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# Sensitivity Studies to Assess the Representation of Rainfall and Temperature over India using the WRF model in a Tropical Channel Setup

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The impacts of climate change, though global in nature, is felt at local levels. India in this context is vulnerable to changes in climate due to its diverse geography and socio-economic factors. Data from high-resolution regional climate models are needed for emerging impact studies. In this regard, representation of the present climate by these models is essential in order to carry forward the future projections. The predictability in the tropics is very difficult when compared to the extra-tropics (Shukla et al 2003), where one of the main challenges lies in the selection of microphysical and cumulus parameterization schemes, which can represent the mean monsoon features well over this region. In this abstract, we will address how well a regional climate model represents temperature and precipitation for India based on the scheme selection.

We have used the Weather Research and Forecasting (WRF) model version 3.2. The horizontal resolution of the model is considered 50 km x 50 km using a tropical channel set up. The tropical channel domain consists only of the boundaries above and below certain latitude. This process allows the interaction from the extra-tropics through the north-and-south boundaries. In addition to that, it allows the generated east-west waves to propagate around the globe more naturally - as in the real world and in global models. The meridional boundary conditions were specified using six-hourly ERA Interim (0.5 degree resolution) data. The runs have meridional boundaries at 45S and 45N, with 37 vertical levels, ranging from the surface to pressure p = 10 hPa.

In order to assess how different microphysical and cumulus parameterization schemes represent temperature and precipitation, we tested four combinations of these: Hong-Dudhia-Chan's and Hong-Lin's microphysical schemes; and Kain-Fritsch's and Betts-Miller-Janjic's cumulus parameterization schemes. Four simulations were run for a two-year period each, where the first year was discarded as the spin-up time. The simulation performance is determined based on comparisons between the simulations and gridded observational data over the Indian region. In order to understand the sensitivity of physical parameterization schemes to horizontal resolution, the validation of model results will be performed at higher resolutions as well.

Results will be shown with respect to the validation described above. The overall outcome of this assessment will later be used for longer climate simulations of the present and future climate.