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## STATE-OF-THE-ART TECHNOLOGY USED TO ANALYZE ATMOSPHERIC POLLUTION

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Scientists together with Mexican and non-Mexican specialists that are participating in the MILAGRO campaign are using five airplanes –provided by different United States agencies and institutions such as the National Center for Atmospheric Research, the USA Forest Service and the well-known NASA- to observe and measure the damage caused by the dispersal of pollutants in Mexico City.



These airplanes –flying from the port of Veracruz to Mexico City- are capable of carrying on board actual laboratories that are used to chase different types of pollutants at different altitudes and at different locations. Even when it is impossible to collect measurements 100 per cent of the time because of the high cost it represents, the use airplanes offers many advantages.

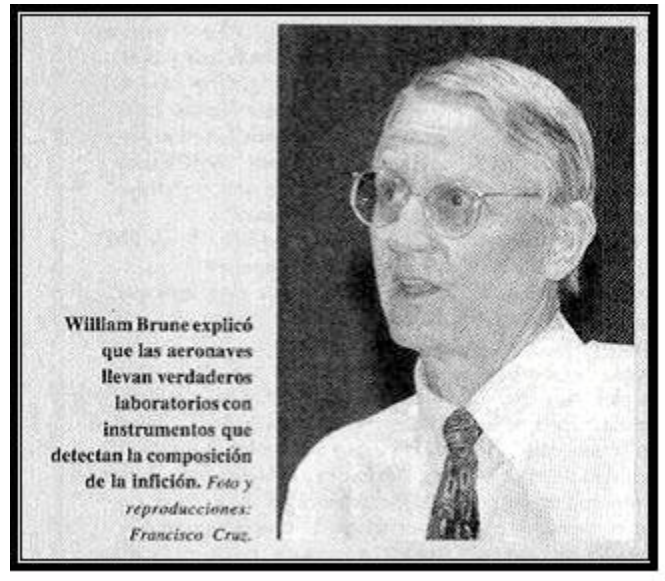
For example, their instruments have lasers that detect atmospheric samples that may be analyzed during mid-flight and provide the composition of the pollution gases.

Such was explained by William Brune from the Department of Meteorology at Penn State University during his conference on using airplanes to chase atmospheric pollution at the Science Theater-Museum Universum. He added that more attention should be paid to the constant expansion of big cities mainly because they harbor a vast quantity of people, activities and vehicles within a confined space, which increases the levels of pollution.

He emphasized the relevance of classifying which pollutants generated by the city stay in the atmosphere and which transport to other regions, and if this is the case where do they go. In the case of Mexico City he indicated that 50 per cent of the time the pollutants transport to the Gulf of Mexico and, depending on the direction the winds, mix with other pollutants of industrial origins.

According to Brune these pollutants are detrimental to human health and the ecology. They also damage the city's infrastructure and generate acid rain. In short, it has an impact on the climate – which is changing- that affects us all.

This forecast requires us to find out just how much of the area is covered by pollutants as well as gather more complete meteorological information. He mentioned that satellites can help measure some of the most hazardous pollutants even when monitoring networks are also used for this task. He stated that Mexico's network and its measurements are useful but that they are not sufficient.



When talking about the pollution sources he indicated that special attention had to be given to biomass fires, industries, and energy plants. “All of them contribute to the problem that should be viewed not only at a global level but also examined at certain times and certain locations”.



He established that to study the dispersal of pollutants one must first determine the wind patterns and see where a storm system or a line of cumulous clouds may be forming, among other things. This requires the use of models with enough resolution to visualize how pollutants travel; to see how they descend and get lost on the ground and how they rise into the atmosphere and envelop the whole planet.

The American scientist recognized that, at present, the models employed are sophisticated but not as good as they should be in order to do an optimal job.

The sources of atmospheric pollution are many and the problem will worsen unless technology is applied in order to minimize it.

### **Where does pollution come from?**

During his conference, William Brune, participating scientist of the MILAGRO Campaign (Megacity Initiative: Local and Global Research Observations), reiterated that it is not only important to study today's atmospheric pollution but also the levels that will exist in the future since they will most likely keep rising.



**Pollution in Mexico City**

The question is where does pollution come from? The particulate and gas emissions, for example, come from the ground levels of big cities and then transport and disperse to more extensive areas.

The pollution generated by cars and by the industry combines with the fumes from burning down fields or forests to make space for new agricultural spaces. The problem worsens, he indicated, when lightning –which is natural light-interacts with man-made pollutants.

William Brune explained that volatile organic compounds like nitrogen oxides and dioxides are hazardous regardless of their origin. There is also carbon monoxide generally produced by an incomplete combustion; all of these compounds accumulate in the atmosphere.

He further mentioned that based on several satellite measurements that show the quantity of carbon monoxide worldwide scientists have been able to illustrate how, for instance, the compound before mentioned generated east of the United States disperses toward Europe and how one generated in Asia moves toward Europe and may end up in Alaska.

More than 100 Mexican and non-Mexican institutions, the UNAM being one of them, participated in the MILAGRO Campaign and were represented by almost 400 scientists, 70 of which are Mexican.