

# Geoffrey J. Stanley

School of Earth and Ocean Sciences  
Bob Wright Centre A405  
University of Victoria  
PO Box 1700 STN CSC  
Victoria BC V8W 2Y2, Canada

Phone: +1 250 721 6176  
Email: [gstanley@uvic.ca](mailto:gstanley@uvic.ca)  
Web: <http://geoffstanley.github.io>

## EDUCATION

- Doctor of Philosophy, University of Oxford, UK (2018)  
Atmospheric, Oceanic, & Planetary Physics  
Thesis: *Tales from Topological Oceans*.  
Supervisor: David Marshall
- Master of Science, University of Victoria, Canada (2013)  
School of Earth and Ocean Sciences  
Thesis: *From winds to eddies to diapycnal mixing of the deep ocean: the abyssal meridional overturning circulation driven by the surface wind-stress*.  
Supervisors: Oleg Saenko and Andrew Weaver
- Bachelor of Mathematics, University of Waterloo, Canada (2011)  
Applied Mathematics (Mathematical Physics) & Pure Mathematics Double Major  
Dean's Honours List, With Distinction

## ACADEMIC EMPLOYMENT

- 2022 - present: Banting Postdoctoral Fellow
  - School of Earth and Ocean Sciences, University of Victoria, Canada
  - Supervisors: Adam Monahan, James Anstey
- 2021 - 2022: Visiting Fellow
  - Research School of Earth Sciences, Australian National University, Australia
  - Supervisor: Andy Hogg
- 2019 - 2022: Postdoctoral Fellow
  - School of Mathematics and Statistics, University of New South Wales, Australia
  - Supervisor: Trevor McDougall

## JOURNAL ARTICLES

- Bisits, J. I., **Stanley, G. J.**, & Zika, J. D. (2022). Can We Accurately Quantify a Lateral Diffusivity from A Single Tracer Release? *Journal of Physical Oceanography*. <https://doi.org/10.1175/JPO-D-22-0145.1>
- Malan, N., Roughan, M., **Stanley, G. J.**, Holmes, R., & Li, J. (2022). Quantifying cross-shelf transport in the East Australian Current System: A budget-based approach. *Journal of Physical Oceanography*, 52(10), 2555-2572. <https://doi.org/10.1175/JPO-D-21-0193.1>
- **Stanley, G. J.**, & Marshall, D. P. (2022). Why Mean Potential Vorticity Cannot Be Materially Conserved in the Eddying Southern Ocean. *Journal of Physical Oceanography*, 52(8), 1629-1654. <https://doi.org/10.1175/JPO-D-21-0195.1>
- **Stanley, G. J.**, McDougall, T. J., & Barker, P. M. (2021). Algorithmic improvements to finding approximately neutral surfaces. *Journal of Advances in Modeling Earth Systems*, 13(5), e2020MS002436. <https://doi.org/10.1029/2020MS002436>

- McDougall, T. J., Barker, P. M., & **Stanley, G. J.** (2021). Spice variables and their use in physical oceanography. *Journal of Geophysical Research: Oceans*, 126(2), e2019JC015936. <https://doi.org/10.1029/2019JC015936>
- Lang, Y., **Stanley, G. J.**, McDougall, T. J., & Barker, P. M. (2020). A pressure-invariant Neutral Density variable for the World's Oceans. *Journal of Physical Oceanography*, 50(12), 3585-3604. <https://doi.org/10.1175/JPO-D-19-0321.1>
- **Stanley, G. J.**, Dowling, T. E., Bradley, M. E., & Marshall, D. P. (2020). Ertel Potential Vorticity versus Bernoulli Potential on Approximately Neutral Surfaces in the Antarctic Circumpolar Current. *Journal of Physical Oceanography*, 50(9), 2621-2648. <https://doi.org/10.1175/JPO-D-19-0140.1>
- Groeskamp, S., de Lavergne, C., Holmes, R., Tamsitt, V., Frenger, I., Chapman, C. C., Newsom, E., & **Stanley, G. J.** (2019). Climate Recorded in Seawater: A Workshop on Water-Mass Transformation Analysis for Ocean and Climate Studies. *Bulletin of the American Meteorological Society*, 100(9), ES243-ES247. <https://doi.org/10.1175/BAMS-D-19-0153.1>
- Padget, O., **Stanley, G.**, Willis, J. K., Fayet, A. L., Bond, S., Maurice, L., Shoji, A., Dean, B., Kirk, H., Juarez-Martinez, I., Freeman, R., Bolton, M., & Guilford, T. (2019). Shearwaters know the direction and distance home but fail to encode intervening obstacles after free-ranging foraging trips. *Proceedings of the National Academy of Sciences*, 116(43), 21629-21633. <https://doi.org/10.1073/pnas.1903829116>
- **Stanley, G. J.** (2019b). The exact geostrophic streamfunction for neutral surfaces. *Ocean Modelling*, 138, 107-121. <https://doi.org/10.1016/j.ocemod.2019.04.002>
- **Stanley, G. J.** (2019a). Neutral surface topology. *Ocean Modelling*, 138, 88-106. <https://doi.org/10.1016/j.ocemod.2019.01.008>
- Cheng, R., Jackson, D. M., & **Stanley, G. J.** (2018). Combinatorial Aspects of the Quantized Universal Enveloping Algebra of  $\mathfrak{sl}_{n+1}$ . *Annals of Combinatorics*, 22(4), 681-710. <https://doi.org/10.1007/s00026-018-0404-2>
- **Stanley, G. J.**, & Saenko, O. A. (2014). Bottom-Enhanced Diapycnal Mixing Driven by Mesoscale Eddies: Sensitivity to Wind Energy Supply. *Journal of Physical Oceanography*, 44(1), 68-85. <https://doi.org/10.1175/JPO-D-13-0116.1>

## NON-PEER REVIEWED ARTICLES

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- **Stanley, G.**, 2014: The most minimal seed for transition to turbulence in shear flow. Tech. Rep. Proceedings Volume 2014, Woods Hole Oceanographic Institution, 359-384 pp.

## CONFERENCE PROCEEDINGS / SEMINARS / WORKSHOPS

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### CONFERENCE PRESENTATIONS: ORAL

- **Stanley G. J.**, T. J. McDougall, and P. M. Barker, Algorithmic improvements to finding approximately neutral surfaces Ocean Sciences Meeting, Abstract Number 3737, 28 February-4 March 2022.
- **Stanley G. J.**, The topology of neutral surfaces and their exact geostrophic streamfunction Ocean Sciences Meeting, Abstract Number PL53B-06, 16-21 February 2020. San Diego, CA, USA.
- **Stanley G. J.**, The topology of neutral surfaces and their exact geostrophic streamfunction, IUGG General Assembly, 8-18 July, 2019. Montreal, Canada.
- **Stanley G. J.**, Neutral Surface Topology, Physical Oceanography Dissertation Symposium X, 21-25 October 2018. Kona, HI, USA.
- **Stanley G. J.**, An exact geostrophic stream function on a neutral surface, Ocean Modelling Group, 9 September 2016. Liverpool, UK.
- **Stanley G. J.** and D. P. Marshall, Inferring Large-Scale Bottom Velocity from Sparse Data, Ocean Modelling Group meeting, 21-22 September 2015. Corpus Christi College, Cambridge, UK.
- **Stanley G. J.** and D. P. Marshall, Predicting Bottom Velocities from Deep ARGO, IUGG General Assembly, 22 June-2 July 2015. Prague, Czech Republic.
- **Stanley G. J.** and O. A. Saenko, Diapycnal mixing parameterized by energy release from mesoscale eddies, IAHS-IAPSO-IASPEI Joint Assembly, Abstract Number P03S3.06, 22-26 July 2013. Gothenburg, Sweden.

## CONFERENCE PRESENTATIONS: POSTERS

- **Stanley, G. J.**, T. E. Dowling, M. E. Bradley, D. P. Marshall, Ertel Potential Vorticity versus Bernoulli Potential on Approximately Neutral Surfaces in the Antarctic Circumpolar Current, IUGG General Assembly, 8–18 July, 2019. Montreal, Canada.
- **Stanley G. J.** and D. P. Marshall, Inferring Large-Scale Bottom Velocity from Sparse Data, Ocean Sciences Meeting, Abstract Number OD14B-2421, 21–26 February 2016. New Orleans, LA, USA.
- **Stanley G. J.** and O. A. Saenko, On the Energetics of Oceanic Mesoscale Eddies and their Parameterization Modified to Induce Diapycnal Mixing, AGU Fall Meeting, 3–7 December 2012. San Francisco, CA, USA.
- **Stanley G. J.** and O. A. Saenko, On the Energetics of Oceanic Mesoscale Eddies and their Parameterization Modified to Induce Diapycnal Mixing, Graduate Climate Conference, 26–28 October 2012. Pack Forest, WA, USA.

## SEMINARS

- **Stanley G. J.**, Topology and Optimization for Neutral Surfaces in the Ocean, *One World Mathematics of Climate*, April 5, 2022. Online global seminar series.
- **Stanley G. J.**, The topology of neutral surfaces and their exact geostrophic streamfunction, September 3, 2019. University of Toronto, Toronto ON, Canada.
- **Stanley G. J.**, The topology of neutral surfaces and their exact geostrophic streamfunction, August 2, 2019. Woods Hole Oceanographic Institution Geophysical Fluid Dynamics Summer School, Woods Hole, MA, USA.
- **Stanley G. J.**, The topology of neutral surfaces and their exact geostrophic streamfunction, May 21, 2019. Institute for Marine and Antarctic Studies, Hobart, Australia.
- **Stanley G. J.**, The topology of neutral surfaces and their exact geostrophic streamfunction, 7 March 2019. University of New South Wales, Sydney, Australia.
- **Stanley G. J.** and N. R. Lebovitz, The Most Minimal Seed for the Onset of Shear Turbulence, Geophysical Fluid Dynamics Program, Woods Hole Oceanographic Institution, 19 August 2014. Woods Hole, MA, USA.
- **Stanley G. J.** and O. A. Saenko, From Winds to Eddies to Diapycnal Mixing over Topography: Driving the Abyssal Meridional Overturning Circulation, National Oceanography Centre, 19 March 2014. Southampton, UK.

## WORKSHOPS

- Water Mass Transformation for Ocean Physics and Biogeochemistry 4–6 February 2019. UNSW Sydney, NSW, Australia.

## MENTORING EXPERIENCE

Jan 2019 – Sept 2022	Aaron Lang (co-advisor)	UNSW Mathematics PhD candidate
Feb – Nov 2021	Josef Bisits (co-advisor)	UNSW Mathematics Honours student (First Class)
Feb – Nov 2020	Alexander Robinson (primary advisor)	UNSW Mathematics Honours student (First Class)
May – Oct 2020	Garrett Finucane (primary advisor)	University of Washington, summer research assistant
June – Aug 2019	Houssam Yassin (co-advisor)	Woods Hole Oceanographic Institution, Geophysical Fluid Dynamics summer school Fellow

## TEACHING EXPERIENCE

2016	Tutor for Geophysical Fluid Dynamics	Masters course in Mathematical Physics, U Oxford
2014	Tutor for Flows, Fluctuations, and Complexity	3rd year course B1, Mansfield College, U Oxford
2012	Lab Instructor for Oceans and Atmospheres	1st year course, EOS 110, U Victoria
2011	Marker for Earth System Modelling	2nd year course, EOS 225, U Victoria
2007	Marker for Advanced Calculus 1	1st year course, MATH 147, U Waterloo

## SELECTED ACADEMIC AWARDS

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2018	Physical Oceanography Dissertation Symposium (PODS) Invited Participant	National Science Foundation (US)
2014	Geophysical Fluid Dynamics Fellowship	Woods Hole Oceanographic Institution
2013 — 2016	Clarendon Fund Scholarship	U Oxford
2013 — 2016	Canadian Alumni Scholarship	Linacre College, Oxford
2012	Gagnon Memorial Scholarship	U Victoria
2011	NSERC Julie Payette Research Scholarship (to the top 24 applicants for MSc funding)	Canada
2011	K.D. Fryer Gold Medal (to one top Math graduate exemplifying good student citizenship)	U Waterloo
2006 — 2010	René Descartes Scholarship	U Waterloo
2006 — 2010	Queen Elizabeth II Aiming for the Top Scholarship	Ontario
2007, 2008, 2010	NSERC Undergraduate Student Research Awards	Canada
2009	Robert Schaefer Memorial Award	U Waterloo
2008	President's Research Award	U Waterloo

## PROFESSIONAL ACTIVITIES

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2019	Staff member at the Geophysical Fluid Dynamics summer school, Woods Hole Oceanographic Institution
2015	Scientist aboard the <i>RRS Discovery</i> on the Extended Ellett Line
2015	Organizer of a 2-day Software Carpentry workshop, AOPP, U Oxford
2013 — 2015	Graduate Student Representative, U Oxford
2010	Undergraduate Representative to the Chair Selection Committee Department of Combinatorics and Optimization, University of Waterloo
2010	Conference Staff Volunteer, Canadian Undergraduate Mathematics Conference
ongoing	Peer reviewer for the Journal of Physical Oceanography, Fluids, Ocean Sciences, Journal of Geophysical Research: Oceans, Journal of Marine Science and Engineering, Journal of Climate, and the National Science Foundation.

## RESEARCH ASSISTANTSHIPS

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2010	Department of Combinatorics and Optimization University of Waterloo Project: <i>Straightening formulas in the quantized universal enveloping algebra <math>sl_2</math></i> Supervisor: David M. Jackson
2008	Department of Physics and Astronomy, University of Waterloo Project: <i>Numerical simulation of entropy evolution in merging galaxy clusters</i> Supervisor: Michael Balogh
2007	Institute for Quantum Computing, University of Waterloo Project: <i>Numerical simulation of a superconducting flux qubit and the fidelity of its quantum state</i> Supervisor: Frank Wilhelm
2006	Richard Lewar Centre for Excellence, Heart & Stroke Lab, University of Toronto Project: <i>Examining the electrophysiological structure of cardiac sodium ion channels</i> Supervisor: Peter Backx

## EXTRACURRICULAR EXPERIENCE

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2014 — 2015	Green Student: Technical & Financial Support Linacre College, Oxford
2012 — 2013	Co-Coordinator of Café Scientifique, a grassroots public science series Faculty of Science, University of Victoria
2008 — 2010	Residence Don, University of Waterloo Housing and Residence Leader and role model to over 100 students for 3 terms; awarded "Rookie of the Term"