Continuous Aerosol and Gaseous Properties of Transported Biomass Burning Smoke Coupled with Fog at a High-elevation Site in East Asia

Chung-Te Lee[1*], Shih-Yu Chang[2], Neng-Huei Lin[3] and Cheng-You Tsai[1]

[1]Graduate Institute of Environmental Engineering, National Central University, Jhongli, Taiwan
[2]Department of Public Health, Chung Shan Medical University, Taichung, Taiwan
[3]Department of Atmospheric Sciences, National Central University, Jhongli, Taiwan
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Presenting author email: ctlee@cc.ncu.edu.tw

Biomass burning (**BB**) in Indochina draws a great attention as its plume spreads in a regional scale to cause significant radiative effects when the plume mixed with cloud in East Asia. Recently, field campaigns had been conducted in Southeast Asia during the spring seasons of 2006 and 2010 to characterize the chemical, physical, and radiative properties of **BB** emissions near source regions, and assess their effects (Lin *et al.*, 2013). This study provides continuous aerosol and gaseous properties observed at a downstream mountain site from **BB** source regions under the prevailing westerly in East Asia.

Atmospheric aerosol was measured at the Mt. Lulin (2,862 m a.s.l.) site in central Taiwan during spring season of 2014. $PM_{2.5}$ water-soluble ions were measured continuously in an interval of 15 min by using particle-into-liquid coupled with anions and cations chromatographs (PILS-IC) (Chang *et al.*, 2007). Meanwhile, gaseous species, aerosol mass concentrations, aerosol light properties, and meteorological factors were monitored.

A **BB** smoke coupled with a fog event was observed from 15 to 16 March 2014. Fig. 1 shows time series of gaseous properties and meteorological factors. The **BB** event was identified by HYSPLIT trajectory model (Draxler and Rolph, 2013) and NASA fire spots in Southeast Asia. Gaseous species levels were found relatively steady during the **BB** event period.

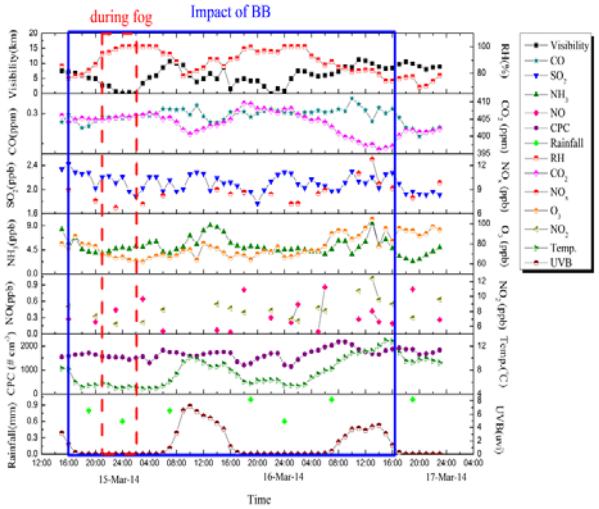

Figure 1. Gaseous properties and meteorological factors of a **BB** event coupled with a fog event observed at Mt. Lulin in 2014.

Figure 2 shows that aerosol mass levels, optical properties, and chemical species were in significant levels during the **BB** period. Prior to the fog, simultaneous increases of SO_4^{2-} and NH_4^+ were observed. Since no apparent gaseous dissolution occurred during fog, aerosol chemical species was probably not converted from gases. Throughout the whole **BB** period, Cl^-, NO_3^-, SO_4^{2-}, NH_4^+, and K^+ were varied consistently in time which indicated that they were originated from similar sources. Based on relatively steady gases levels and aerosol characteristics, the **BB** smoke was considered contributing from long-range transport.

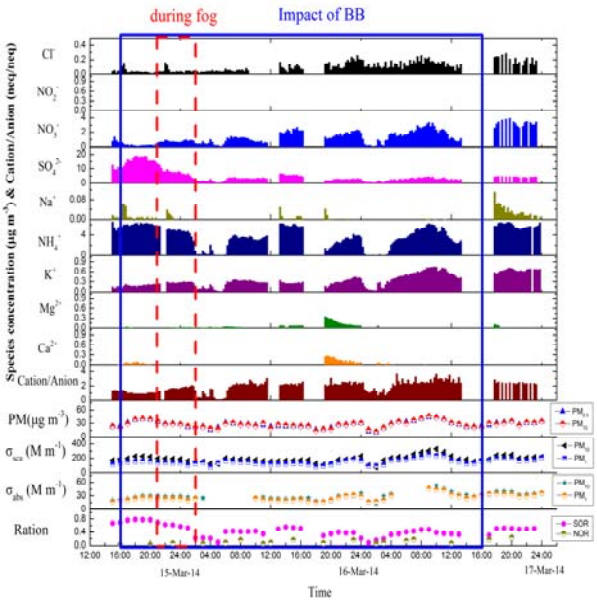

Figure 2. Aerosol mass levels, optical properties, and chemical species observed at Mt. Lulin in 2014.

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