

Remote Sensing of Aerosol optical property Over the Arabian Gulf

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The aim of the study is to detect the pollution periods associated with dust emissions according to aerosols spectral behaviour and the change of wind regimes over the Arabian Gulf. Three Aerosol Robotic Network (AERONET) sites are involved in the study - Kuwait University, Kuwait (29.32°N, 47.97°E), Solar Village, Riyadh (24.91°N, 46.41°E) and Dhadnah Al Fujairah, UAE (25.51°N, 56.327°E).

In Gulf sites fine mode particles lie in a geometric mean radius range of $0.05 < r < 0.33 - 0.44 \mu\text{m}$, while coarse mode lie particles in the range $0.33 - 0.44 < r < 1 < 15 \mu\text{m}$ (figure 1).

Clarke et. Al., (2004) separated soot from dust by taking into assumption that sub micrometer particles have radii within range $\leq 0.75 \mu$. Sub micrometer particles are divided into two categories. In Kuwait site we found particles with radii between 0.75 and $0.35 \mu\text{m}$ have positive significant correlation ~ 0.4 between total volume concentration and absorption factor σ_{abs} in Kuwait. Such trend is related to existence of urban dust. The results of the other sites are demonstrated in Table (1).

Single Scattering Albedo (SSA) is retrieved for wavelengths corresponding to sky radiance measurements. SSA daily averages are computed from hourly data of level 1.5 with solar zenith angle $\leq 55^\circ$. In Kuwait SSA increases with wavelength in spring and summer with associated high absorption at 470 nm wavelength. This situation occur when dust work as a carrier for soot. Soot signature is found in winter season. In Solar village SSA has almost neutral trend in all seasons. Finally in Dhadnah SSA reveal dust dominance with soot emissions in spring and dry summer interval and neutral in humid summer & autumn.

Table 1: Summarize the results of the urban dust correlation with absorption factor as well as the soot percentage in AERONET data.

Aeronet Site	Radii (μm) Division	$r_{\text{VOL-}\sigma_{\text{abs}}}$	Aerosol Load Percentage
Kuwait	$0.35 \leq r < 0.75$	0.40**	Urban dust
	$r < 0.35$	0.05**	5.5% (soot)
Solar Village	$0.35 \leq r < 0.75$	0.525**	Urban dust
	$r < 0.35$	0.41*	2.9% (dust carrying soot)
Dhadnah	$0.35 \leq r \leq 0.75$	0.632*	Urban dust
	$r < 0.35$	0.005	4.87%

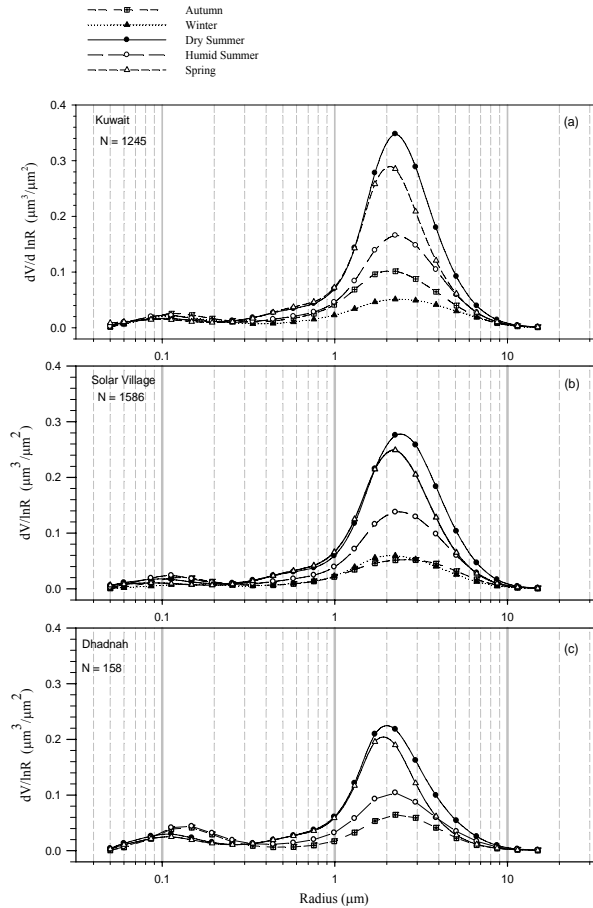


Figure 1: Seasonal aerosol volume size distribution versus geometric mean radius in Kuwait, Solar village and Dhadnah. The number for averaged retrieval is shown for each season.

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