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ACADEMIC POSITIONS

2014–Present **Stanford University**
Professor (2020–Present)
Associate Professor (2015–2020)
Visiting Associate Professor (2014–2015)
Associate Department Chair (2021–2024; 2026–present)
Kenneth and Barbara Oshman Faculty Scholar (2018–2022)
Department of Civil and Environmental Engineering

Woods Institute for the Environment, Affiliated Faculty
Urban Studies Program, Affiliated Faculty
Bio-X, Affiliated Faculty
Wu Tsai Neurosciences Institute, Affiliated Faculty

2008–2015 **Yale University**
Associate Professor (2013–2015)
Assistant Professor (2008–2013)
Department of Mechanical Engineering & Materials Science

2011–2012 **University of Maryland, College Park**
Visiting Assistant Professor
Institute for Research in Electronics and Applied Physics

2007–2008 **Haverford College**
Visiting Assistant Professor and HHMI Postdoctoral Research Fellow
Department of Physics
with Professor Jerry Gollub

2006 **Max Planck Institute for Dynamics and Self-Organization**
Postdoctoral Fellow
with Professor Eberhard Bodenschatz

EDUCATION

2006 Ph.D. in Physics, Cornell University
2005 M.S. in Physics, Cornell University
2002 B.A. with High Honors in Physics and Computer Science, Swarthmore College

RESEARCH INTERESTS

I am broadly interested in the behavior of complex systems far from equilibrium. In particular, a running theme in my research is dynamical self-organization. I seek both to understand the physical principles that govern the spontaneous emergence of low-dimensional structure in high-dimensional systems and to harness this self-organization for engineering applications. I primarily conduct experimental research, but also augment my experiments with numerical simulations and theoretical modeling.

My current research interests include turbulence in two and three dimensions, with a focus on coherent structures, geometric properties, and their connections to dynamics; the transport of inertial, anisotropic, and active particles in turbulence; the erosion of granular beds by fluid flows and subsequent sediment transport; mixing and turbulence in stratified flows; the collective behavior of animal groups; uncovering the natural, self-organized spatiotemporal scales in urban systems; and interpretability in deep-learning physics models.

AWARDS, HONORS, AND FELLOWSHIPS

2022	Fellow, American Physical Society
2020	Tau Beta Pi Teaching Honor Roll, Stanford University School of Engineering
2019	American Physical Society Outstanding Referee Award
2018	Kenneth and Barbara Oshman Faculty Scholar, Stanford University
2015	Terman Faculty Fellowship, Stanford University
2015	Euromech Young Scientist Prize
2014	Provost's Teaching Prize, Yale University
2011	Junior Faculty Fellowship, Yale University
2008	Winner (with Jerry Gollub) of the APS GSNP Gallery of Nonlinear Images
2005	Jayesh Prize for Outstanding Student Talk, Cornell Fluid Dynamics Seminar
2002	Elmore Prize in Physics, Swarthmore College
2002	Phi Beta Kappa
2002	Sigma Xi

PEER-REVIEWED JOURNAL PUBLICATIONS

148. L. K. C. Sunberg, H. Chung, E. S. MacDonald, N. T. Ouellette, and J. R. Koseff, "Particle transport in a flow with a canopy, canopy gap, and buoyant plume," *in preparation*.

147. M. S. Eley and N. T. Ouellette, "Bedforms without bedload," *in preparation.*

146. S. Bodek and N. T. Ouellette, "Pocket spectroscopy and the onset of erosion," *in preparation.*

145. L. Yan, G. E. McIvor, A. Thornton, and N. T. Ouellette, "Mesoscale structure in jackdaw flocks," *in preparation.*

144. J. Yin, S. G. Monismith, and N. T. Ouellette, "An in-situ 3D PTV system for measuring ocean turbulence," *in preparation.*

143. N. T. Ouellette and D. M. Gordon, "Modeling collective search on networks," *in preparation*.

142. E. S. MacDonald and N. T. Ouellette, "Baroclinic effects on the settling of actively buoyant particles," *in preparation*.

141. S. Bodek, D. Wang, M. D. Shattuck, C. S. O'Hern, and N. T. Ouellette, "Ensemble statistics of bedload transport: Stress history effects," *submitted.*

140. S. Bodek, D. Wang, M. D. Shattuck, C. S. O'Hern, and N. T. Ouellette, "Ensemble statistics of bedload transport: Grain motion at near-threshold conditions," *submitted.*

139. D. Wang, S. Bodek, N. T. Ouellette, M. D. Shattuck, and C. S. O'Hern, "Effect of sub-critical fluid shear flow on granular bed strength," *submitted*.

138. T. MacMillan and N. T. Ouellette, "Towards mechanistic understanding in a data-driven weather model: internal activations reveal interpretable physical features," *submitted*.

137. T. MacMillan and N. T. Ouellette, "A topological null hypothesis for coherent structures in turbulence," *accepted for publication in Journal of Fluid Mechanics* (2026).

136. S. Bodek, D. Wang, M. D. Shattuck, C. S. O'Hern, and N. T. Ouellette, "Anisotropic stress history effects in erodible sediment beds," *Journal of Geophysical Research: Earth Surface* **131**, e2025JF008561 (2026).

135. E. S. MacDonald and N. T. Ouellette, "Settling of actively buoyant particles," *Journal of Fluid Mechanics* **1024**, A19 (2025).

134. L. K. C. Sunberg, H. Chung, E. S. MacDonald, N. T. Ouellette, and J. R. Koseff, "Transport of rod-shaped particles in a canopy flow with a buoyant plume," *International Journal of Multiphase Flow* **191**, 105331 (2025).

133. E. S. MacDonald, H. Chung, L. K. C. Sunberg, N. T. Ouellette, and J. R. Koseff, "Nonballistic transport of particles in a canopy-plume system," *Physical Review Fluids* **10**, 053801 (2025).

132. T. MacMillan, J. P. Hilditch, and N. T. Ouellette, "Expected correlation in time-series analysis," *Physical Review E* **111**, 024121 (2025). *Chosen as an Editors' Suggestion.*

131. L. L. Ouellette, V. Fang, and N. T. Ouellette, "How will AI affect patent disclosures?" *Nature Biotechnology* **43**, 26-28 (2025).

130. H. Chung, L. K. C. Sunberg, E. MacDonald, N. T. Ouellette, and J. R. Koseff, "Dispersion of inertial particles in turbulent canopy flows with buoyant and non-buoyant plumes," *Physical Review Fluids* **9**, 093801 (2024). *Chosen as an Editors' Suggestion.*

129. T. MacMillan and N. T. Ouellette, "Spectral energy transfer on complex networks: a filtering approach," *Scientific Reports* **14**, 20691 (2024).

128. L. K. C. Sunberg, M. H. DiBenedetto, N. T. Ouellette, and J. R. Koseff, "Parametric study of the dispersion of inertial ellipsoidal particles in a wave-current flow," *Physical Review Fluids* **9**, 034302 (2024).

127. R. L. Aras, N. T. Ouellette, and R. K. Jain, "Quantifying the pedestrian access potential of suburban street network retrofits," *Environment and Planning B* **51**, 656-669 (2024).

126. A. M. Reynolds and N. T. Ouellette, "Swarm formation as backward diffusion," *Physical Biology* **20**, 026002 (2023).

125. Y. Feng and N. T. Ouellette, "Nonuniform spatial sampling by individuals in midge swarms," *Journal of the Royal Society Interface* **20**, 20220521 (2023).

124. R. L. Aras, N. T. Ouellette, and R. K. Jain, "A barrier too far: understanding the role of intersection crossing distance on bicycle rider behavior in Chicago," *Environment and Planning B* **50**, 2118-2132 (2023).

123. L. K. Clark, M. H. DiBenedetto, N. T. Ouellette, and J. R. Koseff, "Dispersion of finite-size, non-spherical particles by waves and currents," *Journal of Fluid Mechanics* **954**, A3 (2023).

122. D. O'Coin, G. E. McIvor, A. Thornton, N. T. Ouellette, and H. Ling, "Velocity correlations in jackdaw flocks in different ecological contexts," *Physical Biology* **20**, 016005 (2023).

121. T. MacMillan and N. T. Ouellette, "Lagrangian scale decomposition via the graph Fourier transform," *Physical Review Fluids* **7**, 124401 (2022).

120. L. M. Wedding, S. Green, S. Reiter, K. R. Arrigo, L. Hazen, M. Ruckelshaus, J. M. A. van der Grient, R. M. Bailey, M. A. Cameron, J. Leape, M. Levi, A. Merkl, M. M. Mills, S. Monismith, N. T. Ouellette, G. van Dijken, and F. Micheli, "Linking multiple stressor science to policy opportunities through network modeling," *Marine Policy* **146**, 105307 (2022).

119. S. Gakhar, J. R. Koseff, and N. T. Ouellette, "Extracting free-surface expressions of underwater features," *Experiments in Fluids* **63**, 138 (2022).

118. A. M. Reynolds, G. E. McIvor, A. Thornton, P. Yang, and N. T. Ouellette, "Stochastic modelling of bird flocks: accounting for the cohesiveness of collective motion," *Journal of the Royal Society Interface* **19**, 20210745 (2022).

117. M. L. Patel and N. T. Ouellette, "Formation and dissolution of midge swarms," *Physical Review E* **105**, 034601 (2022).

116. N. T. Ouellette, "A physics perspective on collective animal behavior," *Physical Biology* **19**, 021004 (2022).

115. M. Galanis, M. D. Shattuck, C. S. O'Hern, and N. T. Ouellette, "Directional strengthening and weakening in hydrodynamically sheared granular beds," *Physical Review Fluids* **7**, 013802 (2022).

114. Y. Tanimoto, N. T. Ouellette, and J. R. Koseff, "On the interaction between oncoming internal waves and a dense gravity current in a two-layer stratification," *Journal of Fluid Mechanics* **932**, A28 (2022).

113. L. Fang and N. T. Ouellette, "Spectral condensation in laboratory two-dimensional turbulence," *Physical Review Fluids* **6**, 104605 (2021).

112. M. Galanis, P. Wang, M. D. Shattuck, C. S. O'Hern, and N. T. Ouellette, "Onset of grain motion in eroding subaqueous bimodal granular beds," *Physical Review Fluids* **6**, 094301 (2021).

111. N. T. Ouellette and D. M. Gordon, "Goals and limitations of modeling collective behavior in biological systems," *Frontiers in Physics* **9**, 687823 (2021).

110. Y. Tanimoto, N. T. Ouellette, and J. R. Koseff, "Secondary generation of breaking internal waves in confined basins by gravity currents," *Journal of Fluid Mechanics* **917**, A49 (2021).

109. P. Wang, S. Zhang, P. J. Tuckman, D. Wang, N. T. Ouellette, M. D. Shattuck, and C. S. O'Hern, "Shear response of granular packings compressed above jamming onset," *Physical Review E* **103**, 022902 (2021).

108. M. Sinhuber, K. van der Vaart, Y. Feng, A. M. Reynolds, and N. T. Ouellette, "An equation of state for insect swarms," *Scientific Reports* **11**, 3773 (2021).

107. L. Fang and N. T. Ouellette, "Assessing the information content of complex flows," *Physical Review E* **103**, 023301 (2021).

106. R. L. Aras, N. T. Ouellette, and R. K. Jain, "Automated identification of urban substructure for comparative analysis," *PLoS ONE* **16**, e0245067 (2021).

105. T. MacMillan, N. T. Ouellette, and D. H. Richter, "Detection of evolving Lagrangian coherent structures: a multiple object tracking approach," *Physical Review Fluids* **5**, 124401 (2020).

104. K. R. Arrigo, G. L. van Dijken, M. A. Cameron, J. van der Grient, L. M. Wedding, L. Hazen, J. Leape, G. Leonard, A. Merkl, F. Micheli, M. M. Mills, S. Monismith, N. T. Ouellette, A. Zivian, M. Levi, and R. M. Bailey, "Synergistic interactions among growing stressors increase risk to an Arctic ecosystem," *Nature Communications* **11**, 6255 (2020).

103. L. K. Clark, M. H. DiBenedetto, N. T. Ouellette, and J. R. Koseff, "Settling of inertial nonspherical particles in wavy flow," *Physical Review Fluids* **5**, 124301 (2020).

102. J. G. Ballouz, P. L. Johnson, and N. T. Ouellette, "Temporal dynamics of the alignment of the turbulent stress and strain rate," *Physical Review Fluids* **5**, 114606 (2020).

101. D. Gorbonos, J. G. Puckett, K. van der Vaart, M. Sinhuber, N. T. Ouellette, and N. S. Gov, "Pair formation in insect swarms driven by adaptive long-range interactions," *Journal of the Royal Society Interface* **17**, 20200367 (2020).

100. S. Gakhar, J. R. Koseff, and N. T. Ouellette, "On the surface expression of bottom features in free-surface flow," *Journal of Fluid Mechanics* **900**, A41 (2020).

99. L. Fang, S. Balasuriya, and N. T. Ouellette, "Disentangling resolution, precision, and inherent stochasticity in nonlinear systems," *Physical Review Research* **2**, 023343 (2020).

98. Z. Zhou, L. Fang, N. T. Ouellette, and H. Xu, "Vorticity gradient stretching in the direct enstrophy transfer process of two-dimensional turbulence," *Physical Review Fluids* **5**, 054602 (2020).

97. K. van der Vaart, M. Sinhuber, A. M. Reynolds, and N. T. Ouellette, "Environmental perturbations induce correlations in midge swarms," *Journal of the Royal Society Interface* **17**, 20200018 (2020).

96. J. G. Ballouz and N. T. Ouellette, "Geometric constraints on energy transfer in the turbulent cascade," *Physical Review Fluids* **5**, 034603 (2020).

95. D. Gorbonos, K. van der Vaart, M. Sinhuber, J. G. Puckett, A. M. Reynolds, N. T. Ouellette, and N. S. Gov, "Similarities between insect swarms and isothermal globular clusters," *Physical Review Research* **2**, 013271 (2020).

94. Y. Tanimoto, N. T. Ouellette, and J. R. Koseff, "Interaction between an inclined gravity current and a pycnocline in a two-layer stratification," *Journal of Fluid Mechanics* **887**, A8 (2020).

93. H. Ling, G. E. McIvor, J. Westley, K. van der Vaart, R. T. Vaughan, A. Thornton, and N. T. Ouellette, "Behavioural plasticity and the transition to order in jackdaw flocks," *Nature Communications* **10**, 5174 (2019).

92. S. L. Eagleman, D. Chander, C. Reynolds, N. T. Ouellette, and M. B. MacIver, “Nonlinear dynamics captures brain states at different levels of consciousness in patients anesthetized with propofol,” *PLoS ONE* **14**, e0223921 (2019).

91. F. Xiong, P. Wang, A. H. Clark, T. Bertrand, N. T. Ouellette, M. D. Shattuck, and C. S. O’Hern, “Comparison of shear and compression jammed packings of frictional disks,” *Granular Matter* **21**, 109 (2019).

90. H. Ling, G. E. McIvor, J. Westley, K. van der Vaart, J. Yin, R. T. Vaughan, A. Thornton, and N. T. Ouellette, “Collective turns in jackdaw flocks: kinematics and information transfer,” *Journal of the Royal Society Interface* **16**, 20190450 (2019).

89. E. A. Andruszkiewicz, J. R. Koseff, O. B. Fringer, N. T. Ouellette, A. B. Lowe, C. A. Edwards, and A. B. Boehm, “Modeling environmental DNA transport in the coastal ocean using Lagrangian particle tracking,” *Frontiers in Marine Science* **6**, 477 (2019).

88. K. van der Vaart, M. Sinhuber, A. M. Reynolds, and N. T. Ouellette, “Mechanical spectroscopy of insect swarms,” *Science Advances* **5**, eaaw9305 (2019).

87. H. Ling, G. E. McIvor, K. van der Vaart, R. T. Vaughan, A. Thornton, and N. T. Ouellette, “Local interactions and their group-level consequences in flocking jackdaws,” *Proceedings of the Royal Society B* **286**, 20190865 (2019).

86. R. Ouillon, E. Meiburg, N. T. Ouellette, and J. R. Koseff, “Interaction of a downslope gravity current with an internal wave,” *Journal of Fluid Mechanics* **873**, 889-913 (2019).

85. L. Fang and N. T. Ouellette, “Transport across a bathymetric interface in quasi-two-dimensional flow,” *Physical Review Fluids* **4**, 064501 (2019).

84. H. Ling, G. E. McIvor, K. van der Vaart, R. T. Vaughan, A. Thornton, and N. T. Ouellette, “Costs and benefits of social relationships in the collective motion of bird flocks,” *Nature Ecology and Evolution* **3**, 943-948 (2019).

83. M. H. DiBenedetto, J. R. Koseff, and N. T. Ouellette, “Orientation dynamics of non-spherical particles under surface gravity waves,” *Physical Review Fluids* **4**, 034301 (2019). *Chosen as an Editors’ Suggestion.*

82. M. Sinhuber, K. van der Vaart, R. Ni, J. G. Puckett, D. H. Kelley, and N. T. Ouellette, “Three-dimensional time-resolved trajectories from laboratory insect swarms,” *Scientific Data* **6**, 190036 (2019).

81. M. Sinhuber, K. van der Vaart, and N. T. Ouellette, “Response of insect swarms to dynamic illumination perturbations,” *Journal of the Royal Society Interface* **16**, 20180739 (2019).

80. L. Fang, S. Balasuriya, and N. T. Ouellette, “Local linearity, coherent structures, and scale-to-scale coupling in turbulent flow,” *Physical Review Fluids* **4**, 014501 (2019).

79. H. Ling, G. McIvor, G. Nagy, S. MohaimenianPour, R. T. Vaughan, A. Thornton, and N. T. Ouellette, “Simultaneous measurements of three-dimensional trajectories and wingbeat frequencies of birds in the field,” *Journal of the Royal Society Interface* **15**, 20180653 (2018).

78. M. H. DiBenedetto and N. T. Ouellette, “Preferential orientation of spheroidal particles in wavy flow,” *Journal of Fluid Mechanics* **856**, 850-869 (2018).

77. S. L. Eagleman, D. A. Vaughn, D. R. Drover, C. M. Drover, M. S. Cohen, N. T. Ouellette, and M. B. MacIver, “Do complexity measures of frontal EEG distinguish loss of consciousness in geriatric patients under anesthesia?” *Frontiers in Neuroscience* **12**, 645 (2018).

76. M. Sinhuber, J. G. Ballouz, and N. T. Ouellette, “Probing the strain-rotation balance in non-Newtonian turbulence with inertial particles,” *Physical Review Fluids* **3**, 082602(R) (2018).

75. A. H. Clark, J. D. Thompson, M. D. Shattuck, N. T. Ouellette, and C. S. O’Hern, “Critical scaling near the yielding transition in granular media,” *Physical Review E* **97**, 062901 (2018).

74. S. L. Eagleman, C. M. Drover, D. R. Drover, N. T. Ouellette, and M. B. MacIver, “Remifentanil and nitrous oxide anesthesia produces a unique pattern of EEG activity during loss and recovery of response,” *Frontiers in Human Neuroscience* **18**, 173 (2018).

73. S. Balasuriya, N. T. Ouellette, and I. I. Rypina, “Generalized Lagrangian coherent structures,” *Physica D* **372**, 31-51 (2018).

72. C. A. R. Hogg, G. C. Egan, N. T. Ouellette, and J. R. Koseff, “Shoaling internal waves may reduce gravity current transport,” *Environmental Fluid Mechanics* **18**, 383-394 (2018).

71. L. Fang and N. T. Ouellette, “Influence of lateral boundaries on transport in quasi-two-dimensional flow,” *Chaos* **28**, 023113 (2018). *Chosen as a Featured Article, and summarized in an AIP Scilight article.*

70. M. H. DiBenedetto, N. T. Ouellette, and J. R. Koseff, “Transport of anisotropic particles under waves,” *Journal of Fluid Mechanics* **837**, 320-340 (2018).

69. J. G. Ballouz and N. T. Ouellette, “Tensor geometry in the turbulent cascade,” *Journal of Fluid Mechanics* **835**, 1048-1064 (2018).

68. J. C. Salevan, A. H. Clark, M. D. Shattuck, C. S. O’Hern, and N. T. Ouellette, “Determining the onset of hydrodynamic erosion in turbulent flow,” *Physical Review Fluids* **2**, 114302 (2017).

67. M. Sinhuber and N. T. Ouellette, “Phase coexistence in insect swarms,” *Physical Review Letters* **119**, 178003 (2017). *Highlighted in Nature Physics.*

66. T. L. Mandel, I. Rosenzweig, H. Chung, N. T. Ouellette, and J. R. Koseff, “Characterizing free-surface expressions of flow instabilities by tracking submerged features,” *Experiments in Fluids* **58**, 153 (2017).

65. L. Fang and N. T. Ouellette, “Multiple stages of decay in two-dimensional turbulence,” *Physics of Fluids* **29**, 111105 (2017).

64. A. M. Reynolds, M. Sinhuber, and N. T. Ouellette, “Are midge swarms bound together by an effective velocity-dependent gravity?” *European Physical Journal E* **40**, 46 (2017). *Cover article, and chosen as an EPJ E Highlight.*

63. A. H. Clark, M. D. Shattuck, N. T. Ouellette, and C. S. O’Hern, “Role of grain dynamics in determining the onset of sediment transport,” *Physical Review Fluids* **2**, 034305 (2017).

62. W. M. Lord, J. Sun, N. T. Ouellette, and E. M. Bollt, “Inference of causal information flow in collective animal behavior,” *IEEE Transactions on Molecular, Biological and Multi-Scale Communication* **2**, 107-116 (2016).

61. S. Balasuriya, R. Kalampattel, and N. T. Ouellette, “Hyperbolic neighbourhoods as organizers of finite-time exponential stretching,” *Journal of Fluid Mechanics* **807**, 509-545 (2016).

60. L. Fang and N. T. Ouellette, “Advection and the efficiency of spectral energy transfer in two-dimensional turbulence,” *Physical Review Letters* **117**, 104501 (2016).

59. R. Ni and N. T. Ouellette, “On the tensile strength of insect swarms,” *Physical Biology* **13**, 045002 (2016). *Selected as a Physical Biology Highlight of 2016.*

58. A. M. Reynolds and N. T. Ouellette, “Swarm dynamics may give rise to Lévy flights,” *Scientific Reports* **6**, 30515 (2016).

57. D. Gorbonos, R. Ianconescu, J. G. Puckett, R. Ni, N. T. Ouellette, and N. S. Gov, “Long-range acoustic interactions in insect swarms: An adaptive gravity model,” *New Journal of Physics* **18**, 073042 (2016).

56. K.-C. Cheng, H.-K. Park, A. O. Tetteh, D. Zheng, N. T. Ouellette, K. C. Nadeau, and L. M. Hildemann, “Mixing and sink effects of air purifiers on indoor PM2.5 concentrations: A pilot study of eight residential homes in Fresno, California,” *Aerosol Science and Technology* **50**, 835-845 (2016).

55. A. de Chaumont Quitry and N. T. Ouellette, “Concentration effects on turbulence in dilute polymer solutions far from walls,” *Physical Review E* **93**, 063116 (2016).

54. T. Ma, N. T. Ouellette, and E. M. Bollt, “Stretching and folding in finite time,” *Chaos* **26**, 023112 (2016).

53. N. T. Ouellette, C. A. R. Hogg, and Y. Liao, “Correlating Lagangian structures with forcing in two-dimensional flow,” *Physics of Fluids* **28**, 015105 (2016).

52. R. Ni and N. T. Ouellette, “Velocity correlations in laboratory insect swarms,” *European Physical Journal Special Topics* **224**, 3271-3277 (2015).

51. R. Ni, M. H. Michalski, E. Brown, N. Doan, J. Zinter, N. T. Ouellette, and G. M. Shepherd, “Optimal directional volatile transport in retronasal olfaction,” *Proceedings of the National Academy of Sciences of the USA* **112**, 14700-14704 (2015).

50. A. H. Clark, M. D. Shattuck, N. T. Ouellette, and C. S. O’Hern, “Onset and cessation of motion in hydrodynamically sheared granular beds,” *Physical Review E* **92**, 042202 (2015).

49. Y. Liao and N. T. Ouellette, “Correlations between the instantaneous velocity gradient and the evolution of scale-to-scale fluxes in two-dimensional flow,” *Physical Review E* **92**, 033017 (2015).

48. R. Ni, J. G. Puckett, E. R. Dufresne, and N. T. Ouellette, “Intrinsic fluctuations and driven response of insect swarms,” *Physical Review Letters* **115**, 118104 (2015).

47. J. G. Puckett, R. Ni, and N. T. Ouellette, “Time-frequency analysis reveals pairwise interactions in insect swarms,” *Physical Review Letters* **114**, 258103 (2015).

46. Y. Liao and N. T. Ouellette, “Long-range ordering of turbulent stresses in two-dimensional flow,” *Physical Review E* **91**, 063004 (2015).

45. N. T. Ouellette, “Empirical questions for collective-behaviour modelling,” *Pramana–Journal of Physics* **84**, 353-363 (2015).

44. R. Ni, S. Kramel, N. T. Ouellette, and G. A. Voth, “Measurements of the coupling between the tumbling of rods and the velocity gradient tensor in turbulence,” *Journal of Fluid Mechanics* **766**, 202-225 (2015).

43. R. Ni, G. A. Voth, and N. T. Ouellette, “Extracting turbulent spectral transfer from under-resolved velocity fields,” *Physics of Fluids* **26**, 105107 (2014).

42. J. G. Puckett and N. T. Ouellette, “Determining asymptotically large population sizes in insect swarms” *Journal of the Royal Society Interface* **11**, 20140710 (2014).

41. J. G. Puckett, D. H. Kelley, and N. T. Ouellette, “Searching for effective forces in laboratory insect swarms,” *Scientific Reports* **4**, 4766 (2014).

40. P. W. Miller and N. T. Ouellette, “Impact fragmentation of model flocks,” *Physical Review E* **89**, 042806 (2014). *Selected for a Synopsis in Physics.*

39. Y. Liao and N. T. Ouellette, “Geometry of scale-to-scale energy and enstrophy transport in two-dimensional flow,” *Physics of Fluids* **26**, 045103 (2014).

38. E. Fonda, D. P. Meichle, N. T. Ouellette, S. Hormoz, and D. P. Lathrop, “Direct observation of Kelvin waves excited by quantized vortex reconnection,” *Proceedings of the National Academy of Sciences of the USA* **111**, 4707-4710 (2014). *Cover article.*

37. R. Ni, N. T. Ouellette, and G. A. Voth, “Alignment of vorticity and rods with Lagrangian fluid stretching in turbulence,” *Journal of Fluid Mechanics* **743**, R3 (2014).

36. N. Khurana and N. T. Ouellette, “Stability of model flocks in turbulent-like flow,” *New Journal of Physics* **15**, 095015 (2013).

35. D. H. Kelley, M. R. Allshouse, and N. T. Ouellette, “Lagrangian coherent structures separate dynamically distinct regions in fluid flow,” *Physical Review E* **88**, 013017 (2013).

34. M. Wilczek, H. Xu, N. T. Ouellette, R. Friedrich, and E. Bodenschatz, “Generation of Lagrangian intermittency in turbulence by a self-similar mechanism,” *New Journal of Physics* **15**, 055015 (2013).

33. Y. Liao and N. T. Ouellette, “Spatial structure of spectral transport in two-dimensional flow,” *Journal of Fluid Mechanics* **725**, 281-298 (2013).

32. R. M. Lee, D. H. Kelley, K. N. Nordstrom, N. T. Ouellette, and W. Losert, “Quantifying stretching and rearrangement in epithelial sheet migration,” *New Journal of Physics* **15**, 025036 (2013). *Selected as an NJP Highlight of 2013.*

31. D. H. Kelley and N. T. Ouellette, “Emergent dynamics of laboratory insect swarms,” *Scientific Rep*orts **3**, 1073 (2013).

30. N. T. Ouellette, “On the dynamical role of coherent structures in turbulence,” *Comptes Rendus Physique* **13**, 866-877 (2012).

29. N. Khurana and N. T. Ouellette, “Interactions between active particles and dynamical structures in chaotic flow,” *Physics of Fluids* **24**, 091902 (2012).

28. Y. Liao, D. H. Kelley, and N. T. Ouellette, “Effects of forcing geometry on two-dimensional weak turbulence,” *Physical Review E* **86**, 036306 (2012).

27. D. H. Kelley and N. T. Ouellette, “Spatiotemporal persistence of spectral fluxes in two-dimensional weak turbulence,” *Physics of Fluids* **23**, 115101 (2011). *Selected as a Research Highlight.*

26. N. T. Ouellette, E. Bodenschatz, and H. Xu, “Path lengths in turbulence,” *Journal of Statistical Physics* **145**, 93-101 (2011).

25. T. P. Sapsis, N. T. Ouellette, J. P. Gollub, and G. Haller, “Neutrally buoyant particle dynamics in fluid flows: Comparison of experiments with Lagrangian stochastic models,” *Physics of Fluids* **23**, 093304 (2011).

24. A. de Chaumont Quitry, D. H. Kelley, and N. T. Ouellette, “Mechanisms driving shape distortion in two-dimensional flow,” *EPL* **94**, 64006 (2011).

23. N. Khurana, J. Blawzdziewicz, and N. T. Ouellette, “Reduced transport of swimming particles in chaotic flow due to hydrodynamic trapping,” *Physical Review Letters* **106**, 198104 (2011).

22. S. Parsa, J. S. Guasto, M. Kishore, N. T. Ouellette, J. P. Gollub, and G. A. Voth, “Rotation and alignment of rods in two-dimensional chaotic flow,” *Physics of Fluids* **23**, 043302 (2011). *Cover article.*

21. D. H. Kelley and N. T. Ouellette, “Onset of three-dimensionality in electromagnetically driven thin-layer flows,” *Physics of Fluids* **23**, 045103 (2011).

20. D. H. Kelley and N. T. Ouellette, “Separating stretching from folding in fluid mixing,” *Nature Physics* **7**, 477-480 (2011).

19. D. H. Kelley and N. T. Ouellette, “Using particle tracking to measure flow instabilities in an undergraduate laboratory experiment,” *American Journal of Physics* **79**, 267-273 (2011). *Cover article.*

18. D. H. Kelley and N. T. Ouellette, “Scale-local velocity fields from particle-tracking data,” *Chaos* **20**, 041106 (2010).

17. S. T. Merrifield, D. H. Kelley, and N. T. Ouellette, “Scale-dependent statistical geometry in two-dimensional flow,” *Physical Review Lett*ers **104**, 254501 (2010).

16. N. T. Ouellette, H. Xu, and E. Bodenschatz, “Bulk turbulence in dilute polymer solutions,” *Journal of Fluid Mechanics* **629**, 375-385 (2009).

15. N. T. Ouellette and J. P. Gollub, “Detecting topological features of chaotic fluid flow,” *Chaos* **18**, 041102 (2008). *Cover article.*

14. N. T. Ouellette, P. J. J. O'Malley, and J. P. Gollub, “Transport of finite-sized particles in chaotic flow,” *Physical Review Letters* **101**, 174504 (2008). *Chosen as an Editor’s Selection paper.*

13. N. T. Ouellette and J. P. Gollub, “Dynamic topology in spatiotemporal chaos,” *Physics of Fluids* **20**, 064104 (2008).

12. A. Arnèodo, R. Benzi, J. Berg, L. Biferale, E. Bodenschatz, A. Busse, E. Calzavarini, B. Castaing, M. Cencini, L. Chevillard, R. T. Fisher, R. Grauer, H. Homann, D. Lamb, A. S. Lanotte, E. Lèvèque, B. Lüthi, J. Mann, N. Mordant, W.-C. Müller, S. Ott, N. T. Ouellette, J.-F. Pinton, S. B. Pope, S. G. Roux, F. Toschi, H. Xu, and P. K. Yeung, “Universal intermittent properties of particle trajectories in highly turbulent flows,” *Physical Review Letters* **100**, 254504 (2008).

11. L. Biferale, E. Bodenschatz, M. Cencini, A. S. Lanotte, N. T. Ouellette, F. Toschi, and H. Xu, "Lagrangian structure functions in turbulence: A quantitative comparison between experiment and direct numerical simulation," *Physics of Fluids* **20**, 065103 (2008).

10. H. Xu, N. T. Ouellette, and E. Bodenschatz, "Evolution of geometric structures in intense turbulence," *New Journal of Physics* **10**, 013102 (2008). *Selected as an IOP Select paper.*

9. H. Xu, N. T. Ouellette, D. Vincenzi, and E. Bodenschatz, "Acceleration correlations and pressure structure functions in high-Reynolds number turbulence," *Physical Review Letters* **99**, 204501 (2007).

8. N. T. Ouellette and J. P. Gollub, "Curvature fields, topology, and the dynamics of spatiotemporal chaos," *Physical Review Letters* **99**, 194502 (2007).

7. H. Xu, N. T. Ouellette, and E. Bodenschatz, "Curvature of Lagrangian trajectories in turbulence," *Physical Review Letters* **98**, 050201 (2007).

6. N. T. Ouellette, H. Xu, M. Bourgoin, and E. Bodenschatz, "An experimental study of turbulent relative dispersion models," *New Journal of Physics* **8**, 109 (2006).

5. N. T. Ouellette, H. Xu, M. Bourgoin, and E. Bodenschatz, "Small-scale anisotropy in Lagrangian turbulence," *New Journal of Physics* **8**, 102 (2006).

4. H. Xu, N. T. Ouellette and E. Bodenschatz, "Multifractal dimension of Lagrangian turbulence," *Physical Review Letters* **96**, 114503 (2006).

3. M. Bourgoin, N. T. Ouellette, H. Xu, J. Berg, and E. Bodenschatz, "The role of pair dispersion in turbulent flow," *Science* **311**, 835-838 (2006).

2. H. Xu, M. Bourgoin, N. T. Ouellette, and E. Bodenschatz, "High order Lagrangian velocity statistics in turbulence," *Physical Review Letters* **96**, 024503 (2006).

1. N. T. Ouellette, H. Xu, and E. Bodenschatz, "A quantitative study of three-dimensional Lagrangian particle tracking algorithms," *Experiments in Fluids* **40**, 301-313 (2006).

CONFERENCE PROCEEDINGS, BOOK CHAPTERS, AND OTHER WRITING

15. T. MacMillan, E. Huseby, S. Takatori, and N. T. Ouellette, "Advection heads in an atmosphere foundation model," *2026 Conference on Physics and AI at Stanford University (PAI26)* (2026). [peer reviewed]

14. N. T. Ouellette, "Extending the reach of Lagrangian analysis in turbulence," *Journal of Fluid Mechanics* **924**, F1 (2021).

13. N. T. Ouellette, "The most active matter of all," *Matter* **1**, 297-299 (2019).

12. G. Nagy, A. Thornton, H. Ling, N. T. Ouellette, and R. Vaughan, "Computational and structural advantages of pairwise flocking," *IEEE International Symposium on Multi-Robot and Multi-Agent Systems* (2019). [peer reviewed]

11. N. T. Ouellette, "Flowing crowds," *Science* **363**, 27-28 (2019).

10. N. T. Ouellette, "Toward a "thermodynamics" of collective behavior," *SIAM News* **50**, November 2017.

9. C. A. R. Hogg, V. Pietrasz, G. C. Egan, N. T. Ouellette, and J. R. Koseff, "The influence of a shoaling internal gravity wave on a dense gravity current," *8th International Symposium on Stratified Flows* (2016).

8. N. T. Ouellette, "Turbulence in two dimensions," *Physics Today* **65**, 68-69 (2012). Also translated into Japanese and published as *Parity* **28**, 34-36 (2013).

7. N. T. Ouellette, "Particle-based measurement techniques for soft matter," in *Experimental and Computational Techniques in Soft Condensed Matter Physics*, ed. J. Olafsen, pp. 180-208 (Cambridge University Press, Cambridge, 2010).

6. H. Xu, N. T. Ouellette, and E. Bodenschatz, "Multi-particle statistics–Lines, shapes, and volumes in high Reynolds number turbulence," *Proceedings of the 5th International Conference on Nonlinear Mechanics*, ed. W.-Z. Chien, pp. 1155-1161 (2007).

5. H. Xu, N. T. Ouellette, H. Nobach, and E. Bodenschatz, "Experimental measurements of Lagrangian statistics in intense turbulence," *Advances in Turbulence XI: Proceedings of the 11th EUROMECH European Turbulence Conference*, ed. J. M. L. M. Palma and A. Silva Lopes, pp. 1-10 (2007).

4. N. T. Ouellette, H. Xu, and E. Bodenschatz, "Measuring Lagrangian statistics in intense turbulence," in *Springer Handbook of Experimental Fluid Dynamics*, ed. C. Tropea, A. L. Yarin, and J. F. Foss, pp. 789-799 (Springer-Verlag, Berlin, 2007).

3. N. T. Ouellette, H. Xu, K. Chang, and E. Bodenschatz, "Statistical geometry in intensely turbulent flow," *Proceedings of the 12th International Symposium on Flow Visualization*, ed. I. Grant, paper 167 (2006).

2. K. Chang, N. T. Ouellette, H. Xu, and E. Bodenschatz, "Lagrangian particle tracking in high Reynolds number turbulence," *EUROMECH Colloquium 477: Particle-Laden Flow: from Geophysical to Kolmogorov Scales* (2006).

1. H. Nobach, N. T. Ouellette, E. Bodenschatz, and C. Tropea, "Full-field correlation-based image processing for PIV," *Proceedings of the 6th International Symposium on Particle Image Velocimetry* (2005).

RESEARCH FUNDING

Current Support

2025–2028	National Science Foundation CBET-2529151 Settling and Transport of Actively Buoyant Particles $447,000
2025–2028	Stanford Doerr Discovery Grant An Active Matter Framework for Collective Animal Behavior $150,000
2023–2027	Army Research Office W911NF-23-1-0032 Impacts of Stress History on the Mechanical Properties of Sediment Beds $520,339 *with PI Corey O'Hern, Yale Mechanical Engineering & Materials Science*

Prior Support

2022–2026	National Science Foundation OCE-2219857 Development and Validation of an In-Situ Particle Tracking Velocimetry System for Ocean Turbulence Measurement $489,375 *with Co-PI Stephen Monismith, Stanford Civil and Environmental Engineering*
2023–2024	Stanford Institute for Human-Centered Artificial Intelligence Enhancing AI Approaches to Wildfire Prediction with Physical Experiments $74,500 *with PI Jeffrey Koseff, Stanford Civil and Environmental Engineering*
2021–2022	UPS Foundation Endowment Fund, Stanford University Quantifying the Impact of Urban Morphology on Mobility: A Case Study of Bikeshare Systems $52,031 *with Co-PI Rishee Jain, Stanford Civil and Environmental Engineering*
2020–2021	National Science Foundation OCE-2022930 The Interaction between Breaking Internal Waves and Gravity Currents on Inclined Slopes $110,937 *with PI Jeffrey Koseff, Stanford Civil and Environmental Engineering*
2017–2021	Human Frontier Science Program RGP0049/2017 Collective Behaviour and Information Transmission in Heterogeneous Societies $1,050,000 *with PI Alex Thornton, University of Exeter, and Co-PI Richard Vaughan, Simon Fraser University*
2017–2021	National Science Foundation CBET-1706586 Transport of Non-Spherical Particles in Wavy Flows $343,513 *with PI Jeffrey Koseff, Stanford Civil and Environmental Engineering*
2017–2021	National Science Foundation CBET-1706950 Geometric Structure of the Turbulent Cascade $336,975
2017–2020	Army Research Office W911NF-17-1-0164 Strengthening and Armoring of Sheared Granular Beds $483,742 *with PI Corey O'Hern, Yale Mechanical Engineering and Materials Science*
2016–2020	National Science Foundation OCE-1634389 Effects of Internal Waves on Mixing and Transport by Gravity Currents $348,379 *with PI Jeffrey Koseff, Stanford Civil and Environmental Engineering*

2016–2020	Army Research Office W911NF-16-1-0185 Macroscopic Properties and Microscopic Interactions in Insect Swarms $360,000
2016–2020	National Science Foundation CMMI-1563489 Toward the Design and Control of Dynamical Transport Barriers in Nonlinear Flow $345,000
2017–2019	Stanford Catalyst for Collaborative Solutions Harnessing the Data Revolution to Secure the Future of the Oceans $650,000 *with PI Fio Micheli and Co-PIs Jim Leape, Kevin Arrigo, Stephen Monismith, Stefano Ermon, and Margaret Levi, Stanford University*
2017–2018	Stanford Department of Anesthesiology FIDL Grant Quantifying Anesthetic Depth $91,138 *with PI Bruce MacIver and Co-PI David Drover, Stanford Anesthesiology*
2014–2017	National Science Foundation CBET-1436423/CBET-1600292 Bulk Turbulence in Polymer Solutions: Beyond Friction Drag Reduction $279,774
2013–2016	Army Research Office W911NF-14-1-0005 Determining the Essential Elements of Hydrodynamic Erosion of Granular Beds $360,000 *with Co-PI Corey O'Hern, Yale Mechanical Engineering and Materials Science*
2013–2015	Army Research Office W911NF-13-1-0426 Laboratory and Modeling Studies of Insect Swarms $145,352
2012–2015	National Science Foundation DMS-1211952 Collaborative Research: Theories and Experiments on Scalar Mixing in Chaotic Flows $93,056
2012–2015	National Science Foundation DMR-1206399 Linking Spatial and Spectral Transport in Two-Dimensional Fluid Flow $330,000
2013–2014	Yale Endowed Postdoctoral Fellowship in the Biological Sciences $50,545
2012–2013	Army Research Office W911NF-12-1-0517 Characterization and Modeling of Insect Swarms Using Tools from Fluid Dynamics $50,000

2009–2012 National Science Foundation DMR-0906245
Connecting Dynamical Structure and Statistical Analysis in Quasi-2D Fluid Flow
$320,000

STUDENTS AND POSTDOCS SUPERVISED

Current

- **Sophie Bodek** (Ph.D. student, 2022–present, Civil and Environmental Engineering, Stanford; Stanford Graduate Fellowship; Stanford Lieberman Fellowship): Stress history in erodible beds.
- **Maya Eley** (Ph.D. student, 2022–present, Civil and Environmental Engineering, Stanford): Bedform dynamics.
- **Shana Hartwick** (Ph.D. student, 2024–present, Civil and Environmental Engineering, Stanford; NSF Graduate Research Fellowship): Dynamics of porous particles in flows.
- **Lingchun Yan** (Ph.D. student, 2026–present, Civil and Environmental Engineering, Stanford): Animal groups and active matter.
- **Milo Van Mooy** (Ph.D. student 2026–present, Civil and Environmental Engineering, Stanford): Dynamics of particles with active buoyancy.

Former (with last known position)

- **Theodore MacMillan** (Ph.D. 2026, Civil and Environmental Engineering, Stanford; NSF Graduate Research Fellowship; Stanford Graduate Fellowship): Structure in complex systems.
  Researcher at Causal Labs
- **Erika MacDonald** (Ph.D. 2026, Civil and Environmental Engineering, Stanford): Dynamics of thermally active particles in flows.
  Researcher at Tidal
- **Yenchia Feng** (Ph.D. 2023, Civil and Environmental Engineering, Stanford): Insect swarms and bird flocks.
  AI Research Engineer at Distyl AI
- **Jennifer Yin** (Ph.D. 2023, Civil and Environmental Engineering, Stanford; Stanford Graduate Fellowship; Stanford Lieberman Fellowship): In-situ measurements of stratified turbulence.
  Co-advised with Prof. Stephen Monismith, Stanford University.
  Carbon Removal Scientist at Isometric
- **Laura Clark Sunberg** (Ph.D. 2023, Civil and Environmental Engineering, Stanford): Particle transport by waves and currents. *Co-advised with Prof. Jeffrey Koseff, Stanford University.*
  Assistant Professor of Civil and Environmental Engineering at the University of Colorado, Boulder
- **Rohan Aras** (Ph.D. 2022, Civil and Environmental Engineering, Stanford; NSF Graduate Research Fellowship): Urban morphology and its impacts on non-motorized mobility. *Co-advised with Prof. Rishee Jain, Stanford University.*
  Senior Transportation Policy Analyst at the Niskanen Center

- **Saksham Gakhar** (Ph.D. 2022, Civil and Environmental Engineering, Stanford): Surface expression of bathymetric features. *Co-advised with Prof. Jeffrey Koseff, Stanford University.*
  Research Data Scientist at Meta
- **Marios Galanis** (Ph.D. 2022, Civil and Environmental Engineering, Stanford): Hydrodynamic erosion of granular materials.
  Data Scientist at Meta
- **Yukinobu Tanimoto** (Ph.D. 2021, Civil and Environmental Engineering, Stanford): Waves and gravity currents. *Co-advised with Prof. Jeffrey Koseff, Stanford University*.
  Associate at McKinsey & Co.
- **Joseph Ballouz** (Ph.D. 2020, Civil and Environmental Engineering, Stanford): Geometric alignment in turbulence.
  Senior Civil Engineer at Interfield Group
- **Lei Fang** (Ph.D. 2020, Civil and Environmental Engineering, Stanford): 2D turbulence.
  Assistant Professor of Civil and Environmental Engineering at the University of Pittsburgh
- **Michelle DiBenedetto** (Ph.D. 2019, Civil and Environmental Engineering, Stanford; Stanford Graduate Fellowship; Stanford Lieberman Fellowship; Andreas Acrivos Dissertation Award, American Physical Society; Lorenz G. Straub Dissertation Award, St. Anthony Falls Laboratory): Transport of microplastics in wavy flows.
  Assistant Professor of Mechanical and Aerospace Engineering at Princeton University
- **J. C. Salevan** (Ph.D. 2018, Mechanical Engineering, Yale): Hydrodynamic erosion of granular materials.
  Research Analyst at the Yale University Office of Institutional Research
- **Alexandre de Chaumont Quitry** (Ph.D. 2016, Mechanical Engineering, Yale): Turbulence in complex fluids.
  Research engineer at Visby
- **Yang Liao** (Ph.D. 2015, Mechanical Engineering, Yale): 2D turbulence.
  Associate Scientist in Geology & Geophysics at Woods Hole Oceanographic Institution
- **Nidhi Khurana** (Ph.D. 2013, Mechanical Engineering, Yale): Active particles in chaotic flow.
  Researcher at the Centers for Disease Control
- **Patricia Yang** (postdoc, 2020–2021): Bird flocks.
  Assistant Professor of Power Mechanical Engineering at National Tsing Hua University, Taiwan
- **Sarah Eagleman** (postdoc, 2017–2020): EEG signal analysis and anesthetic depth.
  Director of Clinical Studies, Octave Bioscience
- **Hangjian Ling** (postdoc, 2017–2019): Bird flocks.
  Associate Professor of Mechanical Engineering at the University of Massachusetts, Dartmouth
- **Mary Cameron** (postdoc, 2017–2019): Health and stability of ocean ecosystems.
  Data Scientist at Hivemapper
- **Kasper van der Vaart** (postdoc, 2017–2019): Insect swarms, bird flocks.
  In industry

- **Michael Sinhuber** (postdoc, 2016–2019): Insect swarms, non-Newtonian turbulence.
  Ossietzky Fellow at the Institute of Physics, University of Oldenburg
- **Abram Clark** (postdoc, 2014–2017): Hydrodynamic erosion of granular materials.
  Associate Professor of Physics at the Naval Postgraduate School
- **Charlie Hogg** (postdoc, 2015–2017): Gravity currents and internal waves; coherent structures in 2D flow.
  Data Scientist at Aruba
- **Rui Ni** (postdoc, 2013–2015): Particle transport in turbulence; insect swarms.
  Professor of Mechanical Engineering at Johns Hopkins University
- **James Puckett** (postdoc, 2012–2014): Insect swarms; advection-reaction-diffusion systems.
  Sr. Principal Systems Engineer, Northrop Grumman
- **Douglas Kelley** (postdoc, 2009–2012): 2D fluid flow; insect swarms.
  Professor of Mechanical Engineering at the University of Rochester
- **Manisha Patel** (B.S. 2019, Physics, Stanford): Light cues in insect swarms.
  Ph.D. student in Physics at the University of California, Santa Barbara
- **Pearson Miller** (B.S. 2014, Physics, Yale): Fragmentation of model flocks.
  Assistant Professor of Mathematics at the University of California, San Diego
- **Benjamin Green** (B.S. 2014, Physics and Mathematics, Yale): Network analysis of insect swarms.
  Assistant Professor of Information at the University of Michigan
- **Jerry Wang** (B.S. 2013, Physics and Mechanical Engineering, Yale; McCrosky Prize): Anisotropic particles in 2D flow.
  Associate Professor of Civil and Environmental Engineering at Carnegie Mellon University
- **Courtney Engle** (B.S. 2012, Mechanical Engineering, Yale): Turbidity currents.
- **Kevin Shen** (B.S. 2011, Chemical Engineering, Yale): Active particles in synthetic flows.
  Ph.D. student in Chemical Engineering at Caltech
- **Sophia Merrifield** (B.S. 2010, Physics and Mechanical Engineering, Yale; Lichty & Waters Prize): Shape statistics in 2D flow.
  Associate Professor at Scripps Institution of Oceanography

INVITED PRESENTATIONS

2026 • University of Chicago and Caltech Conference on AI+Science, University of Chicago *[upcoming]*
• Tandon School of Engineering, New York University
• "Soft-Earth Geophysics," Kavli Institute for Theoretical Physics, University of California, Santa Barbara
• Benjamin Levich Institute, City College of New York
• Department of Physics, Wesleyan University

2025 • Seminar Series on Complex, Dynamic, and Adaptive Systems, DARPA
• Department of Mechanical Engineering, Yale University

• Fluid Mechanics Seminar, Department of Mechanical and Aerospace Engineering, Princeton University

2024 • Department of Mechanical Engineering, Yale University

2023 • Department of Civil and Environmental Engineering, Carnegie Mellon University
• Fluid Dynamics Research Consortium, Pennsylvania State University
• Stanford Fluids Seminar, Stanford University

2022 • Environmental Engineering Seminar, Stanford University

2021 • Department of Geophysics, Stanford University
• CIRF Seminar, Department of Mechanical Engineering, University of California, Santa Barbara
• Clarkson Center for Complex Systems Science, Clarkson University
• ACM Collective Intelligence Conference 2021, Copenhagen, Denmark
• SIAM Conference on Applications of Dynamical Systems (virtual)

2020 • Applied and Computational Mathematics Seminar, University of Wisconsin, Madison
• Stanford Fluids Seminar, Stanford University
• Physics of Behavior Virtual Workshop, hosted by Emory University, Vrije Universiteit, and Okinawa Institute of Science and Technology

2019 • Workshop on Autonomous Vehicles, Nanoscale Prototyping Laboratory Affiliate Program, Stanford University
• Workshop on Statistical Mechanics of Swarming Behaviour, La Plata, Argentina
• International Symposium: From Pattern Formation to Turbulence, Kloster Banz, Bavaria, Germany
• Department of Mechanical Engineering, University of California, Santa Barbara
• Institute for Geophysics and Planetary Physics Seminar, University of California, Santa Cruz
• APS March Meeting, Boston

2018 • Fluid Mechanics Seminar, University of California, San Diego
• Department of Mechanical Engineering, University of Rochester
• 10th European Solid Mechanics Conference, Bologna, Italy
• MRS Spring Meeting, Phoenix
• "Distributed, Collective Computation in Biological and Artificial Systems," Howard Hughes Medical Institute, Janelia Research Campus
• "Fundamental Problems in Active Matter," Aspen Center for Physics
• Department of Physics, Naval Postgraduate School

2017 • Department of Civil and Environmental Engineering, Duke University
• Department of Applied Physical Sciences, University of North Carolina, Chapel Hill
• 5th Collective Intelligence Conference, New York University
• SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah
• APS March Meeting, New Orleans
• "Transport in Unsteady Flows: from Deterministic Structures to Stochastic Models and Back Again," Banff, Canada

2016 • Berkeley Fluids Seminar, University of California, Berkeley

• Army Research Office Workshop on “Characterizing the Dynamics of Geo-Surface Materials: Modeling and Simulation Challenges and Opportunities”
• AmeriMech Symposium on Fluid Transport and Nonlinear Dynamics, Woods Hole Oceanographic Institution
• “Two-Phase Continuum Models for Geophysical Particle-Fluid Flows,” Max Planck Institute for Physics of Complex Systems, Dresden, Germany
• Department of Physics, Emory University
• “Geometric and Graph-based Approaches to Collective Motion,” Schloss Dagstuhl, Wadern, Germany

2015
• Department of Aerospace Engineering and Mechanics, University of Minnesota
• Center for Nonlinear Dynamics, Department of Physics, University of Texas at Austin
• Stanford Fluids Seminar, Stanford University
• EquaDiff 2015, Lyon, France
• Okinawa Institute of Science and Technology, Okinawa, Japan
• Environmental Multiphase Flow Workshop, Huazhong University of Science Technology, Wuhan, China
• Department of Thermal Engineering, Tsinghua University, China
• SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah
• “Collective Dynamics and Model Verification: Connecting Kinetic Modeling to Data,” Arizona State University
• Environmental Fluid Mechanics and Hydrology Seminar, Department of Civil and Environmental Engineering, Stanford University
• APS Editorial Office Colloquium
• Department of Physics, University of California, Merced
• CIRF Seminar, Department of Mechanical Engineering, University of California, Santa Barbara

2014
• AGU Fall Meeting, San Francisco
• Combustion Research Facility, Sandia National Laboratory, Livermore, CA
• Center for the Ecological Study of Perception and Action, Department of Psychology, University of Connecticut
• Department of Physics, University of Massachusetts, Amherst
• Department of Mechanical Engineering, Arizona State University
• School of Mathematical and Statistical Sciences, Arizona State University
• Department of Civil and Environmental Engineering, Stanford University
• “Interaction and Collective Movement Processing,” Schloss Dagstuhl, Wadern, Germany
• APS March Meeting, Denver
• Department of Physics, Duke University
• Department of Mechanical Engineering, Stanford University
• “Mixing, Transport and Coherent Structures,” Mathematisches Forschungsinstitut Oberwolfach, Germany
• “Yale–Weizmann Encounter in the Biological, Physical, and Engineering Sciences,” Weizmann Institute of Science, Israel

2013
• “Nonlocality in Turbulence,” Wolfgang Pauli Institut, Vienna, Austria

• "Fluid-Mediated Particle Transport in Geophysical Flows," Kavli Institute for Theoretical Physics, University of California, Santa Barbara
• "Uncovering Transport Barriers in Geophysical Flows," Banff, Canada
• "Perspectives in Nonlinear Dynamics 2013," Hyderabad, India
• SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah
• Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany
• Department of Mechanical Engineering, University of Pennsylvania

2012
• Center for Nonlinear Studies Colloquium, Los Alamos National Lab
• Widely Applied Mathematics Seminar, Harvard University
• SIAM Conference on Nonlinear Waves and Coherent Structures, Seattle
• "Particles in Turbulence," Lorentz Center, Leiden, the Netherlands
• "Lagrange versus Euler for Turbulent Flows," Wolfgang Pauli Institut, Vienna, Austria
• Department of Physics, James Madison University
• "New Directions in Turbulence," Kavli Institute for Theoretical Physics China, Beijing

2011
• Applied Dynamics Seminar, University of Maryland, College Park
• Stanford Fluids Seminar, Stanford University
• "Nonlinear Dynamics and Fluid Instabilities in the 21st Century," Haverford College
• "Coherent Structures in Dynamical Systems," Lorentz Center, Leiden, the Netherlands
• CIRF Seminar, Department of Mechanical Engineering, University of California, Santa Barbara
• "The Nature of Turbulence," Kavli Institute for Theoretical Physics, University of California, Santa Barbara
• MMEC Seminar, Department of Mechanical Engineering, MIT

2010
• Department of Physics, Bucknell University

2009
• "Chaos/Xaoc 2009," Woods Hole, MA
• Applied Mathematics Laboratory, Courant Institute, New York University
• Department of Geology & Geophysics, Yale University

2008
• Department of Physics and Astronomy, Swarthmore College
• Department of Mechanical Engineering, City College of New York
• "Dynamics of Inertial Particles: From Ocean and Atmosphere to Planets," Max Planck Institute for Physics of Complex Systems, Dresden, Germany
• Department of Physics, University of Pennsylvania
• James Franck Institute, University of Chicago

2007
• Department of Mechanical Engineering, Yale University
• Department of Physics, Wesleyan University
• Department of Physics, Haverford College

2005
• Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany
• Cornell Fluid Dynamics Seminar, Cornell University

2003
• Department of Wind Energy, Risø National Laboratory, Denmark

CONTRIBUTED PRESENTATIONS

2026
• APS Global Physics Summit, Denver *(author on 2 talks)*

2025 • AGU Fall Meeting, New Orleans *(author on 2 presentations)*
• APS Division of Fluid Dynamics Meeting, Houston *(author on 3 talks)*
• APS Global Physics Summit, Anaheim *(author on 4 talks)*

2024 • APS Division of Fluid Dynamics Meeting, Salt Lake City *(author on 2 talks)*

2023 • APS Division of Fluid Dynamics Meeting, Washington *(author on 3 talks)*
• SIAM Conference on Applications of Dynamical Systems, Portland

2022 • APS Division of Fluid Dynamics Meeting, Indianapolis *(author on 2 talks)*

2021 • APS Division of Fluid Dynamics Meeting, Phoenix *(author on 2 talks)*
• APS March Meeting (virtual) *(author on 2 talks)*

2020 • APS Division of Fluid Dynamics Meeting (virtual) *(author on 2 talks)*

2019 • APS Division of Fluid Dynamics Meeting, Seattle *(author on 6 talks)*
• 17th European Turbulence Conference, Torino, Italy

2018 • APS Division of Fluid Dynamics Meeting, Atlanta *(author on 4 talks)*
• 18th HFSP Awardees Meeting, Toronto

2017 • APS Division of Fluid Dynamics Meeting, Denver *(author on 6 talks)*
• 16th European Turbulence Conference, Stockholm, Sweden *(author on 2 talks)*

2016 • APS Division of Fluid Dynamics Meeting, Portland *(author on 3 talks)*

2015 • APS Division of Fluid Dynamics Meeting, Boston *(author on 3 talks)*
• 15th European Turbulence Conference, Delft, the Netherlands
• 9th European Solid Mechanics Conference, Madrid, Spain
• APS March Meeting, San Antonio *(author on 3 talks)*

2014 • APS Division of Fluid Dynamics Meeting, San Francisco *(author on 4 talks)*
• 10th AIMS Conference on Dynamical Systems, Differential Equations, and Applications, Madrid, Spain
• 17th US National Congress of Theoretical and Applied Mechanics, Michigan State University
• "Dynamics of Particles in Flows: Fundamentals and Applications," NORDITA, Stockholm, Sweden

2013 • APS Division of Fluid Dynamics Meeting, Pittsburgh *(author on 4 talks)*
• 14th European Turbulence Conference, Lyon, France
• 25th IUPAP International Conference on Statistical Physics, Seoul, South Korea
• APS March Meeting, Baltimore *(author on 5 talks)*
• Dynamics Days 2013, Denver *(author on 4 presentations*)

2012 • APS Division of Fluid Dynamics Meeting, San Diego *(author on 6 talks)*
• APS March Meeting, Boston

2011 • APS Division of Fluid Dynamics Meeting, Baltimore *(author on 5 talks)*
• APS March Meeting, Dallas
• Dynamics Days 2011, Chapel Hill *(author on 2 talks)*

2010 • APS Division of Fluid Dynamics Meeting, Long Beach *(author on 5 talks)*
• 3rd Conference on Nonlinear Science and Complexity, Ankara, Turkey *(2 talks)*

	• 16th US National Congress of Theoretical and Applied Mechanics, Pennsylvania State University • 2nd COST Action Workshop on Experiments in Turbulence, Zugspitze, Germany • APS March Meeting, Portland *(author on 3 talks)*
2009	• APS Division of Fluid Dynamics Meeting, Minneapolis *(author on 3 talks)*
2008	• APS Division of Fluid Dynamics Meeting, San Antonio • APS March Meeting, New Orleans
2007	• APS March Meeting, Denver
2006	• APS Division of Fluid Dynamics Meeting, Tampa Bay • 12th International Symposium on Flow Visualization, Göttingen, Germany • Stirring and Mixing European Research Training Network Meeting, Leiden, the Netherlands • APS March Meeting, Baltimore
2005	• APS Division of Fluid Dynamics Meeting, Chicago
2004	• APS Division of Fluid Dynamics Meeting, Seattle • Stirring and Mixing European Research Training Network Meeting, Nice, France

TEACHING

Stanford University	CEE 6 / URBANST 109: Physics of Cities *Spring 2017, Spring 2018, Spring 2019, Spring 2020* CEE 101B/162A: Mechanics of Fluids *Autumn 2015, Autumn 2016, Autumn 2023, Autumn 2024, Autumn 2026* CEE 201E: Nonlinear Dynamics *Autumn 2019, Spring 2023, Spring 2025, Spring 2027* CEE 262A: Hydrodynamics *Autumn 2017, Autumn 2018, Winter 2020, Autumn 2020, Autumn 2021, Autumn 2022* CEE 363B: Chaos and Turbulence *Spring 2016, Winter 2017, Winter 2018, Winter 2019, Spring 2022, Spring 2024, Spring 2026* CEE 363D: Topics in Fundamental Turbulence *Winter 2021, Winter 2025* CEE 379A: Introduction to PhD Studies in CEE *Autumn 2020, Autumn 2021, Autumn 2022, Autumn 2026* ENGR 298: Seminar in Fluid Mechanics *Winter 2017, Autumn 2023* LAW 682D: Science and the Law *Spring 2018 (with L. L. Ouellette)*
Yale University	MENG 361: Mechanical Engineering II: Fluid Mechanics *Fall 2012, Fall 2013*

	MENG 363: Fluid Mechanics and Thermodynamics Laboratory *Spring 2010, Spring 2011, Spring 2013*
	MENG 463 / ENAS 704: Theoretical Fluid Dynamics *Spring 2009, Fall 2010*
	ENAS 789: Turbulence *Spring 2010, Spring 2014*
	SCIE 198: Perspectives on Science and Engineering *Fall 2008, Spring 2009*
Haverford College	Physics 212: Laboratory in Quantum Physics *Spring 2008*
Cornell University	Physics 101: General Physics I *Fall 2002 (Teaching assistant)*
	Physics 102: General Physics II *Spring 2003 (Teaching assistant)*
Swarthmore College	Physics 50: Mathematical Methods *Spring 2001 (Teaching assistant)*

SERVICE

University Leadership and Service

- Associate Department Chair, Department of Civil and Environmental Engineering, Stanford University, 2021–2024; 2026–Present
- Associate Chair for Diversity and Inclusion, Department of Civil and Environmental Engineering, Stanford University, 2023–2024
- Director of Graduate Admissions, Department of Civil and Environmental Engineering, Stanford University, 2021–2024
- Director of Undergraduate Studies, Department of Civil and Environmental Engineering, Stanford University, 2021–2023
- Associate Director, Bob and Norma Street Environmental Fluid Mechanics Laboratory, 2022–Present
- Faculty Search Committee, Department of Mechanical Engineering, Stanford University, 2020–2021
- Research Continuity Working Group on Labs, Libraries, and Shared Facilities, Stanford University, 2020–2021
- Stanford University Faculty Senate Committee on Research, 2019–2022
- Director of Graduate Studies, Civil & Environmental Engineering, Stanford University, 2019–2021; 2023
- Environmental Engineering Graduate Admissions Committee, Stanford University, 2018–2021
- Organizer, Stanford Fluid Mechanics Seminar, Winter 2017, Autumn 2023

- Program Advisor, Undergraduate Minor in Environmental Systems Engineering, Stanford University, 2016–2024
- Pre-Major Advisor, Stanford University, 2016–2018
- Undergraduate Curriculum Committee, Department of Civil and Environmental Engineering, Stanford University, 2016–2023
- Vision Committee, Department of Civil and Environmental Engineering, Stanford University, 2016–2020
- Ad Hoc Civil & Environmental Engineering Committees, Stanford University
    - Faculty Hiring Vision (Chair), 2025
    - Renewing the Civil Engineering Major (Co-Chair), 2019–2020
    - Designing the PhD Cohort Experience, 2023
- Chair, Graduate Admissions Committee, Department of Mechanical Engineering & Materials Science, Yale University, 2009–2014
- Yale College Fulbright Grants Committee, 2012–2013
- Freshman and Sophomore Advisor, Davenport College, Yale University, 2008–2014

Professional Service

- Lorenz G. Straub Award Committee, St. Anthony Falls Laboratory, 2022–2025
- Editorial Board Member, *Physical Review Fluids*, 2022–Present
- American Physical Society Division of Fluid Dynamics Executive Board, Member-At-Large, 2023–2026
    - Organized webinars on the Societal Impact of Fluid Dynamics: Fluid Dynamics of Wildfire Spread (spring 2026); Fluid Dynamics of Microplastics (fall 2026)
- American Physical Society Division of Fluid Dynamics Fellowship Committee, 2023–2024
- American Physical Society Topical Group on Statistical and Nonlinear Physics Executive Board, Member-At-Large, 2018–2021
- American Physical Society Division of Fluid Dynamics Acrivos Dissertation Award Selection Committee, 2017–2018
- American Physical Society Dissertation Award in Statistical and Nonlinear Physics Selection Committee, 2017–2019

Conference Organization

- Full conferences co-organized:
    - “Transport in Unsteady Flows: from Deterministic Structures to Stochastic Models and Back Again,” Banff International Research Station, 2017
    - “Mixing, Transport and Coherent Structures,” Mathematisches Forschungsinstitut Oberwolfach, 2014

- "Nonlinear Dynamics and Fluid Instabilities in the 21st Century," Haverford College, 2011
- 38th New England Complex Fluids Workshop, Yale University, 2009

- Conference sessions co-organized
  - Minisymposium on "Fluid Mechanics of Microplastic Transport," APS Division of Fluid Dynamics Meeting, 2022
  - Focus Session on "Probing Multi-Scale Flows by Coarse-Graining," APS Division of Fluid Dynamics Meeting, 2019
  - Focus Session on "Collective Dynamics: Fluid Physics of Life," APS March Meeting, 2017
  - Focus Session on "Sediment Transport, Geological Flows, and Avalanches," APS March Meeting, 2016

Reviewing

- Grant reviewer for:
  - National Science Foundation *(Cognitive Neuroscience; Condensed Matter Physics; Controls, Dynamics, and Sensing Diagnostics; Earth Science Instrumentation and Facilities; Fluid Dynamics; Graduate Research Fellowship Program; MRSEC; Particulate and Multiphase Processes; Physical Oceanography; Physics of Living Systems)*
  - Army Research Office
  - ACS Petroleum Research Fund
  - Human Frontier Science Program
  - National Geographic
  - Templeton Foundation
  - Gordon & Betty Moore Foundation
  - Israel Science Foundation
  - Swiss National Science Foundation
  - Einstein Foundation
  - Research Corporation
  - Royal Society
  - Netherlands Organisation for Scientific Research
  - Icelandic Research Fund
- Peer reviewer for:
  - *American Journal of Physics*
  - *Behavioral Ecology and Sociobiology*
  - *Bioinspiration & Biomimetics*
  - *Chaos*
  - *Chaos, Solitons and Fractals*
  - *Computers and Fluids*
  - *Computing in Science and Engineering*
  - *European Journal of Mechanics B*
  - *European Physical Journal B*
  - *European Physical Journal Special Topics*

- *Europhysics Letters*
- *Experiments in Fluids*
- *Flow, Turbulence and Combustion*
- *Granular Matter*
- *International Journal of Multiphase Flow*
- *Journal of Atmospheric and Oceanic Technology*
- *Journal of Fluid Mechanics*
- *Journal of Geophysical Research - Oceans*
- *Journal of Physical Oceanography*
- *Journal of the Royal Society Interface*
- *Journal of Theoretical Biology*
- *Journal of Turbulence*
- *Limnology and Oceanography*
- *Limnology and Oceanography Letters*
- *Measurement Science and Technology*
- *Nature Communications*
- *Nature Ecology & Evolution*
- *Nature Physics*
- *Nature Reviews Physics*
- *New Journal of Physics*
- *Physica A*
- *Physica D*
- *Physical Biology*
- *Physics of Fluids*
- *Physical Review E*
- *Physical Review Fluids*
- *Physical Review Letters*
- *Physical Review Research*
- *Physical Review X*
- *PLoS Biology*
- *PLoS ONE*
- *Proceedings of the National Academy of Sciences*
- *Proceedings of the Royal Society B*
- *Review of Scientific Instruments*
- *Science*
- *Science Advances*
- *Scientific Data*
- *Scientific Reports*
- *Water Resources Research*