

Influence of air-sea fluxes on atmospheric aerosols during summer monsoon in the Indian Ocean.

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The local influence of air-sea trace gas fluxes on atmospheric aerosols in the remote marine boundary layer (MBL) is still heavily disputed. During summer monsoon, the western tropical Indian Ocean is predicted to be a hotspot for dimethylsulfide (DMS) emissions, the major marine sulfur source to the atmosphere and an important aerosol precursor. Other aerosol relevant fluxes, such as isoprene and sea salt fluxes, should also be enhanced, due to the steady strong winds during the monsoon. In addition, maritime air masses dominate the area during the summer monsoon, excluding the influence of continentally derived pollutants. During the 234-2/235 cruise in the western tropical Indian Ocean from July-August, 2014, directly measured eddy covariance DMS fluxes confirm that the area is a large source of sulfur to the atmosphere ($8.4 \mu\text{molm}^{-2}\text{d}^{-1}$). The directly measured fluxes, as well as computed isoprene and sea salt fluxes, were combined with FLEXPART back- and forward trajectories to track the emissions in space and time. The fluxes correlate with satellite aerosol products from MODIS-TERRA and Suomi-NPP, showing significant values from 0.42 to 0.62. The maximum correlations were found between 3 and 10 hours after emission, reflecting reasonable timing for atmospheric transformations and indicating a local influence of marine emissions on atmospheric aerosol properties.