Dr. Shraddha Gupta

Postdoctoral Researcher

Personal details

shraddha.gupta@lmu.de

+49 (0) 89 / 2180 – 6722

Department of Geography, Ludwig-Maximilians-Universität München, Luisenstraße 37, 3rd floor, Room A334
80333 Munich

January 28, 1997

Female

Indian

geographie.uni-muenchen.de

pik-potsdam.de/members/gupta/homepage

ORCID | Google Scholar | Github

LinkedIn | Twitter | ResearchGate

Research Interests

- Climate dynamics and extremes
- Land-use and Climate modelling, Forecast Diagnostics
- Nonlinear Dynamics and Chaos
- Complex Network
- Synchronization
- Time Series Analysis
- Data analysis
- Machine Learning applications to climate
- Statistical Physics

Profile

I am a climate science researcher with a background in Physics. I have a strong interest in understanding Climate processes and extremes by employing tools and concepts from the theory of Nonlinear dynamics. My current research involves modelling the Earth system response and feedback to pathways achieving climate neutrality.

Education

Doctoral studies (Dr. rer. nat.) in Physics **Oct 2019 - Apr 2023**
Humboldt-Universität zu Berlin (HU), Berlin, Germany
Specialization: Theoretical Physics, Grade: summa cum laude.

Master of Science in Physics **Jul 2017 - Jul 2019**
Indian Institute of Technology (IIT) Madras, Chennai, India
CGPA: 9.15/10.

Bachelor of Science (Hons.) in Physics **Jul 2014 - May 2017**
St. Xavier's College (Autonomous), University of Calcutta, Kolkata, India
CGPA: 8.79/10, Grade: A+, First Class Division.

Employment

Scientific Researcher **Aug 2023 - Present**
Department of Geography, Research Unit: Physical Geography and Earth System Interactions, Ludwig-Maximilians-Universität München (LMU), Munich, Germany

- Postdoctoral position funded by EU Horizon Europe RESCUE (Response of the Earth System to overshoot, Climate neUtrality and negative Emissions) project, Grant agreement No. 101056939.
- Topic*: Model intercomparison to quantify the Earth system response to pathways achieving climate neutrality by Carbon Dioxide Removal (CDR) deployment with and without temperature overshoot.*
- Supervisor: Prof. Dr. Julia Pongratz.

Doctoral Researcher **Sep 2019 - Feb 2023**
Research Department 4: Complexity Science, Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany

- Early Stage Researcher position funded by EU H2020 MSCA ITN CAFE (Climate Advanced Forecasting of sub-seasonal Extremes) project, Grant Agreement No. 813844.
- Topic*: Study of Climate Variability Patterns at Different Scales – A Complex Network Approach*
- Supervisors: Prof. Dr. Dr. hc mult. Jürgen Kurths, PIK and HU Berlin, Germany; and Prof. Dr. Florian Pappenberger, European Centre for Medium-Range Weather Forecast (ECMWF), Reading, United Kingdom; Bologna, Italy; and Bonn, Germany.

Internships

Student Intern **Mar 2023 - Jun 2023**
Elia Grid International GmbH, Berlin, Germany

- Active contribution to product development of the generation adequacy and market modelling toolchain, provide expert advice on availability and usage of weather and climate data.
- Ad-hoc research towards preparation of proposals and documentations on latest approaches for adequacy and flexibility studies, and PLEXOS and Python-based market modelling toolchain
- Perform quality checks and preparing client presentations.

Languages

English ●●●●●

Hindi ●●●●●

Bengali ●●●●○

Skills

Programming (Python, Matlab, Fortran, C/C++, Java, Object Oriented Programming, Parallel computing, Cluster computing, Climate Data Operators, Git, LATEX, HTML) ●●●●○

Time Series Analysis (Linear/non-linear time series analysis, Hilbert transform, Continuous Wavelet Transform analysis) ●●●●●

Big data handling (Climate data, Astronomical data, Energy data, Finance data.) ●●●●●

Softwares/OS (Microsoft Office, LibreOffice, Keynote) ●●●●●

OS (Microsoft Windows, Linux/Unix, macOS) ●●●●●

Editorial Activities

Reviewer for Peer-review Journals

- Weather and Climate Extremes
- Chaos: An Interdisciplinary Journal of Nonlinear Sciences
- Chaos, Solitons & Fractals
- Earth System Dynamics (ESD)
- Hydrology and Earth System Sciences (HESS)
- Complexity

Academic Positions

Guest Researcher **Mar 2023 - Mar 2024**
Potsdam Institute for Climate Impact Research, Potsdam, Germany

- Application of complex-network, higher-order interactions, and synchronization based approaches to the study of dynamic interactions between crucial regions of climate variability of the Earth.
- Collaborator: Prof. Jürgen Kurths and PD Norbert Marwan.

Visiting Researcher **Feb 2022 - Apr 2022**
Forecast Department, European Centre for Medium-Range Weather Forecast (ECMWF), Reading, United Kingdom

- Comparative study between observational data and model forecast data using the network-based tools.
- MSCA Secondment during Ph.D. Onsite continuation of online secondment project during Oct 2020 - Dec 2020.
- Supervisors: Prof. Florian Pappenberger and Prof. Linus Magnusson.

Visiting Researcher **Jun 2021 - Oct 2021**
IFISC (Institute for Cross-Disciplinary Physics and Complex Systems, UIB-CSIC), Palma de Mallorca, Spain

- Impact of El Niño-Southern Oscillation and Madden-Julian Oscillation on spatial co-variability of convection in the Asian Monsoon region.
- MSCA Secondment during Ph.D.
- Supervisors: Prof. Emilio Hernandez-Garcia and Prof. Cristobal López.

Project Student **May 2017 - Aug 2019**
Plasma Physics Division, Saha Institute for Nuclear Physics, Kolkata, India

- Measure Synchronization of Hamiltonian Systems, dynamical properties of the Duffing oscillator.
- Supervisors: Prof. A. N. Sekar Iyengar and Prof. M. S. Janaki.

Undergraduate Associate **May 2015 - Apr 2017**
Astroparticle Physics and Cosmology Division, Saha Institute for Nuclear Physics, Kolkata, India

- Study of Gamma-ray sources and extensive air showers by analysis of data from Fermi-LAT detector.
- Supervisor: Dr. Pratik Majumdar.

Publications

Peer-review Journal Publications

1. **S. Gupta**, A. Banerjee, N. Marwan, D. Richardson, L. Magnusson, J. Kurths and F. Pappenberger. “Analysis of Spatially Coherent Forecast Error Structures”, *Quarterly Journal of the Royal Meteorological Society*, 149(756), 2881–289 (2023).
2. S. De, **S. Gupta**, V. R. Unni, R. Ravindran, P. Kasthuri, N. Marwan, J. Kurths and R. I. Sujith. “Study of Interaction and Complete Merging of Binary Cyclones Using Complex Networks”, Chaos 33, 013129 (2023) (Selected in Featured and Scilight collections).
3. **S. Gupta**, Z. Su, N. Boers, J. Kurths, N. Marwan and F. Pappenberger. “Interconnection between the Indian and the East Asian Summer Monsoon: spatial synchronization patterns of extreme rainfall events”. International Journal of Climatology, 43(2), 1034–1049 (2023).
4. **S. Gupta**, N. Mastrantonas, C. Masoller and J. Kurths. “Perspectives on the importance of complex systems in understanding our climate and climate change—The Nobel Prize in Physics 2021”, *Chaos* 32, 052102 (2022) (Selected in Featured and Scilight collections).
5. **S. Gupta**, N. Boers, F. Pappenberger and J. Kurths. “Complex network approach for detecting tropical cyclones”, *Climate Dynamics* 57, 3355–3364 (2021).
6. **S. Gupta**, S. De, M. S. Janaki and A. N. Sekar Iyengar. “Using wavelet analysis to investigate synchronization”, *Physical Review E* 100, 022218 (2019).
7. S. De, **S. Gupta**, M. S. Janaki and A. N. Sekar Iyengar. “Frequency and wavelet based analyses of partial and complete measure synchronization in a system of three nonlinearly coupled oscillators”, *Chaos* 28, 113108 (2018).
8. **S. Gupta**, S. De, M. S. Janaki and A. N. Sekar Iyengar. “Exploring the route to

References

Prof. Jürgen Kurths
Potsdam Institute for Climate Impact Research, Potsdam, Germany
01573145099, kurths@pik-potsdam.de

Prof. Florian Pappenberger
European Centre for Medium-Range Weather Forecasts, Reading, UK
Florian.Pappenberger@ecmwf.int

Prof. A. N. Sekar Iyengar
Saha Institute of Nuclear Physics, Kolkata, India
ansekar.iyengar@saha.ac.in

measure synchronization in non-linearly coupled Hamiltonian systems", *Chaos* 27, 113103 (2017) (Selected in Featured and Scilight collections).

Conference Abstracts

1. Asia Oceania Geoscience Society (AOGS) 2022, 19th Annual Meeting, Online, Aug 2022, Oral AS03-A012.
2. EGU General Assembly 2022, Vienna, Austria & Online, May 2022, Short Oral EGU22-8626.
3. EGU General Assembly 2021, Gather Online, Apr 2021, vPICO EGU21-8964.
4. EGU General Assembly 2021, Gather Online, Apr 2021, vPICO EGU21-8740.
5. AGU Fall Meeting 2020, Online Everywhere, Dec 2020, Poster GC083-0010.
6. EGU General Assembly 2020, Sharing Geoscience Online, May 2020, Display EGU2020-5916.
7. ECC15 15th Experimental Chaos and Complexity Conference. Book of Abstracts. Madrid, Spain, Jun 2018, ISBN: 978-84-697-0441-7, p. 55-56, Posters P05 and P06.

Dissertation/Thesis

1. **S. Gupta**. Study of Climate Variability Patterns at Different Scales – A Complex Network Approach, Doctoral Dissertation, Humboldt-Universität zu Berlin, Mathematisch-Naturwissenschaftliche Fakultät (2023).
2. **S. Gupta**. Climate Networks, Master's Thesis, Indian Institute of Technology Madras, Department of Physics (2019).

Blogposts

1. **S. Gupta**, N. Mastrantonas, C. Masoller and J. Kurths. "Modelling the Earth System and the dynamics of complex systems for understanding climate change - The Nobel Prize in Physics 2021", CAFE Blog, Dec 2021.
2. **S. Gupta**, N. Ehstand. "The network behind weather and climate", CAFE Blog, Dec 2020.

Scholarly Achievements

Awards

Prof. Chilukury Ramasastry Memorial Prize Gold Medal, IIT Madras, India — **Sep 2019**
Best academic record in M.Sc. Physics 2017-19.

Chilukuri Ramasastry Memorial Prize, IIT Madras, India — **Apr 2019**
Highest CGPA in the first two semesters in M.Sc. Physics 2017-18.

Swati/Jayalakshmi Memorial Award, IIT Madras, India — **Apr 2019**
Best academic record (female) at the end of pre-final semester in M.Sc. Programme 2017-18.

Parpati Chandumal Shahani Memorial Gold Medal, St. Xavier's College (Autonomous), Kolkata, India — **Jan 2018**
Best Lady Physicist in B.Sc. Physics (Hons.) 2014-17.

Scholarships, Fellowships and Grants

Scientific Researcher, RESCUE Project — **Aug 2023 - Aug 2026**
European Union's Horizon Europe research and innovation programme, Grant agreement No. 101056939. Full-time position – *Accepted*

Early-Stage Researcher, CAFE Project — **Sep 2019 - Feb 2023**
European Union's Horizon 2020 Marie Skłodowska-Curie Actions Innovative Training Network, Grant Agreement No. 813844, fully funded Ph.D. position – *Accepted*

INSPIRE Scholarship — **Jul 2014 - Jun 2019**
Dept. of Science and Technology, Govt. of India, Nationwide among top 1% scorers in Grade 12 at the National Board Examinations 2014 in India.

Dean's Fellowship, University of Maryland, College Park, Department of Physics **Feb 2019**
Ph.D. admission to Graduate School Fall 2019, fully funded position – *Declined*

Junior Research Fellowship (JRF) for PhD in India and Lecturership **Jun 2018**
Human Resource Development Group Council of Scientific and Industrial Research (HRDG-CSIR), India, successfully qualified via the December 2017 Joint CSIR-UGC National Eligibility Test (NET) in Physics.

Scholarship for Integrated MSc–PhD in Physical Sciences **Jun 2017**
Bose Institute in collaboration with University of Calcutta – *Declined*