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Title: Impact of Cumulus and PBL Parameterization schemes on mesoscale simulation of Bay of Bengal Cyclones
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Abstract:
Tropical cyclones (TCs) are one of the deadliest and costliest weather phenomena worldwide. The destruction is mainly due to strong wind, heavy rainfall and associated storm surge. The disaster due to TC can be reduced by providing more accurate prediction of the track and intensity of the storm. As far as single model forecast is concern, high resolution mesoscale model is expected to provide the best possible forecast of tropical cyclones. In this study, the impact of planetary boundary layer and cumulus parameterization schemes are investigated towards mesoscale simulation of Bay of Bengal cyclones. For this purpose two severe storm Sidr (2007) and Aila (2009) is simulated using WRF-ARW model. Thirty numerical simulations are conducted for each of the two cyclones with double nested domain with horizontal resolutions 27 Km and 9 Km with combination of six cumulus convection and five PBL parameterization schemes. The model is integrated for 99 hours and 51 hours for Sidr and Aila case respectively. The initial and boundary conditions for the model are derived from the NCEP Final analysis at one degree resolution. The model simulated results viz, track and intensity is compared with the best-fit datasets from the India Meteorological Department (IMD) and precipitation is compared with TRMM estimates. The model simulated results show that the simulations are sensitive to the choice of different PBL and cumulus parameterization schemes in the model. The minimum model simulated mean vector displacement errors during the whole simulation period are 90 Km and 49 Km for Sidr and Aila respectively. The location and time of landfall of the storms are also fairly simulated by the model with minimum landfall position error is 22 Km & zero Km and minimum landfall time error is 1 hour & 1 hour for Sidr and Aila respectively.
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