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Carbonaceous aerosols over the tropics: Size-resolved chemical characterization of marine, urban and biomass burning aerosols

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We present results on the size-resolved chemical characterization of carbonaceous aerosols collected in tropical environments influenced by marine (M), urban (U) and biomass burning (BB) aerosols. Marine samples were collected at Cape San Juan, Puerto Rico; urban samples at the University of Puerto Rico, Río Piedras Campus, and the biomass burning samples in the Brazilian Amazon as part of the LBA-SMOCC 2002 (*Large Scale Biosphere Atmosphere Experiment in Amazonia - Smoke Aerosols, Clouds, Rainfall and Climate: Aerosols from Biomass Burning Perturb Global and Regional Climate*) project. Aerosol particles with diameters in the range of 0.03 to 10 μm were collected using a Dekati low-pressure impactor (DLPI) with 13 stages. Stacked-filter units were used for the collection of fine particles ($D_p < 2$ μm). The total aerosol mass collected on the DLPI substrates was determined by gravimetric analysis. Evolved gas analyses (EGA) and thermal/optical analyses were performed on quartz filters before and after water extraction to determine the mass concentrations

of aerosol total carbon (TC), elemental carbon (EC), and organic carbon (OC). EGA analysis after water extraction provided an insight into the solubility of the aerosol TC in water. Inorganic water-soluble ions such as Na^+, NH_4^+, K^+, Mg^{2+}, Ca^{2+}, Cl^-, NO_3^-, SO_4^{2-} were analyzed using ion chromatography. Our results on the carbonaceous aerosol showed total TC concentrations in μg m^{-3} of 0.9, 3.6 and 26.9 for the M, U and BB cases, respectively. If the correction for the positive artifact had not performed TC concentrations would be overestimated by about 50% (M), 20% (U), and 45% (BB). EC concentrations at the marine site were low to not detectable. The EC/TC ratio for the urban site was 0.15. In this case, OC shows two modes in the coarse fraction and one in the fine. EC and OC in the fine mode had a similar size distribution with a maximum at the same diameter ($\sim$ 0.4 μm). These similarities in the fine mode of both OC and EC concentrations suggested that they were produced by the same source (combustion). The OC in the coarse mode could come from primary biogenic particles and/or secondary organic aerosols. Additional results on the size distributions of EC and OC for the urban and biomass burning cases along with their contribution to the total aerosol burden will be presented.