Academic Curriculum Vitae

Timothy Charles Andrews

November 23, 2026

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
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Research Interests

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

Academic Positions

Postdoctoral Research Fellow - Department of Climate and Space Science, University of Michigan, United States of America (October 2024 – October 2027)

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)

Scientific Articles

Peer-Reviewed Articles

- **Andrews, T. C.**, and Jablonowski, C. (2026): Stability Analyses of Divergence and Vorticity Damping on Gnomonic Cubed-Sphere Grids. Monthly Weather Review, 154, 1317–1336, https://doi.org/10.1175/MWR-D-25-0192.1.
- **Andrews, T. C.**, and Wingate, B.A. (2026): A numerical study of mean corrected phase-averaging in geophysical flow equations. Theoretical and Computational Fluid Dynamics. 40, 28. https://doi.org/10.1007/s00162-026-00797-x

Manuscripts in review

- **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 Geoscientific Model Development, available online at https://egusphere.copernicus.org/preprints/2026/egusphere-2026-2293.
- **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.
- Pletzer, T., Pletzer, A., **Andrews, T. C.**, Lin, D., and Katurji, M. (2026): Mimetic interpolation for finite-time Lyapunov exponent computation near irregular domain boundaries, submitted to Geoscientific Model Development, available online at https://egusphere.copernicus.org/preprints/2026/egusphere-2026-3377, 2026.
- Jemma Shipton, Thomas M. Bendall, Colin J. Cotter, ... **Timothy C. Andrews** ... (2026): Gusto: a toolkit for compatible finite element dynamical cores. Submitted to Geoscientific Model Development, available as an arXiv pre-print: https://arxiv.org/abs/2611.17540
- **Andrews, T. C.**, Forcone N., Androski N., Hughes O., and Jablonowski C., (2026): On the numerical representation of atmospheric Lamb waves in dynamical cores. Submitted to the Quarterly Journal of the Royal Meteorological Society and available as an arXiv preprint at https://arxiv.org/html/2611.18902v1

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.
- **Andrews T. C.**, Duru K., Lee D., (2026) 'A perfectly matched layer for damping vertically propagating waves in the nonlinear, compressible Boussinesq equations'. Available as an ArXiv preprint at https://arxiv.org/abs/2606.28303.

In Preparation

- **Andrews, T. C.**, Jablonowski C.,, 'A study of momentum equation diffusion in the CAM-FV3 dynamical core using baroclinic wave simulations'. In preparation for submission to Geoscientific Model Development.
- **Andrews, T. C.**, Pletzer A., Pletzer T., and Jablonowski C., 'Mimetic interpolation of D-grid winds on the gnomonic cubed-sphere'. In preparation for submission to Monthly Weather Review.

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.

Selected Presentations

- Poster presentation at EGU 2026: **Andrews, T.**, Jablonowski, C., Hughes, O., and Bendall, T.: New mountain-generated mesoscale flow test cases from DCMIP2025, EGU General Assembly 2026, Vienna, Austria, 3–8 May 2026, EGU26-2009, https://doi.org/10.5194/egusphere-egu26-2009.
- Poster presentation at AGU 2025: **Andrews, T.**, Jablonowski, C.,: 'New mountain-generated meso-scale flow test cases for dynamical cores', AGU Fall Meeting 2025, held in New Orleans, LA, 15-19 December 2025, https://scixplorer.org/abs/2025AGUFMA41J.2159A/abstract?fromADS=true&ads_compat=1.
- Oral presentations at the 2025 and 2026 Community Earth System Model (CESM) workshops (Boulder, United States)
- Oral presentation at the 2025 'PDEs on the Sphere' conference (São Paulo, Brazil)
- Oral presentation at the Parallel-in-Time (PinT) 2023 workshop (Hamburg, Germany)

- Oral presentation at the 2023 'PDEs on the Sphere' conference (Grenoble, France)
- Poster presentation at EGU 2023: **Andrews, T.**, Wingate, B., and Shipton, J.: Quantifying the accuracy of large time-steps in highly oscillatory systems, EGU General Assembly 2023, Vienna, Austria, 23–28 Apr 2023, EGU23-14086, https://doi.org/10.5194/egusphere-egu23-14086, 2023.
- Visiting seminar at the National Institute of Water and Atmospheric Research (NIWA), 2023 (Wellington, New Zealand)

Other Research Experience and Skills

- A code developer for Gusto, a compatible finite element library for solving the geophysical fluid equations (`https://www.firedrakeproject.org/gusto`).
- Connections with the UK Met Office, including code contributions to the trunk of LFRic's shallow water mini app.
- Collaborations with Alex Pletzer at NIWA (New Zealand) for mimetic vector interpolation for LFRic, including comparing different Jacobian approximations.
- Proficiency in Python and Fortran coding, and have also used MATLAB and R.
- Experience with HPC systems, including Derecho (NCAR, United States) and Isambard (United Kingdom).

Academic Service

- Co-organiser for the 2027 'PDEs on the Sphere' workshop, to be held at the University of Michigan in July 2027.
- 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).

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).

Academic Achievements

- Named on the University of Auckland Dean's Honours List for Top Engineering Students of the Year (2016, 2017, 2018)
- Ten first in course awards during my Engineering degree
- Dux of New Plymouth Boys' High School (2015)
- NZQA Scholarships in Physics, Statistics, and Economics (2015)

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