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Real-time measurement on the aging of ambient air masses using a potential aerosol mass chamber (Go:PAM) in Beijing

Qianyun Liu (1), Mattias Hallquist (2), Michael Le Breton (2), Åsa M Hallquist (3), Ravi K. Pathak (2), Chak K. Chan (4), and Song Guo (5)

(1) Division of Environment, Hong Kong University of Science & Technology, Hong Kong, China , (2) Department of Chemistry and Molecular Biology, University of Gothenburg, Gothenburg, Sweden, (3) IVL Swedish Environmental Research Institute, Gothenburg, Sweden, (4) School of Energy and Environment, City University of Hong Kong, Hong Kong, (5) State Key Joint Laboratory of Environmental Simulation and Pollution Control, College of Environmental Sciences and Engineering, Peking University, Beijing, China.

Large formation of Secondary Organic Aerosol (SOA) have been observed in polluted areas over decades of years. Because of the importance of SOA to climate, human health and ecosystem, SOA has become a focus in both laboratory and field studies.

In order to investigate atmospheric ageing process, a portable laminar flow reactor (Go:PAM) is utilized to oxidize the ambient air in Changping, Beijing. The reactor provides a highly oxidizing environment that simulates atmospheric oxidation processes. OH radical concentration was around 5×10^{11} molec cm^{-3} s, achieving equivalent photochemical age of 7-8 days.

A high-resolution aerosol mass spectrometer (AMS), a scanning mobility particle sizer (SMPS) and a Time of Flight Chemical Ionization Mass Spectrometer (ToF CIMS) utilizing the Filter Inlet for Gases and AEROsols (FIGAERO) alternated sampling ambient and reactor-aged air. In the temporal variation, different potential air masses was observed from both clean days and polluted days. Enhancement of aerosol mass from aging was up to a factor of 6 in pollution episodes, which is dominated by organic components. Evolution of the elemental composition in the reactor was similar to trends observed in the atmosphere. These experiments illustrated the potential air masses formation by investigating different components evolution in the observed air-masses.