


# DHRUV BHAGTANI

Research School of Earth Sciences, Australian National University, Australia - 2601

[dhruv.bhagtani@anu.edu.au](mailto:dhruv.bhagtani@anu.edu.au) | 

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## RESEARCH INTERESTS

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I am a PhD student at the Australian National University interested in the intersection of ocean physics and climate change. I use numerical ocean circulation models to understand better the physical interplay between various drivers of large-scale ocean circulation.

## EDUCATION

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- Australian National University Oct '20 - Present  
*Ph.D. in Earth Sciences, Supervisory Panel: [Andy Hogg](#), [Navid Constantinou](#) and [Ryan Holmes](#)*
- Thesis: "The interplay between wind stress and surface buoyancy in driving large-scale ocean circulation."
- Indian Institute of Technology Madras Aug '16 - Jun '20  
*BTech (Honours) in Naval Architecture and Ocean Engineering, CGPA: 9.19/10 (School Rank: 1)*
- Honours thesis: "Parallelised finite element based solver for cyclone inundation in the east coast of Tamil Nadu."

## PUBLICATIONS

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- Barnes A.J., N.C. Constantinou, A.H. Gibson, A.E. Kiss, C. Chapman, J. Reilly, and **D. Bhagtani**, 2024 (*submitted*): regional\_mom6: "A Python package for Automatic generation of regional configurations for the Modular Ocean Model v6", Journal of Open Source Software, (<https://www.navidconstantinou.com/publications/regional-mom6.pdf>).
- **Bhagtani D.**, A.M. Hogg, R.M. Holmes, and N.C. Constantinou, 2024 (*in review*): "Unraveling how winds and surface heat fluxes control the Atlantic meridional heat transport", Geophysical Research Letters, (<https://arxiv.org/abs/2401.14230>).
- **Bhagtani D.**, A.M. Hogg, R.M. Holmes, and N.C. Constantinou, 2023: "Surface heating steers planetary-scale ocean circulation", Journal of Physical Oceanography, 53(10), 2375-2391 <https://doi.org/10.1175/JPO-D-23-0016.1>.
- **Bhagtani D.**, "Parallelised Finite Element Based Solver for Cyclone Inundation in the East Coast of Tamil Nadu.", Honours Thesis, *Indian Institute of Technology Madras*, June 2020 <http://dx.doi.org/10.13140/RG.2.2.33408.05120>.
- **Bhagtani D.** and N. Saha, "Extended Kalman Filtering for Estimating Drag and Inertia Coefficients for Slender Offshore Structures.", *Proceedings of the ASME 2019 38th International Conference on Ocean, Offshore and Arctic Engineering. Structures, Safety, and Reliability*. Scotland, UK. June 9–14, 2019 <https://doi.org/10.1115/OMAE2019-96630>.

## SCHOLARSHIPS AND PRIZES

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### Scholarships

- University Research Fellowship - AU\$ 36,652 per annum Oct '20 - Present
- HDR Fee Remission Merit Scholarship - AU\$ 44,470 per annum Oct '20 - Present
- HDR Supplementary Scholarship - AU\$ 2,000 per annum Oct '20-Apr '24

## Prizes

- FDSE Summer School Bursary - 2,000 € Jun '22
- American Bureau of Shipping Prize - INR 15,000 Jun '20
- Alumni Fund Travel Grant - INR 50,000 Jun '19
- Future Research Talent Fellowship - AU\$ 6,000 Dec '18

## MEDIA APPEARANCES AND OUTREACH

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- Co-authored the Australian Research Centre of Excellence for Climate Extremes “State of Weather and Climate Extremes Report 2023”, Mar 2024. ([Link](#)); appeared at [7News](#), [9News](#), and [UNSW Sydney news](#).
- Interview by the College of Science, Australian National University in collaboration with the National Computational Infrastructure on being awarded the Future Research Talent Award to conduct research on the North Atlantic Ocean, Mar 2023: <https://science.anu.edu.au/news-events/news/india-australia-making-splash-international-award>.

## COMMUNITY SERVICE

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- Scientific steering committee, Ocean Modelling & Observations Workshop, Canberra, Australia, Jul 2024.
- Volunteer for annual field trips to Mount Kosciuszko to demonstrate rock formations and climate change to first year students at the ANU (2022-2024).
- Notetaker for the CMIP7 Hackathon, Aspendale, Australia, Mar 2024.
- Session chair for COSIMA workshop, Canberra, Australia, Sep 2023.
- Student Worker for Ocean Sciences Meeting, Online, Feb 2022.
- Led weekly GFD discussions in the Climate and Fluid Physics Group, Australian National University, 2022.

## TALKS

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- **Bhagtani D.**, Hogg A.M., Holmes R.M., and Constantinou N.C., “The response of oceanic meridional heat transport to varying surface forcing”, COSIMA Meeting, Canberra, Australia, Mar 2024.
- **Bhagtani D.**, Hogg A.M., Holmes R.M., and Constantinou N.C., “Unravelling how winds and surface heat fluxes control the Atlantic Ocean’s meridional heat transport”, *Department of Atmospheric and Oceanic Sciences*, University of California Los Angeles, USA, Feb 2024.
- **Bhagtani D.**, Hogg A.M., Holmes R.M., and Constantinou N.C., “The response of oceanic meridional heat transport to varying surface forcing”, Australian Meteorological and Oceanographic Society Conference, Canberra, Feb 2024.
- **Bhagtani D.**, Hogg A.M., Constantinou N.C., and Holmes R.M., “How does buoyancy forcing affect ocean gyres?”, COSIMA Meeting, Canberra, Australia, Oct 2022.
- **Bhagtani D.**, Hogg A.M., Constantinou N.C., and Holmes R.M., “The interplay between winds and surface buoyancy in driving ocean gyres.”, Gerringong retreat, May 2022.
- **Bhagtani D.**, Hogg A.M., Constantinou N., and Holmes R.M., “How does buoyancy forcing influence ocean gyres?”, *Oceans Sciences Institute*, University of Western Australia, Perth, Australia, Apr 2022.
- **Bhagtani D.**, Hogg A.M., Constantinou N., and Holmes R.M., “The interplay between winds and surface buoyancy in driving ocean gyres.”, Ocean Sciences Meeting, Virtual, Feb 2022.
- **Bhagtani D.** and Ranganathan T., “PhD vs PostDoc: Career Opportunities Ahead”, *International Alumni Relations*, Indian Institute of Technology Madras, Virtual, Jun 2021.
- **Bhagtani D.**, “Effects of Surface Waves on the Marginal Ice Zone”, Technical Seminar, *Department of Ocean Engineering*, Indian Institute of Technology Madras, Virtual, Jun 2020.

## POSTERS

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- **Bhagtani D.**, Hogg A.M., Holmes R.M., and Constantinou N.C., “The response of Atlantic meridional heat transport to varying surface forcing”, Ocean Sciences Meeting, New Orleans, USA, Feb 2024.

- Constantinou N.C., Auger M., Beucher M., **Bhagtani D.**, and others, “A community-driven cookbook of recipes for analysing global ocean-sea ice model output”, Ocean Sciences Meeting, New Orleans, USA, Feb 2024.
- **Bhagtani D.**, Hogg A.M., Holmes R.M., and Constantinou N.C., “The interplay between wind stress and surface buoyancy forcing in driving ocean circulation”, International Union of Geodesy and Geophysics, Berlin, Germany, Jul 2023.
- **Bhagtani D.**, Hogg A.M., Constantinou N.C. and Holmes R.M., “The interplay between winds and surface buoyancy in driving ocean gyres”, Atmospheric and Oceanic Fluid Dynamics Conference, *American Meteorological Society*, Breckenridge, USA, Jun 2022.

## WORKSHOPS, SUMMER/WINTER SCHOOLS, AND HACKATHONS

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- CMIP7 ACCESS Evaluation Hackathon, CSIRO, Aspendale, Australia, Mar 2024.
- **Bhagtani D.**, Hogg A.M., Holmes R.M., and Constantinou N.C., “Unravelling how winds and surface buoyancy forcing control the Atlantic meridional heat transport”, *CLEX Workshop*, Nov 2023. ([Poster Link](#))
- **Bhagtani D.**, Hogg A.M., Holmes R.M., and Constantinou N.C., “The interplay between wind stress and surface buoyancy forcing in driving the large-scale ocean circulation”, *COSIMA Workshop*, Canberra, Australia, Sep 2023.
- Physics of the Ocean Summer school, Bad Honnef Physics School, Bonn, Germany, Jul 2023.
- ARC Center of Excellence for Climate Extremes Winter School (Theme: Observations in the Climate System), Institute for Marine and Antarctic Studies, Hobart, Australia, Jun 2023.
- **Bhagtani D.**, Hogg A.M., Constantinou N.C. and Holmes R.M., “The interplay between wind stress and surface buoyancy fluxes in driving ocean gyres.”, *CLEX Workshop*, Lorne, Victoria, Australia, Nov 2022.
- **Bhagtani D.**, Hogg A.M., Constantinou N.C. and Holmes R.M., “The interplay between wind stress and surface buoyancy fluxes in driving ocean gyres.”, *COSIMA Workshop*, Tasmania, Australia, Nov 2022. ([Link](#))
- Scientific Paper Writing Workshop, ARC Center of Climate Extremes, Presenter: Dr. Peter Rothlisberg from CSIRO, Oct 2022.
- Fluid Dynamics and Sustainability of the Environment (FDSE) Summer School, *Ecole Polytechnique*, Jun-Jul 2022.
- ARC Center of Excellence for Climate Extremes Winter School (Theme: Atmosphere and Ocean Dynamics), Australian National University, Canberra, Australia, Jun 2022.

## SELECT CODE CONTRIBUTIONS

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- COSIMA-recipes, e.g., created a beginner-friendly notebook to estimate meridional heat transport in ACCESS-OM2. ([Link](#))
- Improvements in the Regional MOM6 example code, COSIMA. ([Link](#))
- Oceananigans, CliMA, e.g., rectified a bug in the shallow water code. ([Link](#))
- “CMIP6 Analysis Ready Data (ARD) workflow: turning big climate projection data into useful inputs for modelling or analysis”, *Ocean Hack Week*, Virtual, Aug 2021. ([Link](#))

## TEACHING AND DEMONSTRATING ACTIVITIES

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- Student Ambassador for Future Research Talent Internship Programme, ANU *Mar '22 - Present*
  - Providing information and advice on the student experience to prospective students, assisting the International Relations and Partnerships team in event coordination and administration.
  - Give presentations on the student experience at ANU to students at various events.
  - Organise an annual international panel discussion inviting doctoral and post-doctoral fellows.
- Course Demonstrator at the Research School of Earth Sciences, ANU
  - Climate Dynamics: 3rd year course on understanding weather and climate. *Feb '24 - Present*
  - Climate Science: 2nd year course on climate change. *Jul '22 - Nov '22; Jul '23 - Nov '23*
  - Fluid Physics and Plasma: 3rd year course on the physics of the ocean. *Jul '22 - Nov '22*
  - The Blue Planet: 1st year course on earth and the climate dynamics. *Feb '22 - Jun '22; Feb '23 - Jun '23*

## COMPUTING SKILLS

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- Programming Languages: FORTRAN, C++, Python, Julia
- Programming Environments: MATLAB, GNU Octave, CUDA, OpenMP, GitHub
- Operating Systems: MacOS, Windows, Linux

## UNDERGRADUATE RESEARCH EXPERIENCE

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- Honours Project *Jul '19 - Jun '20*  
*Indian Institute of Technology Madras, V. Sriram's Research Group*
  - Parallelised a finite element based solver to estimate cyclone inundation in Chennai coast (funded by the Department of Science & Technology India Grant No. DST/CCP/CoE/141/2018C under SPLICE – Climate Change Programme).
- Research Assistantship *May '19 - Jul '19*  
*Australian National University, Andy Hogg, Climate and Fluid Physics Group*
  - Evaluated the geostrophic and Ekman transports in the North Atlantic Ocean in an eddy-permitting ocean model, ACCESS-OM2 (funded by the Future Research Talent Programme, ANU).
- Course project *Jan '19 - May '19*  
*Guide: Sriram Venkatachalam, IIT Madras*
  - Formulated predictor corrector and leap frog algorithms to inspect wash waves generated by ships for three different wave heights of practical interest in a closed domain.
- Undergraduate Research Project  
*Indian Institute of Technology Madras, Nilanjan's Research Group*
  - Estimated drag and inertia coefficients on an underwater jacket structure with  $\sim 95\%$  accuracy using forward and inverse Kalman Filtering techniques.
- Course project *Jul '18 - Nov '18*  
*Guide: S.A. Sannasiraj, IIT Madras*
  - Designed a 275 m x 36 m berthing structure for INS Viraat on STAAD.Pro with pneumatic floating fender to withstand the high kinetic energy imparted due to sideways impact by the ship.

## INDUSTRIAL EXPERIENCE

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- Internship at Detect Technologies, Chennai, India *Mar '18 - Jul '18*  
*Guide: Prof. Krishnan Balasubramanian, Department of Mechanical Engineering, IIT Madras*
  - Implemented Kalman Filtering to remove unwanted noise from flight data to precise live tracking of drones (inside pipes for inspection) with a precision of  $\sim 85\%$ .
- Shipyard Training at Cochin Shipyard Limited (CSL), Kerala, India *Jun '18*
  - Underwent a three week training in three departments - Ship Design, Ship Building and Ship Repair.