

BITMAP: Better understanding of Interregional Teleconnections for prediction in the Monsoon And Poles

Call: Climate Predictability and Inter-Regional Linkages

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BITMAP is an Indo-UK-German project to develop better understanding of processes linking the Arctic and Asian monsoon, leading to better prospects for prediction on short, seasonal and decadal scales in both regions. Recent work has suggested that the pole-to-equator temperature difference is an essential ingredient driving variations in the monsoon. BITMAP's initial focus will be on the impact of the temperature difference between pole and equator on the establishment and variation of regional circulations. We will use existing databases of multiple climate models to unpack the impact of different forcing agents (e.g. greenhouse gases and polluting aerosols) on the relative warming of the northern and southern hemispheres and pole-to-equator temperature gradients. Next we will relate the gradient to position of the strongest rainfall and strength and position of monsoon circulation. We will also examine the impact of different pole-to-equator temperatures on hydroclimates of the vulnerable Hindu Kush-Himalaya (HKH) region in High Asia. Next we will test the impact on Arctic circulation patterns of "diabatic" heating arising from the monsoon rainfall (via waves in the atmosphere) by conducting novel experiments with climate models. This will also help us evaluate and improve these models by determining the problems caused by typical monsoon errors (e.g. misplaced tropical rainfall) on simulation of polar climates; we will also explore how errors in model Arctic sea-ice distribution affect the monsoon. Finally we will analyze effects of variations in climate. We will measure and model the impact of typical strong and weak Asian monsoon summers on atmospheric waves that travel to the poles and thereby develop a better understanding of the pathways to Arctic circulation, with implications for predicting sea-ice extent. In the other direction, we will use observations and models to assess the role of the changing Arctic temperatures on the jetstream and on the regularity of heavy rainfall and flooding events that affect South Asia.