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Water uptake by aerosol particles at the Caribbean: differences due to air mass origin and composition

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The EQSAM3 (Metzger et al., 2007) was used to determine the water uptake of aerosol samples collected during the RICO project. EQSAM (EQuilibrium Simplified Aerosol Model) allows calculating the gas/aerosol equilibrium partitioning, including aerosol water for regional and global modeling in a fast and accurate form. Aerosols samples were collected during December 2004 and January 2005 in two different ground-based marine sites in the Caribbean: Dian Point (DP), Antigua and Cape San Juan (CSJ), Puerto Rico. The sampling was conducted with three different samplers: a 13-stage Dekati low-pressure impactor (D_p of 0.1 to 10 μm), a 10-stage micro-orifice uniform deposit impactor (D_p of 0.054 to 18 μm) and stacked-filter units ($D_p < 1.7$ μm).

Five-day back trajectories calculated using the HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) model provided by NOAA Air Resources Laboratory together with the determination of the aerosol chemical composition allowed the identification of three case studies: the clean period, the period with African dust incursions, and the period with anthropogenic influence from North America. Column aerosol optical properties produced by the Multi-angle Imaging SpectroRadiometer (MISR) on the EOS-Terra satellite support the identification of the three cases. For

example, typical aerosol optical depths at mid-visible wavelengths around Antigua are $\sim$ 0.1, with $<$ 1% of this value attributed to large, non-spherical particles. For our African dust case, the aerosol optical depth was $\sim$ 0.16, with $\sim$14% of this value attributed to large, non-spherical particles. Preliminary aerosol water mass results indicate that the samples of pollution aerosols are less hygroscopic compared to samples of the clean period. Additional results on the concentrations of the water-soluble organic fraction, the water mass concentration of samples with respect to their size distributions and the influence of the relative humidity on the estimate of the water uptake will be presented.