Aircraft measurements of aerosol properties during GoAmazon – G1 and HALO inter-comparison

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Abstract

Currently, the indirect effects of atmospheric aerosols remain the most uncertain components in forcing of climate change over the industrial period (IPCC, 2013). This large uncertainty is partially a result of our incomplete understanding of the ability of particles to form cloud droplets under atmospherically relevant supersaturations. One objective of the US Department of Energy (DOE) Green Ocean Amazon Project (GoAmazon2014/5) is to understand the influence of the emission from Manaus, a tropical megacity, on aerosol size, concentration, and chemical composition, and their impact on cloud condensation nuclei (CCN) spectrum.

The GoAmazon2014/5 study was an international campaign with the collaboration efforts from US, Brazil and Germany. During the intensive operation period, in the dry season (Sep. 1st – Oct. 10th, 2014), aerosol concentration, size distributions, and CCN spectra, both under pristine conditions and inside the Manaus plume, were characterized in-situ from the DOE Gulfstream-1 (G-1) research aircraft and German HALO aircraft during 4 coordinated flights on Sep. 9th, Sep. 16th, Sep 21st and Oct. 1st, 2014. During those four flights, aerosol number concentrations and CCN concentrations at two supersaturations (0.25% and 0.5%) were measured by condensation particle counters (CPCs) and a DMT dual column CCN counter onboard both G-1 and HALO. Aerosol size distribution was also measured by a Fast Integrated Mobility Spectrometer (FIMS) aboard the G-1 and is compared with the size distribution from Ultra High Sensitivity Aerosol Spectrometer – Airborne (UHSAS-A, DMT), which were deployed both on the G-1 and the

HALO. Good agreement between the aerosol properties measured from the two aircraft has been achieved. The vertical profiles of aerosol size distribution and CCN spectrum will be discussed.