New particle formation in different atmospheric environments: Comparison of Kyoto and Tokyo-Tama observations

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New particle formation (NPF) is an important source of atmospheric aerosol particles, and may influence to regional/global climate and air quality through a variety of physical and chemical processes. Therefore, understanding of these processes is important. The NPF events have been observed in many different atmospheric environments (e.g., urban, forest, and mountains) and laboratory experiments. But their formation mechanisms are still poorly understood. In this study, field observations of aerosol particle number distributions and gaseous precursors were conducted at two sites: one in an urban area in Kyoto city, and the other in an observational site of Field Museum Tamakyuryo (FM Tama) of the Tokyo University of Agriculture and Technology in Tokyo, in summer to investigate factors controlling NPF.
Observations were performed at the Yoshida campus of Kyoto University, Kyoto (between 19 August and 11 September, 2013), and at the FM Tama, Tokyo (between 24 July and 8 August, 2015). Particle size distributions were measured with a scanning mobility sizer (SMPS; TSI) in both sites. Volatile organic compounds (VOCs) concentrations were measured using a proton transfer reaction mass spectrometer (PTR-MS; IONICON). Other gaseous components such as sulfur dioxide (SO_2) and ozone (O_3) were also measured simultaneously. In this study, we categorized the observed NPF events as a burst of nucleation mode particle (below 30 nm particle diameter) with (Case 1) or without (Case 2) subsequent particle growth, based on Maso *et al.*[1)].
The NPF events corresponding to increases in SO_2 or VOC concentrations were observed at least 7 times during the observation period at Kyoto. On the other hand, no NPF events were observed in the 16 observation days at FM Tama. Although no significant differences in total particle surfaces and SO_2 concentrations in two sites were observed, isoprene concentrations in FM Tama were significantly higher than monoterpenes concentrations during daytime. In this presentation, differences in the particle size distributions and concentrations of possible precursor gaseous between NPF and non-NPF events will be discussed.
References
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