Particulate Matter and Dust Concentrations in the Caribbean: A contribution to the development of Early Warning of Synoptic Air Quality

Authors: Bianca Lee Martínez Huertas, Olga L. Mayol Bracero

University of Puerto Rico - Río Piedras Campus, San Juan, Puerto Rico

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Atmospheric particles, also known as particulate matter (PM), are microscopic solid or liquid particles suspended in the air. PM adversely affects more people than any other ambient pollutant. Mineral dust (e.g., Saharan or African dust) is an example of PM. Over 40 million tons of mineral dust from Northern Africa are transported every year by the trade winds to the Greater Caribbean Basin (GCB). According to the World Health Organization (WHO), PM of diameters less than 10 μm (PM10) should not exceed 50 $\mu g/m^3$ in 24 hours. Nevertheless, recent studies in several countries of the GCB have shown that long-range transported African dust elevates PM10 levels above the WHO 24-hour guideline. The increase rates observed are comparable to major urban areas in Europe and the United States.

Many aspects of the long-range transport of African dust to the GCB remain poorly understood, including intensity and dispersion of the events; dust spatial and temporal transport; evolution of the dust composition and concentrations; and the relationship between dust events and human health. In order to attend this, a multidisciplinary team of universities, agencies and non-governmental organizations located in the Caribbean region will characterize the periodic trans-Atlantic dispersal of African Dust and its impacts on the health of people in small island states (SIS) of the region. The goal is to develop a forecasting ability for hazardous conditions for human populations in SIS, through a characterization of the pattern and variability of African dust in annual events, along with other atmospheric aerosols, using synoptic Earth observations from satellites and ground stations. My part consists in the investigation of the spatial and seasonal distribution of the African Dust in the Caribbean Region. Specifically, for this study, samples will be collected at Cape of San Juan, Luquillo and Facundo Bueso in the University of Puerto Rico – Rio Piedras Campus using the High Volume and the stacked filter units. These samples will be analysed using dust concentration analysis and ion chromatography analysis, to determine the mass concentration and the water-soluble ions. The results will be incorporated in the re-analysis of the models used to predict these types of events.