

Investigating the time scale of the Indian Monsoon dry bias in the Met Office Unified Model

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Abstract

The Met Office Unified Model (UM) is known to produce too little rainfall over India during the Monsoon period (here defined as June, July and August), particularly when considering multi-year climate forecasts. We investigate how quickly this dry bias appears by assessing the 5-day operational forecasts produced by the UM over the last five years. It is found that the UM shows a drying tendency across the five days of the forecasts, for all of the five years (which correspond to a range of different versions of the UM). This suggests that analysing shorter integrations of the UM should provide significant insight into the cause of the dry bias in climate simulations.

We aim to develop such an insight by evaluating the detailed moisture budget for the Indian region, investigating whether any particular terms are responsible for the reduced rainfall. There is some evidence that individual “cases” can be identified, accounting for a small fraction of the 3-month period, but accounting for most of the dry bias over the whole period. We investigate how the moisture budget terms differ inside and outside of these “case” periods.

In order to isolate the effects of the initial condition on the forecast bias, we conduct experimental forecasts for a subset of the five-year period. These correspond to a particular version of the UM initialised with, respectively, ECMWF Integrated Forecast System analyses, and the standard Met Office analyses. In this way we investigate what effect the initial condition, and the model version, have on the forecast precipitation.