

Wet deposition rate of black carbon in low stratus over north Pacific, estimated from aircraft observation

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Black carbon (BC) is critically significant for meteorological and climate processes because of its strong absorption of solar radiation and its cloud/ice nuclei ability. Wet deposition is major removal process of BC and its efficiency in clouds is critical for understanding its concentration decrease during transport. In this study, BC wet deposition efficiency in low stratus over north Pacific was directly estimated from BC and carbon monoxide (CO) data derived aircraft observation.

AF2022 aircraft observation campaign was conducted from 19 July to 2 August, 2022, over north Pacific southeast of Hokkaido. BC, CO concentrations as well as cloud water content data directly measured from the aircraft were used in this study.

On 29 and 30 July, higher BC and CO concentrations were measured under/in/over low clouds at 6 areas lower than 3000m. These higher CO and BC air masses in/over clouds were transported from east Siberia and probably affected by biomass burning there. BC wet deposition rates at each area were estimated from decrease of BC per CO concentrations (DBC/DCO) in clouds. The estimated BC deposition rate in the clouds were between 50 and 70% and well correlated with the cloud water content values.

Keywords: Black carbon aerosol, wet deposition, stratus