

# Shivani Sharma

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## EDUCATION

### International Max Planck Research School on Earth System Modeling

Hamburg, Germany

- PhD in Earth System Science

10.2020 – 10.2024

- Advisers: Dr. David Greenberg, Dr. Ann Kristin Naumann
- Thesis: Parameterizing Lagrangian Cloud Microphysics using Machine Learning
- Coursework: Combinatorics and Probability, Introduction to Dynamical Systems and Chaos, Introduction to Information Theory

### Indian Institute of Technology

New Delhi, India

- Master's in Atmospheric and Oceanic Science

07.2018 – 07.2020

- Adviser: Prof. Somnath Baidya Roy
- Thesis: Solar Energy Nowcasting using Remote Sensing Data
- Coursework: Physics of Climate Change, Dynamics of the Atmosphere, Atmospheric Physics, Numerical Modelling of the Atmosphere

### G. B. Pant University of Agriculture and Technology

Pantnagar, India

- Bachelor's in Agricultural Engineering

07.2014 – 06.2018

## RELEVANT EXPERIENCE

### British Antarctic Survey

Cambridge, UK

- Climate Modeller, as part of the ExtAnt project

07.2025 – present

- Developing deep learning based emulators for downscaling global climate models with a focus on accurately predicting Antarctic precipitation
- Contributing to other projects (SURFIT, PolaRES, HEPPI-ML) as an AI expert with project partners from University of Birmingham, University of Sheffield, Oxford University, University of Reading and the Danish Meteorological Institute
- Organizing regular guest seminars for the department
- Started a monthly journal club for scientific collaborators to stay updated on the latest research in deep learning

### Helmholtz Zentrum Hereon

Geesthacht, Germany

- Doctoral Researcher, Model-driven Machine Learning Group

10.2020 – 03.2025

- Developed ML based parameterizations for sub-grid scale processes
- Carried out scientific collaborations with researchers from German Weather Service (DWD), German Climate Computing Centre (DKRZ) and Max Planck Institute of Meteorology
- Maintaining codebases for shared projects with collaborators using Gitlab
- Organized bi-weekly ML seminars discussing latest developments in machine learning research
- Participated in and organized internal group "hackathons"

### University of Hamburg

Hamburg, Germany

- Teaching Assistant for *Practical Deep Learning with Climate Data*

SS 22/23/24

- Worked with the instructor, Dr David Greenberg, in conceptualizing the coursework
- Created lessons and practical tutorials on *Recurrent Neural Networks and Sequential Data*
- Delivered lectures and routinely assisted the participants during hands-on tutorials

## PUBLICATIONS

### JOURNALS

- Arnold, C., Sharma, S., Weigel, T., and Greenberg, D. S.: Efficient and stable coupling of the SuperdropNet deep-learning-based cloud microphysics (v0.1.0) with the ICON climate and weather model (v2.6.5), *Geosci. Model Dev.*, 17, 4017–4029, <https://doi.org/10.5194/gmd-17-4017-2024>, 2024.
- Sharma, S. and Greenberg, D.: SuperdropNet: a Stable and Accurate Machine Learning Proxy for Droplet-based Cloud Microphysics, *Journal of Advances in Modeling Earth Systems*, 17, e2024MS004279, <https://doi.org/10.1029/2024MS004279>, 2025.

### CONFERENCES

- PASC, Basel/hybrid, Switzerland, 27.06.2022 - 29.06.2022: "Fortran-Python bridges for Earth System Models", Talk by C. Arnold, S. Sharma.
- EGU, Vienna, Austria, 23.04.2023 - 28.04.2023: "SuperdropNet: Machine Learning Parameterization for Super-droplet Cloud Microphysics", Poster by S. Sharma, D. Greenberg.

	<ul style="list-style-type: none"> <li>▪ Helmholtz AI Conference, Hamburg, 12.06.2023-14.06.2023. Machine Learning Parameterization for superdroplet Cloud Microphysics Scheme, Talk by <u>S. Sharma</u>.</li> </ul>	
<b>OTHER ACTIVITIES</b>	<ul style="list-style-type: none"> <li>▪ Scientific Reviewer Geoscientific Model Development Helmholtz AI Conference, Hamburg</li> <li>▪ International School on Satellite Meteorology, Naples, Italy Focused on the retrieval and usage of meteorological data from different satellite sensors, while focusing on European satellite missions</li> <li>▪ Teaching assistant For workshop on <i>Physics Informed Machine Learning for the Shallow Water Equation</i></li> <li>▪ Winner of AI-HERO Hackathon Hackathon for energy-efficient AI organized by Helmholtz AI</li> <li>▪ Summer School at Neuromatch academy Attended a 3-week hands-on summer school on deep learning.</li> <li>▪ Training course by ECMWF A week long course on Parameterization of subgrid physical processes, that included theoretical lectures along with practical tutorials</li> <li>▪ Mentor at the HIDA Datathon</li> </ul>	2024-Present 2023  2024  2023  2022  2021  2020  2020
<b>LANGUAGES</b>	<ul style="list-style-type: none"> <li>▪ English: Fluent</li> <li>▪ Hindi: Native</li> <li>▪ German: Conversational (B1)</li> </ul>	
<b>SKILLS</b>	Deep Learning, Artificial Intelligence, Scientific Computing, Numerical Modeling, High-Performance Computing (HPC), Statistical Analysis, Probabilistic Modeling	
<b>PROGRAMMING FRAMEWORKS</b>	<b>Python:</b> Pytorch, Lightning, NumPy, Pandas, Dask, Xarray, Optuna Git, FORTRAN, Sphinx, $\text{\LaTeX}$	
<b>INTERESTS</b>	Portrait Photography, Calligraphy, Cooking , Reading	