Inter Annual Variation of Aerosol Transport Over the Arabian Sea During Pre-monsoon Season

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During the pre-monsoon season of every year, large quantities of mineral dust from the Arabian deserts are transported across the Arabian Sea towards the Indian land mass. Aerosol concentrations in the northern Arabian Sea and the South Eastern Arabian Sea (SEAS) are generally high during this time. The high pressure system in the north western quarter of the Arabian Sea induces an anticyclonic flow from the desert regions of Arabia. Attracted by the low pressure over the Indian peninsula this flow speeds up after traversing through the northern Arabian Sea, turns southward along the west coast and decelerates near the southern end of the Indian Peninsula resulting into a strong convergence in the SEAS. The high aerosol loading in the north/north western Arabian Sea is mainly due to the direct transport of mineral dust by the winds from the adjacent desert regions. On the other hand, the increased aerosol concentration in the SEAS is a result of the accumulation of aerosols by the convergence of winds at lower altitude.

This work is aimed at the study of inter annual variations in the dust transport from the Arabian deserts towards the eastern boundary of the Arabian Sea bordering with the Indian land mass. Using MODIS aerosol observations, NCEP reanalysis winds and aerosol extinction profiles from by CALIPSO, aerosol flux in the pre monsoon season of the years 2003-2009 is computed for the lower and upper atmospheric altitudes. A regional climate model (RegCM3) with an active dust generation scheme is also used to simulate the dust transport with initial conditions from NCEP/NCAR reanalysis. The results on upper and lower level aerosol fluxes estimated from MODIS observations and from model simulations for the years 2003-2009 are compared with each other.