

How intrusions of dry air affect Indian monsoon rainfall

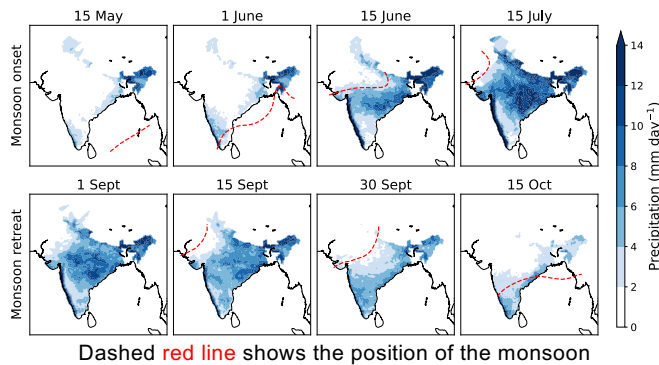
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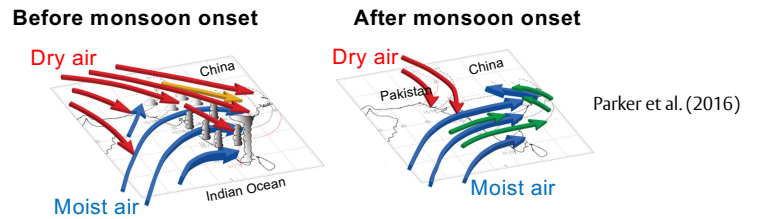
³ Met Office, UK

What do we know about the Indian monsoon and its interaction with dry air?

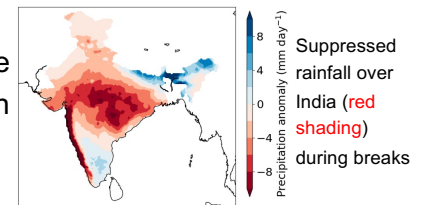
1. The monsoon is a powerful weather system that advances into India in June–July and retreats in September–October, supplying water to over a billion people



2. The monsoon progresses when moist oceanic air overpowers dry air originating from higher latitudes



3. Dry air can return during the monsoon and contribute to breaks in the rains, which can trigger drought and affect the economy

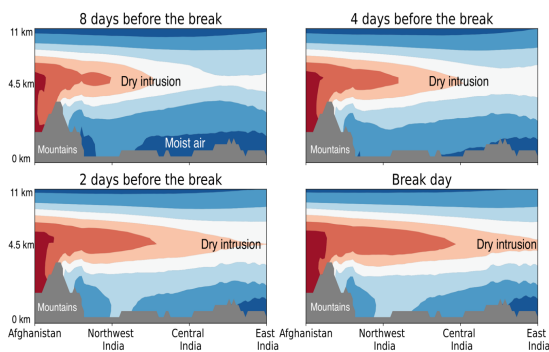


What is the research question?

How does dry air lead to breaks in the monsoon rains?

What did we find?

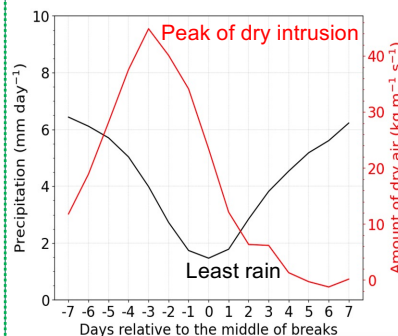
1. Dry air expands into India



Equivalent potential temperature (units: Kelvin), which is a combined measure of the temperature and moisture content of air, showing locations of dry and moist air as a monsoon break evolves

Dry intrusion from arid regions such as Afghanistan expands into India and suppresses rain clouds, triggering breaks

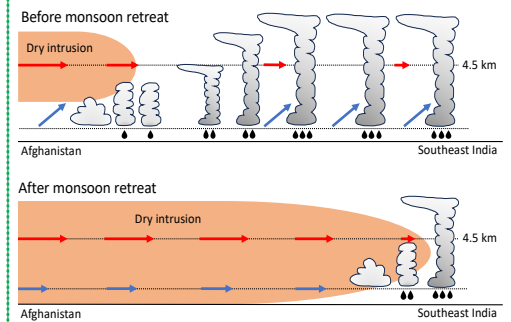
2. Causal relationship



The evolution of dry air and rainfall over India during breaks

Dry intrusion attains its peak strength 3 days prior to the middle day of breaks

3. Dry air's role in the final retreat of rains



Schematic showing the role of dry intrusion in the final retreat of monsoon rains

Dry intrusion plays a similar role in the direction of the final retreat of rains in India (Deoras et al. 2024)

How will our work benefit stakeholders?



An improved understanding of the dry air-monsoon relationship will improve monsoon rain forecasts, supporting sustainable farming, refining water management practices, and fostering UK-led global research collaborations on monsoon-related issues (contributing to the UN Sustainable Development Goals 2, 6 & 17)

