

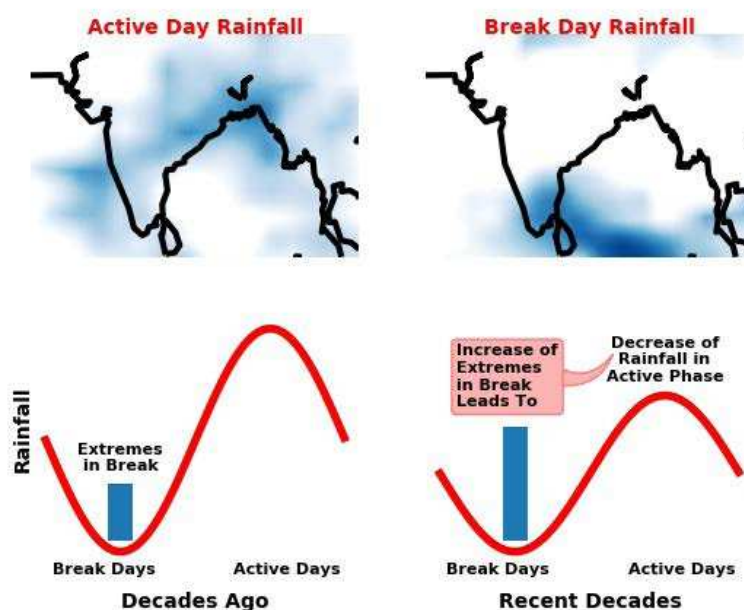
INCREASE IN EXTREME RAINFALL EVENTS DECREASE THE SEASONAL MEAN MONSOON RAINFALL

Indian summer monsoon rainfall has shown a small decline in the seasonal mean during the past 50 years. During the same period extreme rainfall events (rainfall greater than 100 mm/day) has increased by 50%. How can a decline in seasonal mean and increase in extreme rainfall occur at the same time? In a recent study published in the journal *Scientific Reports*, Karmakar, Chakraborty and Nanjundiah have investigated this apparent paradox using observational data and numerical models.

Indian summer rainfall alternates between phases with copious rainfall (called active) and quiescent phases (called breaks). These phases last for about a week or two over central India. Most of the contribution to seasonal mean rainfall comes from the active phase. This study found that extreme rainfall events have increased in the break phase during the last three decades. This increase

in the extreme rain events during the break phase stabilizes the atmosphere, which weakens the subsequent phase of active rainfall. The evolution of active-break cycle of the Indian monsoon is not simulated well by the present climate models. How will Indian monsoon evolve in response to climate change? The climate models show large disagreement with regard how monsoon rainfall will change in the future. This may be partly on account of their inability to simulate accurately the active-break cycle of the monsoon.

Reference: Karmakar N, Chakraborty A, Nanjundiah RS (2017a) Increased sporadic extremes decrease the intraseasonal variability in the Indian summer monsoon rainfall. *Sci Rep* 7:7824, DOI 10.1038/s41598-017-07529-6 Article link: <https://www.nature.com/articles/s41598-017-07529-6>



Spatial pattern of rainfall during active and break monsoon