# Abstract Details

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**Title:** Effects of Long-range Transport on Aerosol Optical Depth Over Arabian Sea During Inter- Monsoon Season

**Abstract:** Atmospheric aerosols modify the radiation budget of the earth-atmosphere system and hence have implications to regional and global climate. Nevertheless, there still persist large uncertainties in the regional radiative forcing estimates due to aerosols. This arises mainly because of the lack of adequate knowledge of aerosol properties, and the large variations in these properties over rather short scales, both spatially and temporally. Over the land, this arises primarily from the wide variety of source processes; while over the ocean transport from the continents contribute a major share. Due to its geographical location, Arabian Sea experiences contrasting weather pattern associated with Indian monsoon. It is also influenced by the anthropogenic activities along the densely inhabited continental regions surrounding it. Besides, long-range transport of aerosols from west Asia and Southeast Asia also is known to modify the aerosol properties over the Arabian Sea. Even though a few, recent field campaigns have provided a considerable insight into this during the dry, Indian (northern) winter season, when the synoptic airmass is steady and continental in nature, observations are very sparse 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), measurements of aerosol spectral optical depth (AOD) were made onboard the research vessel Sagar Kanya, during its inter-monsoon cruise SK190 (during March – April 2003, when the monsoon winds are in transition from north-easterlies to westerlies/ south-westerlies over India), over the Arabian Sea adjoining the Indian Peninsula. The AOD spectral shape resembled the pattern generally observed over continental environments or maritime environments highly influenced by continental advection, rather than the flat spectra generally expected over far marine environment. Spectra in general, were steep with the Angstrom exponent exceeding 1. Moreover, the spectral AODs showed significant temporal variation over the rather small oceanic region, with the AODs decreasing from initial high values to reach a minimum by 19 March. Subsequently there was a remarkable increase in the AOD, with values as high as 0.8 at 500nm, observed in the first week of April before decreasing again. The spectral shape showed an opposite behaviour, with flatter spectra occurring on higher AOD periods. The role of long-range transport of aerosol from distinct regions in causing this observed changes was examined by computing three-level, seven-day air back-trajectories for all the days using the NOAA - HYSPLIT model. It was observed that the highest AODs and the flattest spectra occurred when the trajectories showed significant advection from the west Asian (Arabian) regions, and west coastal India across the Arabian Sea, where as the lowest AODs, the steepest spectra occurred when the advection was from the Bay of Bengal and across the southern peninsular India. The cases when advection was mainly from the Indian landmass came in between these extremities.

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