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NARROWING THE UNCERTAINTIES ON AEROSOL AND CLIMATE CHANGES IN SÃO PAULO STATE – NUANCE-SPS

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SCIENCE QUESTIONS AND OBJECTIVES

This project is starting in the first semester of 2011 after a long process of evaluation. The rapid proliferation of megacities (> 10 millions of inhabitants) and their air quality problems are producing unprecedented air pollution health risks and ambient management challenges. Emissions from megacities affect not only local populations but also regional and global scale atmospheric chemistry and climate, as the megacities play an important role in the increase of atmospheric emission of Green House Gases (GHGs) and aerosols. The impact of the megacities is related not only to the air pollutants emission but also to the modification of surface (with increased roughness and drier surface) and consequently the change on the radiative balance and rain formation.

The theme of the project can be summarized as the implementation of a modeling system representing the chemical-physical process in the troposphere and the health impacts at the urban scale. The megacity of São Paulo will be an example of integrated approach regarding evaluating of the impact of the climate change on it air quality. In this project, MASP will be an observatory of the climate, with special attention to the variation of the meteorological characteristics due to the climate change.

The atmospheric aerosols concentrated all the complexity associated to the correct representation of the atmospheric chemistry and dynamical dispersion. The aerosols can be considered as tracers of the atmospheric process, as they are responsible for the radiative and cloud formation.

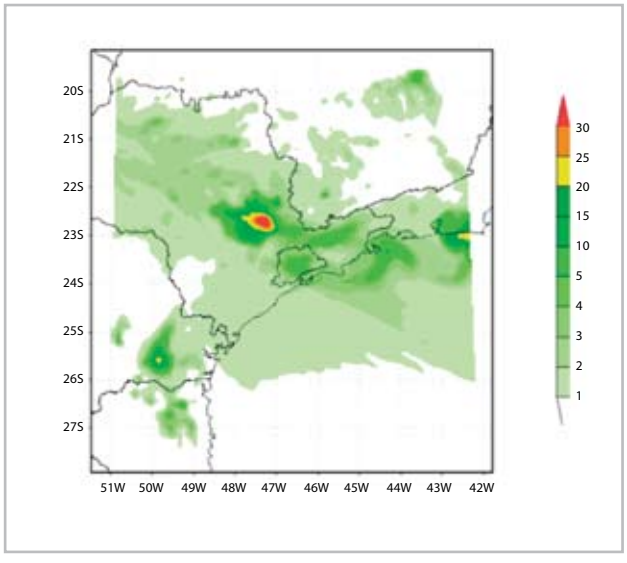

Figure 1. Dispersion of Fine Particles (PM2.5) in São Paulo

CURRENT RESULTS AND PERSPECTIVES

Modeling the impacts of megacities emission involves the knowledge of the sources of these aerosols and gases (both primary and secondary) and their spatial distribution. This includes the processes that lead to the formation of secondary organic and inorganic aerosols and their transport across multiple spatial scales and the chemical and microphysical evolution of primary aerosol species, particularly black carbon which is a strongly radiative absorbing aerosol component. Given the breadth and complexity of the scientific issues involved in global climate, the overall goal of Nuance is the study of the role of primary and secondary aerosol and gases (emissions, production, reactions, radiation interaction, and dispersion and transport process) in the regional scale in Sao Paulo State, South Hemisphere.

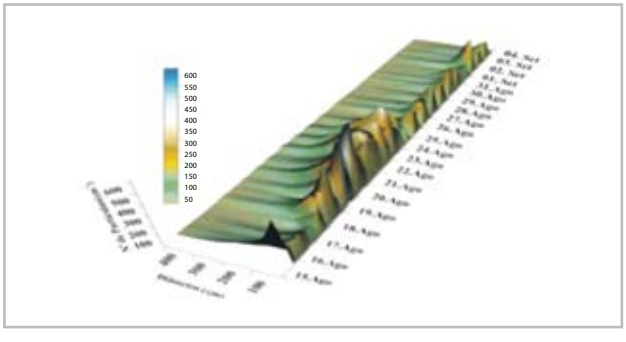

Figure 2. Number distribution of nano particles in São Paulo

Figure 3. Convective system over São Paulo

RELATED PUBLICATIONS

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