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# Interactions between the land surface and summer monsoon over India from selected CMIP5 climate model data

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Anthropogenic land use changes, such as a shift from forested land into irrigated agriculture, are having a dramatic impact on rainfall patterns (in both time and space), which are so vital for life. Since the 1970s, India (and in particular the northern plains region) has experienced the largest and fastest increase of irrigated land in the world. The resulting changes to soil moisture and local heat and water fluxes are likely to be significant, however the impact of these changes on summer monsoon rainfall (upon which the majority of Indian agriculture is reliant) is less well understood.

In this study, we focus on the interactions between soil moisture and several key atmospheric variables, namely rainfall, temperature, winds and latent/sensible heat fluxes. Using a variety of rain-gauge data, blended observational–satellite data and climate model data from Phase 5 of the Climate Modelling Intercomparison Project (CMIP5), we investigate these land surface-atmosphere interactions in a number of ways. Firstly, we identify how the different datasets represent rainfall during the summer monsoon. Secondly, using composite analysis, we investigate the impact of pre-monsoonal soil moisture on monsoon rainfall. Thirdly, we look at spatial and temporal correlations between soil moisture and rainfall at various lag-leads (daily, dekad and monthly timescales). Lastly, and most importantly, we look at the relationship between soil moisture and subsequent temperature extremes (such as extreme hot days) across different regions of India.