Session: C12 Poster: M61A

Vertical changes in mixing state of aerosol particles in the boundary layer in Beijing, China: Balloon-borne measurements in summer and spring

Bin Chen[†]; Maromu Yamada; Guangyu Shi; Daizhou Zhang; Atsushi Matsuki; Yasunobu Iwasaka
[†] Institute of Atmospheric Physics, CAS, China, People's Republic of
Leading author: chen_bin@mail.iap.ac.cn

Vertical structures of aerosols from the ground to about 1000 m altitude in Beijing were measured with a balloon-borne optical particle counter. The results showed that, in hazy days, there were inversions at approximately 500-600 m, below which the particulate matters were well mixed vertically while the concentration of particles decreased sharply above the mixing layer. Electron microscopic observation of the particles collected with the balloon borne impactor indicate that the composition of particles are different according to weather conditions in the boundary mixing layer of Beijing city, and suggest that dust particles are always dominant in coarse mode particles. Interestingly sea salt particles are frequently identified suggesting the importance of marine air inflow to the Beijing area even in summer. The Ca rich and spherical particles are also frequently identified suggesting chemical modification of dust particle by NOx or emission of CaO and others from local emission. Additionally those types of particles showed higher concentration above the mixing layer under the relatively calm weather condition of summer suggesting the importance of local scale convection found in summer which rapidly transported anthropogenic particles above the mixing layer. Lidar extinction profiles qualitatively have good consistency with the balloon-borne measurements. Attenuation effects of laser pulse intensity are frequently observed due to high concentration of particulate matter in the Beijing atmosphere, and therefore quantitative agreement of lidar return and aerosol concentration can be hardly observed during dusty condition. Comparing the depolarization ratio obtained from the lidar measurements with the balloon-borne measurements the contribution of the dry sea-salt particles, in addition to the dust particles, is suggested as important factor causing depolarization ratio in the Beijing atmosphere.