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- towards climate change services

Investigating the Optical and Microphysical Properties of Particulate Matter during MEGAPOLI Field Campaigns

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Particulate Matter (or aerosols) is one of major components affecting the air quality and climate change. Despite the abundance of PM in the atmosphere, the emissions, composition and transformation of PM are still poorly understood due partly to the large measurement uncertainties and chemical complexity, particularly a distinct lack of the optical and microphysical properties of PM over megacities. In this study, we use the global chemistry transport model (GEOS-Chem) and regional air quality model (WRF-CMAQ) to simulate the optical and microphysical properties of PM over megacities such as London and Paris.

The intensive MEGAPOLI field campaigns were performed during summer 2009 in the Ile-de-France region and winter 2010 in Paris. Measurements have provided the detailed information on aerosol properties including size distribution, volatility, hygroscopicity, chemical composition and optical properties. We use the observational data from the intensive field campaigns to validate the simulations from global and regional air quality models. The model simulations of major aerosol species including sulphate, ammonium, nitrate and black carbon, particularly the organic compounds will be evaluated with measurement datasets.

We analyses the effects of emissions, meteorology and chemistry on the aerosol properties over megacities. The impact of Megacity emissions on PM concentrations (PM10 and PM2.5) will be examined according to model simulations, particularly the factors such as speciation, temporal profile and contributions from the long range transport. We use the satellite observational data such as the Ozone Monitoring Instrument (OMI), the Moderate Resolution Imaging Spectroradiometer (MODIS) and the Multi-angle Imaging SpectroRadiometer (MISR) for inter-comparison with the model simulations on regional and urban scales. The combining modeling and observations will improve our understanding of PM properties and the model prediction accuracy of PM episodes.