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Chemical and Physical Properties of Marine Aerosols during the RICO Experiment: Results from Caribbean Ground-Based Stations

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We present results on the chemical and physical characterization of tropical marine aerosol collected as part of the *Rain In Cumulus Over the Ocean Experiment* (RICO). Aerosol samples were collected during the months of December 2004 and January 2005 at two ground-based stations in the Caribbean region: 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, a 10-stage micro-orifice uniform deposit impactor and stacked-filter units. For the chemical characterization we used ion chromatography (Na^+, NH_4^+, K^+, Mg^{2+}, Ca^{2+}, formate, acetate, Cl^-, NO_3^-, SO_4^{2-}, and oxalate), total organic carbon analysis (water-soluble organic carbon), aerosol mass spectrometry, and a volatility system with an ASASP-X on it. For the physical and optical properties CCN counters, CN counters, a PCASP, an SMPS,

a nephelometer, and an aethalometer were used. The total aerosol mass concentrations collected on the substrates and filters of the aerosol samplers were determined by gravimetric analysis. Back trajectories calculated using the HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) model from NOAA showed two possible sources for the air masses that influence our aerosols samples: air masses coming from North America and coming from the North Atlantic Ocean (trade winds). These results together with the aerosol chemical composition allowed us to identify three case studies: the clean (C) period, the period with Saharan dust (SD) influence, and the period with anthropogenic influence (AI) from North America. Results showed that (1) the CN average concentrations for DP and CSJ were 300 and 700 cm^{-1}, respectively, (2) aerosol mass concentrations (D_p $<$ ca. 1 μm) for the DP station were lower ($\sim$ 1.2 μg m^{-3} DP vs 1.9 μg m^{-3} CSJ), (3) at both stations the predominant water-soluble ions in the fine aerosol fraction were Cl^-, Na^+, and $SO_4^=$, (4) elemental carbon concentrations were at low-to-nondetectable levels in both sites, and (5) the organic carbon concentrations were about five times higher in CSJ than in the DP. Results that include the size-resolved chemical composition and concentrations of the aerosol samples, the differences between the three different periods, and the possible reasons for the differences between the two sites will be discussed.