

Thomas Wilder

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Education

- Ph.D., Physical Oceanography**, University of East Anglia, Norwich, UK. 2018 - 2022
- MSc, Applied Mathematics (Distinction)**, The University of Manchester, Manchester, UK. 2016 - 2017
- BSc, Mathematics (First class with Honours)**, Oxford Brookes University, Oxford, UK. 2012 - 2015

Research Interests

- Machine Learning
- Ocean mesoscale processes
- Mixing closures
- Southern Ocean circulation
- Climate model development

Publications

In Prep

- Wilder, T., Swaminathan, R., Storkey, D., and Kuhlbrodt, T. A machine learning mesoscale eddy parameterisation for NEMO.
- Sweeny, A., Tailleux, R., and Wilder, T. Available potential energy diagnostics in the Southern Ocean in a global ocean sea-ice configuration.

Published

- Wilder, T. and Kuhlbrodt, T. (2025) Examining the Fidelity of Leith Subgrid Closures for Parameterizing Mesoscale Eddies in Idealized and Global (NEMO) Ocean Models. *J. Adv. Model. Earth Syst.* <https://doi.org/10.1029/2025MS004950>
- Kuhlbrodt, T., Swaminathan, R., Ceppi, P., and Wilder, T. (2024) A Glimpse into the Future: The 2023 Ocean Temperature and Sea Ice Extremes in the Context of Longer-Term Climate Change. *Bull. Am. Meteorol. Soc.*, 105, E474-E485, doi.org/10.1175/BAMS-D-23-0209.1.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. (2023) Constraining an eddy energy dissipation rate due to relative wind stress for use in energy budget-based eddy parameterisations. *Ocean Sci.*, 19, 1669-1686, doi.org/10.5194/os-19-1669-2023.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. (2022) The Response of a Baroclinic Anticyclonic Eddy to Relative Wind Stress Forcing. *J. Phys. Oceanogr.*, 52, 2129-2142, doi.org/10.1175/JPO-D-22-0044.1.

Professional Experience

National Centre for Atmospheric Science, University of Reading 2022 - Present

Postdoctoral Research Associate

- Implemented new viscosity parameterisations into the NEMO ocean model and examined their impact in an eddy-permitting global ocean sea-ice model, GOSI9, resulting in a publication in JAMES.
- Worked with the eddy closure working group to implement Leith schemes into the NEMO version 5.x trunk for wider community use.
- Collaborated with colleagues across Europe to develop a data-driven eddy parameterisation.
- Co-led the organisation of a scientific workshop, Machine Learning for Ocean Modelling, attracting 102 registrations and 56 in-person attendees.
- Co-convended the EGU 2026 session, Machine Learning for Ocean Science.
- Awarded the Early Career Output prize in the environmental research theme.

University of East Anglia

2018 - 2022

Researcher

- Developed and ran parallel model experiments on an HPC cluster, computing an eddy energy budget

to examine the effects of relative wind stress on mesoscale eddies.

- Led the publication of the article “The Response of a Baroclinic Anticyclonic Eddy to Relative Wind Stress Forcing” in the Journal of Physical Oceanography, which has been cited ten times.
- Presented research findings at the EGU General Assembly to an audience of 40+.

GO-SHIP Cruise Member

- Collected and analysed hydrographic data along a 26N Atlantic transect, monitoring changes in North Atlantic ocean circulation.

UK Biobank

2017 - 2018

Project Support Officer

Passle

2016

Marketing Internship

Journal Reviews

- Journal of Fluid Mechanics, Cambridge University Press
- Ocean Dynamics, Springer
- Journal of Physical Oceanography, AMetSoc
- Ocean Sciences, EGU
- Ocean Modelling, Elsevier

Awards

University of Reading

2024

- Early Career Output prize in the environmental research theme for the journal article entitled “Constraining an eddy energy dissipation rate due to relative wind stress for use in energy budget-based eddy parameterisations”.

Professional Memberships

- European Geosciences Union
- American Geophysical Union

Invited Talks

- Wilder, T., Swaminathan, R., and Kuhlbrodt, T. Machine Learning Subgrid Eddy Parameterisation. Potsdam Institute for Climate Impact Research (PIK), 2026.
- Wilder, T., Swaminathan, R., and Kuhlbrodt, T. AI4PEX: Developing a Machine Learning eddy parameterisation for NEMO. Joint Marine Modelling Programme (JMMP) annual meeting, 2024.
- Wilder, T., Kuhlbrodt, T. Implementing Leith viscosities in NEMO: Results from idealised and realistic configurations. University of Oxford, Department of Earth Science, Oxford, UK, 2023.

Conference Talks

- Wilder, T., Swaminathan, R., and Kuhlbrodt, T. A Machine Learning Approach for Predicting Eddy Energy in a Scale-Aware Eddy Parameterisation and its Evaluation in an Idealised NEMO Configuration. Ocean Sciences Meeting, Glasgow, UK, 2026.
- Wilder, T., Swaminathan, R., and Kuhlbrodt, T. Progress in the development of a machine learning eddy parameterisation. DRAKKAR NEMO workshop, Grenoble, Fr, 2026.
- Wilder, T., Swaminathan, R., and Kuhlbrodt, T. Predicting mesoscale eddy energy using a convolutional neural network. Machine Learning for Ocean Modelling workshop, Reading, UK, 2025.
- Wilder, T., Kuhlbrodt, T. On the implementation of Leith viscosities in NEMO: Results from a forced global ocean model. European Geosciences Union General Assembly, Vienna, Aust, 2024.
- Kuhlbrodt, T., Swaminathan, R., Ceppi, P., and Wilder, T. A glimpse into the future: The 2023 temperature extremes in the North Atlantic in the context of longer-term climate change. European Geosciences Union General Assembly, Vienna, Aust, 2024.
- Wilder, T., Kuhlbrodt, T. Implementing Leith viscosities in NEMO: Results from a realistic global

configuration GOSI9. DRAKKAR NEMO workshop, Grenoble, Fr, 2024.

- Wilder, T., Kuhlbrodt, T. Can Southern Ocean circulation in ORCA025 be improved using a flow-aware viscosity scheme? DRAKKAR NEMO workshop, Grenoble, Fr, 2023.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. The Energetics of a Mesoscale Eddy in Response to Relative Wind Stress. EGU, Vienna, Aust, 2022.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. The Response of a Baroclinic Anticyclonic Eddy to Relative Wind Stress Forcing. Climate Process Team Meeting, Virtual/Boulder, USA, 2022.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. The Response of a Baroclinic Anticyclonic Eddy to Relative Wind Stress Forcing. Ocean Sciences Meeting, Virtual/Hawaii, USA, 2022.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. Role of Relative Wind Stress in Generating Eddy Instabilities. EGU General Assembly, Virtual/Vienna, Aust, 2021.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. Predicting the damping of eddy energy. British Antarctic Survey Student Symposium, Virtual/Cambridge, UK, 2020.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. Predicting the damping of barotropic eddy energy. Challenger Ocean Modelling Workshop, Edinburgh, UK, 2019.

Conference Posters

- Wilder, T., Chegini, F., and Li, H. Towards model-independent machine learning parameterisations of meso-scale eddies. EGU, Vienna, 2026.
- Wilder, T., Swaminathan, R., and Kuhlbrodt, T. Progress in the development of a machine learning eddy parameterisation. DRAKKAR NEMO workshop, Grenoble, Fr, 2026.
- Wilder, T., Swaminathan, R., and Kuhlbrodt, T. Developing a data and physics driven machine learning mesoscale eddy parameterisation for NEMO. EGU, Vienna, 2025.
- Wilder, T., Kuhlbrodt, T. Implementing Leith viscosities in NEMO: Results from a realistic global configuration GOSI9. DRAKKAR NEMO workshop, Grenoble, Fr, 2024.
- Wilder, T., Kuhlbrodt, T. The implementation of a flow-aware viscosity scheme in NEMO. Earth System Models for the Future 2025 General Assembly, Grenoble, Fr, 2023.
- Wilder, T., Kuhlbrodt, T. Can Southern Ocean circulation in ORCA025 be improved using a flow-aware viscosity scheme? DRAKKAR NEMO workshop, Grenoble, Fr, 2023.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. Eddy-Wind Interaction: An Energetic Perspective. C-CLEAR-ARIES Doctoral Alliance Student Conference, Cambridge, UK, 2022.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. Surface winds remove eddy energy. STEM for Britain, London, UK, 2020.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. The Damping of Eddy Energy by the Relative Wind Stress. British Antarctic Survey Student Symposium, Cambridge, UK, 2019.

Internal and Group Talks

- Sommer, A., and Wilder, T. Overview of Machine Learning for Ocean Modelling Workshop. University of Reading, NCAS, Reading, UK, 2025.
- Wilder, T., Swaminathan, R., and Kuhlbrodt, T. Developing a machine learning mesoscale eddy parameterisation. University of Reading, Climate & Ocean Dynamics, Reading, UK, 2025.
- Wilder, T., Kuhlbrodt, T. Implementing Leith viscosities in NEMO: Results from idealised and realistic configurations. University of Reading, Climate & Ocean Dynamics, Reading, UK, 2024.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. Constraining an Ocean Eddy Energy Dissipation Rate due to Relative Wind Stress. University of Reading, Climate & Ocean Dynamics, Reading, UK, 2022.
- Wilder, T., Zhai, X., Munday, D., and Joshi, M. Damping of mesoscale ocean eddies by relative wind stress. University of East Anglia, Centre for Ocean and Atmospheric Sciences, Norwich, UK, 2022.

Teaching

- Guest lecture on Machine Learning and Ocean Modelling to MSc students, Potsdam Institute for Climate Impact Research (PIK), 2026.
- Master's project supervision, University of Reading, 2025.

Core Skills

- Programming: Python, Fortran
- Ocean Modelling: NEMO, MITgcm
- HPC: JASMIN, Monsoon3, ARCHER2, LUMI
- Tools: LaTeX, Git
- Scientific Expertise: Fluid dynamics

Soft Skills

Project management

- Organised and facilitated the Climate and Ocean Dynamics seminar series.
- Co-ordinated multi-author manuscript preparation and revisions through peer review to publication..
- Co-led the organisation of the Machine Learning for Ocean Modelling workshop.

Communication

- Delivered a guest lecture to MSc students at PIK.
- Presented current research at the Ocean Sciences Meeting 2026 in Glasgow.
- Authored a blog post for the University of Reading Environmental research theme.

Collaboration and Leadership

- Worked with the eddy closure group to implement Leith viscosity in NEMO version 5.x.
- Collaborated with national and international partners through European research projects.
- Served on the organising committee for the Met Department research away-day.