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Impact of aerosol on air temperature in Kuwait

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ABSTRACT

This work uses MODIS aerosol optical thickness (AOT) data observed over Kuwait during the 7-year interval 2000–2007. The values of AOT and the Ångström wavelength exponent (α) show a clear annual cycle. These data are categorized into two catalogues in terms of the values of the AOT of the 870 nm channel (τ_{870}). One catalogue (71 days) includes days with high values of AOT ($\tau_{870} \geq 0.75$). The most probable “modal” value of α for these days is 0.52. The other catalogue (1162 days) consists of the background days with a modal value ~ 1.1 for the exponent α . This analysis is extended to include water vapor content (WVC), surface wind speed (V), visibility (Vis) and the diurnal temperature range (DTR). Chree’s method of superposed-epoch analysis is applied to these parameters in order to compare the variation in the daily averages during days with high AOT values with respect to background days. The high values of AOT during the 71 days are positively correlated with aerosol size, near-surface winds and poor visibility. This concludes that the aerosol particles during these days were mostly dust. The mean daily value of the DTR (ΔT) and visibility reduced significantly during these days. This reduction on DTR is a direct result of increasing the atmospheric opacity due to the presence of dust.