



A long-term observation of the Saharan dust presence in West Africa

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The size distribution characteristics of the Saharan dust that is transported and deposited over many countries in the West African atmospheric environment (5°N) during the months of November to March, known locally as the Harmattan, have been determined over a 9-year period between 1996 and 2005, using a location in central Ghana ($6^{\circ} 40'\text{N}$, $1^{\circ} 34'\text{W}$) as the reference geographical point. The particle size distributions and concentrations are discussed. Within the particle size range measured ($0.5 \mu\text{m} - 25 \mu\text{m}$), the average inter-annual mass concentrations during the winter months ranged from $140 \mu\text{g m}^{-3}$ to $1200 \mu\text{g m}^{-3}$ while the average number concentrations varied between 24 cm^{-3} and 63 cm^{-3} . The measured particle concentrations outside the winter period were consistently less than 10 cm^{-3} . In spite of the strong daily and inter-annual variations in particle concentration, the overall dust mean particle diameter over the 9-year period was found to be $1.5 \mu\text{m}$. The particle size distributions exhibited the typical distribution pattern for atmospheric aerosols with a coarse mode diameter situated at about $3.5 \mu\text{m}$. The control exerted on the dust incursions and the particle concentrations by both the Inter-Tropical Convergence Zone (ITCZ) and the North Atlantic Oscillation (NAO) are highlighted. The experimental results reported in this study will be of value in validating satellite based observations and simulation models of the African dust plume during winter.