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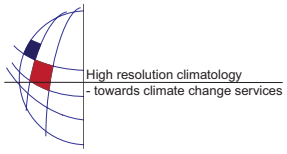

Easterly Waves in Tropical Channel Simulations: An Assessement Using the WRF Model

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Westward propagating waves ('easterly' waves) are tropical depression-type disturbances with a life span of around 1-2 weeks. Easterly waves are climatologically important as they may significantly alter the amount of rainfall in a region. They are also linked to tropical cyclogenesis, with consequences to many vulnerable regions. But how well do climate models represent such waves? Studies have shown that the deficiencies in model convective parameterization schemes are primarily responsible for their poor representation in Global Climate Models. In this study, we assess the performance of different parameterization schemes in simulating easterly waves using a Regional Climate Model.

We have used the Weather Research and Forecasting (WRF) model version 3.2. The model was run at a 50 km resolution using a tropical channel set up. In this type of setup, the domain consists of the boundaries above and below a certain latitude and no side boundaries. This process allows the interaction from the extra-tropics through the north-and-south boundaries. In addition to that, it allows the generated 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 easterly waves, we tested six combinations of these: Hong-Dudhia-Chan's, Hong-Lin's and Milbrandt-Yau's microphysical schemes; and Kain-Fritsch's and Betts-Miller-Janjic's cumulus parameterization schemes.

The easterly-wave assessment was conducted in two stages: a) First, six simulations were run for a two-year period each, where the first year was discarded as the spin-up time; b) Then, two of the combinations in (a) that best represented easterly waves are selected for a pair of multiyear (six years) simulations. The similation performance is determined based on comparisons between the runs and reanalysis datasets: NCEP/NCAR and ERA Interim.

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