Tropical cyclone forecast from NCMRWF global ensemble forecast system, verification and bias correction

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ABSTRACT. The North Indian Ocean is one of the world's worst affected areas by tropical cyclones. It is because of its vast coastline and high population density in the coastal areas that the damage to life and property caused by a landfalling tropical cyclone is huge. Therefore, timely prediction of the cyclone track, landfall location and time is of critical importance for this region. In the present study a comparison is made between the relative skills of a deterministic model NGFS (NCMRWF Global Forecast System) and an ensemble prediction system (EPS) NGEFS (NCMWRF Global Ensemble Forecast System) in predicting the tropical cyclone track. Four cases of recent cyclones, *i.e*., Phailin (9-12 October 2013), Helen (19-23 November, 2013), Lehar (23-28 November, 2013) and Madi (6-12 December, 2013) are considered for this comparison. Except of Helen which was a Severe Cyclonic Storm (SCS), all the above cyclones were in the category of Very Severe Cyclonic Storms (VSCS). Further an attempt is made to correct the systematic biases in NGEFS model by using the method of moment adjustment. A comparison of the performance of the models is made on the basis of along track, cross track and direct position errors obtained from the forecast tracks from the three models and the IMD best track data. It is seen that for a cyclone like Phailin which did not show any sudden changes in the track the mean of NGEFS shows a lower track error as compared to NGFS and the bias corrected output from NGEFS shows a further improvement in the TC track forecast. However, in the case of Madi which showed a sudden change in the direction NGEFS showed a better forecast before the direction change as compared to both NGFS and the bias corrected NGEFS. But after the change in the direction NGEFS with bias correction is seen to be performing better than NGEFS and NGFS. On an average for the four cyclone cases of 2013 it is seen that the bias correction leads to an improvement of about 17% in the initial position error as compared to raw ensemble track forecast and about 38% when compared with the deterministic model. In the day 5 forecasts the improvement in the bias corrected ensemble forecast as compared to NGEFS and NGFS are 24% and 17% respectively.

Key words – Tropical cyclone, Phailin, Helen, Lehari, Madi.