

## Observation of NPF events at the summit of Mt. Fuji during daytime and nighttime

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An improved understanding of a new particle formation (NPF), which is a key process controlling the spatial and temporal distributions of aerosol concentration, is needed to estimate the direct radiative forcing. However, it is difficult to quantitatively understand the mechanism of NPF because the frequency of the NPF depends on the aerosol concentration, gases, and meteorological condition. In this study, we measured number concentrations ( $N$ ) of aerosol particles (10 to 487 nm) at the summit of Mt. Fuji (35.360°N, 138.727°E, 3776 m a.s.l.) between July and August during 2011-2017. We report the annual and diurnal variations of the frequency of the NPF for a long-term period. The summit of Mt. Fuji is usually located in the free troposphere and enable us to observe the long-range transport of aerosol particles. The NPF event was defined as the event that  $N$  increases over 1 hour for diameter smaller than 25 nm. We observed 172 NPF events (daytime and nighttime events were 90 times and 82 times, respectively) during the observation period. Most events occurred at 8 o'clock (at the peak of daytime events) and 20 to 21 o'clock (at peaks of nighttime events) in local time. In addition, the growth rate of aerosol particles was calculated. The median value of the growth rate was estimated to be 5.27 nm/h (6.03 nm/h for daytime and 4.56 nm/h for nighttime) at 40 NPF events, suggesting that aerosol particles are easily grown during daytime. Finally, using a back trajectory analysis (NOAA HYSPLIT version 4), we investigated when and where the NPF occurred. As a result, it is suggested that 62.5% of the total NPF occurred during the daytime, and the rest occurred during the nighttime (37.5%). The NPF frequently occurred during daytime over Japan although a few NPF occurred over the sea during nighttime.

Keywords: New particle formation, Mt. Fuji, Nighttime NPF event, Particle size distribution