Geophysical Research Abstracts
Vol. 12, EGU2010-2925, 2010
EGU General Assembly 2010

First approach to a comparison study of Asian desert dust particles from Amakusa and African dust particles of Cape Verde Islands

Kirsten I. Lieke (1), Daizhou Zhang (2), Konrad Kandler (1), and Carmen Emmel (3)

(1) Institute of Applied Geosciences, Technische Universität Darmstadt, Darmstadt, Germany (kirstenlieke@gmx.de), (2) Faculty of Environmental and Symbiotic Science, Prefectural University of Kumamoto, Kumamoto, Japan, (3) Institute for Atmospheric Physics, Johannes-Gutenberg-Universität Mainz, Mainz, Germany

Many researchers have worked on both, African and Asian dust for decades, a few modellers and remote sensing researchers studied both. There are only few comparisons based on field measurements. We are still lacking a sufficient approach to a direct comparison of both, African and Asian mineral dust particles, with the same instrumentation.

In this study, samples of African dust transported to the Cape Verde Islands west of Africa as well as Asian dust samples transported to Amakusa, Japan are compared by using data sets gained from electron-microscopical analysis.

For all samples, mineral dust is the dominant component, and the same typical mineral dust particles are found on both sites. The most abundand particle groups are silicates and mixtures of silicates with sulfate, sea salt and others. In this study, we compare size resolved relative number abundances of classified particle groups. Aswell differences in chemical composition are observed, as there is for example a hint on an existence of a sulfate (or sulfate containing) coating on African dust particles, whereby there is no such hint on sulfate-containing coatings on the samples from Amakusa. Instead, Asian dust particles are usually frequently mixed with sea salt while on Cape Verde agglomerates of dust with sea salt are not frequently observed.
Mixing state and element indices most probably are affected by different source region and transport circumstances. The meteorological situation is different for both regions: in the vicinity of Cape Verde, we observe layer structure of high stability above the marine boundary layer that can last for several days over the Atlantic Ocean. At Amakusa, the atmosphere is very well mixed until large altitudes, and under some circumstances, the mixing state of aerosol changes with approaching weather fronts. At Cape Verde Islands, we can easily distinguish dust events from non dust events whereby sea salt is present in relatively high number abundances in comparison to non-dust event phases. But we rarely observe downward mixing from higher altitudes, as for example admixture of soot from biomass burning layers.

This presentation refers in parts to data presented by Zhang et al. about Asian dust particles observed in Japan.