

## Number-size distribution of maritime aerosol particles over the Pacific Ocean

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Size and number concentration of atmospheric aerosol particles are the most fundamental parameters for estimating effects of aerosol on climate. Number-size distributions of aerosol in 10-500 nm diameters were observed on board the R/V Hakuho-Maru cruises over the Pacific Ocean during December 2011-March 2012. The KH-11-10 cruise started from Tokyo and reached Peru via Hawaii and the mid-latitudes eastern South Pacific Ocean. The KH-12-1 cruise started from Peru and reached Tokyo via the eastern equator and Hawaii. Number-size distribution of dried aerosol particles was measured using a Scanning Mobility Particle Sizer (3034, TSI Inc.) for diameters of 10-500 nm and a laser particle counter (LPC, KC01D; RION Co. Ltd.) for diameters greater than 300 nm. The obtained number-size distributions were analyzed to reveal their relationship with the condensation sink of precursor gases, air mass transport, meteorological condition, and chlorophyll concentration along trajectory.

Bimodal size distribution with mode peaks in 30-80 nm (Aitken mode) and 100-200 nm (accumulation mode) was frequently observed. Relatively large mode sizes were observed over the western equator. The 5 days backward trajectory shows that the air masses in equator are originated from the high chlorophyll area without experiencing precipitation. Over the mid-latitudes in the eastern South Pacific where chlorophyll concentration is low, new particle formation event was often observed in accordance with the low concentration of accumulation mode particles.

In this observation, new particle formation event was not observed under high chlorophyll condition over the equator. Condensation of precursor gases onto pre-existing particles strongly prevents nucleation of fresh particles. Because such condensation to pre-existing particles was effective enough in the equator under non-precipitating condition, new particle formation could not be observed over the equator. These results suggested that precipitation and biological productivity controlled the balances of formation and growth of aerosol particles, characterizing the number size distribution over each ocean areas.

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