

# Nihar Paul

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## Research Interests

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

## Research positions and Experiences

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**Postdoctoral Investigator, Woods Hole Oceanographic Institution,** Jan 2025 – present  
**Woods Hole, Massachusetts, USA**

- **Advisor:** [Dr. J. Thomas Farrar](#)
- **Research Area:** Tropical Waves and analysis of the moored observation.

**Postdoctoral Investigator, Woods Hole Oceanographic Institution,** Aug 2023 – Dec 2024  
**Woods Hole, Massachusetts, USA**

- **Advisor:** [Dr. Amala Mahadevan](#)
- **Research Area:** To study 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,** Oct 2022 – Jul 2023  
**Indian Institute of Technology Madras, Chennai, India**

- **Advisor:** [Dr. Manikandan Mathur](#)
- **Research Area:** Lagrangian Coherent Structures, and Internal Gravity Waves.

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

- **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

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

- **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

### **Publications, preprints, and ongoing research**

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| <b>Effect of near-inertial pumping on subduction from the mixed layer</b>  | 2025 |
| Nihar Paul, and Amala Mahadevan<br>(Manuscript is being prepared and will be submitted to JPO).  |      |
| <b>Influx of Bay of Bengal waters and stirring trends in the Arabian Sea based on satellite altimetry</b>  | 2025 |
| Nihar Paul, Manikandan Mathur, Jai Sukhatme, J. Thomas Farrar, & Debasis Sengupta<br>(To be submitted to Geophysical Research Letters).<br>10.48550/arXiv.2503.20585 |      |
| <b>Eddy-Freshwater Interaction Using Regional Ocean Modeling System in the Bay of Bengal</b>   | 2023 |
| Nihar Paul, Jai Sukhatme, Bishakhdatta Gayen, & Debasis Sengupta<br>Journal of Geophysical Research: Oceans 128.4 (2023): e2022JC019439.<br>10.1029/2022JC019439     |      |
| <b>Eddy induced trapping and homogenization of freshwater in the Bay of Bengal</b>   | 2021 |
| Nihar Paul, Jai Sukhatme, Debasis Sengupta, & Bishakhdatta Gayen<br>Journal of Geophysical Research: Oceans 126.6 (2021): e2021JC017180.<br>10.1029/2021JC017180     |      |
| <b>Seasonality of surface stirring by geostrophic flows in the Bay of Bengal</b>   | 2020 |
| Nihar Paul, and Jai Sukhatme<br>Deep Sea Research Part II: Topical Studies in Oceanography 172 (2020): 104684.<br>10.1016/j.dsr2.2019.104684                         |      |

### **Co-authored publications, preprints, and ongoing research**

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| <b>Near-Inertial Wave Energetics during post-monsoon in the Bay of Bengal</b> | 2024 |
| Abhilash Kokkirala, Nihar Paul, Debasis Sengupta, and Manikandan Mathur       |      |

(Abstract submitted to AGU: [Link](#))

## **The Role of Freshwater and Seasonality in the Indian Ocean Overturning Circulation**

2024

Kaushik Mishra, Bishakhdatta Gayen, P N Vinayachandran, and **Nihar Paul**  
(Work in progress, presented at Ocean Sciences Meeting, 2024).

## **Talks, Conferences, and Posters**

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### **Talk at the “Woods Hole Oceanographic Institution, Woods Hole, MA, USA”**

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, USA”**

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, USA**

Jun, 2024

- Presented poster on “Effect of near-inertial pumping on subduction from the mixed layer”.

### **Ocean Sciences Meeting, New Orleans, Louisiana, USA**

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, USA”**

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, USA**

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 “Eddy-freshwater interaction in the Bay of Bengal”.

### **AGU Fall Meeting, New Orleans, LA, USA**

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**

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“**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

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

February 2019

- 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

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- Journal of Operational Oceanography, and Journal of Physical Oceanography.

## Fellowship and Awards

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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 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, USA.	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 Indian Institute of Science, Bengaluru, India.	2016 - 2021
Recipient of Ministry of Human Resource Development (MHRD) fellowship during M.Tech program from Indian Institute of Science, Bengaluru, India.	2013 - 2015

## Technologies

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**Languages:** MATLAB, FORTRAN, PYTHON, **JULIA (started recently)**, PY-FERRET, and L<sup>A</sup>T<sub>E</sub>X.

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

**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

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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

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<b>Chief Placement coordinator</b> , managed placement activities for non-circuit branches along with five other circuit and non-circuit department members, IISc, Bengaluru, India.	2014-2015
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## Extra-curricular activities

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- 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

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**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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