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Desert Dust PM2.5 and PM10 ratio over a Caribbean Island Atmosphere

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Desert and neighbouring regions contribute to the total budget of aerosol presence in the atmosphere as the main sources of mineral particles. Thus, for tropical Atlantic air masses of the northern hemisphere, 28% of desert dust flows lifted over West Africa are transported to the Caribbean and reach Guadeloupe where their settlement participate into the soil mineral composition. The 2 main sources of dust are located first in an area between Mauritania and Mali, and the second one in the Bodélé (former Lake Chad).
The dust events locally known as “sand haze”, seasonally affect the West Indies. From May to September, during three or four days, the mineral dust concentration increase until important levels, which has an impact on the health of population.
Fortunately Guadeloupe is a part of France, related to the protection of the population, it have an air quality network, Gwad’Air, which detect the presence of aerosols in the atmosphere through the measurements of PM10 and PM2.5 concentrations. Thus, PM 10 and PM2.5 data, are available from 2005 to 2012, and help us to establish the climatology of dust phenomenon in Guadeloupe. After verification, the months of January and February are free of dust event in Guadeloupe area. The average of PM 10 and PM 2.5 values for these months are respectively 20 μg m-3 and 9 μg m-3 for these periods. They correspond to PM10 and PM2.5 levels related to the human activity and can be used as thresholds (background) of anthropogenic pollution in Guadeloupe. We note a peak of values of PM 2.5 in the months of March and September, outside the major dust season in Guadeloupe. This correspond to the maximum activity level of the Bodélé zone at these times of the year.
The second part of our analysis consists in studying the ratio PM 2.5 / PM 10, and the desert dust PM2.5/PM10 ratio using the values without the human activity impact. We analyse the climatology of those climate elements with a special focus on the origins and the time delay between the moment when the particles leave African coast and the moment when they reached Guadeloupe Island.