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MILAGRO PROJECT LAUNCHED AT THE UNIVERSITY

- Environmental Study of Megacities
- Important participation of UNAM in this vital proposal for the planet
- 70 Mexican researchers involved

MILAGRO Project, inaugurated at the UNAM

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José Lema, Carlos Gay y Luisa Molina, durante la presentación del proyecto en Universum.

Project to study the local and global impact of pollution generated by megacities.

With the expectation to determine the temporal and spatial magnitude of the plume of pollutants in megacities, the **Milagro** Project started off its activities at the UNAM using Mexico City as a case study in order to better understand how and when pollutants from the city are eliminated by the atmosphere, and their regional and global impacts.

At the ceremony, celebrated at the theater of the science museum Universum, Carlos Gay director of the Center for Atmospheric Sciences indicated that this learning center –the UNAM– plays an important role in this monumental project, essential to the well being of the planet.

In the presence of Rick Petty, Bruce Doddridge and Anne Mari Schmoltnner –as well as Julia Tagüeña, general director for Science Dissemination–, Carlos Gay disclosed that more than 100 national and American institutions participate in **Milagro** represented by approximately 400 science researchers, 70 of which are from Mexico.

Luisa Molina from the Massachusetts Institute of Technology and head coordinator of the **Milagro** Project indicated that in all megacities there is an existing concern, at a local level, about the impact that pollution has on the health of the population and on the city's meteorological parameters. At a regional level, the concerns relate to pollution's influence on agriculture, natural ecosystems, as well as on the reduction of visibility.

She explained that megacities are cities with a growing population of more than 10 million inhabitants. In 1950 New York was the only megacity that covered these requirements, but by 1995 that number had increased to 14 and it is estimated that by 2015 there will be 21 megacities in existence. She went on to say that while in 1995 there were only seven urban centers with a population of 5 to 10 million people, that figure is expected to rise to 37 by 2015.



The four monitoring components

The first of the four components of the **Milagro** Project will be the Mexico City Metropolitan Area. Here the researchers will examine emissions and boundary layer concentrations within the region through the measurements of aerosols, volatile organic compounds and other gases. Solar radiation and meteorological parameters will also be monitored at different points of the MCMA. The analysis will help to establish the exposure patterns of the general population to these pollutants, as well as their general effects on human health.

The second component - Megacity Aerosol Experiment in Mexico City (MAX-Mex)- will characterize aerosol formation and changes in aerosol composition, size distribution, light scattering coefficient, absorption coefficient, optical depth, soot-specific absorption, and radiative fluxes at selected vertical and horizontal locations in the outflow from a well-characterized urban core.

The next monitoring component - Megacity Impacts on regional and Global Environments (MIRAGE-Mex)- aims to increase the understanding of how the world's megacities affect regional and global air chemistry, and how this in turn can influence weather and climate. To achieve these objectives, an extensive series of observations of the chemical and physical state of the atmosphere in the region surrounding Mexico City will be conducted.

The fourth component - Intercontinental Chemical Transport Experiment-Phase B (INTEX-B)- will emphasize the regional-to-global aspect of Milagro with observations from two aircraft, as well as satellites. One of the airplanes will provide comprehensive observations of chemistry and aerosols using both direct air sampling and laser remote sensing while the other will focus

exclusively on aerosols and their radiative impacts. Both will be conducting their observations from the Gulf of Mexico to the Mexico City Metropolitan Area.

The coordinator of the **Milagro** Project explained that the reason why Mexico City was chosen as a study case was because its situated at a tropical latitude similar to other expanding megacities. It offers reliable pollution emission inventories and air quality monitoring studies, as well as a previous history of excellent scientific collaboration with Mexican scientists and first-rate logistical infrastructure.



Esta exposición de carteles corresponde a la parte educacional del Proyecto Milagro.
Fotos: Marco Mijares.

Luisa Molina indicated that there would be three monitoring supersites located at the *Instituto Mexicano del Petróleo* in the Federal District (Mexico City), the *Universidad Tecnológica de Tecamac* in the State of Mexico, and the *Rancho la Bisnaga* in Tizayuca, State of Hidalgo.

The benefits



As to the benefits that would result from this campaign, Luisa Molina called attention to the fact that this would be the first examination ever performed on air quality at this level. She indicated this project would provide a better understanding of the relative importance of the different pollution sources (urban, biomass fires, natural); help improve air quality and meteorological models, and increase our knowledge on the transformation and elimination processes of atmospheric pollution. Furthermore, it would provide educational opportunities for Mexican and American students and stimulate collaboration between scholars and technical personnel from state and local governments.

Luisa Molina added that the project includes an educational program with guided tours to the monitoring supersites, as well as a website with information (Windows to the Universe), specialized workshops for technicians, graduate and undergraduate students, activities for children of all ages, posters and exhibits, science related activities, presentations and talks. The first of **Milagro's** activities was launched during its inauguration ceremony at Universum.

Along with the UNAM, other Mexican participating institutions are the Mario Molina Center (CMM), the Environmental Metropolitan Commission (CAM), the National Council for Science and Technology (CONACYT), the Mexican Air Force Association (FAM), the Electric Research Institute (IIE), Mexican Institute of Water Technology (IMTA), National Institute of Public Health (INSP), the Mexican Secretariat of Communication and Transportation (SCT), the Secretariat of Public Education (SEP), the Secretariat of the Interior (SEGOB), the Secretariat of National Defense (SEDENA), and the Secretariat of the Navy (SM).

Some of the non-Mexican institutions that stand out are the National Aeronautics and Space Administration (NASA), the National Center for Atmospheric Research (NCAR), the National Science Foundation (NSF), and the universities of Harvard, California, Hawaii and Houston.

José Lema, dean of the Metropolitan Autonomous University (UAM) mentioned that a preliminary version of the Milagro project which now is taking place at the UNAM, had previously been launched at the UAM Iztapalapa.

He concluded that, in time, the results will contribute not only to the improvement of the air quality in places like the Federal District (Mexico City) but also in other cities, and help avoid pollution problems, such as the ones experienced over the past 50 years, in the future.