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Perspective

Impact of Global Warming on Indian Summer Monsoon Rainfall

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ABOUT THE STUDY

Indian summer monsoon, a part of the Asian summer monsoon is defined as the seasonal reversal of atmospheric circulation, is manifested in the form of northward migration of Inter-Tropical Convergence Zone (ITCZ) with respect to its normal position over the equator and resulting precipitation caused by the cross-equatorial moisture-laden south-westerly winds over the Indian subcontinent. Indian summer monsoon which is a complex geophysical phenomenon possesses a wide spectrum of variability such as daily, intra-seasonal, inter-annual, decadal. The interaction between multiple modes of propagating intra-seasonal oscillations of the Indian summer monsoon causes intermittent wet spells (i.e. active spells with good rainfall) and dry spells (i.e. breaks with little rainfall) over core monsoon zone. It is argued that a prolonged dry spells during July-August and an uneven temporal and spatial distribution of rains (even in normal monsoon years) has potential to have an adverse effect on agriculture.

Indian summer monsoon which is a complex geophysical phenomenon possesses a wide spectrum of variability such as daily, intra-seasonal, inter-annual, decadal, and so on. The intrinsic spatial-temporal variability in the Indian monsoon system is associated with the anomalies in the large-scale climate variables driven by the. In particular, the intra-seasonal variability of the Indian summer monsoon has a crucial role in deciding the fate of kharif crops in the Indian Subcontinent. The nations participated in Paris Agreement under the 'United Nations Framework Convention on Climate Change' (UNFCCC) set one goal for the protection of the climate under the long-term temperature change and the goal is to keep the global warming below 2°C and pursuing efforts to limit it below 1.5°C after the pre-industrial period, accepting that this would significantly reduce the impacts of climate change and risks under the warming scenario.

At present, there is no study that focuses the impact of 1.5°C and 2°C warming on active and break spells in India, therefore, this study investigates the impacts of warming on the core monsoon zone and all India monsoon regions by using the output of the HAPPI experiment model. The purpose of this study is to provide detailed information of the future changes in active and break spells. The main focus of the study is to understand the nature of the break and characteristics of the break over all India monsoon regions under different target temperatures such as 1.5°C and 2°C and how active and break will vary with the warming?

Impacts of warming on the core monsoon zone by using the output of the HAPPI experiment model. There are five AGCM models are used in this study such as NorESM1-HAPPI, ECHAM6.3-LR, CanAM4, MIROC5, and CAM4-2 degree. These five AGCM models are part of the HAPPI experiment which provides climatic data such as precipitation for the historical period, plus15 period, and plus20 period. Since, only NorESM1-HAPPI model has precipitation, specific humidity, wind vector, and surface pressure data for the historical period, plus15 period and plus20 period as compared to the other four.

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