Nishant N. Uchale

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Education

Master of Science (Atmospheric Sciences) — **Pune, India**
Savitribai Phule Pune University, Jointly with the Indian Institute of Tropical Meteorology (IITM), 9.72 CGPA — *2021 – 2023*

Bachelor of Science (Mathematics) — **Pune, India**
Sir Parshurambhau College, Savitribai Phule Pune University, Overall 85.0% — *2018 – 2021*

Publications

1. **Uchale, N. N.** Singh, B. B.(2024) Characteristics and projected changes in maximum daily precipitation across the globe. *Quarterly Journal of Royal Meteorological Society*, 1-21. Available from: https://doi.org/10.1002/qj.4912
2. **Uchale, N. N.** & Thomas, J. (2025) Some features of internal gravity wave energy cascade. ***Submitted***
3. Singh, B. B. & **Uchale, N. N.** (2025) Which continents and ocean basins are more susceptible to strong changes in precipitation patterns? ***Manuscript in preparation***

Awards and Fellowships

Long-Term Visiting Student Research Fellowship (2024): Awarded by the Tata Institute of Fundamental Research's International Centre for Thereotical Sciences for a year long research under Dr. Jim Thomas on energy transfers in the internal wave continuum in oceans.

Summer Student Research Program Fellowship (2024): Awarded by the Tata Institute of Fundamental Research's Centre for Applicable Mathematics for summer research under Dr. Jim Thomas on numerical methods and parallel computing.

Project Junior Research Fellowship (2023): Awarded by the Interdisciplinary Program in Climate Studies, Indian Institute of Technology, Bombay for a research project under Dr. Vishal Dixit on temperature extremes.

Conference Presentations

Oral

1. **2025** Energy transfers in internal gravity wave turbulence: *ICTS In-house program held from 19th to 22th April 2025 at ICTS-TIFR, Bangalore, India.*
2. **2025** Energy transfers in internal gravity wave turbulence: *4th Frontier Symposium in Physics held from 17th to 19th January 2025 at IISER Trivandrum, India.*
3. **2023** Characteristics of global precipitation extremes in CMIP6 models: *Annual Monsoon Workshop and National Symposium on Challenges in Climate services for health sector in the warming environment held from 28th to 30th March 2023 at IITM Pune organized by Indian Meteorological Society:* **Secured 3rd prize**

Poster

1. **Nishant N. Uchale,** Jim Thomas (2024): Energy transfers in internal gravity wave turbulence, *"Moist Convective Dynamics of Monsoons" held at ICTS-TIFR, India, on 18-29 November 2024.*
2. **Nishant N. Uchale,** Jim Thomas (2024): Energy transfers in the internal wave continuum, *"Climate Dynamics and Networks" held at ICTS-TIFR, India, on 11-15 November 2024.*

3. **Nishant N. Uchale,** & Bhupendra Bahadur Singh (2024): Characteristics and projected changes in maximum daily precipitation across the globe, *"Theoretical and Practical Perspectives in Geophysical Fluid Dynamics" at ICTS-TIFR, Bangalore, India.*

4. **Nishant N. Uchale,** & Bhupendra Bahadur Singh, Pradeep Kumar Pallath (2023): Analysis of global precipitation extremes in CMIP6 models, *National Symposium TROPMET-2023 on Changing Dynamics of Arid Region and Impact on Weather and Climate over Indian Sub-continent organized by Indian Meteorological Society and Birla Institute of Technology, Mesra, Jaipur, India.*

5. **Nishant N. Uchale,** Bhupendra Bahadur Singh, Pradeep Kumar Pallath (2023): *Characteristics of global precipitation extremes in CMIP6 models, "WCRP Open Science Conference" held in Kigali, Rwanda, on 23-27 October 2023.* (*online*)

Research Experience/Projects

Visiting Research Student, *GFD group, International Centre for Theoretical Sciences* (*ICTS*), **Bangalore, India**
Tata Institute of Fundamental Research (*TIFR*) *08/2024–04/2025*

Project: Energy Transfers in the Internal wave continuum in oceans: Used the non-hydrostatic Boussenisq equations to simulate the flow fields in a wave dominant regime to study the poorly understood energy flow pathways in wave turbulence which play an important role in the ocean kinetic energy budget. *Currently preparing findings for publication in an academic journal.*

Advisor: Dr. Jim Thomas

Summer Research Student, *Centre for Applicable Mathematics* (*CAM*), **Bangalore, India**
Tata Institute of Fundamental Research (*TIFR*) *02/2024–07/2024*

Project: 3D DNS solvers using python parallel programming: Used MPI4py for parallel programming in python and coded the Boussenisq equations solver using the pseudo-spectral method with various de-aliasing methods e.g., 2/3 de-aliasing, fourier smoothening etc.

Advisor: Dr. Jim Thomas

Project Research Assistant, *Monsoon Dynamics Lab, Interdisciplinary Program in Climate Studies* (*IDPCS*), **Mumbai, India**
Indian Institute of Technology (*IIT*), *Bombay* *08/2023–01/2024*

Project: Climate risk analysis to infer near surface temperature: The project highlighted the importance of humidity variables in predicting seasonal changes in near surface temperatures and understanding the mechanism leading to temperature extremes.

Advisor: Dr. Vishal Dixit

Project Student, *Centre for Climate Change and Research* (*CCCR*), **Pune, India**
Indian Institute of Tropical Meteorology (*IITM*) *01/2023–01/2024*

Project: Characteristics and projected changes in daily maximum precipitation across the globe: This research evaluates the statistical characteristics of extreme precipitation globally in observations and CMIP6 model projections mainly focusing on maximum daily precipitation on an annual, seasonal, and monthly scale globally for both historical and future climate. (*Based on Master's Thesis*) ***Manuscript accepted in QJRMS***

Term Project: Cyclone Mandous: a case study: Used the WRF ARW model to simulate the cyclone with the NCAR reanalysis data as the initial condition and studied its characteristics and trajectory which was found to be a comparable with the actual observed features of the cyclone. *Part of Term Project*

Advisor: Dr. Bhupendra Singh

Relevant Coursework

Geophysical Fluid Dynamics, Atmospheric Dynamics, Ocean Dynamics, Physical Oceanography, Atmospheric Thermodynamics, Wave Dynamics, Atmospheric Radiation, Numerical Weather Prediction, Synoptic Meteorology, Atmospheric Boundary Layer, Climate Modeling (introductory level).

Technical Skills

Programming

Python [MPI4Py, Dask Parallel, netCDF, metpy, xarray], LaTeX, FORTRAN 90/95

Visualization and Statistics: Matplotlib, Xarray, Numpy, Scikit-learn, Ferret, Climate Data Operators (CDO), Origin

Experience with

Ground observations: IMD AWS station datasets, Ceilometer, Disdrometer

Satellite Observations: TRMM, GPM (L2, L3, IMERG), GPCP, MODIS

Reanalysis & Model datasets: NCAR Reanalysis, ERA5, ERA-INTERIM, WRF, CMIP5, CMIP6, Numerical simulation datasets

Other

HPC, Linux, Windows OS

Extracurricular Courses/Certifications

Jan 2025: Non-linear Dynamics by CAOS, IISc Bangalore, India.

Sep 2024: Geophysical Fluid Dynamics by TIFR-CAM, Bangalore, India.

Aug 2024: Introduction to Atmospheric Dynamics by CAOS, IISc Bangalore, India.

Jan 2024: Attended the "Geophysical Flows: From the Field to the Lab" discussion meeting organized by IIT Madras, India.

Aug 2023: Application Oriented School on WRF Modeling System by C-DAC and IMD Pune, India.

Sep 2023: Attended the online lecture series "Atmospheric and Climate Dynamics" and "The Art of Climate Modelling" by Paul A. Ullrich, University of California, Davis.

Language Skills

English, Marathi, Hindi, Konkani(Malvani)