

Shrinking Arctic ice behind high summer rainfall

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THE mystery behind the increase in Indian summer monsoon rainfall and its link with the melting of Arctic ice during spring (March to May) has been demystified in a ground breaking research by the National Centre for Polar and Ocean Research (NCPOR), Goa, in collaboration with the Korea Polar Research Institute.

"There is a significant link between the melting of Arctic sea ice in spring and increased Indian Summer Monsoon Rainfall (ISMR)," said NCPOR Scientist and corresponding author Avinash Kumar.

The paper 'Contrasting Response of Regional Spring Arctic Sea Ice Variations on Indian Summer Monsoon Rainfall' is published in the June edition of the internationally reputed peer reviewed journal 'Remote Sensing of Environment'.

The study has investigated the intricate relationship between spring Arctic Sea Ice Concentration (SIC) and the ISMR using satellite observations and climate model simulations (CMIP5 and CMIP6). It sheds light on the complex teleconnections between polar regions and the Indian subcontinent's climate, with potential implications for agriculture, water resources, and disaster management.



Reduced sea ice in the Central Arctic is associated with increased rainfall in central and north-eastern India. This is due to changes in atmospheric circulation patterns that influence global weather

The Indian Summer Monsoon Rainfall has shown a decadal trend of increased rainfall over western India and a decrease in the northeast. This is attributed to factors like shifting land-sea temperature gradients, warming of western Indian Ocean, & changes in Asian jet stream

Low sea ice in the Barents-Kara Sea in the Arctic region is linked to changes in the North Atlantic-Eurasia teleconnection wave train pattern, which affect the onset and intensity of the Indian monsoon

ment's climate, with potential implications for agriculture, water resources, and disaster management.

"Our research found that reduced sea ice in the Central Arctic is associated with increased rainfall in central and north-eastern India. This is due to changes in atmospheric circulation patterns, including atmospheric waves that connect distant regions, influencing global weather. In contrast, low sea ice in the Barents-Kara Sea

in the Arctic region is linked to changes in the North Atlantic-Eurasia teleconnection wave train pattern, which affect the onset and intensity of the Indian monsoon," said Kumar.

The study also examines the decadal trend of ISMR, revealing increased rainfall over western India and a decrease in the northeast. This trend is attributed to factors like shifting land-sea temperature gradients, warming of the western Indian Ocean, and changes in the

Asian jet stream. "These findings highlight the far-reaching impacts of Arctic sea ice melts on global weather patterns," said project scientist, NCPOR, and lead author Juhi Yadav.

"As the Arctic continues to warm at an alarming rate — 3-4 times faster than average global warming — understanding these teleconnections becomes crucial for predicting and mitigating the effects of climate change on the Indian monsoon and its associated socio-economic consequences," NCPOR scientist Rohit Srivastava said.

The researchers utilised satellite observations and climate model simulations to analyse the relationship between Arctic sea ice and the Indian monsoon from 1979 and 2021. The study emphasises the need for improved representation of regional Arctic sea ice dynamics in climate models to enhance the accuracy of rain forecasts.

"The implications of this research are significant for India, where the monsoon is critical for agriculture and water resources and will help scientists and policymakers to anticipate and prepare better for changes in rainfall patterns, said Group Director of Polar Sciences NCPOR, Rahul Mohan.

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