

## Difference of composition and mixed state of dust particles by height

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Continental Asia has been recognized as one of the most important sources of atmospheric dust particles. Many investigators have pointed out the importance of the atmospheric processing of dust particles in the course of long-range transport. Such processing can potentially change their radiative properties and their ability to act as cloud condensation nuclei. Three major factors that govern the processing of dust particles are dust mineral composition, relative humidity and concentration of acidic gas species. These factors are considered to be closely related with the height at which dust particles are transported. However, there has been no report so far on the direct comparison of the morphology and chemical composition of individual dust particles in the free troposphere and in the planetary boundary layer in the event of a same dust outbreak.

The helicopter was employed as the airborne platform in this study. Aerosol particles were directly collected by aerosol impactor over Hakui city, Isikawa, Japan (36.9 N, 136.7 E) on March 19, 2013. Then, Dust event was observed western Japan by Japan Meteorological Agency. Morphology and elemental composition of the collected particles were later examined on individual basis under SEM-EDX (Scanning Electron Microscope equipped with Energy Dispersive X-ray spectrometry).

Atmospherically processed dust particles (with apparent morphological modification) were hardly found in the free troposphere. On the other hand, large fraction of dust particles was found modified in the planetary boundary layer, showing spherical outline. High proportion of Calcium and Magnesium were detected from the modified particles. Also, dust particles collected in the planetary boundary layer contained Sulfur in higher abundance.

It is suggested that the atmospheric conditions in the free troposphere are less favorable for the dust particles to be modified than in the planetary boundary layer, because the vertical supply of acidic gases and water vapor into free troposphere is generally limited by the temperature inversion layer.

Keywords: mineral dust, free troposphere, planetary boundary layer, SEM-EDX