



## **Climate model experiments to explore the interactions between the land surface and summer monsoon over India**

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Regional rainfall patterns, in both time and space, are being increasingly influenced by anthropogenic land use changes. For example, a significant increase in irrigated land has been made across India over the last 40 years, but the ways in which this has affected the summer monsoon are not well understood. The interactions between land surface parameters (such as soil moisture) and atmospheric fields (such as rainfall or heat fluxes) therefore require further investigation.

In a companion paper, we discuss some of these interactions based on already available climate model data from Phase 5 of the Climate Modelling Intercomparison Project (CMIP5). In contrast, in this study we conduct our own climate model experiments to study the links between soil moisture and atmospheric processes. We use HadGEM2, a state-of-the-art general circulation/global climate model (GCM) from the UK Meteorological Office Hadley Centre.

Running the model in atmosphere-only mode (i.e. where sea surface temperatures and sea ice are prescribed), we investigate the effect of coupling and uncoupling soil moisture from the atmosphere. In the first experiment, nominated the 'Control', soil moisture is allowed to be free running i.e. fully coupled to the atmosphere, globally. Conversely, in Experiment A, soil moisture is prescribed i.e. uncoupled to the atmosphere, again globally. Lastly, Experiments B and C combine the two; soil moisture is fully coupled over India and uncoupled elsewhere in B, and vice versa in C. Preliminary results of these experiments will be presented.