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Ground based characterization of biomass burning aerosols during the South American Biomass Burning Analysis (SAMBBA) field experiment in Brazil during Sept - Oct 2012

Paulo Artaxo (1), Joel Ferreira de Brito (1), Luciana Varanda Rizzo (2), Ben Johnson (3), Jim Haywood (3), Karla Longo (4), Saulo Freitas (4), and Hugh Coe (5)

(1) Institute of Physics, University of Sao Paulo, Sao Paulo, Brazil (artaxo@if.usp.br), (2) Federal University of Sao Paulo, São Paulo, Brazil, (3) UK Met Office, United Kingdom, (4) National Institute for Space Research (INPE), Brazil, (5) University of Manchester, United Kingdom

Biomass burning is one of the major drivers for atmospheric composition in the Southern hemisphere. In Amazonia, deforestation rates have been steadily decreasing, from 27,000 Km^2 in 2004 to about 5,000 Km^2 in 2011. This large reduction (by factor 5) was not followed by similar reduction in aerosol loading in the atmosphere due to the increase in agricultural fires. AERONET measurements from 5 sites show a large year-to year variability due to climatic and socio-economic issues. Besides this strong reduction in deforestation rate, biomass burning emissions in Amazonia increases concentrations of aerosol particles, CO, ozone and other species, and also change the surface radiation balance in a significant way. To complement the long term biomass burning measurements in Amazonia, it was organized in 2012 the intensive campaign of the South American Biomass Burning Analysis (SAMBBA) experiment with an airborne and a ground based components. A sampling site was set up at Porto Velho, with measurements of aerosol size distribution, optical properties such as absorption and scattering at several wavelengths, organic aerosol characterization with an ACSM – Aerosol Chemical Speciation Monitor. CO, CO_2 and O_3 were also measured to characterize combustion efficiency and photochemical processes. Filters for trace elements measured by XRF and for OC/EC determined using a Sunset instrument were also collected. An AERONET CIMEL sunphotometer was operated in parallel with a multifilter radiometer (MFR). A large data set was collected from August to October 2012. PM2.5 aerosol concentrations up to 250 ug/m3 were measured, with up to 20 ug/m3 of black carbon. Ozone went up to 60 ppb at mid-day in August. At night time ozone was consumed completely most of the time. ACSM shows that more than 85% of the aerosol mass was organic with a clear diurnal pattern. The organic aerosol volatility was very variable depending on the air mass sampled over Porto Velho. Aerosol optical depth at the site was lower than previous years due to an early arrival of the wet season. Comparison between ground based measurements with aircraft observations will provide a detailed view of biomass burning aerosol properties in Amazonia.