



New Particle Formation and Growth to Haze in the Northern China

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The economic growth, urbanization, energy consumption and vehicle population increase are driving forces for PM_{2.5} and haze pollution in China. The features of air pollution complex are that multi-pollutants coexist at high concentrations, the formation mechanism is complex and process is nonlinear, and regional air pollution has become prominent. Strict measures for air pollution control has been taken since 2010s, such as, the revision of “National Ambient Air Quality Standards”, “Action Plan on Prevention and Control of Air Pollution”, and the amendment of “Law on Prevention and Control of Air Pollution”. One of the challenges for air pollution control in China is to understand the mechanism of secondary aerosol formation.

The new particle formation (NPF) and growth is believed as one possible process for secondary aerosol formation to cause haze in the Northern China. Simultaneous intensive field measurements were conducted in the winter of 2017 at two sites of urban Beijing and regional Dezhou in Shandong Province. Particle number concentration (down to 1.5 nm), gas precursors (such as sulphuric acid, NH₃, amine, and HOMs), and aerosol chemical compositions were measured. NPF events was observed with the efficiency of 49% and 51%, in which 23% and 27% resulted in regional haze in Beijing and Dezhou, respectively. Sulphuric acid, NH₃, amine, and HOMs are potential precursors for the NPF event. The new particles acted as the seeds in the atmosphere and sequent growth with contribution of secondary organic aerosols and secondary inorganic ions. The MALTE-box model is adopted to discuss the nucleation formation.