Nihar Paul

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Research Interests

Dynamics of mesoscale flows and eddies, non-linear dynamics, air-sea interaction processes, sub-mesoscale flows, shallow-water equations, rotating and stratified turbulence, machine learning, and ocean modeling.

Research positions and Experiences

Postdoctoral Investigator, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, US — Jan 2025 – present

- **Advisor:** Dr. J. Thomas Farrar
- **Research Area:** Tropical Waves, air-sea interaction, and analysis of the moored observation.

Postdoctoral Investigator, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, US — Aug 2023 – Dec 2024

- **Advisor:** Dr. Amala Mahadevan
- **Research Area:** Studying the advective transport by Near-inertial waves using observations and process study modeling simulation from the CALYPSO field campaign.

Postdoctoral Researcher, Department of Aerospace Engineering, Indian Institute of Technology Madras, Chennai, India — Oct 2022 – Jul 2023

- **Advisor:** Dr. Manikandan Mathur
- **Research Area:** Lagrangian Coherent Structures, and Internal Gravity Waves.

Project Associate, Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru, India — Aug 2015 – Jul 2016

- **Advisor:** Dr. Jai Sukhatme
- **Research Area:** Continuation of M.Tech work, followed up in the Ph.D. subsequently.

Project Engineer, Wipro Technologies, Bengaluru, India — Sep 2010 – Jul 2013

- **Role:** SAP SRM Consultant for EAS-SAP-PWC-T&M PROJECT, for PricewaterhouseCoopers (PwC), UK.

Education

Ph.D. in Climate Science, Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science, Bengaluru, India — Aug 2016 - Sep 2022

- **Advisor:** Dr. Jai Sukhatme & Dr. Debasis Sengupta
- **Thesis**: Stirring and mixing driven by mesoscale eddies in the stratified Bay of Bengal
- **GPA**: 9.0/10.0
- **Coursework:**
  Topics in Tropical Convection (AS311),
  Introductions to Dynamical Systems Theory (MA278),
  Non-linear Models in Climate Sciences (AS313),
  Origin and Evolution of Earth (ES204),

Numerical Methods in Atmospheric Modeling (AS210),
Environmental Fluid Dynamics (AS215), &
Environmental Data Analytics (DS 392, Audit).

M.Tech. in Climate Science, Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science, Bengaluru, India Aug 2013 – Jul 2015

- **Advisor:** Dr. Jai Sukhatme
- **GPA**: 5.9/8.0
- **Coursework:**
  Atmospheric Thermodynamics (AS203),
  Atmospheric Radiation and Climate (AS204),
  Ocean Dynamics (AS205),
  Introduction to Atmospheric Dynamics (AS207),
  Introduction to Climate System (AS216),
  Turbulent Shear Flows (AE214),
  Geophysical Fluid Dynamics (AS202),
  Mathematical Methods in Climate Science (AS209),
  Numerical Solutions of Differential Equations (SE289),
  Observational Techniques (AS211),
  Dynamics of Linear Systems (EI241),
  Mathematics for Geophysicists (ES205), &
  Earth System Modeling (AS312).

B.Tech. in Electronics and Communication Engineering, Heritage Institute of Technology, Kolkata, India (West Bengal University of Technology) Aug 2006 – Jul 2010

- GPA: 8.17/10.0

Manuscripts in preparation

Effect of 20-50 day variability on upwelling in the Arabian Sea 2025-2026
Nihar Paul and J. Thomas Farrar
(*To be submitted to Geophysical Research Letters;*
To be presented at Ocean Sciences Meeting 2026)

Near-Inertial Wave Energetics during post-monsoon in the Bay of Bengal 2025-2026
Abhilash Kokkirala, **Nihar Paul**, Debasis Sengupta, and Manikandan Mathur
(*Presented at AGU:* AGU abstract)

Publications, and preprints

Effect of near-inertial pumping on subduction at an ocean front 2025
Nihar Paul, and Amala Mahadevan
(*To be submitted to Journal of Physical Oceanography;*
https://doi.org/10.48550/arXiv.2511.23460).

Influx of Bay of Bengal waters and stirring trends in the Arabian Sea based on satellite altimetry 2025
Nihar Paul, Manikandan Mathur, Jai Sukhatme, J. Thomas Farrar, & Debasis Sengupta
(*Under revison in Geophysical Research Letters;*
https://doi.org/10.48550/arXiv.2503.20585;
https://doi.org/10.22541/essoar.176208341.13060577/v1).

Tracing the Abyssal Water Pathways in the Indian Ocean 2025
Kaushik Mishra, Bishakhdatta Gayen, Kathryn L Gunn, P N Vinayachandran, and **Nihar Paul**
(*Under revision in Geophysical Research Letters;*
https://doi.org/10.22541/essoar.175138846.68537835/v1).

Eddy-Freshwater Interaction Using Regional Ocean Modeling System in the Bay of Bengal 2023
Nihar Paul, Jai Sukhatme, Bishakhdatta Gayen, & Debasis Sengupta
Journal of Geophysical Research: Oceans 128.4 (2023): e2022JC019439.
https://doi.org/10.1029/2022JC019439

Eddy induced trapping and homogenization of freshwater in the Bay of Bengal 2021
Nihar Paul, Jai Sukhatme, Debasis Sengupta, & Bishakhdatta Gayen
Journal of Geophysical Research: Oceans 126.6 (2021): e2021JC017180.
https://doi.org/10.1029/2021JC017180

Seasonality of surface stirring by geostrophic flows in the Bay of Bengal 2020
Nihar Paul, and Jai Sukhatme
Deep Sea Research Part II: Topical Studies in Oceanography 172 (2020): 104684.
https://doi.org/10.1016/j.dsr2.2019.104684

Talks, Conferences, and Posters

Poster presentation at Ocean Science Meeting 2026 (Scheduled), Scottish Event Campus (SEC) in Glasgow, Scotland. Feb 26, 2026
- Presenting my postdoc work on "Effect of 20-50 day variability on upwelling in the Arabian Sea" (Scheduled).

Presented at the "EKAMSAT Science" seminar Oct 10, 2025
- Presenting the postdoc work on "Effect of near-inertial pumping on subduction at an ocean front".

Talk at the PO seminar, "Woods Hole Oceanographic Institution, Woods Hole, MA, US" Sep 09, 2025
- Presented the postdoc work on "Effect of near-inertial pumping on subduction at an ocean front."

Talk at CPT Ocean transport & Eddy energy meeting, "New York University, Courant Institute, 251 Mercer St, New York City, US" Aug 14, 2025
- Presented the postdoc work on "Effect of near-inertial pumping on subduction at an ocean front."

Talk at the "EKAMSAT Science" Seminar Jul 14, 2025
- Presented my work on "Stirring and transport in the north Indian Ocean from satellite altimetry."

Poster presentation at Postdoc Poster Party, "Woods Hole Oceanographic Institution, Woods Hole, MA, US" Apr 9, 2025
- Presented my postdoc work on "Effect of near-inertial pumping on subduction from the mixed layer."

Talk at the "Woods Hole Oceanographic Institution, Woods Hole, MA, US" Feb 12, 2025
- Presented my postdoc work on "Influx of Bay of Bengal waters and stirring trends in the Arabian Sea."

Talk at the "Woods Hole Oceanographic Institution, Woods Hole, MA, US" Jul 9, 2024
- Presented my doctoral work on "Surface stirring by geostrophic flows in the Bay of Bengal".

Gordon Research Conference (GRC), Mount Holyoke College, Massachusetts, US Jun, 2024
- Presented poster on "Effect of near-inertial pumping on subduction from the mixed layer".

Ocean Sciences Meeting, New Orleans, Louisiana, US Feb, 2024
- Presented poster on "Effect of near-inertial pumping on subduction from the mixed layer".

Talk at the "Sub-Mesoscale Ocean Dynamics Experiment (S-MODE) science meeting" Jun 24, 2022

- Invited by Dr. J. Thomas Farrar to present my doctoral work on "Eddy-freshwater interaction in the Bay of Bengal".

Talk at the "Woods Hole Oceanographic Institution, Woods Hole, MA, US" Aug 30, 2022

- Invited by Dr. J. Thomas Farrar to present my doctoral work on "Eddy-freshwater interaction in the Bay of Bengal".

International Indian Ocean Science Conference (IIOSC), India 2022

- Presented an online poster on "Eddy induced trapping and homogenization of freshwater in the Bay of Bengal".

AGU Fall Meeting, Chicago, US 2022

- Presented an online poster on "Eddy-freshwater interaction in the Bay of Bengal".

International Symposium on Geophysical Flows, Indian Institute of Technology, Chennai, India 2022

- Presented an in-person poster on the "Eddy-freshwater interaction in the Bay of Bengal".

AGU Fall Meeting, New Orleans, LA, US 2021

- Oral presentation on "Eddy induced trapping and homogenization of freshwater in the Bay of Bengal".

EGU General Assembly, Vienna, Austria 2019

- Presented an online poster on "Seasonality of surface stirring by geostrophic flows in the Bay of Bengal".

Field Campaigns

"ASTral/EKAMSAT", Participated in the ASTral (Air-Sea Transition Layers)/EKAMSAT (Enhancing Knowledge of the Arabian Sea Marine Environment through Science and Advanced Training) process study field campaigns in leg 1 for collecting observations in the Bay of Bengal, focused on studying the air-sea interaction processes. May 2024

"OMEM", Participated in the "Oceanic Mesoscale Eddy Mixing (OMEM)" field campaign program in the Bay of Bengal onboard ORV-Sagar Manjusha (SM-14); I was involved in planning for the survey across various regions of the mesoscale eddy and worked with instruments along with data processing such as Lowered Acoustic Doppler Current Profiler (LADCP), Vertical Microstructure Profiler (VMP), and Underway Conductivity Temperature Depth (uCTD) for obtaining oceanic sub-surface measurements., Further, I designed and conducted the bamboo raft and bamboo plates experiments to study the dispersion mechanism by ocean currents and waves on a shorter spatiotemporal scale. Mar 2023

Summer schools and workshops

Ocean Mixing and Monsoon (OMM) workshop cum meeting, Space Applications Centre (SAC), Indian Space Research Organization (ISRO), Ahmedabad, India. January 2020

- Attended a 4-day workshop and a two-day discussion meeting conducted by MISOBOB scientists working on the Bay of Bengal.
- The project title was "How does the rate of change of SST relate to net surface heat flux on MISO and diurnal time scales over the Bay of Bengal?" mentored by Dr. Eric A D'Asaro.

Air-Sea Interactions in the Bay of Bengal from Monsoons to Mixing workshop February 2019

cum meeting, International Centre for Theoretical Sciences (ICTS), Bengaluru, India.

- Attended a 3-day workshop followed by a two-day discussion meeting organized by Dr. Eric A D'Asaro, Dr. Rama Govindarajan, Dr. Manikandan Mathur, Dr. Debasis Sengupta, Dr. Emily Shroyer, Dr. Jai Sukhatme and Dr. Amit Tandon.
- The project title was "Two Cyclones and an Eddy in the Bay of Bengal" mentored by Dr. Rama Govindarajan.

Upper Ocean Physics in the Bay of Bengal, Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science, Bengaluru, India. May-Jun 2014

- Attended a three week Summer school on "Upper Ocean Physics in the Bay of Bengal" held at Centre for Atmospheric and Oceanic Sciences (CAOS), Indian Institute of Science (IISc), organized by Dr. Amit Tandon (University of Massachusetts Dartmouth), Dr. Karan Venayagamoorthy (Civil and Environmental Engineering, Colorado State University), Dr. Louis St. Laurent (Woods Hole Oceanographic Institution), Dr. Eric A D'Asaro (University of Washington, Applied Physics Laboratory), Dr. G.S. Bhat (CAOS, IISc), Dr. Debasis Sengupta (CAOS, IISc), Dr. Jai Sukhatme (CAOS, IISc), and Dr. V. Venugopal (CAOS, IISc).
- Our group project was on "Analysis Of TRMM rainfall data for 1998-2013," mentored by Dr. Jai Sukhatme and Dr. V. Venugopal.

Reviewing activity

- Journal of Operational Oceanography, Journal of Physical Oceanography, Ocean Modelling, and Springer Nature.

Fellowship and Awards

Senior Research Fellowship from Indian Institute of Tropical Meteorology, Pune, India, project grant. Aug 2022 - Sep 2022

Senior Research Fellowship from Indian Institute of Science, Bengaluru, India. May 2022 - Jul 2022

Senior Research Fellowship from the Indo-Israel project grant. Aug 2021 - Apr 2022

Recipient of Student Travel Grant to participate in the American Geophysical Union (AGU) Fall Meeting, 13-17 December 2021, in New Orleans, LA, US. 2021

Recipient of Early Career Scientist's Travel Support belonging to the abstract of my work "Seasonality of surface stirring by geostrophic flows in the Bay of Bengal" to attend an international conference, EGU General Assembly 2020, in Vienna, Austria. The conference was canceled later and conducted online due to the Coronavirus disease (COVID-19) pandemic. 2020

Receipt of Grantham Fellowship from Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru, India. 2016 - 2021

Recipient of Ministry of Human Resource Development (MHRD) fellowship during the doctoral curriculum from the Indian Institute of Science, Bengaluru, India. 2016 - 2021

Recipient of Ministry of Human Resource Development (MHRD) fellowship during M.Tech program from the Indian Institute of Science, Bengaluru, India. 2013 - 2015

Technologies

Languages: MATLAB, FORTRAN, PYTHON, JULIA (started recently), PY-FERRET, and LATeX.

Software: Linux, Windows, HPC system: CRAY & PARAM PRAVEGA (Indian Institute of Science, Bengaluru, India), and POSEISON (Woods Hole Oceanographic Institution, Massachusetts, US).

Ocean model: Regional Ocean Modeling System (ROMS), Process Study Ocean Model (PSOM), Price-Weller-Pinkel (PWP) vertical mixing model, General Ocean Turbulence Model (GOTM), and Oceananigans (started recently).

Teaching Assistantship

AS5430: Stability of Shear Flows, IITM, Chennai, India. Jan 2023 - May 2023

UES204: Fundamentals of Climate Science, IISc, Bengaluru, India. Jan 2020 - Apr 2020

AS202: Geophysical Fluid Dynamics, IISc, Bengaluru, India. Jan 2019 - Apr 2019

AS203: Atmospheric Thermodynamics, IISc, Bengaluru, India. Aug 2018 - Dec 2018

Position of Responsibility

Chief Placement coordinator, managed placement activities for non-circuit branches along with five other circuit and non-circuit department members, IISc, Bengaluru, India. 2014-2015

Extra-curricular activities

- Semi-& western classical music enthusiast (violin), composing tunes, was part of a band called “Rhythmica” in IISc, Bengaluru, India.
- Trekking and exploring new places.
- Playing football.

References

Jai Sukhatme, Professor, Centre for Atmospheric and Oceanic Sciences,
Indian Institute of Science, Bengaluru, India.
Email: jai@iisc.ac.in; jai.goog@gmail.com.

Debasis Sengupta, Professor, International Centre for Theoretical Sciences,
Bengaluru, India.
Emiritus professor, Centre for Atmospheric and Oceanic Sciences,
Indian Institute of Science, Bengaluru, India.
Email: debasis0189@gmail.com; debasis.sengupta@icts.res.in

Bishakhdatta Gayen, Associate Professor, Department of Mechanical Engineering,
University of Melbourne, Australia.
Assistant professor, Centre for Atmospheric and Oceanic Sciences,
Indian Institute of Science, Bengaluru, India.
Email: bishakhdatta.gayen@unimelb.edu.au; bgayen@iisc.ac.in

Manikandan Mathur, Professor, Department of Aerospace Engineering,
Indian Institute of Technology Madras, Chennai - 600036, India.
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