

Andrew Gunn

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Education

Department of Earth & Environmental Science, University of Pennsylvania Philadelphia, U.S.A
Doctor of Philosophy 2016-current
GPA: 3.91. Advisor: Douglas Jerolmack. Thesis: Scale-dependent coupling between aeolian flow & form.

Institute for Marine & Antarctic Studies, University of Tasmania Hobart, Australia
Bachelor of Marine Science, Honours 2015
GPA: 4.0. Advisor: Maxim Nikurashin. Thesis: The role of mixing and wind for the meridional overturning circulation and ocean carbon.

School of Mathematics and Statistics, University of Melbourne Melbourne, Australia
Bachelor of Science 2012-2014
GPA: 3.1. Major: Applied Mathematics. Minor: Ocean & Atmosphere Science.

Fellowships & Appointments

Benjamin Franklin Fellow Philadelphia, U.S.A
Earth & Environmental Science, University of Pennsylvania 2016-current
Advisor: Douglas Jerolmack. Research: atmospheric boundary layer (ABL) and dune field interactions, sediment transport measurement techniques, continental slope failure & rheology. Methods: experiments, fieldwork, remote sensing, theory.

Research Fellow Philadelphia, U.S.A
Earth & Environmental Science, University of Pennsylvania 2016
Advisor: Irina Marinov. Research: GFDL GCM Weddell Sea convection dynamics, phytoplankton functional-type ecology models. Methods: computer simulations.

Tsuneichi Fujii Scholar Sapporo, Japan
Graduate School of Environmental Science, University of Hokkaido 2015
Advisors: Masakazu Yoshimori, Maxim Nikurashin. Research: Meridional overturning circulation (MOC) polynomials, MITgcm mixing and westerly MOC sensitivity testing, carbon-phosphate PDE coupling to MOC polynomials applied to the Last Glacial Maximum. Methods: theory, computer simulations.

Australian Research Council Climate System Science Scholar Hobart, Australia
Institute for Marine & Antarctic Studies, University of Tasmania 2015
Advisors: Maxim Nikurashin, Peter Strutton. Research: Semi-analytical MOC coupling with biogeochemical parameterisation model sensitivity and dynamics testing. Methods: theory, computer simulations.

Publications

1. **Gunn, A.**, P. Schmutz, M. Wanker, D. Edmonds, R. Ewing, and D. Jerolmack, Macroscopic flow disequilibrium over aeolian dune fields, *Geophysical Research Letters*.
2. Gadal, C., C. Narteau, R. Ewing, **A. Gunn**, D. Jerolmack, B. Andreotti, P. Claudin, Spatial and temporal development of the dune instability, *Geophysical Research Letters*.

In review

1. **Gunn, A.**, M. Wanker, N. Lancaster, D. Edmonds, R. Ewing, and D. Jerolmack, Circadian rhythm of dune-field activity, *Science Advances* (arXiv:1812.03612).

In preparation

1. **Gunn, A.** and D. Jerolmack, Conditions for aeolian transport in the Solar System.
2. Seiphoori, A., **A. Gunn**, S. Kosgodagan Acharige, P. Arratia and D. Jerolmack, Tuning sedimentation through surface charge and particle shape.
3. **Gunn, A.**, J. Nield, P. Delorme, M. Baddock, G. Wiggs, R. Ewing, and D. Jerolmack, In situ laser-plane imaging of wind-blown sand.

Seminars, Conference Proceedings & Invited Talks (underline denotes student mentee, * denotes scheduled)

Invited Talks & Seminars

1. ***University of Minnesota**, Saint Anthony Falls Laboratory Seminar, 9 March 2021, "Scale-dependent coupling between aeolian flow & form".
2. **University of Pennsylvania**, Physics & Astronomy 'Disordered Colloids, Nanoparticles, Atoms, and Particulates' Seminar, 25 June 2020, "Conditions for aeolian transport across the Solar System".
3. **Princeton University**, Environmental Fluid Mechanics Seminar, 20 May 2019, "Land-atmosphere coupling at White Sands Dune Field, NM".
4. **University of Pennsylvania**, BenTalks, 17 March 2017, "Turbulence suppresses glacial cycles".
5. **University of Pennsylvania**, Earth & Environmental Science Lunch Seminar, 12 September 2016, "Diapycnal mixing inhibits ocean carbon storage".

6. **University of Tasmania**, Thesis Defence Seminar, 24 November 2015, “The role of mixing and wind for the meridional overturning circulation and ocean carbon”.
7. **Australian National University**, Geophysical Fluid Dynamics Seminar, 24 November 2015, “A comparison of the role of mixing and wind for the meridional overturning circulation in theory and the MITgcm”.
8. **University of Hokkaido**, Ocean-Atmosphere Climate Dynamics Lecture, 1 September 2015, “The role of ocean mixing and Southern Ocean Westerlies for ocean carbon: theory development and comparison with a GCM”.
9. **Commonwealth Scientific & Industrial Research Organisation (CSIRO)**, Lunch Seminar, 30 July 2015, “Understanding ocean carbon’s response to wind and mixing: a theoretical and modelled approach”.
10. **Institute for Marine & Antarctic Studies**, Physical Oceanography Seminar, 11 February 2015, “The role of the deep ocean ventilation for the carbon uptake and storage in the ocean”.

Conference Presentations

1. ***A. Gunn**, D. Jerolmack, (2020) Conditions for aeolian transport in the Solar System, *American Geophysical Union Fall Meeting*, Submitted.
2. ***K. Cho, A. Gunn**, D. Jerolmack, (2020) Understanding formative winds of intracrater aeolian dunes on Mars, *American Geophysical Union Fall Meeting*, Submitted.
3. ***A. Gunn**, G. Casasanta, F. Falcini, N. Lancaster, D. Jerolmack, (2020) Long-term dune geometry bounded by geology and climate, *American Geophysical Union Fall Meeting*, Submitted.
4. C. Gadal, C. Narteau, R. Ewing, **A. Gunn**, D. Jerolmack, B. Andreotti, P. Claudin, (2020) Spatial and temporal development of the dune instability at White Sands Dune Field, USA, 6th *International Planetary Dunes Workshop*, Online Poster.
5. **A. Gunn**, N. Lancaster, R. Ewing, M. Wanker, D. Edmonds, F. Falcini, G. Casasanta, D. Jerolmack, (2019) Self-building landscapes: Sand seas grow by steering climate, *American Geophysical Union Fall Meeting*, **Oral Session**.
6. **R. Fetell, A. Gunn**, D. Jerolmack, (2019) Phase-space of sediment failure spanned by packing-fraction and grain-size, *American Geophysical Union Fall Meeting*, Poster Session.
7. **A. Gunn**, R. Ewing, M. Wanker, D. Edmonds, P. Schmutz, D. Jerolmack, (2019) Internal Boundary Layer Induced by Dune-Field Roughness, *American Physical Society Division of Fluid Dynamics*, **Oral Session**.
8. **A. Gunn**, D. Jerolmack, (2019) Dune geometry extraction from DEMs, *EarthCube, OpenTopography, U. Potsdam Point-cloud Workshop*, **Oral Session**.
9. **A. Gunn**, M. Wanker, D. Edmonds, R. Ewing, D. Jerolmack, (2019) How to make a dust storm: *In situ* observations at White Sands, New Mexico, *Australian Meteorological & Oceanographic Society Conference*, **Oral Session**.
10. D. Jerolmack, M. Houssais, B. Ferdowsi, C. Ortiz, N. Deshpande, **A. Gunn**, (2019) Phase transitions in geophysical flows, *European Geosciences Union General Assembly*, Oral Session.
11. **A. Gunn**, D. Jerolmack, (2019) Turbidity Current Rheology, *Northeast Complex Fluids & Soft Matter Symposium*, Poster Session.
12. **A. Gunn**, M. Wanker, K. Cheffer, D. Edmonds, R. Ewing, D. Jerolmack, (2018) The Unsung Aeolian Movers and Shakers: Atmospheric Stability and Humidity, *American Geophysical Union Fall Meeting*, **Oral Session**.
13. **A. Gunn**, **J. Daif**, D. Jerolmack, (2018) Experimental Turbidity Current Onset: Breaching Front Rheology, *American Geophysical Union Fall Meeting*, **Oral Session**.
14. **A. Gunn**, D. Jerolmack, (2018) Experimental Turbidity Current Onset: Breaching Front Rheology, *Binghamton Geomorphology Symposium*, Poster Session.
15. **A. Gunn**, M. Wanker, D. Edmonds, R. Ewing, D. Jerolmack, (2018) From geostrophic to grain: momentum transfer in aeolian systems, *International Conference on Aeolian Research*, **Oral Session**.
16. **A. Gunn**, D. Jerolmack, (2018) Coupled climate and dune feedbacks, *Wolman Club*, Poster Session.
17. **A. Gunn**, D. Jerolmack, (2018) Turbidity Current Rheology, *Northeast Complex Fluids & Soft Matter Symposium*, Poster Session.
18. **A. Gunn**, D. Jerolmack, D. Edmonds, R. Ewing, M. Wanker, S. David, (2017) Connecting meteorology to surface transport in aeolian landscapes: Peering into the boundary layer with Doppler lidar, *American Geophysical Union Fall Meeting*, **Oral Session**.
19. **A. Gunn**, D. Jerolmack, (2017) Diurnal Ekman layer cycles at White Sands, New Mexico observed with Doppler lidar, *American Physical Society Division of Fluid Dynamics*, **Oral Session**.
20. **A. Gunn**, D. Jerolmack, (2017) The role of diurnal surface heating for dune migration in White Sands, New Mexico, *International Association of Mathematical Geosciences*, Lightning Oral Session.
21. **A. Gunn**, D. Jerolmack, (2017) The role of diurnal surface heating for dune migration in White Sands, New Mexico, *International Association of Mathematical Geosciences*, Poster Session.
22. **A. Gunn**, D. Jerolmack, (2017) Diurnal atmospheric stability cycles control transport at White Sands, New Mexico, *Amtrak Club*, Poster Session.
23. M. Nikurashin, **A. Gunn**, (2017) Sensitivity of the ocean overturning circulation to wind and mixing: theoretical scalings and global ocean models, *European Geosciences Union General Assembly*, Oral Session.
24. **A. Gunn**, D. Lee, P. Arratia, D. Jerolmack, (2017) Geophysical flows: 2D turbulence, lagrangian coherent structures, and particles, *Exxon Mobil Presentation*, Poster Session.
25. **A. Gunn**, I. Marinov, M. Nikurashin, (2016) Novel biogeochemical theory predicts ocean carbon reservoir response to changes in MOC strength and diapycnal mixing, *American Geophysical Union Fall Meeting*, Poster Session.
26. I. Marinov, A. Cabre, **A. Gunn**, A. Gnanadesikan, (2016) Tropical teleconnections via the ocean and atmosphere induced by Southern Ocean deep convective events, *American Geophysical Union Fall Meeting*, Poster Session.
27. **A. Gunn**, M. Nikurashin, (2016) Diapycnal mixing inhibits ocean carbon storage, *Ocean Carbon Biogeochemistry Workshop*, Poster Session.
28. **A. Gunn**, M. Nikurashin, (2015) The role of the Southern Ocean overturning circulation for ocean carbon uptake, *Australian Meteorological & Oceanographic Society Conference*, **Oral Session**.

Scholarships & Awards (research-based values listed, total US\$133,800 excluding stipend)

- **Petroleum Research Fund, New Directions Grant \$110,000, 2020**, American Chemical Society awarded to PI Douglas Jerolmack.
- **Greg & Susan Walker Endowment Award \$1,600, 2019**, competitive departmental award used for AGU 2019.
- **SASGov Travel Award \$300, 2019**, competitive UPenn School of Arts & Sciences graduate student award.
- **GAPSA Travel Award \$800, 2019**, competitive UPenn graduate student award.
- **UNAVCO Point Cloud Travel Award \$1,600, 2019**, competitive US-based participant award to attend U. Potsdam workshop.
- **Greg & Susan Walker Endowment Award \$2,000, 2019**, competitive departmental award used for AMOS 2019.
- **GAPSA Travel Award \$800, 2018**, competitive UPenn graduate student award.

- **Binghamton Student Award \$100, 2018**, symposium conveners' cash award for best student contributor.
- **NSF Binghamton Student Travel Award \$800, 2018**, competitive student travel award used for BGS.
- **International Society of Aeolian Research Elsevier Research Scholarship \$2,250, 2018**, competitive student research grant.
- **Greg & Susan Walker Endowment Award \$1,400, 2018**, competitive departmental award used for ICAR.
- **SASGov Executive Stipend \$2,000, 2017**, awarded for research purposes by democratic election.
- **IAMG Student Travel Award \$1,200, 2017**, competitive society award for conference.
- **OCB Student Travel Award \$300, 2016**, competitive travel award for students to the 2016 OCB Workshop.
- **Benjamin Franklin Fellowship \$133,000+tuition, 2016-2021**, 4-year stipend for UPenn School of Arts & Sciences PhDs.
- **Tsuneichi Fujii Scholarship \$5,600, 2015**, awarded to 1 graduate student at the universities of Tasmania and Hokkaido for exchange.
- **ARCCSS Summer Student Scholarship \$3,050, 2015**, awarded to 15 Australian students for climate science research projects.
- **Melbourne Global Scholarship, 2014**, awarded on academic merit for exchange to the London School of Economics.
- **Trinity College Student Coordinator Scholarship, 2013**, awarded to 10 Trinity College students for pastoral care.
- **Peter McPhee Award, 2013**, awarded to 4 students at the University of Melbourne for community service.
- **Trinity College Academic Excellence Award, 2012**, awarded for top grades at the University of Melbourne per semester.
- **Western Australian Government Certificate of Excellence Award, 2011**, awarded for top 1% students in that year.
- **Christ Church Grammar School Academic Scholar Award (x4), 2010-2011**, A grades for every subject for 2 years.

Teaching Experience

- **'Earth Surface Processes' GEOL305, Guest Lecturer & Field Teaching Assistant, 2020**, boundary layer section of UPenn class, 20 students to White Sands dunes, administration, mentoring undergraduate field research projects.
- **'Oceanography' GEOL130, Head Teaching Assistant, 2020**, ~300 students, office-hours, teaching, grading, reviews.
- **University of Pennsylvania Center for Teaching & Learning, Teaching Certificate, 2018-ongoing**, multi-component accreditation including teaching: experience, observations, philosophy development, and workshops. Workshops participated:
 - 'Engaging diverse audiences in the classroom'
 - 'Supporting students of diverse backgrounds in science'
 - 'Teaching field courses'
- **'Earth Surface Processes' GEOL305, Field Teaching Assistant, 2019**, 15 students to Algodones dunes, administration, mentoring undergraduate field research projects.
- **'Earth & Life Through Time' GEOL125, Teaching Assistant, 2019**, ~200 students, office-hours, guest lecturing, recitations, grading.
- **'Oceanography' GEOL130, Head Teaching Assistant, 2018**, ~300 students, office-hours, teaching, grading, reviews.
- **'Structured, Active, In-class Learning' (SAIL) Teaching Certificate, 2017**, semester-long course on 'flipped' undergraduate teaching.
- **'Oceanography' GEOL130, Teaching Assistant, 2017**, ~300 students office-hours, teaching, grading, review sessions.
- **GEOL204 'Global Climate Change', Guest Lecturer, 2016**, ~40 students, climate modelling section of UPenn class.
- **Private, Mathematics, Physics and English Tutor, 2012-2015**, employed as tutor for over 15 students between high school and 1st year undergraduate level.
- **MyGuru Ltd., Mathematics Tutor, Apr 2014-Nov 2015**, employed as the primary content creator for online videos for Australian mathematics curricula accessed by thousands of students, as well as other written and in-person tutoring services.

Outreach & Service

- **Good Data Institute, Volunteer, Ongoing**, consultant coder for NFPs on analytics and data-practices.
- **Trinity College Alumni Career Event, Science Panelist, 4 Sept 2020**, career mentoring for science undergraduates at my alma mater.
- **American Geophysical Union Fall Meeting, Session Primary Convener, 1-17 Dec 2020**, "Granular and Fluid Physics in Geomorphology".
- **American Geophysical Union Fall Meeting, Session Co-Convener, 9-13 Dec 2019**, "Centennial Session: Leopoldian, Bagnoldian, and Einsteinian Geomorphology Today: Historical Reflections and New Approaches".
- **Hayden Fellowship Seminar, Discussion host, 7 Aug 2019**, on helping dept. summer scholarship undergraduates apply for graduate school.
- **Penn Prep Summer School 'Climate Change on the Blue Planet', Instructor, 7 Jul-2 Aug 2019**, 2x 2-week course I devised and taught for rising-freshman students mostly on scholarships.
- **Penn Prep Summer School 'Climate Change on the Blue Planet', Instructor, 24 Jul-3 Aug 2018**, 2-week course I devised and taught for rising-freshman students mostly on scholarships.
- **Philadelphia Science Festival, Presenter, 21-28 Apr 2017**, flume river evolution at the Franklin Institute.
- **Titjimat Teachabout Inc., Science Program Coordinator, Aug 2013-Feb 2014**, devised and implemented a 4-week STEM program for indigenous Australian school students. I also attracted government, private and university funding for this NGO.
- **River Nile Learning Centre, ESL and Science Tutor, Feb 2012-Nov 2012**, pro-bono tutoring for 10 South Sudanese refugees in Melbourne ranging across mature-aged vocational courses, undergraduate written English help, high school sciences.

Workshops

- **Inclusive & Equitable Teaching Workshop, Feb 26-Apr 1 2020**, U. Penn 5-week course committed to diversity-promoting education.
- **From point clouds and full-waveform data to DEM analysis, Sept 30-Oct 4 2019**, U. Potsdam week on elevation models.
- **Mid-Atlantic Soft Matter Workshop, 12 Aug 2019**, regional conference at Johns Hopkins University.
- **Thinkful City Coho, Git & Github: your coding safety net, 12 Feb 2019**, course on collaborating through Github.
- **Penn Institute for Computational Science, Data Analysis in Python, 8-9 Apr 2017**, data packages i.e. Pandas.
- **Woods Hole Oceanographic Institute, OCB Workshop, 25-28 Jul 2016**, current and future topics in the OCB community.
- **Monash University, ARCCSS Tropical Meteorology Winter School, 20-24 Jun 2016**, course on tropical weather and climate systems.
- **CLIVAR/JAMSTEC, 2nd Session of OMDP: Forcing Ocean-Ice Climate Models, 14-15 Jan 2016**, live stream to session.
- **University of New South Wales, ARCCSS Scientific Writing Workshop, 17-19 Nov 2015**, journal publishing course.
- **University of Queensland, AMOS Software Carpentry Workshop, 13-15 Jul 2015**, Python and Git course.
- **University of Tasmania, DaSH Software Carpentry Workshop, Jun 2015-Jul 2015**, Unix, SQL and R weekly sessions.
- **University of Tasmania, ARCCSS Biogeochemistry Winter School, 15-19 Jun 2015**, course on global nutrient cycle, etc.

Standardised Tests

- **Graduate Record Examinations (GRE)**, *Aug 2015*, Verbal: 163 (92nd%), Quantitative: 163 (86th%), Analytical: 5.0 (93rd%).
- **Australian Tertiary Admissions Rank (ATAR)**, *2011*, 99th% of Australians applying for undergraduate study in 2011.
- **Various Olympiads**, *2011*, Higher Distinctions in Australasian Mathematics, Informatics, Computer Science, Economics Olympiads.

Leadership Responsibilities

- **Student Representative, UPenn EES Faculty Meetings**, *2019-2020*, represent PhD students to the department faculty.
- **Executive Board Member, Graduate Assembly UPenn**, *Aug 2017-Aug 2018*, 1 of 6 students elected to represent ~2000 graduate students, maintain a budget of over US\$125K.
- **Department Representative, Graduate Assembly UPenn**, *Aug 2016- Aug 2017*, represent my department to the wider university.
- **Executive Student Committee, Trinity College**, *Oct 2013-Oct 2014*, 1 of 8 elected students to represent 350 residential students, oversee a AU\$300k annual budget, organise all social or pastoral activities, and manage an associated incorporated company.
- **Director, Trinity Leadership Challenge**, *Nov 2012-Oct 2013*, led a leadership program in which 8 students raised AU\$20k, participated in professional development seminars, served charities and hiked an important Australian war trail in Papua New Guinea.
- **Editor, Trinity College Students' Publication**, *Feb 2013-Nov 2013*, sole editor of student-led quarterly university publication.