

# Potential impacts of aerosol–land–atmosphere interactions on the Indian monsoonal rainfall characteristics

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**Abstract** Aerosols can affect the cloud-radiation feedback and the precipitation over the Indian monsoon region. In this paper, we propose that another pathway by which aerosols can modulate the multi-scale aspect of Indian monsoons is by altering the land–atmosphere interactions. The nonlinear feedbacks due to aerosol/diffuse radiation on coupled interactions over the Indian monsoon region are studied by: (1) reviewing recent field measurements and modeling studies, (2) analyzing the MODIS and AERONET aerosol optical depth datasets, and (3) diagnosing the results from sensitivity experiments using a mesoscale modeling system. The results of this study suggest that the large magnitude of aerosol loading and its impact on land–atmosphere interactions can significantly influence the mesoscale monsoonal characteristics in the Indo-Ganges Basin.

**Keywords** Asian monsoon · Aerosols · Land use · Land-surface feedback · Precipitation · Radiation feedback

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