Modeling for Forecasting and Analysis of Megacity Impacts on Regional and Global Environments-Mexico City Pollution Outflow Field Campaign (MIRAGE-Mex)

Luisa Molina ltmolina@mit.edu (Principal Investigator)
Mario Molina (Co-Principal Investigator)
Massachusetts Institute of Technology

This award will provide funding for meteorological support for the MIRAGE-Mex field campaign to support campaign planning and execution. The objective of the MIRAGE-Mex campaign is to improve our understanding of the impacts of the Mexico City Metropolitan Area pollution plume, to study the gas phase reactivity in the urban-regional-global transition, analyze the physical and chemical evolution of aerosols and their radiative properties, and study gas-aerosol interactions. This project will contribute towards these goals by forecasting the evolution of the plume and to analyze the meteorological conditions during the experiment. The project will use the MM5, CAMx, and FLEXPART models. Specific tasks will include: Analysis of plume dispersion from the Mexico City basin; investigation of residence times, mixing processes, slope flows and urban heat island flow to determine the initial conditions necessary for analyzing regional export and global transport; development of advanced methods for model evaluation for conditions of weak and variable wind flow, the development of improved inputs for the meteorological Land Surface Model. In addition, methods will be developed for source identification based on particle trajectories.

This project will provide educational opportunities for a graduate student and a post-doctoral researcher, and provide a central element for a field program aimed at a very important topic regarding the interactions between atmospheric composition, in particular under conditions influenced by megacity emissions, and climate.