

# Nirmal Mathew Alex

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*Atmospheric Research, Meteorologist*

## Education

- 2018-2020 **Master's in Meteorology**, *Cochin University of Science And Technology, Cochin, Kerala, GPA - 8.1/10.*  
**"Statistical Prediction of Tropical Cyclones in North Indian and global basins"**
- 2014-2017 **Bachelor of Physics**, *University of Calicut, Palakkad, GPA - 3.38/6.*

## Project Student

- Dec 2019 - **Statistical Prediction of Tropical Cyclones in North Indian Basin**, *Dissertation Work.*  
April 2020

The most severe weather systems that affect the Indian coastline are undoubtedly tropical cyclones (TCs). Cyclone track and intensity prediction is an important part of hazard mitigation programs. TCs track forecasting has remarkably improved over the past decades but not the TCs intensity forecasting. Statistical models are routinely used for the prediction of TC tracks and intensity changes, along with dynamical models. Operational statistical intensity forecast models are generally developed using multiple linear regression techniques. These models forecast TCs intensity changes from predictors such as environmental parameters and persistence of TC characteristics. Yet, many physical processes related to TCs intensification are non-linear, hence potentially hindering the skill of linear models. Here, non-linear schemes (Machine Learning) such as artificial neural network and support vector machine will be used to predict the intensity of tropical cyclones. A comparison scheme between non-linear models and linear model is also done for the major cyclones in the North Indian Ocean.

## Experience

### Atmospheric Research fellow

- July 2020 - **Technoculture research, India.**  
Present Research and technical support on weather modification project specifically aimed at enhancing precipitation on several key reservoir catchments in India. Job tasks mainly include running numerical simulations (WRF-ARW), Data visualisations, visualisation in GIS (QGIS), Automated operational forecasting development using BASH and Python scripts, Simulation of particle dispersion using NOAA-HYSPLIT models, Development of Automatic weather Station Network for long range applications (LORA) including embedded programming and Python scripts for creation of server based automated dataset, Also experimentation with WRF-DA frameworks

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## Intern Fellow

June 2020 - **IISER, Pune India.**

Present Working as Independent intern under Dr.Joy Merwin Monteiro for the development Several algorithms for an climate model development project. Specifically focused on parallel computation of several climate components using programming language "CHAPEL"

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## Research Interests

- Numerical Weather Prediction and modelling
- Geophysical Fluid Dynamics
- non-linear systems in atmosphere and evolution
- Tropical Cyclone modelling
- Computational fluid dynamics
- Statistical modelling and analysis of synoptic systems
- cloud modelling and microphysics
- Digital weather observations and data analysis

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## Skills

Programming: Python, C++ and Cython, BASH, MATLAB, Fortran,IDL, Chapel (limited)

### Meteorology

Datasets: NetCDF4, ERA datasets, ASCII datasets, GeoTIFF

Modelling: WRF-ARW, WRF-DA, Statistical models using Python, NOAA-Hysplit

### Data Science

Visualisation: Matplotlib(Python), MATLAB, ArcGIS, QGIS, IDL(limited)

Analysis: Scipy,Pandas,Excel

Machine learning: Tensorflow, MATLAB-SIMULINK

### Others

Arduino-CPP, HTML(limited)

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## Workshops and Seminars

- Participated in the five-day International Conference on 'Frontiers in Marine Science:Challenges and Prospects - MARICON 2019' organized by School of Marine Sciences,CUSAT, held from December16-20, 2019

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- Participated in the workshop 'Coastal erosion and possible solutions' organized by Department of Atmospheric Sciences, CUSAT and TUCI on 20th of September 2019
- Participated in the symposium 'Physics-Dynamics Interactions in Climate( Pinnacle 2019)' organized by Department of Atmospheric Science, CUSAT held from Feb 21-22, 2019

## References

### 1. Dr.K Sateesan

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### 2. Dr.Neetu S

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