILAGRO* campaign. 6 U.S. aircraft participate in the monitoring of pollutants in the Mexico City Metropolitan Area.

By Alejandro Ramos and Iván Sosa

The National Defense Ministry will supervise the atmospheric research efforts conducted in the Mexico City Metropolitan Area by the scientists of the ***MILAGRO*** campaign.

For reasons of national security, the flights of the six airplanes from international agencies will be monitored by law enforcement elements from the Mexican Air Force.

Luisa Molina, head coordinator of the ***MILAGRO*** campaign, said that “we went over the project with them; they were very interested both in the scientific and in the security sense. We also conveyed to them the necessity of flying over the Santa Lucia air base”.

The military base is situated in Zumpango, State of Mexico, directly in the route where pollution travels. After it is generated in Mexico City, it is transported to other regions, which will be studied by a team of 350 scientists from 60 institutions and 17 countries.

Each morning, car-owners, drivers, shop workers, people who cut down trees, burn trash or light up a heater or stove at home, are producing air pollution.

By noon the inhabitants of the second most populated city in the world feel the symptoms caused by pollutants. In spite of this, after midday, the general belief is that the pollutants disappear, only to reappear the next day.

However, the research scientist from the Massachusetts Technological Institute explained that “it doesn’t disappear into thin air, it stays there; in other regions, in other ways; the deterioration of the vegetation after the rains or in ways as complex as to influence the climate change of the planet”.

With airplanes outfitted with laboratories, satellite observation systems and the ground-based information to be collected by 8 operational vehicles, 4 fixed stations and three supersites, as well as radiosondes and measurement balloons, the scientists hope to create a comprehensive database.

Between March 1-30, one hundred pieces of equipment that will be used to make measurements will be installed at the T0 supersite located at the Petroleum Mexican Institute. The specialized equipment will be operated by 80 scientists.

Luisa Molina indicated that “after presenting the project, the United States National Science Foundation and the Department of Energy decided to convene U.S. scientists, with funding for 25 million dollars, which includes Mexican researchers”.

NASA’s motivation to join the campaign stemmed from the studies they conducted on the migration of pollution plumes from China, Korea and India to America. Scientists from Europe, Asia and South America will also be joining the project.

“In order to support the participation of more Mexican scientists, the Semarnat, Conacyt and the Metropolitan Environmental Commission, have contributed 7.2 million pesos to the campaign”, indicated the director of the Molina Center in La Jolla, California.

The military have full access to the generated database, as well as all of the participating scientists. “After March 1st, 2008, the information will be available to the public over the internet”, stated Luisa Molina.

The preliminary results from the studies conducted will be disclosed 6 months from now. Then, on March 2007, the consolidated study will be presented and it is expected that during the following 10 years more information will be generated by researchers.

Equipment from NASA

The DC-8, one of six airplanes to participate in the **MILAGRO** campaign, is a “flying laboratory” from the National Aeronautics and Space Administration (NASA).

The aircraft is equipped with the Airborne Synthetic Aperture Radar (AIRSAR) developed by the Jet Propulsion Laboratory (JPL) from Pasadena, California.

Radar antennae placed on external parts of the aircraft send out wavelengths that reflect off distant surfaces or objects and, upon their return, register the accumulated energy, which represents a digital snapshot of the atmospheric spectrum.

Previously, the DC-8 has flown over Mexico and Central America on other scientific missions and it has studied the behavior of hurricanes and tornados.

It also performs scientific tasks and studies in ecology, archeology and oceanography. The databases generated by the plane are corroborated with the information provided by the satellites.

Explorers

A group of scientists will conduct studies on the atmosphere of the metropolitan region to determine the types of pollutants exported to other cities and continents.

DC-8: A flying laboratory from the National Aeronautics and Space Administration (NASA).

It will measure peroxides and peroxyacetyl nitrates. Operated by NASA, it will fly from Houston to evaluate flight routes through which the pollution from the city spreads out to the United States and affects climate change.

Other aircraft

King Air 2 – Also from NASA, it is a smaller airplane. It is equipped with the LIDAR (Light Detection and Ranging) system that emits a laser beam vertically to the atmosphere which, after returning, offers information about the detected components. Based in Veracruz.

Jetstream 31 – Equipped with photometers and optical analyzers, it evaluates the behavior of aerosols through a vertical profile. Based in Veracruz.

Twin Otter – It will evaluate the information obtained from the particles produced by forest fires. Based in Veracruz.

Gulfstream G-1 – With a slow-moving flight trajectory, it will study chemical reactions in the atmosphere. Based in Veracruz.

Migrating pollutants

Four large-scale scientific research studies incorporate the **MILAGRO** campaign (Megacity Initiative: Local and Global research Observations).

Areas explored by region

- MCMA-2006 (Molina) Mexico City
- MAX-MEX (DOE) Mexico City
- MIRAGE-MEX (NFS) Tampico / Tuxpan / Veracruz / Puebla
- INTEX-B (Nasa/NSF) Nuevo Laredo / Monterrey / Matamoros / Zacatecas / San Luis Potosí / León / Coahuila

Projects

MCMA-2006 (Mexico City Metropolitan Area 2006). The Molina Center, the National Science Foundation (NSF) and the Department of Energy (DOE) will conduct studies on pollution in the Mexico City Metropolitan Area.

MAX-MEX (Megacity Aerosol Experiment in Mexico City). The Atmospheric Science Program from the Department of Energy (DOE) will examine the evolution of aerosols and gas-aerosols interactions in the immediate urban outflow.

MIRAGE-MEX (Megacity Impacts on Regional and Global Environments) The National Center for Atmospheric Research (NCAR) and the NSF will examine the evolution of the Mexico City pollution plume on larger regional scales.

INTEX-B (Intercontinental Chemical Transport Experiment, phase B). NASA will analyze the transport of pollution in the city and its effects on climate change. Phase A studied the migration of pollutants from Asia to North America.

THEY SAID IT

"The chemical composition of the planet's atmosphere is changing. This is one of the questions the measurement of pollutants will try to explain"
Mario Molina, 1995 Nobel Prize in Chemistry.

"The research presented by Dr. Molina's team will uphold the policies to improve air quality. The study to be conducted now will contribute greatly to the fight against pollution".
Claudia Sheinbaum, Secretary of the Environment of Mexico City

"In 2008, the information of the **MILAGRO** campaign will be available on the internet to be accessed and downloaded by all interested parties.
Luisa Molina, MIT research scientist.

"This is a science project of historical importance. It is the first global project to monitor pollutants from one of the most polluted cities in the world".
César Reyna, Interim Technical Secretary of the Metropolitan Environmental Commission