An observational study on air pollution conditions in two continuous haze periods in winter in Nanjing, China

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Two serious haze pollution courses occurred in Jiangsu Province, affected by the continuous haze weather conditions in the Central and East China in January 2013. According to the observed data from Jiangsu Environment Monitoring Center, the characteristics of particulate matter and gaseous pollutants these haze periods were analyzed. Results showed that the daily averaged mass concentrations of $PM_{2.5}$ were176-205 μg/m^3 as 5-6 times than the standards of EPA, and the maximum hourly value is 336 μg/m^3. Positive relationship between $PM_{2.5}$ and PM_{10} was found with correlation coefficients (R^2) as 0.87. Fine particles plays an important role in the two pollution process as $PM_{2.5}$ accounted for 70-86% of PM_{10}, The mass concentrations of SO_4^{2-}, NO_3^- and NH_4^+ exhibited higher values in submicron particles ($PM_{1.0}$) with the total mass concentrations of them accounting for 83% and 51% of those for $PM_{2.5}$. Meanwhile, the mass concentrations of $PM_{1.0}$ showed positive relationships with SO_4^{2-}, NO_3^- and NH_4^+, with the R^2 as 0.57, 0.65 and 0.73, respectively. While they exhibited worse correlations with $PM_{2.5}$ mass concentrations, indicating that these ions preferred to concentrate in the fine particles. A positive correlation between NH_4^+ with SO_4^{2-} and NO_3^- was found with R^2 as 0.8 and 0.85. The secondary aerosol obviously affected visibility. Positive relationship between black carton (BC) and visibility existed with R^2 as 0.31. BC make lower contribution to visibility when compared with the secondary aerosol which may be the key factors for the cause of the continuous haze weather conditions in the two periods.

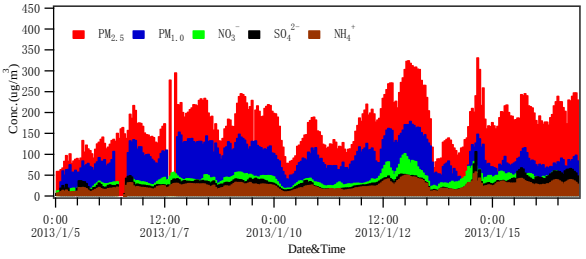

Figure 1. Time series of $PM_{2.5}$, $PM_{1.0}$, NO_3^-, SO_4^{2-}, and NH_4^+.

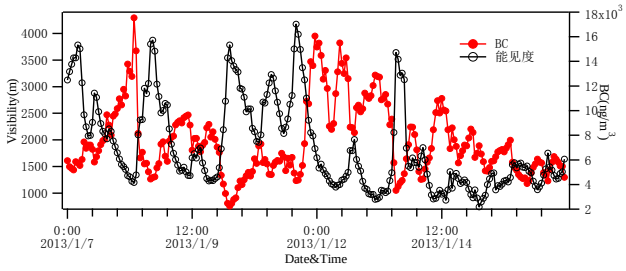

Figure 2. Time series of BC and visibility

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