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Size distribution of PM at Cape Verde - Santiago Island

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The archipelago of Cape Verde is located on the eastern North Atlantic, about 500 km west of the African coast. Its geographical location, inside the main area of dust transport over tropical Atlantic and near the coast of Africa, is strongly affected by mineral dust from the Sahara and the Sahel regions.

In the scope of the CVDust project a surface field station was implemented in the surroundings of Praia City, Santiago Island (14°55' N e 23°29' W, 98 m at sea level), where aerosol sampling throughout different samplers was performed during one year.

To study the size distribution of aerosol, an optical dust monitor (Grimm 180), from 0.250 to 32 μm in 31 size channels, was running almost continuously from January 2011 to December 2011. The performance of Grimm 180 to quantify PM mass concentration in an area affected by the transport of Saharan dust particles was evaluated throughout the sampling period by comparison with PM10 mass concentrations obtained with the gravimetric reference method (PM10 TSI High-Volume, PM10 Partisol and PM10 TCR-Tecora).

PM10 mass concentration estimated with the Grimm 180 dust monitor, an optical counter, showed a good correlation with the reference gravimetric method, with R^2= 0.94 and a linear regression equation of $PM10_{Grimm}$ = 0.81$PM10_{TCR}$- 5.34.

The number and mass size distribution of PM at ground level together with meteorological and back trajectories were analyzed and compared for different conditions aiming at identifying different signatures related to sources and dust transport.

January and February, the months when most Saharan dust events occurred, showed the highest concentrations, with PM10 daily average of 66.6±60.2 μg m^{-3} and 91.6±97.4 μg m^{-3}, respectively. During these months PM1 and PM2.5 accounted for less than 11% and 47% of PM10 respectively, and the contribution of fine fractions (PM1 and PM2.5) to PM mass concentrations tended to increase for the other months. During Saharan dust events, the PM2.5 hourly average could reach mass concentrations higher than 200 μg m^{-3} whereas PM10 overpass 600 μg m^{-3}.

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