



Sustained monitoring of CO₂ emissions from megacities

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The need to build confidence in both the execution and efficacy of greenhouse gas mitigation actions has been recognized in many forums. The potential of applying “top-down” methods (data derived from atmospheric observations) together with improved “bottom-up” information (including emission inventories) to reduce uncertainty in and help validate emission estimates has been cited in recent reports under the auspices of the Group on Earth Observations, US National Research Council, and the Intergovernmental Panel on Climate Change. These and other studies have also recognized the significant barriers (scientific, technical, and geopolitical) to practical application of this concept on policy relevant space-time scales. Building capacity for sustained atmospheric monitoring and robust emission trend detection for urban sources of CO₂ has been recognized as one of the priority areas for research and development given that approximately 75% of fossil fuel emissions are currently estimated to come from a few hundred large cities and power plants around the world. Monitoring trends in the intense CO₂ boundary layer enhancements of megacities will likely prove more tractable scientifically, technically, and (perhaps) geopolitically sooner than resolving the anthropogenic signals of entire countries.

We present a concept and plans for a coordinated pilot project to evaluate and monitor the trends in atmospheric CO₂ emissions from three mega-cities. The project involves an international collaboration to design and implement sustained observations of CO₂ emission trends for the Los Angeles Basin, the Paris Metropolitan Area, and a third (to be determined) megacity using atmospheric observations (in situ and remote-sensing from surface, air, and satellite platforms), forward and inverse flux modeling, energy/emission modeling and ultimately, synthesis with inventories. The project will be conducted for a minimum of 3 years, with coordinated data collection beginning as early as mid 2011. Protocols for data sharing and comparative analysis will be jointly developed by the scientific community and the relevant city governments (discussions of which are already underway). The ultimate objective of the project is to address some of the key scientific and technical infrastructure barriers to practical application of these techniques to policy support while demonstrating mechanisms for open and transparent data sharing.