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# Sensitivity of different convective parameterization schemes on tropical cyclone prediction using a mesoscale model

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**Abstract** This study presents an intercomparison of four cumulus parameterization schemes (CPS) in the prediction of three cases of tropical cyclones in the north Indian Ocean. The study makes use of the Weather Research and Forecasting model of Nonhydrostatic esoscale Model version with a horizontal resolution of 27 km. The four deep cumulus schemes studied are (a) modified Kain–Fritsch (KF), (b) Betts–Miller–Janjic, (c) Simplified Arakawa–Schubert and (d) Grell-Devenyi Ensemble (GD) schemes. Three cases chosen for the study are unique cases with entirely different characteristics, synoptic/convective conditions and with varying levels of performance of the driving global model forecasts. The objective of the current study is to report the relative performance of the CPSs rather than the accuracy of the forecasts, under different convective conditions as reflected in the initial and boundary conditions. The study shows that generally KF scheme produced near-realistic track, intensification and the associated rainfall patterns and GD performed worst in terms of convective organisation and the sustained intensity. The impact of cumulus parameterization schemes and its performance vary widely among the three cases studied. The standard verification scores and the contribution of grid-scale precipitation towards the total rainfall by the mesoscale model are also compared between the different cases as well as the different cumulus parameterization schemes. The performance evaluation of the tropical cyclone predictions by the mesoscale model is influenced by not only the model physics but also the convective conditions as input into the model.

Keywords Cumulus parameterization _ Tropical cyclones _ Weather Research Forecasting model _ Convective conditions

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