

# Pankaj Kumar

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Python ★ Git ★ Machine Learning ★ Physical Modeling

## EDUCATION

- Present **Doctor of Philosophy, Atmospheric Chemistry and Physics**, *Indian Institute of Technology Kharagpur (IN)*.
- 2017 **Master of Technology, Earth System Science and Technology**, *Indian Institute of Technology Kharagpur (IN)*.
- 2012 **Bachelor of Engineering, Mechanical Engineering**, *Birla Institute of Technology, Mesra (IN)*.

## RESEARCH EXPERIENCE

- 2017 - **Research Scholar, PhD, ATMOS Lab, IIT Kharagpur.**
- Present
- Implemented bias-correction of long-term records of rainfall, ozone and related trace gases using various techniques like quantile mapping and scaled distribution mapping in python.
  - Developed Receptor models for pollutant source detection based on air mass trajectories in python.
  - Implemented Mean-shift clustering of HYSPLIT air-parcel trajectories with features extracted using wavelet transform for transportation pathways analysis.
  - Performed Self-organising map based clustering of tropospheric ozone and their trend analysis using Bayesian Dynamic linear model and Multivariate linear regression.
  - Conducted Causal network analysis of tropospheric ozone to identify geophysical drivers responsible for observed variability.
  - Investigated Land Use Land Cover change over North-East India using Google Earth Engine and Random forest based classification.
  - Developed a sequence-to-sequence autoencoder to extract features from variable length trajectories.
- 2016 - 2017 **Research Assistant, MTech, ATMOS Lab, IIT Kharagpur.**
- Estimated rainfall using preliminary Doppler Weather radar data for Kolkata region using python.
  - Investigated freezing and shape transformation of water droplet numerically using MATLAB.
- 2011 - 2012 **Undergraduate project, BE, BIT Mesra.**
- Performed optimization of Wind Turbine Blades using Fluent in Ansys.
  - Investigated natural convection in Bingham fluids with differentially heated sidewalls using Fluent.

## TECHNICAL SKILLS

- **Data Analytics:** Bayesian inference, Machine Learning, Causal analysis
- **Physical Modeling:** HYSPLIT, RRTMG, WRF, GEOS-Chem, climlab
- **Programming:** Python, MATLAB, Fortran, Bash, Git
- **Markup Languages:** LaTeX, Markdown

## PUBLICATIONS

- J. Kuttippurath, P. Kumar, P. J. Nair, P C Pandey, *Emergence of ozone recovery evidenced by reduction in the occurrence of Antarctic ozone loss saturation*, npj Climate and Atmospheric Science, 2018.
- J. Kuttippurath, P. Kumar, P. J. Nair, A. Chakraborty, *Accuracy of satellite total column ozone measurements in polar vortex conditions: Comparison with ground-based observations in 1979–2013*, Remote Sensing of Environment, 2018.

## ACADEMIC ACHIEVEMENTS

- Received full funding for attending European Geosciences Union (EGU) General Assembly held in Vienna, Austria during April 2017.