Sreevathsa Golla

PhD Candidate • Oceanography & Climate Science
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RESEARCH INTERESTS

Physical Oceanography • El Niño - Southern Oscillation (ENSO) • Large-Scale Ocean Dynamics • Ocean - Climate Interactions • Ocean - Atmosphere Coupling • Climate Variability & Change • Ocean Modelling • AI/ML Applications in Ocean & Climate Science

EDUCATION

PhD in Oceanography and Climate Science *Sep 2023 – Present*
University of Southampton & National Oceanography Centre Southampton, UK

- **Thesis Title**: "Evolution of El Niño - Southern Oscillation (ENSO) in a warming climate: Subsurface ocean expression in observations and high-resolution climate models"
- Combining eddy-resolving high-resolution climate model simulations with targeted sensitivity and attribution experiments to unravel mechanisms driving ENSO variability and its subsurface expression
- Under INSPIRE Doctoral Training Partnership programme, funded by NERC, UK Research & Innovation
- *Advisors*: Dr. Joël Hirschi, Dr. Adam Blaker, Dr. Jennifer Mecking & Dr. Stephen Kelly (NOC); Prof. Robert Marsh (University of Southampton)

BS-MS (Dual Degree) in Earth and Environmental Sciences *Aug 2018 – May 2023*
Indian Institute of Science Education and Research (IISER) Bhopal Bhopal, India

- **Minor**: Data Science and Engineering | **CPI (CGPA)**: 8.81/10 *(equivalent to First Class)*
- Awarded the *Proficiency Medal* for 'Best Academic Performance' in Earth & Environmental Sciences
- **MS Thesis**: "Western Boundary Currents: Representation in High-Resolution Ocean General Circulation Models (OGCMs) and their Relationship with Climate Modes"
- Evaluated the representation of the North Atlantic Current and Agulhas Current in high-resolution ocean models, assessing the impact of model nesting on current pathway, strength and transport accuracy against observations and reanalysis
- *Advisors*: Prof. Paul Myers (University of Alberta) & Dr. Pankaj Kumar (IISER Bhopal)

RESEARCH EXPERIENCE

Visiting Researcher *Aug 2025 – Oct 2025*
Climate & Global Dynamics (CGD) Laboratory, NSF NCAR Boulder, CO, USA

- Evaluated resolution dependence and future reorganisation of Indo-Pacific variability in CESM MESACLIP simulations across different global warming scenarios
- Assessed projected changes in Indian Ocean Dipole (IOD), Indonesian Throughflow (ITF) characteristics and inter-basin IOD-ITF-ENSO interactions
- Analysed a suite of moderate to *very* high-resolution (0.1°) ocean-atmosphere coupled CESM simulations under different SSP warming scenarios, from the CESM MESACLIP Project
- *Supervisors*: Dr. Gökhan Danabasoglu (Head, Oceanography Section), Dr. Isla Simpson (Head, Climate Analysis Section), Dr. Fred Castruccio (Scientist IV, Oceanography Section)

Research Intern | *Mitacs Globalink Research Internship* *May 2022 – Aug 2022*
Geophysical Fluid Dynamics & Modelling Lab, University of Alberta Edmonton, AB, Canada

- Analysed the representation of the North Atlantic Current (NAC) in different high-resolution NEMO model configurations and model nests at varying spatio-temporal scales
- Examined and inter-compared contours of SST and SSH from different model setups; calculated section transports in the North Atlantic domain with initial comparisons to satellite/reanalysis data
- Investigated NAC pathway, strength and transport variability; work continued into MS thesis
- *Supervisor*: Prof. Paul G. Myers (GFDL Lab, Department of Earth and Atmospheric Sciences)

Research Intern | *Deep Learning-Based Downscaling (GANs)* *Aug 2021 – Mar 2022*
Climate & Glacier Modelling Lab (CGMLI), IISER Bhopal Bhopal, India

- Helped develop an adapted Super-Resolution Generative Adversarial Network (SRGAN) architecture to spatially downscale IMD gridded rainfall data from 1.00° to 0.25° resolution over the Indian domain.
- Contributed primarily to the technical implementation: architecture design, coding, testing and hyperparameter tuning of the GAN model
- Work published in *Modeling Earth Systems and Environment* (Murukesh, Golla & Kumar, 2023)
- *Supervisor*: Dr. Pankaj Kumar, Department of Earth and Environmental Sciences

Summer Research Intern | *Spatial Downscaling Using CNNs* *Apr 2021 – Jul 2021*
Climate & Glacier Modelling Lab (CGMLI), IISER Bhopal Bhopal, India

- Applied SRCNN and SRResNet-based image super-resolution techniques to spatially downscale IMD daily gridded rainfall data (1980 - 2010) from 1.00° to 0.25° resolution, benchmarking performance across multiple architectures
- Work published as a first-author in *SN Computer Science* (Golla, Murukesh & Kumar, 2024)
- *Supervisor*: Dr. Pankaj Kumar, Department of Earth and Environmental Sciences

PUBLICATIONS

First-Author

[1] **Golla, S.**, Murukesh, M. & Kumar, P. (2024). Comparative assessment of image super-resolution techniques for spatial downscaling of gridded rainfall data. *SN Computer Science*, 5. DOI: 10.1007/s42979-024-02653-3

[2] **Golla, S.**, Hirschi, J. J.-M., Blaker, A. T., Mecking, J., Kelly, S. & Marsh, R. (2026). Characterising surface discrepancies and vertical coherence of ocean temperature anomalies in CMIP6 HighResMIP during ENSO events. *Preprint, in revision at SN Climate Dynamics*. DOI: 10.21203/rs.3.rs-8345018/v1

[3] **Golla, S.**, Hirschi, J. J.-M., Blaker, A. T., Mecking, J., Kelly, S. & Marsh, R. Wind-forced modulation of thermocline feedback processes during El Niño development. *Submitted to Journal of Geophysical Research: Oceans* - Under review.

Co-Authored

[4] Murukesh, M., **Golla, S.** & Kumar, P. (2023). Downscaling and reconstruction of high-resolution gridded rainfall data over India using deep learning-based generative adversarial network. *Modeling Earth Systems and Environment*, 10, 2221–2237. DOI: 10.1007/s40808-023-01899-9

[5] Joseph, L., Dey, D., Skliris, N., Sanchez-Franks, A., Marsh, R., Hirschi, J. & **Golla, S.** (2025). Warming trend in the western Indian Ocean driven by oceanic transport. *Journal of Geophysical Research: Oceans*, 131(1). DOI: 10.1029/2025JC022762

CONFERENCES & PRESENTATIONS

[1] Golla, S., Hirschi, J., Mecking, J., Blaker, A., Kelly, S. & Marsh, R. (2026). Wind modulation of thermocline feedback during development of El Niño. *Ocean Sciences Meeting 2026,* Glasgow, UK *[Poster]*

[2] Golla, S., Hirschi, J., Mecking, J., Blaker, A. & Marsh, R. (2024). Characterising surface discrepancies and vertical coherence of ocean temperature anomalies in CMIP6 HighResMIP during ENSO events. *AGU Fall Meeting 2024,* Washington D.C., USA *[Poster]*

[3] Golla, S., Hirschi, J., Mecking, J., Blaker, A., Kelly, S. & Marsh, R. (2024). Dynamical evolution of ENSO in a warming background: A review of recent trends & future projections. *EGU General Assembly 2024*, Vienna, Austria. DOI: 10.5194/egusphere-egu24-626 *[Poster]*

[4] Golla, S., Murukesh, M. & Kumar, P. (2023). Spatial downscaling of IMD gridded rainfall data using SRCNN and SRResNet: A comparative study. *Frontiers in Geosciences Research (FGRC) 2023, Physical Research Laboratory*, Ahmedabad, India *[Poster]*

AWARDS & FUNDING

- Proficiency Medal for Best Academic Performance in Earth and Environmental Sciences, IISER Bhopal
- INSPIRE Doctoral Training Partnership Studentship (NERC-funded), University of Southampton, 2023 - Present
- Mitacs Globalink Research Internship Fellowship, University of Alberta, 2022

WORKSHOPS & TRAINING

- NSM GPU Hackathon, organised by NSM, CDAC & NVIDIA at IIT Bombay (Sep 2022)
- TROPMET-2022 National Symposium, Indian Meteorological Society, hosted by IISER Bhopal (Nov 2022)
- M.P. State Youth Policy Consultation Workshop on “The Role of Youth in Environmental Sustainability”, EPCO, State Government of Madhya Pradesh, India (Dec 2022)
- AI Shiksha: Introduction to Deep Learning, NSM & CDAC, Government of India (Jun 2021)
- Workshop on Internet of Things (IoT) using Raspberry Pi, Technex’20 IIT (BHU) at IISER Bhopal (Aug 2019)

TEACHING & LEADERSHIP

- Module Demonstrator, School of Ocean and Earth Science, University of Southampton
- Teaching Assistant, Department of Electrical Engineering and Computer Science, IISER Bhopal
- Vice-Secretary, Computing and Networking Council, IISER Bhopal (2021 - 2022)
- Core Committee Member, Computing and Networking Council, IISER Bhopal (2019–2020)
- Club Coordinator, Earth and Environmental Sciences Club, IISER Bhopal (2020 - 2021)
- Event Management & Design Team Lead, ORB 2021, Annual Departmental Symposium, Department of Earth and Environmental Sciences, IISER Bhopal
- Student Volunteer, Conference Events Management Committee, TROPMET-2022 National Symposium

TECHNICAL SKILLS

Programming: Python, MATLAB, Mathematica, LaTeX, Shell scripting
Ocean/Climate Models: NEMO v4.2; CESM (MESACLIP) and CMIP6/HighResMIP model analysis
GIS & Data Tools: ArcGIS, QGIS, CDO (Climate Data Operators), CDAT
AI/ML: Deep Learning, Machine Learning, Image Super-Resolution for Climate Data
Computing: High Performance Computing (HPC) clusters, CPU & GPU environments
Languages: English (Proficient; TOEFL 108/120), Hindi (Fluent), Telugu (Native)

REFERENCES

Available upon request.