Characteristics of water-soluble ions before, during and after fog events

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Two atmospheric processes of rain-fog-haze and haze-fog-rain were observed on Feb. 8th and Mar. 14th, 2010 in urban Shanghai. On-line characterization of water-soluble ions of aerosol was performed before, during and after two fog episodes by an instrument of Monitoring AeRosoles and GAses (MARGA). Fog water samples were also collected to study the chemical ion characteristics for identifying the property of fogs. After rain, total water-soluble ion concentration in PM2.5 increased by 71.9%. Afterwards, a fog formation was observed as a frontal fog. Six fog water samples were collected to measure concentration of water-soluble ions, whose total concentrations decreased from beginning to end of fog. At the end of fog, the total water-soluble ion concentration of aerosol was continually increased. Meanwhile with a sharp decline of RH down to 70% in two hours, and a haze episode was observed. The reverse process, haze-fog-rain process, was also investigated. After the haze episode, total water-soluble ions concentration of aerosol rarely increased, but fog appeared with sharp increase of RH. Concentration of water-soluble ions in the fog water sample was higher than mean concentration of samples in 2009. When the fog started to disperse, the ion concentration hardly changed. As water vapor continued to increase, rain was observed. The inorganic compositions of aerosol in both fog events were dominated by sulfate and ammonium. The in situ investigation clearly illustrated that fog water mainly influenced by continental sources was dirtier and contained more sediment comparing with fog water influenced by marine sources.