A Machine Learning based approach to improve TC intensity forecasts over NIO

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- TCs occurring in the NIO are only 10% of the world, but their effect is higher due to a larger population density around the coastal regions. Intensity of TCs is usually underestimated duee to systematic errors in models particularly for intense cyclones.
- 3 different ML techniques: Random Forest (RF), Multivariate Liner Regression (MLR) and eXtreme Gradient Boost (XGB) have been tried for the BC of the ensemble mean forecast of MSW and CP from NEPS-G model (23 member lagged EPS with a horizontal resolution of 12 km.)

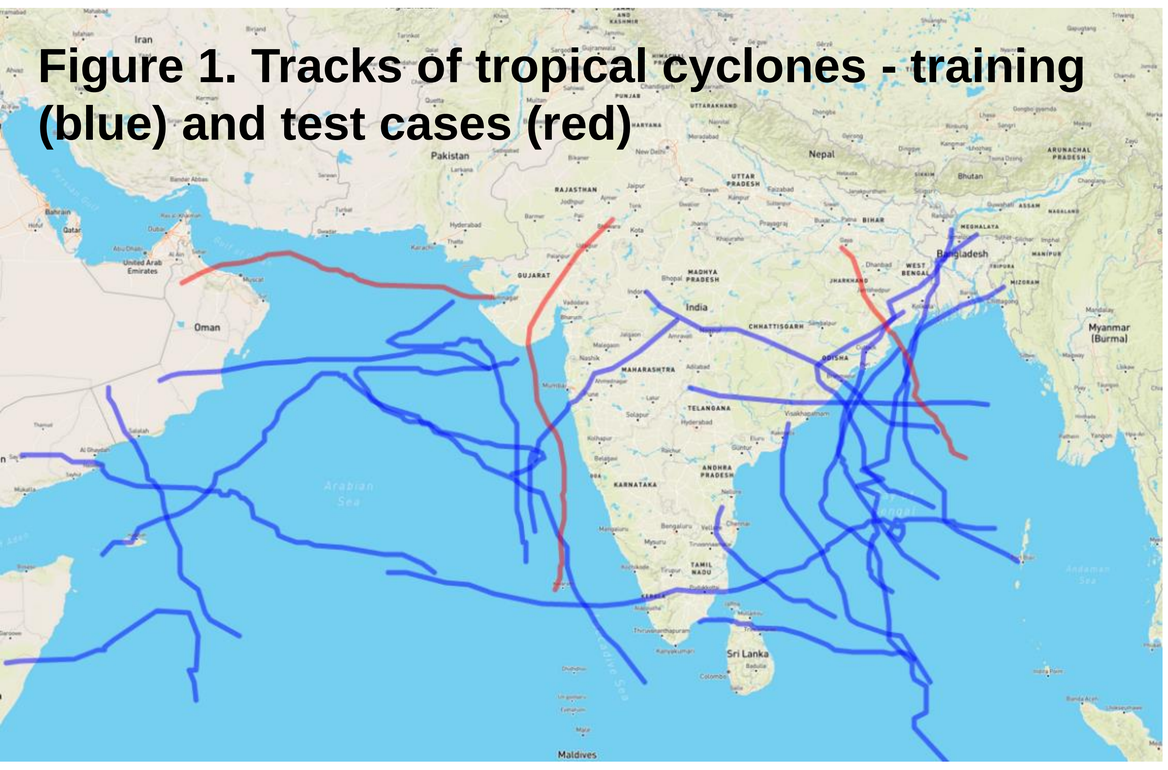
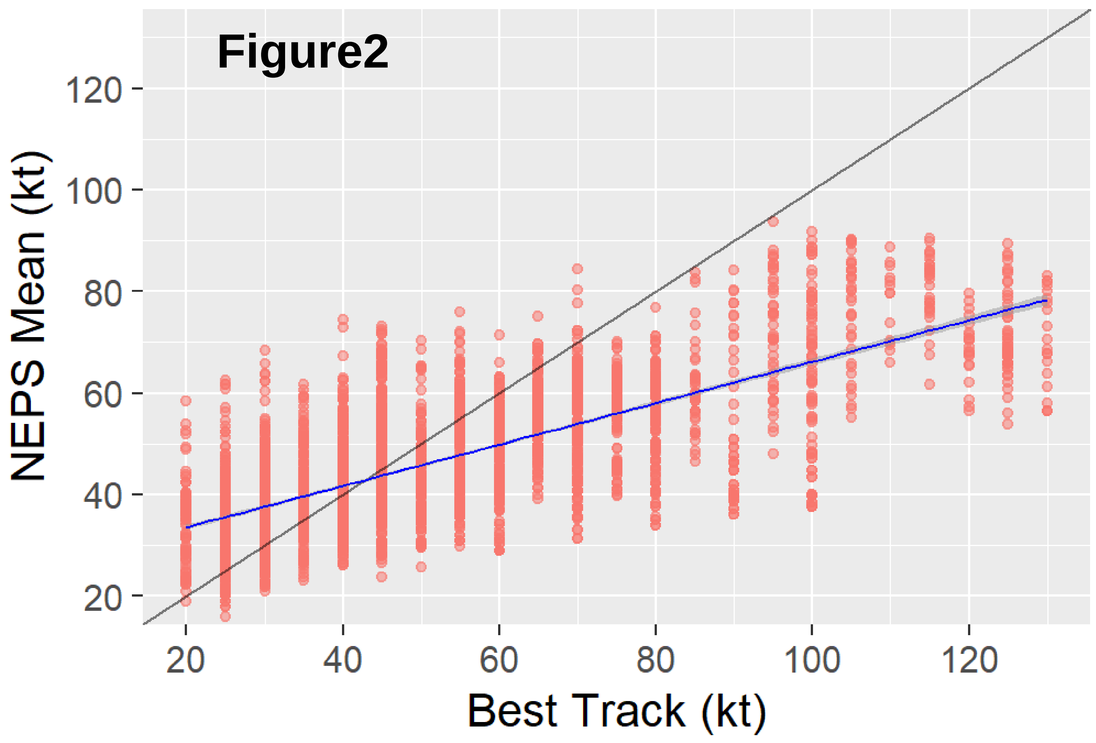
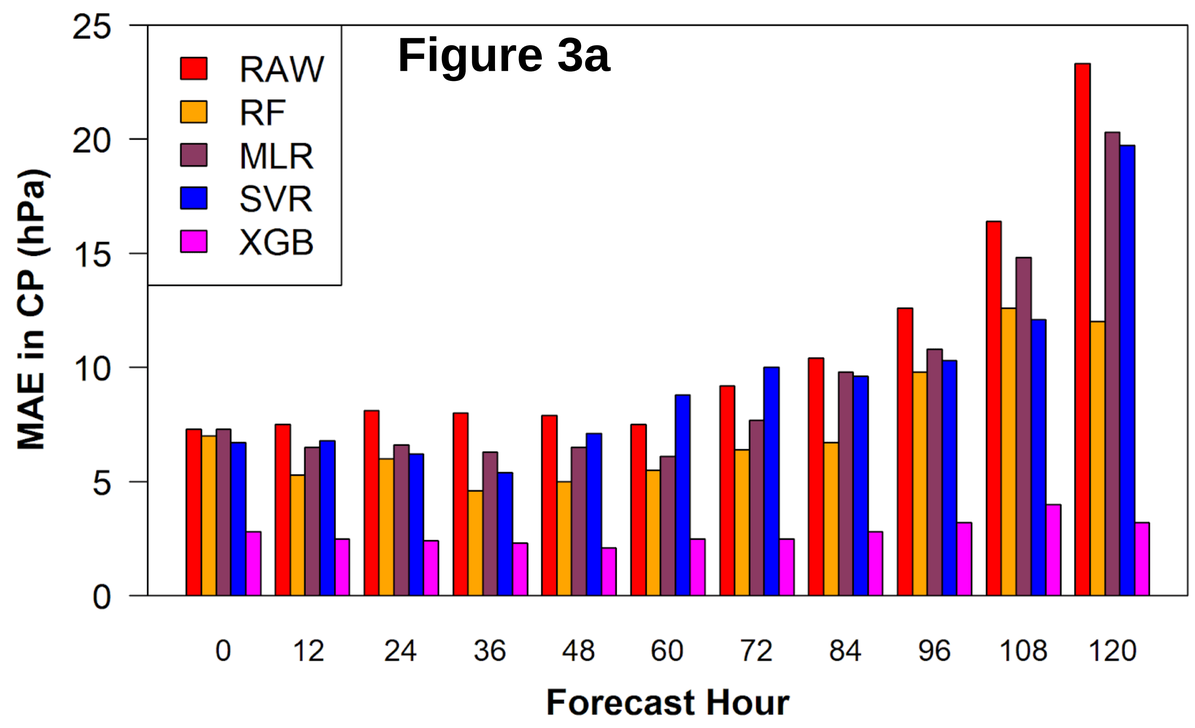


Figure 1. Tracks of tropical cyclones - training (blue) and test cases (red)

- 20 TC cases during 2018-21 (Figure 1) are used in the study. The observed data for TCs is obtained from IMD BEST TRACKs.
- Figure 2 shows the comparison of MSW from NEPSG and IMDBT and it clearly shows the underestimation of MSW.





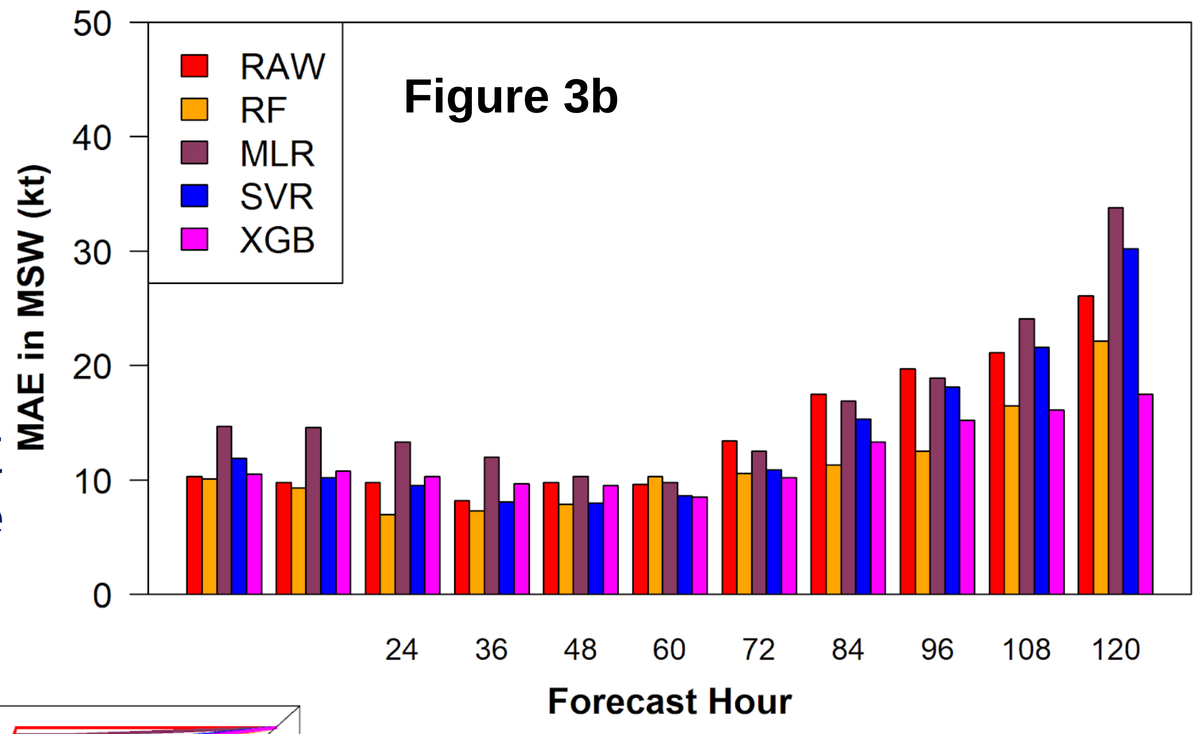
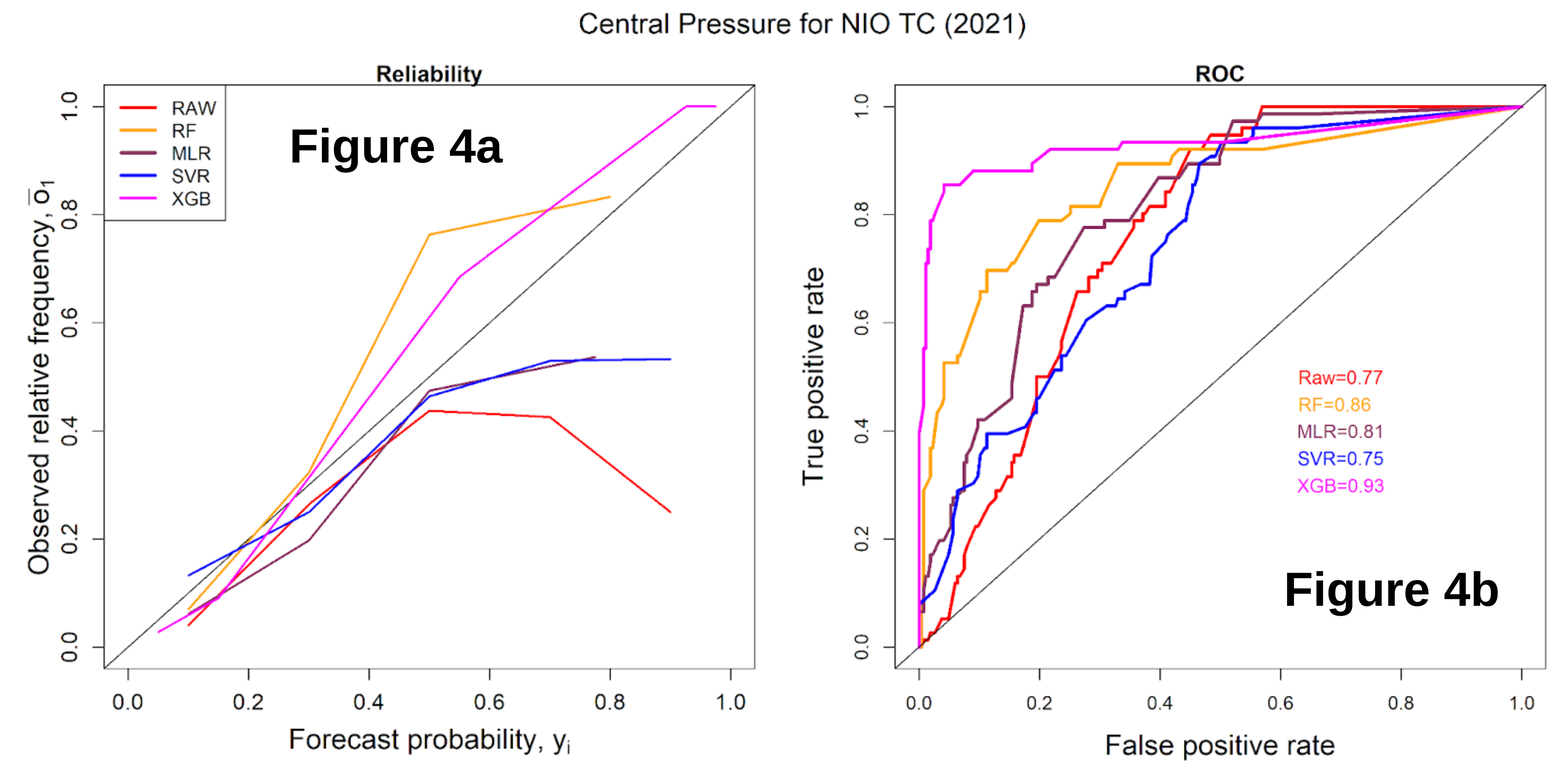
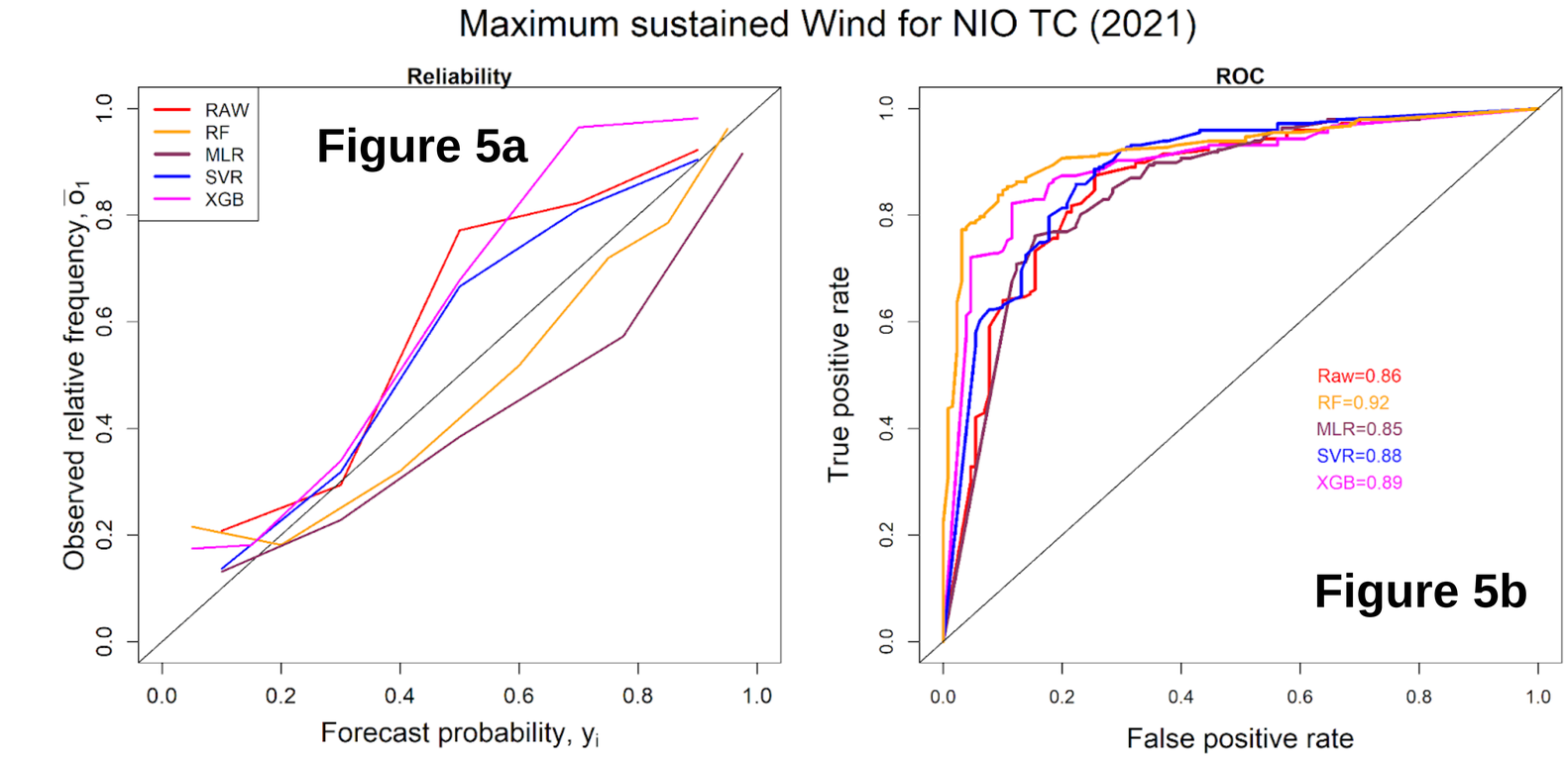


Figure 3a and 3b shows the comparison of MAE in predicted MSW and CP from the ensemble mean based on the ML methods.



- Figure 4a and 4b show the reliability diagram and ROC for MSW obtained from the raw and BC methods.
- It is seen from the figure that for MSW the XGB method shows the best reliability and ROC as well as the highest AROC.



- Figure 5a and 5b show the reliability diagram and ROC for CP obtained from the raw and BC methods.
- It is seen from the figure that for CP the XGB method shows the best reliability and ROC as well as the highest AROC.