Geophysical Research Abstracts
Vol. 20, EGU2018-5636, 2018
EGU General Assembly 2018

A case study of spring haze in Beijing: characteristics, formation processes, secondary transition and regional transportation

Hui Li

Tsinghua University, School of environment, School of environment, China (li-h16@mails.tsinghua.edu.cn)

A continuous intensive monitor of haze case was conducted from 4/3 12:00 to 4/8 12:00 in Beijing, during which the PM2.5 ranged from 6.3 to 164.6 μg m-3 with an average of 63.8 μg m-3. Nitrate was the most abundant species, on average accounting for 36.4% of PM2.5, followed by OC (organic carbon-21.5%), NH4+ (19.3%), SO42- (18.8%) and EC (elemental carbon-4.1%), indicating the key role of nitrate in this haze event. Various species contributed to the different pollution periods, among which, sulfate contributed to the evolution and booming periods, nitrate to booming and haze, SOC (secondary organic carbon) accounted the most during latent and clean stages. The secondary transition of sulfate was mostly influenced by SO_2, then RH (relative humidity) and Ox (O_3+NO_2). Two steps was identified through the nitrate formation, the first one was the oxidizing of NO_2, which was more vulnerable to Ox, and the following step was the partitioning of N (+5) which was susceptible to the RH and temperature. SOC tended to form when the Ox and RH reached a certain balance. According to the hourly behavior of species, sulfate and nitrate enriched mainly during the booming period, in concert with the decrease of MLH (mixed layer height). However, SOC accumulated within the latent and evolution stages, which further proved the strong contribution of SIA (secondary inorganic aerosol), and the limiting devotion of SOC to this haze case. Investigating the 24-h backward trajectories, we found the northwestern air mass always corresponded the cleaner periods (latent, falling and clean), characterized by the high speed and straightforward direction. On the contrary, the air mass from southwest passed some highly industrialized and polluted cities including Shijiazhuang, Baoding, Zhengzhou, Datong and Handan etc., bringing Beijing with abundant pollutants, further stimulated the occurrence of haze pollution. Based on this study, nitrate was the most contributor of PM2.5 thus the control of NO_2 needs to be highlighted. In addition, the well correlation between trajectories and pollution condition in Beijing reminds us the necessity of inter-region prevention and control action.