

Yamashita K., W.-C. Kuo, M. Murakami, T. Tajiri, A. Saito, N. Orikasa, and H. Ohtake, 2024: Physical properties of background aerosols and cloud condensation nuclei measured in Kochi city in June 2010 and its implication for planned and inadvertent cloud modification. *J. Meteor. Soc. Japan*, **102**, <https://doi.org/10.2151/jmsj.2024-016>

**Plain Language Summary:** Background (BG) aerosol particles (APs) play a key role in climate change research by modulating cloud and precipitation microphysics and in weather modification research by influencing the effects of cloud seeding using artificial cloud condensation nuclei (CCN). Our ground-based measurements showed that the mean concentrations of APs and CCN at the observation site were considerably affected by air pollution in East Asia. Our findings also suggested that even air masses from the Pacific Ocean were considerably affected by air pollution in East Asia, including Japan.

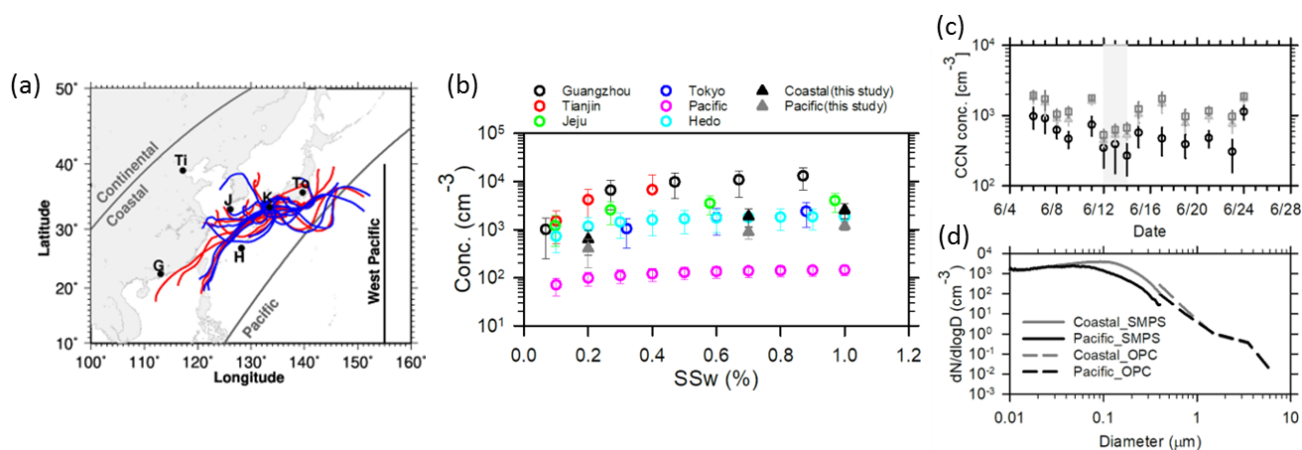


Figure 1. (a) Three-day backward trajectories from a point 500 m above the observation site at 09:00 JST (red) and 15:00 JST (blue). G, Ti, J, H, To, and K indicate the locations of the Guanzhou, Tianjin, Jeju, Hedo, Tokyo, and Kochi observation sites, respectively. (b) The CCN activation spectra measured at these locations. (c) Time series of CCN concentrations at 0.2% (○), 0.7% (△), and 1.0% (□) SSw. The symbols and error bars represent the mean and standard deviation, respectively, of one day's data. The vertical gray bar indicates the days on which the air mass was transported from the Pacific region. (d) Median aerosol particle size distributions measured in air masses transported from the coastal and Pacific regions.

### Highlights:

- Comparison with aircraft measurements suggested that ground-based measurements represented APs and CCN in the boundary layer, where the air is ingested by clouds.
- Numerical simulations with a detailed bin microphysics parcel model showed that cloud droplet number concentrations would range from 500 to 1,500 droplets cm<sup>-3</sup>.
- These concentrations signify this area is considered to be suitable for rain enhancement by hygroscopic seeding.