

**A decade of change in aerosol properties over the Indian Subcontinent**

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Changing atmospheric aerosol properties caused by anthropogenic activities carries serious implications for climate change and human health. The launch of the Multi-angle Imaging SpectroRadiometer (MISR) onboard Terra spacecraft more than a decade ago provides the first capability to monitor several physical properties of aerosols over land from space. We use ten years (Mar 2000-Feb 2010) of observations from MISR to quantify decadal changes in seasonal aerosol optical depth ( $\tau$ ) segregated by particle size and shape over the Indian Subcontinent. Here we show that many regions (referred to here as hotspots) have statistically significant (i.e.,  $p < 0.05$ ) seasonal linear trends in  $\tau$ , with seasonal increasing in the range 0.1-0.4 in the last decade. These hotspots are associated with urban centers and densely-populated rural areas. Based on particle size and shape, we demonstrate that the trends, facilitated by topography and synoptic scale meteorology, are attributed to a significant rise in anthropogenic particles with additional contribution of natural particles in the rural and oceanic regions. The spatial and seasonal patterns of trends suggests greater complexity in quantifying potential aerosol-induced regional climate and air quality effects, particularly at coarser scales.