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"Elevated heat pump" hypothesis for the aerosol-monsoon hydroclimate link: "Grounded" in observations?

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Documents

PDF Available Here
796 KB, PDF-document
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<http://onlinelibrary.wiley.com/doi/10.1029/2009JD013800/abstract>

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The viability of the elevated heat pump hypothesis, a mechanism proposed by Lau and Kim (2006) for absorbing aerosols' impact on South Asian summer monsoon hydroclimate, is assessed from a careful review of these authors' own analysis and others since then. The lack of appreciation of the spatial distribution of the aerosol-related precipitation signal over the Indian subcontinent, its east-west asymmetric structure, in particular, apparently led to the development of this hypothesis. Its key elements have little observational support, and the hypothesis is thus deemed untenable. Quite telling is the observation that local precipitation signal over the core aerosol region is negative, i.e., increased loadings are linked with suppressed precipitation and not more as claimed by the hypothesis. Finally, motivated by the need to address causality, the analysis of contemporaneous aerosol-monsoon links by Bollasina et al. (2008) is extended by examining the structure of hydroclimate lagged regressions on aerosols. It is shown that findings obtained from contemporaneous analysis can be safely interpreted as representing the impact of aerosols on precipitation, not vice versa. The possibility that both are shaped by a slowly evolving, large-scale circulation pattern cannot however be ruled out.

Research areas

BLACK CARBON AEROSOLS, INDIAN MONSOON, CLIMATE MODELS, PRECIPITATION, RADIATION, RAINFALL, IMPACTS

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