Geophysical Research Abstracts
Vol. 14, EGU2012-6599, 2012
EGU General Assembly 2012

South American mega cities: Knowledge gaps and collaboration opportunities

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Urbanization and population concentration are outstanding phenomena in South America. About 83% of the 530 million South Americans live already in large coastal or near coastal cities (> 750 k inhabitants), many of which are heavily polluted. Curbing measures have been implemented on a relatively fast pace taking advantage of lessons learned elsewhere. However, as environmental objectives become more ambitious, considering for instance chronic health effects, impacts on ecosystems and agriculture, addressing secondary particles and climatic impacts, the need for cost-effective measures requires of more reliable and locally representative data. Such data include: emission fluxes (both natural and anthropogenic) and emission scenarios; characterization of vertical mixing; speciation and distribution of pollutants and precursors. In this presentation, we review the current situation in terms of atmospheric modeling, emission modeling, measuring and observations in a number of South American cities. Also, we describe low-cost actions oriented towards improving our understanding of: 1) vertical mixing by means of a modeling inter comparison exercise using data already collected in Santiago de Chile; 2) aerosol composition and speciation of volatile organic compounds by means of a coordinated sampling of filters and canisters at various locations highlighting the diversity of our cities. These actions were collectively convened by ca. 50 leading scientists and local policy makers during an international symposium held in Santiago in January 2012 (<http://ossaf.cmm.uchile.cl/>http://ossaf.cmm.uchile.cl/). This activity marked the closure of a five year project sponsored by the Inter American Institute on Global Change Research that tackled South American Emissions Megacities and Climate (SAEMC, CRN 2017). It was also a regional activity promoted and sponsored by the international Commission on Atmospheric Chemistry and Global Pollution (iCACGP), and by the World Meteorological Organization, Global Atmospheric Watch (GAW) Urban Research Meteorology and Environment (GURME).