Geophysical Research Abstracts
Vol. 17, EGU2015-11245, 2015
EGU General Assembly 2015


# Rain chemistry and cloud composition and microphysics in a Caribbean tropical montane cloud forest under the influence of African dust

Elvis Torres-Delgado (1), Carlos J. Valle-Diaz (1,2), Darrel Baumgardner (3), William H. McDowell (4), Grizelle González (5), and Olga L. Mayol-Bracero (1)

(1) Department of Environmental Science, University of Puerto Rico, San Juan, PR , (2) Department of Chemistry, University of Puerto Rico, San Juan, PR, (3) Droplet Measurement Technologies, Boulder, Colorado, USA, (4) Department of Natural Resources and the Environment, University of New Hampshire, Durham, New Hampshire, USA, (5) International Institute of Tropical Forestry, US Forest Service, San Juan, PR

It is known that huge amounts of mineral dust travels thousands of kilometers from the Sahara and Sahel regions in Africa over the Atlantic Ocean reaching the Caribbean, northern South America and southern North America; however, not much is understood about how the aging process that takes place during transport changes dust properties, and how the presence of this dust affects cloud's composition and microphysics. This African dust reaches the Caribbean region mostly in the summer time. In order to improve our understanding of the role of long-range transported African dust (LRTAD) in cloud formation processes in a tropical montane cloud forest (TMCF) in the Caribbean region we had field campaigns measuring dust physical and chemical properties in summer 2013, as part of the *Puerto Rico African Dust and Cloud Study* (PRADACS), and in summer 2014, as a part of the *Luquillo Critical Zone Observatory* (LCZO) and in collaboration with the *Saharan Aerosol Long-Range Transport and Aerosol-Cloud-Interaction Experiment* (SALTRACE). Measurements were performed at the TMCF of Pico del Este (PE, 1051 masl) and at the nature reserve of Cabezas de San Juan (CSJ, 60 masl). In both stations we monitored meteorological parameters (e.g., temperature, wind speed, wind direction). At CSJ, we measured light absorption and scattering at three wavelengths (467, 528 and 652 nm). At PE we collected cloud and rainwater and monitored cloud microphysical properties (e.g., liquid water content, droplet size distribution, droplet number concentration, effective diameter and median volume diameter). Data from aerosol models, satellites, and back-trajectories were used together with CSJ measurements to classify air masses and samples collected at PE in the presence or absence of dust. Soluble ions, insoluble trace metals, pH and conductivity were measured for cloud and rainwater. Preliminary results for summer 2013 showed that in the presence of LRTAD (1) the average conductivity of cloud water was almost twice (81.1 $\mu$S/cm) as that in the absence of LRTAD (47.7 $\mu$S/cm), (2) the average conductivity in rainwater was slightly higher (15.0 $\mu$S/cm vs 12.8 $\mu$S/cm), and (3) the average pH was slightly higher for both cloud and rainwater samples (average of 6.41 for cloud water and 6.37 for rainwater). Detailed results on the chemical composition (water-soluble ions, trace metals, total organic carbon and total nitrogen) of cloud and rainwater, cloud microphysics, and on how these properties are affected in the presence of dust events will be presented at the meeting.