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Desert dust over a Caribbean island with North West Atlantic air masses

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Desert dust is the major pollutant affecting the air quality of the Caribbean region. A climatological study of dust events over Guadeloupe have been performed between 2005 and 2015. We focused our work on the events behavior in terms of intensity with the mean concentration, duration with the number of dusty days. We pay a special attention to the origin and the path of the air masses bringing desert dust over the island, using back trajectories and AOT satellite imagery study.
Here we analyzed a multi-year PM 10 measurements performed by the air quality network using certified instrumentation (TEOM) positioned in Guadeloupe island (16.25 N, 61.55 W). Relatively to dust presence recorded in the Guadeloupe air quality network (PM10), we observed two seasons. A high dust season from May to August and a low dust season from September to April. During the last part of spring and summer time the main scheme leading to high PM10 in Guadeloupe consist in dusty air masses lifted in a region situated at the intersection of Mauritania, Mali and South Algeria borders. The raising into suspension was followed by a transport over the Atlantic Ocean in the Saharan Air Layer, along a quasi-direct path between West African coasts to the Caribbean islands.
During the period between fall season and the first part of spring, the changes in large-scale winds over the Atlantic drive the dusty air masses lifted over the Bodele basin to the northeast coast of South America. Sometime they follow their travel around the Acores high pressure and reach Guadeloupe Island. But we observed too, during the low dust period, another behavior leading to dust concentration higher than 35μg/m3. The air masses come from North West make a loop over the Atlantic Ocean witch bring them near West Africa coast, interact with dusty air masses before their arrival over the Caribbean islands. This type of dust events present weak daily PM10 mass concentration and for the most part of them (78%) have a dust transport without Saharan Air Layer.
In conclusion, during the low dust season, we can observe some dust events with air masses coming from North West Atlantic, crossing over the ocean at the vicinity of dusty air masses and bringing dust without the presence of SAL.