

Analysis of precipitation in operational simulations of WRF in case of intense convection over Rio Grande do Sul State: Case Study December 11, 2012

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ABSTRACT

During early morning of December 11, 2012 a mesoscale convective system (MCS) pass-over Rio Grande do Sul (RS) State causing many records of extreme rainfall. Was used the Weather Research and Forecast (WRF) atmospheric model, with two nesting grids with 48 and 12 km of the horizontal resolution and boundary condition (bc) of GFS with 1 degrees of horizontal resolution, the goal of this work was evaluate the operational performance of model in simulate the rainfall over the RS during the displacement of MCS. Was analysed accumulated rainfall, to each six hours, in two operational runnings, 36 and 12 hours previous to displacement of system (runs started in 12Z in the days 09 -Op09- and 10 -Op10- of december), comparing with a analysis run (control – bc of final analysis GFS) all analysis was doing between 18Z of 10 until 18Z of 11 december. The results compared with control run, the Op09 and Op10 show the increase of root mean squared error (RMSE) in regions of high topography gradient like in northeast of RS with higher values than 24mm/6hours and, in the Op10, had a decrease of maximum magnitude error (control – forecast), but with increase of area coverage with minimum of 4mm/6h. Was verified to the true statistic skill using the Hanssen-Kuipers score (HK) to the accuracy of the events of occurrence or none of rain, to each grid point, that the simulations with less resolution (Op09 and Op10 with 48km) have a high skill during each individual analysed time and the Op09 was that showed, over all time, the high total skill principally in 12 km simulation. Concluding the importance of the topography in rain simulations over RS, specially in regions of transitions like toward to north/northeast, suggesting the use of simulations with different or adaptatives resolutions to each microarea, in view that lowland regions, like southern, the low resolution simulation have a good skill. Also showing the applicability of low resolution simulations as a qualitative tool to evaluate rain occurrence additionally with high resolutions simulations.