



Seasonal and Diurnal Variation of Black Carbon on Surface and its Vertical Distribution within Boundary Layer in Sichuan Basin, China

Xiaoling Zhang (1), Liang Yuan (1), Zhaoze Deng (2), Xiangao Xia (2), and Miaolin Yang (1)

(1) School of Atmospheric Sciences, Chengdu University of Information Technology, Chengdu, China, (2) LAGEO, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China

Black carbon (BC) aerosol is an important influence factor of global climate change, which can absorb visible light and part of infrared light strongly and affect climate change. Black carbon aerosol is also one of the main components of PM_{2.5}. It can adsorb some toxic and harmful substances, affecting human health. Black carbon aerosol can participate in atmospheric chemical processes and affect the composition of the atmosphere. Sichuan Basin lies in the southwest China, there are two mega-cities of Chengdu and Chongqing. Due to the unique topographic conditions and the rapid development of urbanization, the pollution diffusion condition in Sichuan Basin is poor, which often results in the accumulation of pollutants, especially in winter time.

In order to investigate the BC concentration evolution and its variations and impacts in this special region, surface BC concentration was observed using AE33 instrument from September 2017 to August 2018 in CUIT (Chengdu University of Information Technology) campus located in western suburb of Chengdu and vertical structures were monitored using MA200 multiband black carbon micro-instrument in December 2017 in Jianyang city of Sichuan Province. The distance between CUIT station and Jianyang station is about 60 km. The observation data showed that, the annual concentration of BC is $5.88 \pm 2.49 \mu\text{g}/\text{m}^3$. The concentration of BC in winter was much higher ($8.16 \pm 3.19 \mu\text{g}/\text{m}^3$) than other seasons, BC concentration in summer was relative low ($2.77 \pm 1.17 \mu\text{g}/\text{m}^3$), in spring and autumn BC was about $5.20 \pm 2.41 \mu\text{g}/\text{m}^3$. The diurnal variation of BC concentration was also obvious due to the local meteorological conditions and anthropogenic activities. It appeared that BC high peak value in the morning and night and low value in the afternoon. The experiment data showed that the vertical distribution of BC concentration varied with different weather patterns and boundary layer structures. Usually BC concentration was high from surface to about 500m height, the value was relative low (about $3 \sim 6 \mu\text{g}/\text{m}^3$) at normal days. When stable weather and inversion temperature occurred in lower layer, BC concentration within 200m could be very high more than $12 \mu\text{g}/\text{m}^3$, as well as the PM_{2.5} was high resulting heavy pollution. In Sichuan basin, the ratio of BC and PM_{2.5} was about 0.08, which means BC account for 8 percent of PM_{2.5} on average. The further deep investigation in the source of BC and PM_{2.5} and their formation process, impact on local and regional weather and climate and their effect on human health will be conducted.