

Size Resolved measurements of aerosol hygroscopicity and mixing state during Green Ocean Amazon (GoAmazon) 2014

Authors:

Ryan Thalman, Jian Wang, Chongai Kuang, Stephen Springston, Gunnar Seanum, Arthur Sedlacek, Thomas Watson

Brookhaven National Laboratory, Upton, NY

Scot Martin, Suzane de Sa

Harvard University

Liz Alexander

Pacific Northwest National Laboratory

Jose Jimenez, Brett D. Palm, Douglas Day, Pedro Companzo-Jost

Department of Chemistry and Biochemistry and Cooperative Initiative for Research in the Environmental Sciences (CIRES), University of Colorado Boulder

Paulo Artaxo, Henrique M. J. Barbosa

University of Sao Paulo

Rodrgio Souza

Universidade do Esatdo do Amazonas, Manaus, Amazonia, Brazil

Antonio Manzi

Instituto Nacional de Pesquisas da Amazonia, Manaus, Amazonia, Brazil

Mira Krüger

MPI Mainz

Measurements of size-resolved cloud condensation nuclei (CCN) spectra were performed at the T3 site of the Green Ocean Amazon (GoAmazon) field project located near Manacapuru, Brazil during 2014. The T3 site is a receptor site for both polluted urban down-wind (Manaus, BR a city of several million 70 km up wind) and background (Amazon rainforest) air-masses and can provide a contrast between clean and polluted conditions. Particle hygroscopicity (κ) and mixing state were calculated from the particle activation spectrum measured by size selecting aerosols and exposing them to a wide range of supersaturation in the CCN counter (Droplet Measurement Technologies Continuous-Flow Streamwise Thermal Gradient CCN Chamber). The supersaturation was varied between 0.07 and 1.1% by changing a combination of both total flow rate and temperature gradient in the CCN counter. Measured spectra were examined for air masses with different level of influence from Manaus plume. Particle hygroscopicity generally peaked near noon local time which was broadly consistent with the trend in aerosol sulfate. The average κ values during the first intensive operation period were 0.14 ± 0.05 , 0.14 ± 0.04 and 0.16 ± 0.06 for 75, 112 and 171 nm particles respectively. Evaluation of particle hygroscopicity and dispersion (mixing state) will be presented with respect to size and level of pollution.