Academic Curriculum Vitae

Timothy Charles Andrews

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Place of Birth: Croydon, England
Nationality: Dual citizen of New Zealand and the United Kingdom
New Zealand Permanent Residence: 28 Plympton St, New Plymouth, 4310
United States Current Residence: 1105 Nielsen Court, Apt 6, Ann Arbor, Michigan, 48105
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Research Interests

- Numerical modelling of geophysical fluid equations
- Development and testing of dynamical cores for Global Circulation Models (GCMs)
- Diffusion mechanisms in dynamical cores
- Analysis and comparison of timestepping methods
- The phase-averaged timestepping method for oscillatory PDEs

Academic Positions

Postdoctoral Research Fellow - Department of Climate and Space Science, University of Michigan, United States of America (October 2024 – October 2026)

Education

Doctor of Philosophy (PhD) in Mathematics (Geophysical Fluid Dynamics) — University of Exeter, United Kingdom (September 2020 – September 2024)
Bachelor of Engineering with First Class Honours, specialising in Engineering Science — University of Auckland, New Zealand (2016–2019)

Presentations

- Poster presentation at the 2025 American Geophysical Union (AGU) conference (New Orleans, United States)
- Oral presentation at the 2025 Community Earth System Model (CESM) workshop (Boulder, United States)
- Oral presentation at the 2025 'PDEs on the Sphere' conference (São Paulo, Brazil).
- Oral presentation at PinT 2023 conference (Hamburg, Germany)
- Oral presentation at the 2023 'PDEs on the Sphere' conference (Grenoble, France)
- Poster presentation at the European Geophysical Union (EGU) conference, 2023 (Vienna, Austria)
- Visiting seminar at the National Institute of Water and Atmospheric Research (NIWA), 2023 (Wellington, New Zealand)
- Poster presentation at the 2022 conference 'Solvers for frequency-domain wave problems and applications' (Glasgow, United Kingdom)

Scientific

Submitted manuscripts

- Andrews T. C., Jablonowski C., and Hughes O. K., and Bendall T. M. (2026),'A mountain-generated mesoscale test case from DCMIP-2025: Gap flow and vortex shedding variants'. Submitted to Geophysical Model Development.
- Andrews, T. C., Bendall, T. M. (2026) 'A conservative, discontinuous Galerkin, tracer transport scheme using compatible finite elements.' Submitted to the Journal of Computational Physics and available as an arXiv preprint at `https://arxiv.org/abs/2603.19075`.
- Andrews. T. C, Jablonowski C. (2025). 'Stability analyses of divergence and vorticity damping on gnomonic cubed-sphere grids'. Accepted for publication at Monthly Weather Review on 30/4/2026. Also available as an arXiv preprint at `https://arxiv.org/abs/2505.05624`.
- Andrews, T. C., Wingate, B. A. (2024). 'A mean correction for improved phase-averaging accuracy in oscillatory, multiscale, differential equations'. Submitted to Theoretical and Computational Fluid Dynamics and available as an arXiv preprint at `https://arxiv.org/abs/2404.03964`.

Preprints

- Andrews, T. C., Shipton, J., Wingate, B. (2023), 'The effect of linear dispersive errors on nonlinear timestepping accuracy in the f-plane rotating shallow water equations'. Available as an arXiv preprint at `https://arxiv.org/abs/2305.06685`.

In Preparation

- Andrews, T. C., Jablonowski C., (2026), 'A study of momentum equation diffusion in the CAM-FV3 dynamical core using baroclinic wave simulations'. In preparation for submission to Geophysical Model Development.
- Andrews T. C., Duru K., Lee D., (2026) 'A perfectly matched layer for damping vertically propagating waves in the nonlinear, compressible Boussinesq equations'. In preparation for submission to the Journal of Computational Physics.

PhD Thesis

PhD Thesis from the University of Exeter: 'Using nonlinear interactions to quantify and improve timestepping accuracy in the Rotating Shallow Water Equations' (2024). Available at:
`https://ore.exeter.ac.uk/articles/thesis/29811980?file=56858228`.

Other Research Experience and Skills

- A code developer for the Gusto, a compatible finite element library for solving the geophysical fluid equations (`https://www.firedrakeproject.org/gusto`).
- Connections with the UK Met Office, including contributing some code to the trunk of LFRic's shallow water mini app.
- Collaborations with Alex Pletzer at NIWA (New Zealand) around mimetic vector interpolation for LFRic, including comparing different Jacobian approximations.
- I can use the programming languages of Python, Fortran, MATLAB, R, and Visual Basic.
- Summer Internship research project at the Methanex New Zealand plant in Taranaki. This focused on using extreme value statistics to extrapolate the states of the plant's processing devices, given a small testing sample (2018-2019).
- Summer Research Scholarship project in the Precision Acoustic Group, within the University of Auckland Physics Department. I investigated using reflected acoustic measurements to estimate soil moisture properties (2017-2018).

Academic Service

- Volunteer peer reviewer for AMS Journals (2025).
- Instructor at the DCMIP-2025 summer school (`https://sites.google.com/umich.edu/dcmip-2025`) (2025).
- Judge for the Michigan Geophysical Union annual symposium (2025).
- Coordinator for scientific committee elections for the Parallel-in-time (PinT) community (2023, 2025).

Academic Achievements

During my bachelor's degree in Engineering Science:

2019
First in Course Awards for:
ENGSCI 711: Advanced Mathematical Modelling
ENGSCI 740: Advanced Mechanics in Research and Technology
ELECTENG 733: Signal Processing

2018
First in Course Awards for:
ENGSCI 314: Mathematical Modelling 3
ENGSCI 343: Mathematical and Computational Modelling in Mechanics
ENGSCI 344: Modelling and Simulation in Computational Mechanics
ENGSCI 391: Optimisation in Operations Research
MECHENG 325: Dynamics of Fluids and Structures

2017
First in Course Awards for:
ENGSCI 233: Computational Techniques and Computer Systems
ENGSCI 255: Modelling in Operations Research

2016 – 2018
Named on the University of Auckland Dean's Honours List for Top Engineering Students of the Year

Last year of High School:

2015
Dux of New Plymouth Boys' High School (NPBHS)
NZQA Scholarships attained in Physics, Statistics, and Economics
Awarded an IPENZ Foundation Scholarship to study Engineering

Teaching

- Guest lecturer for CLIMATE401: Geophysical FLuid Dynamics, University of Michigan (2025)
- Teaching assistant for NSC1002 Mathematics and Computing, University of Exeter (2022).
- High School maths and physics tutor for Taranaki Tutors, New Plymouth, New Zealand (2020–2022).

Other Achievements

- Ran the Wanganui marathon (42km) in under three and a half hours (2019)
- Have completed four half marathon runs
- Completed the 'Lake Taupo Cycle Challenge' (Approx. 160km) (2018)
- Member of the Auckland University Division 1 Men's hockey team (2016-2017)

- Member of the 1st XI NPBHS Hockey team (2013-2015)
- Member of the NPBHS Senior Debating Team (2015)

Hobbies

I am passionate about outdoor activities such as hiking (we call it tramping in New Zealand!) and running. I love planning and executing multiple-day adventures in the forest parks of New Zealand. I am also aiming to complete the New Zealand Coast to Coast challenge sometime. In my spare time, when I'm not enjoying nature, I relax by cooking and reading epic fantasy books.

Academic Referees

Professor Beth Wingate - Department of Mathematics and Statistics, University of Exeter (Emeritus)
PhD supervisor
b.wingate@exeter.ac.uk

Professor Christiane Jablonowski - Department of Climate and Space Sciences and Engineering, University of Michigan
Postdoctoral research supervisor
cjablono@umich.edu