Comparison of CCN activity measured in pristine and polluted sites during the Intensive Operation Periods (IOP) of the GoAmazon 2014 campaign

H.M.J. Barbosa[1], M. L. Kruger[2], R. Thalman[3], Wang, J.[3], T. Pauliquevis[4], J. Brito[1], G. Almeida[5], Pöschl, U.[2], Andreae, M. O.[2], Martin, S. T.[6], P. Artaxo[1], R. Souza[7], G. Cirino[7] and M. F. Andrade[1]

[1]Universidade de São Paulo, São Paulo-SP, Brasil
[2]Max Planck Institute for Chemistry, 55020 Mainz, Germany
[3]Brookhaven National Laboratory, Upton, NY 11973, USA
[4]Universidade Federal de São Paulo, Diadema-SP, Brasil
[5]Universidade Estadual do Ceará, Fortaleza-CE, Brasil
[6]Harvard University, Cambridge, MA 02138-3826, USA
[7]Universidade do Estado do Amazonas, Manaus-AM, Brasil

The effects of aerosol particles on cloud microphysical properties, cloud cover, precipitation, and regional climate are significant. The Amazon region is particularly susceptible to changes in number-diameter distributions of the atmospheric particle population because of the low background concentrations and high water vapor levels, indicating a regime of cloud properties that is highly sensitive to aerosol microphysics. A particle-limited regime means that for modest to vigorous updrafts the cloud droplet number concentration (CDNC) is dominated by CCN number instead of updraft velocity. This natural regime, different from most other continental areas worldwide, is expected to be disrupted by the interaction of Manaus urban plume with the natural aerosol population. Studying the effects of this interaction on the cloud and aerosol life cycle is the main objective of the Green Ocean Amazon (GoAmazon) campaign taking place around Manaus-Brazil from January 2014 to December 2015. In this paper we compare the particle hygroscopicity calculated from measurements of size-resolved cloud condensation nuclei performed at three ground sites during the first and second intensive operational periods. Site T3 is about 70km downwind from Manaus experiencing urban polluted and background conditions; site T2 is just across the Negro river from Manaus and operated only for the second IOP; and T0, at the Amazon Tall Tower Observatory (ATTO), is a pristine site about 200km upwind from Manaus. Our results indicate a lower hygroscopicity under polluted conditions, with mean value around 0.14 to 0.16, than under clean conditions, with a mean value around 0.2 to 0.3. At the clean site, it was possible to identify peaks of large sea salt particles with organic coating, while small particles seems to be pure organic. The activation fraction and hygroscopicity will be compared and discussed as a function of particle size.