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Observations of Saharan dust long-range transport and optical properties at the Caribbean area

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Poster Presentation:

A field campaign measurement was made to investigate the effects of Saharan Dust (SD) on precipitation development at Puerto Rico between June 22 and July 12 of 2015 (a midsummer drought (MSD)) when the SD transports across the tropical Atlantic Ocean often occur and reach peak concentrations. This study presents the observation-based SD optical properties and long-range transport over UPRM, which includes the data collected from a three-channel Lidar, ceilometer (Vaisala CL-51), and multiple AEROSOL RObotic NETwork (AERONET) sunphotometers at La Parguera, Mayagüez, CAPE San Juan, and Guadeloupe. The ground-based and CALIPSO lidar data show that the SD layers are mainly located below 4.0 km altitude and mix into planetary-boundary-layer (PBL) at UPRM. On the days of the SD intrusions, the aerosol optical depths (AOD) increase up to 0.6 at 500-nm while the Angstrom exponents become smaller with the range of 0.1~0.3 at the wavelength pair of 440-870 nm. Meanwhile, both high levels of MODIS-AOD and OMI-aerosol index (AI) clearly indicate the transport pattern or the zone (5°N-25°N) of the SD across the Atlantic Ocean. The NOAA-HYSPLIT model indicates that the SD at 3-km level travels for about 4-5 days for the Africa coast to the Caribbean area. In addition, the range-resolved distributions and evolution process of SD across the Atlantic Ocean will be presented; and a cap inversion caused by the SD laden Saharan Air Layer (SAL) is demonstrated, which probably inhibited convective cloud formation during the campaign.

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Background:

Every Summer Saharan Dust travel from Africa to Puerto causing a Summer Mid Summer Drought

Objective:

A field campaign measurement at Puerto Rico between June 22 and July 12 of 2015 presents the observation-based Saharan Dust optical properties, long-range transport and potential impact on the air quality over Puerto Rico.

Methods:

- A three channel LIDAR system
- A ceilometer
- AEROSOL ROBOTIC NETWORK (AERONET) sunphotometers
- Satellite data: CALIPSO/CALIOP, MODIS, OMI.
- NOAA-HYSPLIT model
- Surface: hourly and daily PM10, PM2.5.

