

Satellite- and ship-based investigations of variability in aerosol optical depth over the Arabian Sea

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The spatiotemporal characteristics of aerosol optical depth (AOD) are analyzed in the Arabian Sea using satellite remote sensing data from AVHRR, MODIS, and field observations data of the shipborne Maritime Aerosol Network (MAN). AOD spectral distribution of the MAN presents a feature of reduction with an increase in the wavelength from 440 to 870 nm. The average observed MAN AOD at the spectral wavelengths of 440 nm, 500 nm, 675 nm, and 870 nm is 0.41 ± 0.14 , 0.38 ± 0.15 , 0.31 ± 0.14 , and 0.27 ± 0.14 , respectively. Satellite-derived average AOD of AVHRR (630 nm) and MODIS (550 nm) is observed to be 0.35 ± 0.06 and 0.12 ± 0.01 , respectively, during 2002-2022. AVHRR and MODIS AOD reached their peak in the summer season with a seasonal average of 0.47 ± 0.17 and 0.58 ± 0.07 , respectively. Satellite-based AOD is also validated by field observations of MAN. During the study period, AVHRR shows a decreasing trend of AOD over the Arabian Sea with a decline rate of -0.05 per year. Whereas, a rise in MODIS-AOD is observed with a growth rate of 0.07 per year.