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# Role of Long-range transport on Aerosol Radiative forcing over Arabian Sea: Results from ARMEX field campaign

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The transport of aerosols from distinct source regions over the continents to the oceans is a major contributor to the spatial and temporal heterogeneity in aerosol characteristics over the oceans and it could have significant role in the regional climate. The role of long-range transport of aerosols over the Arabian Sea and Indian Ocean in causing changes in the optical depths, composition as well as physical characteristics of aerosols has been a subject of great interest in the recent years [*Krishnamurti, et al.*, 1998; *Moorthy et al.*, 2001]. Even though the recent international field campaigns under the INDOEX (Indian Ocean Experiment) have provided a considerable insight into the aerosol properties and their radiative impacts over this region, these studies were primarily conducted during the dry Indian (northern) winter season, when the synoptic airmass was steady and continental in nature. Observations are very scanty during the monsoon transition months (inter-monsoon period) as well as the southwest monsoon (summer monsoon) seasons. During the second phase of the Arabian Sea Monsoon Experiment (ARMEX-II), extensive measurements of columnar aerosol spectral optical depth (AOD), total as well as size segregated aerosol mass concentrations and mass concentration of aerosol black carbon (BC) were made onboard the Oceanographic Research Vessel (ORV), *Sagar Kanya* (SK-190), during the inter-monsoon period (i.e., when the monsoon winds are in transition from north-easterlies to westerlies/ south-westerlies over India), over the Arabian Sea adjoining the Indian Peninsula.

Spectral variation of AOD showed high values at the shortest wavelength and decreased rapidly towards the longer wavelengths, resembling more to those observed over continental environments, rather than the flat spectra generally expected over marine environment. This indicates significant abundance of continental aerosols over the oceanic area under investigation. The aerosol properties over Arabian Sea were found to respond distinctly with respect to change in the airmass back trajectories, with higher optical depths and flatter AOD spectra associated with trajectories coming over the landmasses of west Asia, west and west-coastal India while the AODs were lowest and the spectra were steepest when the trajectories indicated advection from the Bay of Bengal. This change in the AOD and its spectral dependence related to advection has significant impact on the (regional) direct aerosol radiative forcing. The net atmospheric forcing is found to increase remarkably when there were indications of transport from the western landmass.

## Reference

[1] Krishnamurti T.N., et al., *Tellus-B*, **50(5)**, 521-542, (1998).
[2] Moorthy, K.K., et al., *J. Geophys. Res.*, **106**, 28539-28554, (2001).