Aditya Sengupta

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"Knowledge is knowing that tomato is a fruit; Wisdom is not putting it in a fruit salad."

Personal Profile

As a curious and enthusiastic student, I have always been fascinated by the complexities of the natural world and its ever-changing climate. With a strong academic background in Physics and Atmospheric Science, I have been able to develop a deep understanding of the fundamental principles that govern our planet's weather and climate patterns. Currently, I am pursuing my passion for climate research at the **University of Melbourne as a Graduate Researcher**, with a particular focus on climate variability. I am also honored to be affiliated with the **ARC Center of Excellence for Climate Extremes**, where I have been able to collaborate with leading experts in the field and expand my knowledge and skills in statistical climatology, model evaluation, and climate variability. My primary research interests lie in exploring the impact of climate beyond net-zero and the ways in which human activities can affect the Earth's climate system. In addition to my academic pursuits, I have also been actively involved in **media outreach efforts**, using my knowledge and expertise to share developments in climate science with the general-public and young students. I have been privileged to assist in running practicals and tutorials for various subjects, allowing me to share my passion for climate science with students from diverse backgrounds.

Education

University of Melbourne   *Parkville, Australia*
Doctor of Philosophy - Science   *March 2023 - Current*
- **Supervised by** Dr. Andrew D. King, Dr. Josephine R. Brown and Dr. Nicola Maher
- **Research Area:** Understanding climate variability under net-zero and net-negative carbon emission scenarios of future climate projections. This project will focus on demystifying the role of anthropogenic warming on ENSO and other climate drivers under fast and slow warming climates and try to determine the evolution of large scale drivers beyond net-zero.

National Institute of Technology, Rourkela   *Odisha, India*
MSc in Atmospheric Sciences   *August 2020 - June 2022*
- CGPA - 9.24/10.0
- **Theory courses:** Atmospheric Physics and Dynamics, Physical and Dynamical Oceanography, Science of Climate and Climate Change, Boundary Layer Meteorology, Weather Analysis and Forecasting, Numerical Weather Prediction, Parameterization of Physical processes, Satellite Meteorology, Tropical and Applied Meteorology
- **Laboratory Courses:** Fortran Programming Laboratory, MATLAB programming laboratory, Data Analysis and Visualization, Climate Diagnostics, Simulation Laboratory (using WRF meso-scale model)
- **Supervised by** Dr. Naresh Krishna Vissa
- **Research topic**: The thermodynamic and dynamic response of precipitation extremes over the Indian subcontinent in a changing climate
- **Description**: This project explored the seasonal variations in the thermodynamic response of precipitation extremes over the Indian subcontinent using apparent scaling estimates and the objective was to determine the seasonal deviations of the apparent scaling rates from the extpected climate scaling (based on Clausius-Clayperon climate scaling i.e. $7\% K^{-1}$), and further to determine the dynamical and thermodynamical factors responsible for the deviations in the apparent scaling rates. Link to thesis and Link to presentation

Amity University, Noida   *NCR, India*
Bachelor of Science (Honours) - Physics   *August 2017 - June 2020*
- CGPA - 9.63/10.0
- **Core courses:** Mechanics, Semiconductor Physics, Electricity and Magnetism, Waves and Oscillations, Material Sciences, Wave Optics, Classical Dynamics, Thermal Physics, Statistical Physics, Quantum Mechanics, Atomic Physics, Digital and Analog Electronics, Mathematical Physics, Solid State Physics, Fundamentals of Astronomy,, Numerical Methods and Data Analysis, Nuclear Physics, Molecular Spectroscopy, Non-linear optics
- **Value-added Courses:** Communication skills, Behavioral Sciences, Foreign Business Language (French) and associated courses
- **Supervised by** Dr. Rama Shankar Pandey
- **Research topic**: Kelvin-Helmholtz instability and its applications.
- **Description**: The project deals with the study of how interfacial perturbations in fluids grow or decay over time using the dispersion relation of the Kelvin-Helmholtz Instability and to compare this with the same effects that take place in other hydrodynamic stabilities. Link to the project and Link to the presentation

Birla Vidya Niketan   *New Delhi, India*
Higher Secondary Certificate Examination (High School)   *April 2015 - May 2017*
- Marks - 91.2%
- Core Subjects - Mathematics, Physics, Chemistry, Economics, English Communication
- Leadership roles - Served as Vice-President of the Students' Council, Representad the school at national and international conferences.

Work Experience

Graduate Researcher   *Melbourne, Australia*

ARC Center of Excellence for Weather of the 21st Century   *January 2025 - Current*

- **About**: 21st Century Weather is a global consortium of 24 organisation aimed at understanding changes in weather patterns within this century as a result of anthropogenic climate change
- Working as a Graduate Researcher on the project of Weather Systems in a Warmer World focused on understanding how key weather systems, essentially related to local variability are affected by global climate changes.

Graduate Researcher   *Melbourne, Australia*

ARC Center of Excellence for Climate Extremes   *May 2023 - December 2024*

- **About**: CleX is an international consortium of five Australian universities and international partner organisations supported by the Australian Research Council
- Working as a Graduate Researcher on media outreach, climate reports and on climate and weather related skills training opportunities.

Geospatial Data Scientist   *NCR, India*

Blue Sky Analytics   *October 2022 - Feb 2023*

- **About**: Blue Sky Analytics is a climate tech startup building an API-based catalogue of environmental datasets by leveraging satellite data, AI and the cloud.
- **Duties and Responsibilites**: Worked on geospatial architecture and data requirements, particularly biomass estimation and reverse geocoding projects, in close collaboration with data engineers, data scientists and software developers to provide novel geospatial data solutions for combatting climate change.

Indian Institute of Tropical Meteorology (IITM)   *Pune, India*

Summer Research Fellow   *May 2021 - January 2022*

- Selected through the Science Academies' *Summer Research Fellowship Program* (SRFP) - 2021
- **Supervised by**: Dr. Saching Ghude and Dr. Gaurav Govardhan
- **Project topic**: Probing into the wintertime meteorology and particulate matter ($PM_{2.5}$ and PM_{10}) forecast over Delhi
- **Description**: Analysing the performance of high resolution quality and meteorological parameters model data obtained from forecasting system developed at IITM, Pune against observation data from the WIFEX campaign and to calculate statistical performance and skill score of model AQI output against CPCB observation data for major cities of India during winter 2020-2021.
- **Associated publication**: 10.1016/j.apr.2022.101426

Research projects

A review on climate change and its impact on agriculture and associated mitigation strategies   *Odisha, India*

National Institute of Technology, Rourkela   *Nov 2021 - Dec 2021*

- A review, of the current literature available, on the impacts of climate change and extremes on crop yield and agricultural productivity and also review the associated mitigation strategies to combat the said impacts. Link to the research work.
- **Link to the project**: 10.13140/RG.2.2.19072.30725
- **Link to the poster**: 10.13140/RG.2.2.14039.14248

The dynamics of 2013 Uttarakhand extreme rainfall event using WRF model simulation   *Odisha, India*

National Institute of Technology, Rourkela   *Jan 2022 - Feb 2022*

- A WRF Simulation technical report on the dynamical influences associated with the 2013 Uttarakhand extreme rainfall event, based on an 11 day WRF simulation.
- **Link to the project**: 10.13140/RG.2.2.16555.72483

Earthquake Frequency-Magnitude Relation and Hazard Estimation   *Odisha, India*

CSIR-NEIST   *August 2020 - September 2020*

- The project deals with the study of the Geo dynamics of the Andaman Region and use ISC Catalog and the Gutenberg-Richter Relation to estimate the b-value of the Andaman Region (divided into two seismic zones) and use the b-values and the seismic history of the Andaman Region to do hazard estimation for the said region. This was Mega project-1 of the CSIR-SRTP 2020 This project was carried out under the guidance of Dr. Debasis Das Mohanty, Geo Sciences and Technology Division, CSIR-NEIST during the summer of 2020
- **Link to the project**: 10.13140/RG.2.2.27452.46727

Publications

In prep (3)

Modulation of the tropical pacific mean state by Southern Ocean surface warming in transient and stabilised climates
   Aditya Sengupta, Andrew King, Josephine Brown, Nicola Maher, Mandy Freund, Andrea Dittus, Tilo Ziehn
   In prep. 2025

Are future changes in ENSO teleconnections robust to internal variability
   Aditya Sengupta, Andrew King, Josephine Brown, Nicola Maher, Mandy Freund, Ruby Lieber
   In prep. 2025

Future changes in rainfall variability and role of ENSO variability under transient and stabilised climates

Aditya Sengupta, Andrew King, Josephine Brown, Nicola Maher, Mandy Freund, Ruby Lieber
In prep. 2025

PUBLISHED (6)

Do CMIP6 models capture seasonal and regional differences in the asymmetry of ENSO-precipitation teleconnections?
Aditya Sengupta, Andrew D King, Josephine R Brown
Journal of Geophysical Research: Atmospheres. Wiley Online Library, 2024

Acceleration of local warming damped in urban areas of the Global South
Aditya Sengupta, Andrew D King, Robert G Ryan
Geophysical Research Letters. Wiley Online Library, 2024

Exploring climate stabilisation at different global warming levels in ACCESS-ESM-1.5
Andrew D King, Tilo Ziehn, Matthew Chamberlain, Alexander R Borowiak, Josephine R Brown, Liam Cassidy, Andrea J Dittus, Michael Grose, Nicola Maher, Seungmok Paik, Sarah E Perkins-Kirkpatrick, **Aditya Sengupta**
EGUsphere pp. 1–38. Copernicus Publications Göttingen, Germany, 2024

Assessing the performance of satellite derived and reanalyses data in capturing seasonal changes in extreme precipitation scaling rates over the Indian subcontinent
Aditya Sengupta, Naresh Krishna Vissa, Indrani Roy
Atmospheric Research p. 106741. Elsevier, 2023

Seasonal variations in the dynamic and thermodynamic response of precipitation extremes in the Indian subcontinent
Aditya Sengupta, Naresh Krishna Vissa, Indrani Roy
Climate Dynamics pp. 831–848. Springer, 2023

Probing into the wintertime meteorology and particulate matter (PM2. 5 and PM10) forecast over Delhi
Aditya Sengupta, Gaurav Govardhan, Sreyashi Debnath, Prafull Yadav, Santosh H Kulkarni, Avinash N Parde, Prasanna Lonkar, Narendra Dhangar, Preeti Gunwani, Sandeep Wagh
Atmospheric Pollution Research p. 101426. Elsevier, 2022

OTHER PUBLICATIONS (2)

Understanding Net Zero
Alice Wilson, Alex Borowiak, Liam Cassidy, Andrew D King, **Aditya Sengupta**
Briefing Note. ARC Centre of Excellence for Climate Extremes, 2024

New South Wales winter Heat
Aditya Sengupta, Andrew D King
The State of Weather and Climate Extremes report 2023. ARC Centre of Excellence for Climate Extremes, 2024

Conferences and Seminars

CONFERENCE PRESENTATIONS (6)

Assessment of CMIP6 model capabilities in simulating the asymmetric response of precipitation to ENSO
Aditya Sengupta, Andrew D King, Josephine R Brown
Session 10: Modelling, prediction and projections of climate variability and past and future climate change. AMOS Conference, 2024

Regional and seasonal diversity of ENSO-precipitation teleconnections and their asymmetry in CMIP6 models
Aditya Sengupta, Andrew D King, Josephine R Brown
Session 03: Space-time statistical methods for modelling and analyzing climate variability. International Meeting on Statistical Climatology, 2024

Changes in ENSO variability and teleconnections beyond net zero in ACCESS-ESM1.5
Aditya Sengupta, Andrew D King, Josephine R Brown, Nicola Maher, Andrew Dittus
Session: ENSO teleconnctions. Australian Academy of Science Elizabeth and Frederick White Research Conference on Atmospheric Dynamics, 2024

Acceleration of local warming damped in urban areas of the Global South
Aditya Sengupta, Andrew D King, Robert G Ryan
Session 12: Impact attribution: from source to sufferin. International Meeting on Statistical Climatology, 2024

Pacific climate variability and its regional impacts in warmer, stabilised climates
Andrea Dittus, Nicola Maher, Andrew D King, **Aditya Sengupta**
Session 03: Space-time statistical methods for modelling and analyzing climate variability. International Meeting on Statistical Climatology, 2024

Understanding different climate changes in a net-zero emissions future
King, Andrew D, Tilo Ziehn, Alexander R Borowiak, Josephine R Brown, Liam Cassidy, Matthew Chamberlain, Andrea J Dittus, Michael Grose, Seungmok Paik, Sarah E Perkins-Kirkpatrick, **Aditya Sengupta**
Session 11: Realisation of Paris Agreement pledges. AMOS Conference, 2024

CONFERENCE POSTERS (2)

Quantifying ENSO teleconnections in a variable climate
Andrew King, **Aditya Sengupta**, Benjamin Henley
Session 03: Space-time statistical methods for modelling and analyzing climate variability. International Meeting on Statistical Climatology, 2024

Optimization of bias voltage and gas pressure for a sinlge wire PSPC device

Aditya Sengupta, Deepak Swamy

. International Conference on Recent Trends in Materials and Devices, 2019

Seminars (1)

Blue Economy Involving Offshore Hydrocarbons and Seabed Minerals

Ishita, **Aditya Sengupta**

Seminar theme: Blue Economy and Maritime Security in the Indian Ocean Region. National Maritime Foundation (NMF) Seminar, 2020

Skills

Programming	Python (Pandas, Xarray, NumPy, SciPy, etc.), Fortran, Lua, Julia
Tools	Linux, Shell (Bash/Zsh), LaTeX(Overleaf/R Markdown), QGIS, Microsoft Office, Docker, WRF (numerical modelling), Vi/Vim/Neovim
Softwares	NCL, NCO, CDO, GrADS, Git/GitHub
Platforms	Linux, macOS, MS Windows
Soft Skills	Time Management, Teamwork, Problem-solving, Documentation, Engaging Presentation, Planning and collaboration, Academic Writing

Achievements

2024	**John and Allan Gilmour Research Award**, he John and Allan Gilmour was established with a gift from John Gilmour to promote scientific research for the benefit of mankind and is offered to students who are enrolled in the Doctor of Philosophy - Science to pursue research that benefits mankind	*Faculty of Science, UniMelb, Australia*
2023	**OSI - Post Graduate Dissertation Award 2022**, Received an award for the best post graduate dissertation from Ocean Society of India and Ministry of Education, India for the year 2022 in the Ocean and Atmospheric Sciences Category.	*OSI and EduMinofIndia*
2022	**Melbourne Research Scholarship**, Awarded the extremely competitive Melbourne Research scholarship for pursuing a PhD at the University of Melbourne, covering my tuition fees, stipend, living costs, etc.	*UniMelb, Australia*
2020	**Joint Admission Test**, Secured All India Rank 1480 in the National level joint Admission test for Master's courses in the most premier institutes of India	*India*
2020	**Shri Baljit Shastri Award**, for showing the best qualities in Human and Traditional values	*Amity Univ., India*
2020	**Gold Medal in BSc (Honours) Physics**, for excellent performance in academics and for securing the highest CGPA in Department of Physics	*Amity Univ., India*
2020	**Winner of ICPS Worldwide Grant 2020**, awarded to only two students each year, the grant provides a travel grant to attend the International Conference of Physics Students (ICPS) organised by International Association of Physics Students. [Detained due to COVID-19]	*IAPS, France*
2019	**Best Presentation at IUAC B.Sc. Summer Program**, for the presentation on the internship work carried out at IUAC on PSPC design and optimisation	*IUAC, India*
2019	**Nationwide Education and Scholarship Test (NEST-Senior)**, Secured 95/200 with an All India national rank of 231.	*India*
2017	**On-Admission Merit Scholarship**, for academic achievements to waiver off 50% of University tuition fees	*Amity Univ., Noida*
2016	**Academic Excellence scholarship**, awarded in years 2013, 2014, and 2016 for academic performance in middle school and high school	*Birla Vidya Niketan*
2012	**Ideal Student Award**, awarded for two straight years in 2011 and 2012	*Birla Vidya Niketan*

Teaching and Outreach

Student Ambassador   *University of Melbourne*

Faculty of Science @ University of Melbourne   *May 2024 - November 2024*

As a student ambassador for the Faculty of Science, I have delivered talks at Disovery workshops and "Masterclass" sessions to showcase Post-graduate science studies and research opportunities to undergraduate audience, with a specific emphasis on climate science research.

Lead Demonstrator   *University of Melbourne*

Extreme Weather and Climate [ATOC20001]   *Feb 2024 - May 2024*

Working as the lead demonstrator, assisting Dr. Linden Ashcroft during practical classes for the Extreme Weather and Climate covering general circulation, clouds, synoptic and satellite meteorology, weather analysis and forecasting, weather observations, etc.

Tutor   *University of Melbourne*

Environmental Impact Assessment [EVSC90015]   *Feb 2024 - May 2024*

Working as tutor for the subject of Environmental Impact Assessment alongside the coordinator, Dr. Candan Desem helping students with doubts and covering conceptual topics around case studies of EIA methods.

Demonstrator
University of Melbourne

Wonders of the Weather [ATOC10001]
July 2023 - November 2024

Working as demonstrator, assisting Dr. Adam Morgan for the first year undergraduate subject called Wonders of the Weather covering the basics of meteorology, climatology, urban air pollution, weather maps, weather and climate interactions, etc.

Tutor
University of Melbourne

Dangerous Earth [ERTH20001]
July 2023 - November 2024

Working as a tutor, assisting Dr. Mark Quigley, Dr. Yi Huang and Dr. Hamish Clarke for the second year breadth-subject called Dangerous Earth covering extreme weather events, such as bushfires, floods, east coast low pressure systems, etc., and how they impact Australia and people within.

Student Mentor
Melbourne, Australia

In2Science
July 2023 - November 2023

Working as a student mentor at Mount Alexander College, engaging science students of Year 7 in STEM and science activities and encouraging them to continue with STEM all the way to University admissions.

Hosted session on climate models
UniMelb, Australia

Year10 WorkEx Program
June 2023

Hosted a session on "Understanding climate models and predicting Earth's future warming" for year 10 students visiting UniMelb to familiarise them with state-of-the-art climate models from the CMIP archive using the IPCC Climate Atlas.

NOTE - Assisted in marking for assignments for all subjects mentioned above and assisted with final examination marking for Wonders of the Weather.

Professional Activities

2024	*Contributing author* for The State of Weather and Climate Extremes 2023 report released by ARC Centre of Excellence for Weather and Climate Extremes
2023-pres.	*Served as reviewer* for the following journals - **Weather and Climate Extremes**;**Journal of Advances in Modeling Earth Systems (JAMES)**
2023	Selected as one of the **Fresh Eyes on CMIP** members in the Model Evaluation sub-group working closely with the Model Benchmarking Task Team for the 7th cycle of CMIP model development and evaluation
2023	Student member of the **Australian Meteorological and Oceanographic Society**
2018-2021	Student member of the **International Association of Physics Students** (IAPS) and its indian national committee - Association of Indian Physics Students (AIPS)
2020	**Co-Editor** of the Journal of the International Association of Physics Students (jIAPS)

Workshop and Training

Sep 2024	ACCESS-NRI Model evaluation Hackathon/ESMValTool training and Workshop in Canberra
Mar 2024	ACCESS-NRI CMIP7 Model evaluation Hackathon in Melbourne
Dec 2023	ARC Centre of Excellence for Climate Extremes (CleX) Media Training workshop in Melbourne
Dec 2023	ARC Centre of Excellence for Climate Extremes (CleX) Scientific writing workshop in Melbourne
Nov 2023	ARC Centre of Excellence for Climate Extremes (CleX) Annual Workshop in Brisbane
Nov 2023	ARC Centre of Excellence for Climate Extremes (CleX) Weather and Climate Interactions (WaCI) group workshop and meeting in Melbourne

News and Media

January 2025	*Soziable Magazine (Spain)*. Study reveals inequalities in the acceleration of global warming. (**Interview**). [Article]
December 2024	*SciencePost (France)*. Global warming is slowing in some major cities due to air pollution. (**Research findings quoted**). [Article]
December 2024	*Grist*. Some of the world's biggest cities are so polluted they're warming slower. (**Research findings quoted**). [Article]
October 2024	*ARC CLeX*. Understanding Net Zero briefing note. (**Contributing Author**). [Article]
Jun 2024	*ARC CLeX*. "I felt I would have a larger impact as a climate researcher": Aditya Sengupta's transition from physics to climate science (**Researcher profile**). [Article]
Feb 2024	*9news*. "You weren't imagining it - 2023 was a year of extremes, climate scientists confirm" (**Quoted**). [Article]
Dec 2023	*Pursuit*. "COP28 WRAP UP: SOME POSITIVES BUT FOSSIL FUEL PHASE OUT REMAINS ELUSIVE" (**Contributed**). [Article]

Languages

English	Professional proficiency, IELTS Band 8.5
Hindi	Native proficiency
Bengali	Native proficiency
French	Beginner