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Mixing states and hygroscopicity of aerosol particles in West Africa: Based on AMMA aircraft campaign in summer 2006

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While West Africa is recognized as the region with highest aerosol optical thickness in the entire globe, the heterogeneity arising from the mixing and cloud processing of various aerosol species (mineral dust, biomass burning, sulphates etc.) further complicates the accurate prediction of how the particles affect the direct radiative budget, modify cloud life cycle and consequently induce indirect effect.

In order to characterize the aerosol physico-chemical properties, with particular emphasis on the hygroscopicity, the French ATR-42 research aircraft equipped both with a counterflow virtual impactor (CVI) and community aerosol inlets was deployed in Niamey, Niger (13˚30' N, 02˚05' E) in August 2006 during one of the special observation periods (SOP) of the African Monsoon Multidisciplinary Analysis (AMMA) project.

Continuous exploration of both the aerosol particles and the cloud residual particles (can be considered as those activated as CCN) was performed by choosing between the two inlets depending on whether the aircraft was outside, or inside the cloud. The comprehensive set of physical parameters and the particle samples collected downstream the two inlets are expected to provide deeper insights into the characteristics of the CN fraction which eventually became CCN, and their possible cloud processing. Individual particle analysis on the impactor samples is currently underway using electron microscopes (SEM, TEM) coupled with energy dispersive X-ray spectroscopy (EDS). The preliminary results of the analysis will be presented at the conference.