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Aerosol type Identification over the Arabian Sea in the pre-monsoon season during the ICARB campaign

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A discrimination method of the different aerosol types over Arabian Sea (AS) during the ICARB-06 campaign is achieved using values of AOD at 500 nm (AOD_{500}) and Ångström exponent (α) in the spectral band 340-1020 nm ($\alpha_{340-1020}$). Spectral AOD and Ångström exponent data were analyzed to obtain information about the adequacy of the simple use of the Ångström exponent for characterizing the aerosols, and for exploring possibilities for a more efficient characterization of the aerosols. For this purpose, appropriate thresholds for AOD_{500} and $\alpha_{340-1020}$ are applied. It is shown that a single aerosol type in a given location over AS can exist only under specific conditions (e.g. anthropogenic emissions or dust outbreaks), while the presence of well-mixed aerosols is the usual situation. Our analysis indicates that the dominant aerosol types change significantly in the different regions of AS (coastal AS, middle AS and far AS). Thus, the urban/industrial aerosols are mainly observed in coastal AS, the desert-dust particles in middle and northern AS, while clear maritime conditions mainly occur in far AS. This is achieved by taking advantage of the spectral variation of α, the so-called curvature. The results show that the spectral curvature can provide important additional information about the different aerosol types, and can effectively be used as a tool for their discrimination, since the fine-mode aerosols exhibit negative curvature, while the coarse-mode particles positive. The correlation between the coefficients a_1 and a_2 with the Ångström exponent α, and the atmospheric turbidity, is further investigated.

Keywords: Aerosol optical properties; Aerosol type; cruise measurements; Arabian Sea; pre-monsoon ICARB.