

The AI/ML based IOD predictions

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The Indian Ocean Dipole (IOD), with opposite sea surface temperature anomalies off Sumatra and off East Africa, affects the climate of many parts of the world; especially that of East Africa, Australia, India, Japan, and Europe through atmospheric teleconnections. Therefore, accurate prediction of IOD is important for societal benefit. State of the art coupled climate models, such as the SINTEX-F, is used for the prediction of the phenomenon. However, these sophisticated models need large computers and data storage. Here for the first-time, we have shown the usefulness of the machine learning (ML) techniques to predict the IOD. The ML technique used in the study is based on the artificial neural networks (ANNs) and requires much less computational resources. The IOD forecasts are generated for May to November from February-April observed initial conditions with the attributes derived from sea surface temperature, 850hPa and 200hPa geopotential height anomalies, using a correlation analysis for the period 1949-2018. An ensemble of ANN forecast is generated using 500 samples with replacement using jackknife approach. The skill score of the ensemble mean is found to be superior to the skill score obtained from the persistence forecasts that one would guess from the observed data. The ANN models also perform far better than the models of the North American Multi-Model Ensemble (NMME) with higher correlation coefficients and lower root mean square errors (RMSE) for all the target prediction months of May-November.

Keywords: IOD, AI, ML, Indian Ocean, prediction