ABSTRACT
DETECTION AND TRACK PREDICTION OF TROPICAL CYCLONES IN THE BAY OF BENGAL USING A REGIONAL CLIMATE MODEL

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A Regional Climate Model (RegCM3, version 3.1) is used in detecting and predicting the tracks of four tropical cyclones (TC) that formed in the Bay of Bengal during the period October-December, 2000. The sensitivity of model outputs to two sets of applied initial and boundary conditions, namely ECMWF/ERA-40 and NCEP-NCAR/NNRP2 reanalysis data sets, are also assessed. Detection and tracking utilized a basin-dependent 850-mb maximum vorticity threshold, local minimum sea level pressure and the presence of a warm core aloft as criteria. The 6-hourly model track positions are then compared with JTWC best track in terms of zonal, meridional and position errors. The mean zonal and meridional errors of model tracks using ERA-40 are -72 and -169 km, respectively. This indicates that model tracks are moving faster westward and southward than the JTWC best track. On the other hand, model track using NNRP2 are on the average moving slower westward (250 km) and northward (22 km) of best track. Using paired-sample t-test, the zonal and meridional errors for the two sets of experiments are found to be significantly different at 95% confidence level. The average position errors (321 km for ERA-40 and 335 km for NNRP2) are not significantly different. The model TC intensity is weaker than JTWC intensity since the former is area-averaged (22 km resolution) while the latter is point-estimated. For NNRP2, model TC intensity was consistently weaker than observed for all 4 TC's, but for ERA-40, intensity was overestimated by about 30 knots for one TC. Analysis of model TC structure, e.g. vertical cross-section of temperature anomaly, wind field and vertical motion showed sensitivity to initial and lateral boundary conditions and are better simulated by the model using ERA-40. Precipitation is skillfully simulated by the model when compared with 0.25^0 resolution precipitation product of the Tropical Rainfall Measuring Mission (TRMM) satellite. It is found, however, that NNRP2 suffers from a dry bias and the simulated precipitation is lower than that modeled using ERA-40.