Curriculum Vitae

1 Personal Information

Full name: Han Wang
Work Address: Bundesstr. 53, 20146, Hamburg, Germany
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2 Research Interests

Physical Oceanography and Fluid Dynamics

- Wave-mean interactions and disentanglement
- Submesoscale ocean dynamics
- Statistical fluid mechanics
- Deep learning

3 Degrees

- 08/2011-07/2015, B.S. in Atmopheric Sciences, University of Science and Technology of China, China. Thesis advisor: Prof. Dr. Rui Li
- 09/2015 -07/2020, PhD in Atmosphere-Ocean Science and Mathematics, Courant Institute of Mathematical Sciences, New York University, United States. Thesis advisor: Prof. Dr. Oliver Bühler

4 Employment History

- 09/2024-present, Project Leader, Theoretical Oceanography,University of Hamburg
- 04/2022-09/2024, Postdoctoral Research Associate, School of Mathematics, University of Edinburgh
- 09/2020-03/2022, Postdoctoral Researcher, Department of Physics, University of Toronto

Leaves

- 07/2020-09/2020, unemployed due to visa delay caused by Canadian governmental closures during COVID-19

5 Scientific Expertise

5.1 Peer-reviewed Publications

- **Wang, H.** and Bühler, O. (2020). *Ageostrophic corrections for power spectra and wave–vortex decomposition.* Journal of Fluid Mechanics, 882. [manuscript]

  – Highlighted in Focus on Fluids

- **Wang, H.** and Bühler, O. (2021). *Anisotropic statistics of Lagrangian structure functions and Helmholtz decomposition.* Journal of Physical Oceanography, 51(5), 1375-1393. [manuscript]

- Khatri, H., Griffies, S. M., Uchida, T., **Wang, H.**, and Menemenlis, D. (2021). *Role of mixed-layer instabilities in the seasonal evolution of eddy kinetic energy spectra in a global submesoscale permitting simulation.* Geophysical Research Letters, 48(18), e2021GL094777. [manuscript]

- **Wang, H.**, Grisouard, N., Salehipour, H., Nuz, A., Poon, M., and Ponte, A. L. (2022). *A deep learning approach to extract internal tides scattered by geostrophic turbulence.* Geophysical Research Letters, 49(11), e2022GL099400. [ESSOAR]

- **Wang, H.**, Bôas, A.B.V., Young, W.R. and Vanneste J. (2023). *Scattering of swell by currents.* Journal of Fluid Mechanics, 975. [arXiv]

- **Wang, H.**, Bôas, A.B.V., Vanneste J. and Young, W.R. (2024). *Scattering of surface waves by ocean currents: the U2H map.* Journal of Fluid Mechanics, 964. [arXiv]

- **Wang, H.**, Bôas, A.B.V., Vanneste J. and Young, W.R. *The U2H map explains the effect of (sub)mesoscale turbulence on significant wave height statistics.* Accepted by Journal of Physical Oceanography. [arXiv]

5.2 Successful grant applications

Received as principal applicant:

- Project W2: "Observed and simulated internal tides: generation, modification by eddies, and contribution to energy budget" of the Collaborative Research Centre TRR 181: "Energy transfers in Atmosphere and Ocean". Deutsche Forschungsgemeinschaft (Projektnummer 274762653). Award date 06/2024. Funded period 07/2024 - 06/2028. Funded value €621,100.

Named as intended postdoctoral researcher:

- "Disentangling internal waves and (sub–)mesoscale motions in satellite altimetry: Northeast Pacific". Canadian Space Agency. Award date 12/2023. Funded period 04/2024 – 03/2027 (estimated). Funded value $225,000. The other applicants are: Jody Klymak (principal applicant), Guoqi Han (co-applicant), Tetjana Ross (co-applicant).

- "Phase Averaged Deferred Correction for Multi-Timescale Systems". UK Research and Innovation (Project Reference: EP/Y032624/1). Funded period 06/2024 – 02/2025. Funded value £78,966. The other applicant is Hossein Kafiabad (principal applicant).

5.3 Conference presentations

Oral Presentations

- Bornö workshop on surface waves, Stora Bornö, Sweden, " The U2H map explains effects of (sub)mesoscale currents on significant wave height", Aug 2025
- GFD Symposium in memory of Vladimir Zeitlin, Paris, France, "Synergizing Surface Fields in a Deep-learning Extraction of Internal Tides", May 2025.
- TAPGFD (Theoretical and Practical Perspectives in Geophysical Fluid Dynamics, Bengaluru, India, virtual presentation, "A deep learning approach to extract surface internal tidal signals scattered by geostrophic turbulence", May 2024.
- Ocean Sciences Meeting, New Orleans, United States, "Imprint of Currents on Surface Waves: solutions in two regimes ", Feb 2024.
- WISE Zoominar on Waves over spatial inhomogeneity, virtual."Imprint of Currents on Surface Waves", Oct 2023.
- Challenger Society Ocean Modelling Conference, Southampton, United Kingdom, "Dynamical insights from Lagrangian-filtered structure functions applied to drifter observations", Sep 2023.
- EGU General Assembly, Vienna, Austria, "Imprint of ocean currents on significant wave height", Apr 2023.
- TRR 181 Eddy-Wave Meeting, Hamburg, Germany, virtual presentation, "Dynamical insights from frequency-filtered Lagrangian structure functions", Feb 2023.
- 103rd American Meteorological Society Annual Meeting (23rd Conference on Air-Sea Interaction), United States, virtual presentation, "Imprint of ocean currents on significant wave height", Jan 2023.
- Oberwolfach Workshop 2238 - Multiscale Wave-Turbulence Dynamics in the Atmosphere and Ocean, Oberwolfach, Germany, "A deep learning approach to extract surface internal tidal signals scattered by geostrophic turbulence", Sep 2022.
- IX International Symposium on Stratified Flows, Cambridge, UK,"A deep learning approach to extract surface internal tidal signals scattered by geostrophic turbulence", Aug 2022.
- Surface Water and Ocean Topography (SWOT) Science Team Meeting, virtual presentation,"Internal tidal extraction: challenges from scatterings by vortices, and hopes for a deep learning solution", Jun 2022.
- Ocean Sciences Meeting, virtual, "Extraction of tidal signals from a machine learning approach", Apr 2022.
- EGU General Assembly, virtual, "Anisotropic statistics of Lagrangian structure functions and Helmholtz decomposition", Apr 2021.
- Meeting on eddies and internal waves with TRR Mercator fellows, TRR 181, virtual, "Generalizing the "BCF14" method to anisotropic cases", Mar 2021.

Poster Presentations

- 12th Warnemünde Turbulence Days (WTD) on "Waves and Turbulence", Insel Vilm,

Germany, “Synergizing Surface Fields in a Deep-learning Extraction of Internal Tides”, Sep 2025.
- Climate Exploration in Lively Liaison with the Ocean, Hamburg, Germany, “ The U2H map explains effects of (sub)mesoscale currents on significant wave height”, Sep 2025
- 22nd Conference on Atmospheric and Oceanic Fluid Dynamics, Maine, UNITED STATES, “Anisotropic Helmholtz decomposition of Lagrangian Tracer Data”, Jun 2019.
- 21st Conference on Atmospheric and Oceanic Fluid Dynamics, Oregon, United States, “Wave-Vortex Decomposition of 1D ship-track data with weak nonlinearity in the balanced flow”, Jun 2017.

5.4 Invited seminar talks/research visits

- University of Bremen, Bremen, Germany, “Diagnosing scale-dependent dynamics from limited observations”. Jan 2025.
- University of Edinburgh, Edinburgh, United Kingdom. Research visit only (no talk given). Nov 2024.
- TIFR Centre for Applicable Mathematics, Benglaluru, India, virtual presentation, “A deep learning approach to extract internal tides scattered by geostrophic turbulence”. Oct 2024.
- Durham University, United Kingdom, “Scattering of surface waves by oceanic currents”. Jun 2024.
- University of California, Los Angeles, California, United States. Research visit only (no talk given). Mar 2024.
- California Institute of Technology , California, United States, “Scattering of surface waves by oceanic currents”. Mar 2024.
- University of California San Diego, California, United States, “Scattering of surface waves by oceanic currents”. Mar 2024.
- Colorado School of Mines, Colorado, United States, “Scattering of surface waves by oceanic currents”. Feb 2024.
- University of Hamburg, Hamburg, Germany,“A deep learning approach to extract internal tides scattered by geostrophic turbulence”. Jul 2023.
- University of Waterloo, Canada, “Disentangling balanced and unbalanced flows under weak nonlinearity”, virtual. Sep 2021.

5.5 Completed referee assignments

- 2020: Quarterly Journal of the Royal Meteorological Society (1)
- 2021: Journal of Atmospheric and Oceanic Technology (1), Journal of Advances in Modeling Earth Systems (1), Journal of Physical Oceanography (2)
- 2022: Journal of Physical Oceanography (1)
- 2023: Geophysical Research Letters (2), Journal of Fluid Mechanics (2)
- 2024: Nature Communications (1), Journal of Fluid Mechanics (1)
- 2025: Science Advances (1), Journal of Physical Oceanography (2), Ocean Engineering (1), European Journal of Mechanics / B Fluids (1)

5.6 Planning and organizing

- Convener (1 of the 4) of the Ocean Sciences 2026 session "Internal and surface gravity waves: evolution, interactions, regime transitions, and energy cascades".
- Organizer (1 of the 4) for TAPGFD (Theoretical and Practical Perspectives in Geophysical Fluid Dynamics), a 2-week workshop that took place at ICTS, Bengaluru, India in May 2024, funded by ICTS and TRR181. I contributed to: the application for the workshop's funding and location; design and coordination of the workshop program; contacting of invited speakers; selection of participants.
- Various local, regular seminars at Courant Institute and University of Edinburgh.

5.7 Honours

- MacCracken Fellowship, five-year graduate student award at NYU, 2015-2020

6 Teaching Experience

6.1 Course instructions

Undergraduate courses

- Substitute lecturer: Industrial Mathematics [2022-2023 SEM1]. University of Edinburgh. Class size: ~ 50. Led all teaching activities for one week. This includes: designing and recording two 20-minute-long videos on materials (dimensional analysis, similarity solutions) for students to self-study online; designing, making and presenting the slides for a full class lecture (on solving differential equations numerically) in-person; hosted a 2-hour long live-coding and problem-solving workshop in-person over an interactive Jupyter Notebook about the lecture I presented, answering students' questions live. Moderated the grading of a course project with the instructor.
- Workshop tutor: Mathematics in Action B (Fluid Dynamics) [2022-2023 SEM2]. University of Edinburgh. Class size ~ 40. Worked as a tutor bi-weekly at 2-hour long live-coding and problem-solving workshops, assisting the instructor in answering students' questions. Graded one homework assignment.
- Recitation leader: Vector Analysis [MATH-UA 224 002, Spring 2018]. Courant Institute. Class size: 18. Hosted weekly recitation lectures in-person, presenting and explaining exercise problems on blackboard. Helped the instructor check some homework solutions and final exam problems.

Graduate courses

- Substitute lecturer (scheduled): Theoretical Ocaenography I [Winter semester 2025/26]. University of Hamburg. Class size: ~ 30. Will deliver 1.5-hour long in-person lectures when the main instructor is away. The first lectures I host are scheduled on Nov.10, 2025 and Nov.13, 2025.
- Grader: Methods of Applied Mathematics [MATH-GA 2701, Fall 2018], Applied Stochastic Analysis [MATH-GA 2704, Spring 2019], Fluid Dynamics [MATH-GA 2702.001, Fall 2019], Basic Probability [MATH-GA 2901, Fall 2018]. All were at

Courant Institute with class sizes 10-35. Graded homework assignments (roughly bi-weekly) of semester-long graduate classes. In Applied Stochastic Analysis, I helped the instructor check the final exam problems.

Conference workshops

- Contributed to the workshop design, presentation slides and interactive codes, and jointly hosted the corresponding 2.5-hour workshop (with one other volunteer) on machine learning basics at TAPGFD: Theoretical and Practical Perspectives in Geophysical Fluid Dynamics, May 2024.

6.2 Research supervision

PhD project (co-)supervision

- Belal Abdelhadi, University of Hamburg, 2025/02 – present. Student's funding obtained from my work package in the TRR181 grant, and I led the selection process. Currently I am the main research advisor, with the roles as a Mentor in the student's PhD panel. Topic: machine learning methods on the extraction of oceanic internal tide signals.
- Jeffrey Uncu, University of Toronto, 2022/10 – 2024/08 (student admitted in 2019). Unofficial co-supervision. Topic: machine learning methods on the extraction of internal tides. Student graduated in Fall 2024. Met regularly, contributed to the research plan and offered technical advice. Collaborations lead to 2 full chapters of the student's PhD thesis.

MSc project supervision

- Simin Wang. M.Sc. in Computational and Applied Mathematics, University of Edinburgh, 2023/06 - 2023/08, sole supervisor. Dissertation titled "Pruning U-Net with First-Order Taylor Approximation". Student graduated in Fall 2023.
- Aitor Perez. M.Sc. in Ocean and Climate Physics in Ocean and Climate Physics at University of Hamburg, 2025/04 – present, 1 of the 2 official supervisors. Proposed dissertation titled "Deep Learning to Infer Depth-Dependent Eddy Heat Fluxes". Expected graduation 2025/12.

Undergraduate student co-supervision

- Kerryn Van Rooyen, University of Toronto, 2022/05-2022/08. Unofficial co-supervision. Topic: investigating small-scale errors of a machine learning algorithm.
- Lingxiao Guan, University of Michigan, 2021/07-2021/11. Unofficial co-supervision. Topic: experimenting with the pix2pixHD algorithm on the extraction of internal tides.

7 Administrative and Management Experience

7.1 Examiner activities

- PhD panel member (mentor) of Belal Abdelhadi, University of Hamburg, Nov 2025 – present
- PhD panel member of Buu-Lik Duong, University of Bremen, May 2025 – present
- Referee of two M.Sc. projects in Computational and Applied Mathematic, University of Edinburgh, fall 2023.
- Judge for the Outstanding Student and PhD candidate Presentation contest at the EGU General Assembly, 04/2023.

7.2 Personnel administration

- Led the selection process of a PhD student at University of Hamburg in 2024. Drafted and distributed the job advertisement. Selected the candidates for interviews from the pool of applicants. 6 interviews were conducted, each around 30 minutes long, hosted by me and 1-2 other faculty panel members. Designed all the pre-prepared interview questions. Informed interviewees the decisions of their applications personally. Completed the administrative paperwork. The student admitted (enrolled in 2025/01) is being supervised by me.

8 Community Interaction

- In 04/2019, I volunteered as a lecturer at the Courant cSplash event taking place in New York, where I gave a lecture to high school students, explaining how to debunk flat-earth theories by the existence of variations in gravitational acceleration and the Coriolis force.
- In 10/2022 – 10/2023, I collaborated with the ICMS Visiting Fellow in Music and contributed the development of a symphony musical piece that demonstrates some ideas in wave-mean interactions in the ocean. The musical piece was performed in Edinburgh (free to the public), and I gave an oral presentation about this experience, titled "'Resonance', A Musical Response To Research In Geophysical Fluid Dynamics" at an outreach session in the Ocean Science Meeting in 2024/02