Geophysical Research Abstracts
Vol. 21, EGU2019-5576, 2019
EGU General Assembly 2019

Influence of pollutants on activity of aerosol and cloud condensation nuclei (CCN) during pollution and post-rain periods in Guangzhou, southern China

Junyan Duan, Xin Xie, and Tiantao Cheng
Fudan University, Shanghai, China (janeduan123@163.com)

Atmospheric pollutions have an important impact on aerosol, condensation nuclei (CN) and cloud condensation nuclei (CCN) loadings near the ground through disturbing particle size, number, chemical composition and reactions, mixing state, hygroscopicity, and so on. Aerosols and CCN were measured in urban Guangzhou during pollution and post-rain periods to examine effects of particulate pollutants on aerosol CCN activity and compare their mechanisms between summer and winter. In contrast with different levels of pollutions, particle matter ($PM_{2.5}$) and number(CN) and CCN almost showed an opposite trend to aerosol activity (CCN/CN). In summer, new particle formation (NPF) events triggered by photochemical reactions (e.g.O_3) always occurred in no pollution daytime, and increased significantly CN and CCN as a dominant contributor to secondary aerosols. Under pollution conditions, the gas-to-particle transition driven by photochemical reactions guided the formation and aging processes of particles in daytime, especially in changing soluble species, whereas atmospheric oxidation and heterogeneous reactions dominated at night. In winter, stagnant weather conditions, high pollutant levels and relatively high RH were in favor of particle growing and aging through enhancing secondary particle formation and heterogeneous reactions. The wet scavenging of precipitation reduced greatly CCN amount by scouring preexisting particles in winter, and during post-rain period the photochemical reactions did not promote the burst of secondary particle formation in the absence of ozone, compared with summer. The results may provide insights into the relationship between aerosol moisture absorption and pollution that may be useful for improving air quality.