Daniel O'Malley (omalled@gmail.com)

Experience

Visiting Research Assistant Professor 2018–present
Department of Computer Science and Electrical Engineering,
University of Maryland, Baltimore County

Co-founder & CTO 2016–present
Fill Education, LLC

Scientist 2016–present

Director's Postdoctoral Fellow 2014–2016

Postdoctoral Research Associate 2013–2014
Computational Earth Science Group,
Earth and Environmental Sciences Division,
Los Alamos National Laboratory

Postdoctoral Research Associate 2011–2013
Department of Earth, Atmospheric, and Planetary Sciences,
Purdue University

Education

Purdue University, West Lafayette, Indiana USA

Ph.D., Mathematics, May 2011

M.S., Mathematics, December 2006

B.S., Computer Science & Mathematics, May 2004

Honors & Awards

LANL Large Team Distinguished Performance Award (2019)

"The multidisciplinary Subsurface Hydrology, Geology, and Geochemistry Science Team provided essential science through lab, field, and computer modeling contributions to characterize and assess subsurface geochemical and hydrological processes critical for decisions on how to remediate contamination at LANL."

LAAP Award (2019)

$500 Los Alamos Awards Program award "in recognition of excellence in the area of scientific publications"

LAAP Award (2018)

$500 Los Alamos Awards Program award "in recognition of outstanding publication record of first authored papers"

LAAP Award (2016)

$500 Los Alamos Awards Program award "in recognition of excellence in the area of scientific publications"

Orlob Foundation Travel Grant (2016)

All expenses paid for travel to the Second Orlob Symposium on Theoretical Hydrology

NSF/AGU Travel Grant (2015)

$2,000 to travel to the AGU Chapman Conference on highly heterogeneous aquifers

LANL Director's Postdoctoral Fellowship (2014)

Two year fellowship awarded four times a year in a fierce laboratory-wide competition

InterPore Fraunhofer Award for Young Researchers (2012)

5,000€ award from the International Society for Porous Media and funded by the Fraunhofer Institute for Industrial Mathematics (ITWM) for outstanding contributions to porous and composite materials modelling and computer simulation by a recent Ph.D. graduate

Charles C. Chappelle Fellowship (2004)

Awarded annually by Purdue University to outstanding seniors who continue their graduate studies at Purdue

Meyer E. Jerison Memorial Award in Analysis (2004)

Awarded annually by the mathematics department at Purdue University to an outstanding student in analysis

Grants

Coupling HPC with D-Wave

NNSA: Advanced Simulation and Computing
2019-2020, $370,000
My role: Principal Investigator

Machine Learning Through Adiabatic Quantum Annealing

CRADA between LANL and Booz Allen Hamilton
2018-2019, $160,000
My role: Principal Investigator

Leveraging quantum annealing to design additively manufactured products

LANL: Laboratory Directed Research & Development
2018, $50,000
My role: Principal Investigator

Implementing Grover's algorithm on an IBM quantum computer

LANL: Information Science and Technology Institute
2017-2018, $20,000
My role: Principal Investigator

Finding a needle in a haystack: Physics-constrained discrete optimization by coupling HPC and quantum annealing

LANL: Laboratory Directed Research & Development
2017-2018, $250,000

My role: Principal Investigator

Combinatorial Blind Source Separation using LANL's D-Wave 2X Ising

LANL: Laboratory Directed Research & Development
2016, $50,000
My role: Principal Investigator

Quantum uncertainty quantification for physical models using ToQ.jl

LANL: Information Science and Technology Institute
2016, $22,000
My role: Principal Investigator

Data Driven Multiscale Model Identification and Scaling via Random Renormalization Group Operators for Subsurface Transport

NSF-EAR: Hydrologic Sciences
2013-2016, $400,000
My role: Principal Author (PI: John H. Cushman)

Book Chapters

1. **O'Malley, D.** and J.H. Cushman. Fractional Fokker-Planck Equations. *Fractals: Concepts and Applications in Geosciences*. A. Hunt and B. Ghanbarian eds. 2017. ISBN 9781498748711.

2. **O'Malley, D.** and J.H. Cushman. Anomalous Dispersion. *The Handbook of Groundwater Engineering*. J.H. Cushman and D.M. Tartakovsky eds. 2016. ISBN 9781498703048.

Peer Reviewed Papers

Underlined names indicate students working under my supervision.

1. Vesselinov, V.V., M.K. Mudunuru, S. Karra, **D. O'Malley**, B.S. Alexandrov. Unsupervised machine learning based on non-negative tensor factorization for analyzing reactive-mixing. *Journal of Computational Physics*. 395:85. 2019.
doi:10.1016/j.jcp.2019.05.039

2. Battiato, I., P.T. Ferrero, **D. O'Malley**, C.T. Miller, P.S. Takhar, F.J. Valdés-Parada, B.D. Wood. Theory and Applications of Macroscale Models in Porous Media. *Transport in Porous Media*. 2019.
doi:10.1007/s11242-019-01282-2

3. Vesselinov, V.V., B.S. Alexandrov, and **D. O'Malley**. Nonnegative tensor factorization for contaminant source identification. *Journal of Contaminant Hydrology*. 220:66. 2019.
doi:10.1016/j.jconhyd.2018.11.010

4. Hunter, A., B.A. Moore, M. Mudunuru, V. Chau, R. Tchoua, C. Nyshadham, S. Karra, **D. O'Malley**, E. Rougier, H. Viswanathan, and G. Srinivasan. Reduced-order modeling through machine learning and graph-theoretic

approaches for brittle fracture applications. *Computational Materials Science*. 157:87. 2019.
doi:j.commatsci.2018.10.036

5. **O'Malley, D.**, V.V. Vesselinov, B.S. Alexandrov, and L.B. Alexandrov. Nonnegative/binary matrix factorization with a D-Wave quantum annealer. *PLoS ONE*. 13:e0206653. 2018.
doi:10.1371/journal.pone.0206653

6. Srinivasan, S., J.D. Hyman, S. Karra, **D. O'Malley**, H. Viswanathan, and G. Srinivasan. Robust system size reduction of discrete fracture networks: a multi-fidelity method that preserves transport characteristics. *Computational Geosciences*. 22:1515. 2018.
doi:10.1007/s10596-018-9770-4

7. Viswanathan, H.S., J.D. Hyman, S. Karra, **D. O'Malley**, S. Srinivasan, A. Hagberg, and G. Srinivasan. Advancing graph-based algorithms for predicting flow and transport in fractured rock. *Water Resources Research*. 54:6085. 2018.
doi:10.1029/2017WR022368

8. Srinivasan, G., J.D. Hyman, D.A. Osthus, B.A. Moore, **D. O'Malley**, S. Karra, E. Rougier, A.A. Hagberg, A. Hunter, and H.S. Viswanathan. Quantifying topological uncertainty in fractured systems using graph theory and machine learning. *Nature Scientific Reports*. 8:11665. 2018.
doi:10.1038/s41598-018-30117-1

9. **O'Malley, D.**, S. Karra, J.D. Hyman, H.S. Viswanathan, and G. Srinivasan. Efficient Monte Carlo with graph-based subsurface flow and transport models. *Water Resources Research*. 54:3758. 2018.
doi:10.1029/2017WR022073

10. Lovell, A.E., S. Srinivasan, S. Karra, **D. O'Malley**, N. Makedonska, H.S. Viswanathan, G. Srinivasan, J.W. Carey, and L.P. Frash. Extracting hydrocarbon from shale: an investigation of the factors that influence the decline and the tail of the production curve. *Water Resources Research*. 54:3748. 2018.
doi:10.1029/2017WR022180

11. Qian, E., B. Peherstorfer, **D. O'Malley**, V.V. Vesselinov, and K. Willcox. Multifidelity Monte Carlo estimation of variance and sensitivity indices. *SIAM/ASA Journal on Uncertainty Quantification*. 6:683. 2018
doi:10.1137/17M1151006

12. **O'Malley, D**. An approach to quantum-computational hydrologic inverse analysis. *Nature Scientific Reports*. 8:6919. 2018.
doi:10.1038/s41598-018-25206-0

13. Karra, S., **D. O'Malley**, J.D. Hyman, H. Viswanathan, and G. Srinivasan. Modeling flow and transport in fracture networks using graphs. *Physical Review E*. 97:033304. 2018.
doi:10.1103/PhysRevE.97.033304

14. Moore, B.A., E. Rougier, **D. O'Malley**, G. Srinivasan, A. Hunter, and H. Viswanathan. Predictive modeling of dynamic fracture growth in brittle materials with machine learning. *Computational Materials Science*. 148:46. 2018.
doi:10.1016/j.commatsci.2018.01.056

15. Vesselinov, V.V., B.S. Alexandrov, and **D. O'Malley**. Contaminant source identification using semi-supervised machine learning. *Journal of Contaminant Hydrology*. 212:134. 2018.
doi:10.1016/j.jconhyd.2017.11.002

16. Harp, D.R., P.H. Stauffer, **D. O'Malley**, Z. Jiao, E.P. Egenolf, T.A. Miller, D. Martinez, K.A. Hunter, R.S. Middleton, J.M. Bielicki, and R. Pawar. Development of robust pressure management strategies for geologic CO_2 sequestration. *International Journal of Greenhouse Gas Control*. 64:43. 2017.
doi:10.1016/j.ijggc.2017.06.012

17. Lin, Y., E.B. Le, **D. O'Malley**, V.V. Vesselinov, and T. Bui-Thanh. Large-scale inverse model analyses employing fast randomized data reduction. *Water Resources Research*. 53:6784. 2017.
doi:10.1002/2016WR020299

18. Djidjev, H., **D. O'Malley**, H. Viswanathan, J.D. Hyman, S. Karra, and G. Srinivasan. Learning on graphs for predictions of fracture propagation, flow and transport. *IEEE Parallel and Distributed Symposium Workshops*. 2017.
doi:10.1109/IPDPSW.2017.11

19. Bakarji, J., **D. O'Malley** and V.V. Vesselinov. Agent-based socio-hydrological hybrid modeling for water resource management. *Water Resources Management*. 31:3881. 2017.
doi:10.1007/s11269-017-1713-7

20. Hansen, S.K., B. Berkowitz, V.V. Vesselinov, **D. O'Malley**, and S. Karra. Push-pull tracer tests: Their information content and use for characterizing non-Fickian, mobile-immobile behavior. *Water Resources Research*. 52:12. 2016.
doi:10.1002/2016WR018769

21. **O'Malley, D.** and V.V. Vesselinov. ToQ.jl: A high-level programming language for D-Wave machines based on Julia. *IEEE High Performance Extreme Computing*. 2016.
doi:10.1109/HPEC.2016.7761616

22. Hyman, J.D., J. Jiménez-Martínez, H. S. Viswanathan, J. W. Carey, M. L. Porter, E. Rougier, S. Karra, Q. Kang, L. Frash, L. Chen, Z. Lei, **D. O'Malley**, and N. Makedonska. Understanding hydraulic fracturing: a multi-scale problem. *Philosophical Transactions of the Royal Society A*. 374:2078. 2016. (**Cover Article**)
doi:10.1098/rsta.2015.0426

23. Lin, Y., **D. O'Malley** and V.V. Vesselinov. A computationally efficient parallel Levenberg-Marquardt algorithm for highly parameterized inverse model analyses. *Water Resources Research*. 52:6948. 2016. doi:10.1002/2016WR019028

24. Throckmorton, H.M., B.D. Newman, J.M. Heikoop, G.B. Perkins, X. Feng, D.E. Graham, **D. O'Malley**, V.V. Vesselinov, J. Young, S.D. Wullschleger and C.J. Wilson. Active layer hydrology in an Arctic tundra ecosystem: quantifying water sources and cycling using water stable isotopes. *Hydrologic Processes*. 30:26. 2016. doi:10.1002/hyp.10883

25. Grasinger, M., **D. O'Malley**, V.V. Vesselinov, and S. Karra. Decision Analysis for Robust CO2 Injection: Application of Bayesian-Information-Gap Decision Theory. *International Journal of Greenhouse Gas Control*. 49:73. 2016. doi:10.1016/j.ijggc.2016.02.017

26. **O'Malley, D.**, S. Karra, R.P. Currier, N. Makedonska, J.D. Hyman, and H. Viswanathan. Where does water go during hydraulic fracturing?. *Groundwater*. 54:488. 2016. (**Cover Article**) doi:10.1111/gwat.12380

27. **O'Malley, D.** and V.V. Vesselinov. Bayesian information-gap decision analysis applied to a CO_2 leakage problem. *Water Resources Research*. 51:7080. 2015. doi:10.1002/2015WR017413

28. Cushman, J.H. and **D. O'Malley**. Fickian dispersion is anomalous. *Journal of Hydrology*. 531:161. 2015. doi:10.1016/j.jhydrol.2015.06.036

29. **O'Malley, D.**, V.V. Vesselinov, and J.H. Cushman. Diffusive mixing and Tsallis entropy. *Physical Review E*. 91:042143. 2015. doi:10.1103/PhysRevE.91.042143

30. Dempsey, D., **D. O'Malley**, and R. Pawar. Reducing uncertainty associated with CO_2 injection and brine production in heterogeneous formations. *International Journal of Greenhouse Gas Control*. 37:24. 2015. doi:10.1016/j.ijggc.2015.03.004

31. **O'Malley, D.** and V.V. Vesselinov. A combined probabilistic/non-probabilistic decision analysis for contaminant remediation. *SIAM/ASA Journal on Uncertainty Quantification*. 2:607. 2014. doi:10.1137/140965132

32. Park, M., J.H. Cushman, and **D. O'Malley**. Fractional Brownian motion run with a multi-scaling clock mimics diffusion of spherical colloids in microstructural fluids. *Langmuir*. 30:11263. 2014. doi:10.1021/la502334s

33. **O'Malley, D.**, V.V. Vesselinov, and J.H. Cushman. A method for identifying diffusive trajectories with stochastic models. *Journal of Statistical Physics*. 156:896. 2014.
doi:10.1007/s10955-014-1035-6

34. **O'Malley, D.** and V.V. Vesselinov. Analytical solutions for anomalous dispersion transport. *Advances in Water Resources*. 68:13. 2014.
doi:10.1016/j.advwatres.2014.02.006

35. Park, M., **D. O'Malley** and J.H. Cushman. Generalized similarity, renormalization groups, and nonlinear clocks for multiscaling. *Physical Review E*. 89:042104. 2014.
doi:10.1103/PhysRevE.89.042104

36. **O'Malley, D.** and V.V. Vesselinov. Groundwater remediation using the information gap decision theory. *Water Resources Research*. 50:246. 2014.
doi:10.1002/2013WR014718

37. Cushman, J.H., **D. O'Malley** and M. Park. Anomalous Dispersion, Renormalization Groups, Scaling Laws and Classification: A Reflection on Recent Efforts. *Advances in Water Resources*. 62B:207. 2013.
doi:10.1016/j.advwatres.2013.07.001

38. **O'Malley, D.**, J.H. Cushman and G. Johnson. Random renormalization groups and Bayesian scaling of dispersion/diffusion in Lake Michigan and the Gulf of Mexico. *Geophysical Research Letters*. 40:4638. 2013.
doi:10.1002/grl.50918

39. **O'Malley, D.** and J.H. Cushman. Ubiquity of, and geostatistics for, nonstationary increment random fields. *Water Resources Research*. 49:4525. 2013.
doi:10.1002/wrcr.20328

40. **O'Malley, D.**, J.H. Cushman and L.M. Flesch. Global sensitivity analysis for a micropolar Stokes flow problem. *International Journal for Multiscale Computational Engineering*. 11:359. 2013.
doi:10.1615/IntJMultCompEng.2013005115

41. **O'Malley, D.** and J.H. Cushman. Random renormalization group operators applied to stochastic dynamics. *Journal of Statistical Physics*. 149:943. 2012.
doi:10.1007/s10955-012-0630-7

42. **O'Malley, D.** and J.H. Cushman. Two-scale renormalization-group classification of diffusive processes. *Physical Review E*. 86:011126. 2012.
doi:10.1103/PhysRevE.86.011126

43. **O'Malley, D.**, J.H. Cushman and P. O'Rear. On generating conductivity fields with known fractal dimension and nonstationary increments. *Water Resources Research*. 48:W03201. 2012.
doi:10.1029/2011WR011681

44. **O'Malley, D.** and J.H. Cushman. A renormalization group classification of nonstationary and/or infinite second moment diffusive processes. *Journal of Statistical Physics*. 146(5):989. 2012. doi:10.1007/s10955-012-0448-3

45. Cushman, J.H., M. Park and **D. O'Malley**. A stochastic model for anomalous diffusion in confined nano-films near a strain-induced critical point. *Advances in Water Resources*. 34(4):490. 2011. doi:10.1016/j.advwatres.2011.01.005

46. Cushman, J.H., M. Park, M. Moroni, N. Kleinfelter-Domelle and **D. O'Malley**. A universal field equation for dispersive processes in heterogeneous media. *Stochastic Environmental Research and Risk Assessment*. 25(1):1. 2010. doi:10.1007/s00477-010-0446-4

47. **O'Malley, D.**, J.H. Cushman and G. Johnson. Scaling laws for fractional Brownian motion with power-law clock. *Journal of Statistical Mechanics: Theory and Experiment*. 2011(1):L01001. 2011. doi:10.1088/1742-5468/2011/01/L01001

48. **O'Malley, D.** and J.H. Cushman. Fractional Brownian motion run with a nonlinear clock. *Physical Review E*. 82:032102. 2010. doi:10.1103/PhysRevE.82.032102

49. Cushman, J.H., M. Park and **D. O'Malley**. Chaotic dynamics of super-diffusion revisited. *Geophysical Research Letters*. 36:L08812. 2009. doi:10.1029/2009GL037399

50. Cushman, J.H., **D. O'Malley** and M. Park. Anomalous diffusion as modeled by a nonstationary extension of Brownian motion. *Physical Review E*. 79:032101. 2009. doi:10.1103/PhysRevE.79.032101

51. Parashar, R., **D. O'Malley** and J.H. Cushman. Mean first-passage time for superdiffusion in a slit pore with sticky boundaries. *Physical Review E*. 78:052101. 2008. doi:10.1103/PhysRevE.78.052101

Other Publications

1. Lin, Y., **D. O'Malley**, V.V. Vesselinov, G.D. Guthrie, and D. Coblenz. Randomization in characterizing the subsurface. *SIAM News*. 51:1. January/February 2018.

Oral presentations

1. Learning to regularize with a variational autoencoder for hydrologic inverse analysis, EES-16 Science Café, Los Alamos National Laboratory (2019); Los Alamos, New Mexico USA.

2. Variations on a theme: solving linear systems with D-Wave, LANL/D-Wave Technical Exchange (2019); Los Alamos, NM USA.

3. Modeling flow and transport in fracture networks using machine learning and graphs, SIAM Conference on Mathematical & Computational Issues in the Geosciences (2019); Houston, TX USA.

4. Decision analyses for groundwater remediation, SIAM Conference on Mathematical & Computational Issues in the Geosciences (2019); Houston, TX USA.

5. Dimensionality reduction for subsurface flow models, SIAM Conference on Computational Science & Engineering (2019); Spokane, WA USA.

6. An approach to quantum-computational hydrologic inverse analysis, AGU Fall Meeting (2018); Washington, DC USA.

7. Efficient Monte Carlo with graph-based subsurface flow and transport models, AGU Fall Meeting (2018); Washington, DC USA.

8. An approach to quantum-computational hydrologic inverse analysis, Qubits North America (2018); Knoxville, Tennessee USA.

9. Unsupervised machine learning via matrix factorization with a quantum annealer, LANL Applied Machine Learning Summer School (2018); Los Alamos, New Mexico USA.

10. Quantum-computational approach to discrete tomography for porous media, InterPore (2018); New Orleans, Louisianna USA.

11. Unsupervised machine learning based on tensor factorization, InterPore (2018); New Orleans, Louisianna USA.

12. Characterizing the subsurface with randomized matrix algorithms, Technical University of Munich (2018); Munich, Germany.

13. Quantum computational hydrology 101, Qubits Europe (2018); Munich, Germany.

14. Los Alamos National Laboratory site report, Qubits Europe (2018); Munich, Germany.

15. Hydrologic model analyses for decision support at the Los Alamos National Laboratory site, Waste Management Symposia (2018); Phoenix, Arizona USA.

16. An approach to quantum-computational hydrologic inverse analysis, NASA Goddard Space Flight Center (2018); Remotely.

17. Nonnegative/binary matrix factorization with a D-Wave quantum annealer, CHMPR Distinguished Lecture, University of Maryland (2018); Baltimore County, Maryland USA.

18. Quantum computational hydrology 101, Booz Allen Hamilton (2018); Remotely.

19. Nonnegative/binary matrix factorization with a D-Wave quantum annealer, Qubits (2017); National Harbor, Maryland USA.

20. D-Wave programming tools panel, Qubits (2017); National Harbor, Maryland USA.

21. Quantum computational hydrology 101, SIAM Conference on Mathematical & Computational Issues in the Geosciences (2017); Erlangen, Germany.

22. Uncertainty quantification with graph-based flow/transport models, SIAM Conference on Mathematical & Computational Issues in the Geosciences (2017); Erlangen, Germany.

23. Nonnegative/binary matrix factorization with a D-Wave quantum annealer, Oak Ridge National Laboratory (2017); Remotely.

24. Quantum-computational hydrology 101, EES-16 Science Café, Los Alamos National Laboratory (2017); Los Alamos, New Mexico USA.

25. Nonnegative/binary matrix factorization with a D-Wave quantum annealer, Information Science & Technology Institute, Los Alamos National Laboratory (2017); Los Alamos, New Mexico USA.

26. Experiences using LANL's D-Wave quantum annealer, EES-16 Science Café, Los Alamos National Laboratory (2017); Los Alamos, New Mexico USA.

27. LANL D-Wave quick-start guide, Information Science & Technology Institute, Los Alamos National Laboratory (2017); Los Alamos, New Mexico USA.

28. Quantum uncertainty quantification for physical models using ToQ.jl, Information Science & Technology Institute, Los Alamos National Laboratory (2016); Los Alamos, New Mexico USA.

29. Groundwater remediation using Bayesian information-gap decision theory, AGU Fall Meeting (2016); San Francisco, California USA.

30. Reduced order models for decision analysis and upscaling of aquifer heterogeneity, AGU Fall Meeting (2016); San Francisco, California USA.

31. ToQ.jl: A high-level programming language for D-Wave machines based on Julia, IEEE High Performance Extreme Computing Conference (2016); Waltham, Massachusetts USA.

32. ToQ.jl: A high-level programming language for D-Wave machines based on Julia, US Navy Space and Naval Warfare Systems Command (2016); Remotely.

33. Fickian dispersion is anomalous, Orlob Symposium on Theoretical Hydrology (2016); Davis, California USA.

34. Taming parameter unidentifiability of ill-posed inverse problems in porous media, InterPore (2016); Cincinnati, Ohio USA.

35. Robust CO_2 Injection: Application of Bayesian-Information-Gap Decision Theory, AGU Fall Meeting (2015); San Francisco, California USA.

36. Decision-oriented optimal-experimental design, AGU Fall Meeting (2015); San Francisco, California USA.

37. Fast Geostatistical Inversion using Randomized Matrix Decompositions and Sketchings for Heterogeneous Aquifer Characterization, AGU Fall Meeting (2015); San Francisco, California USA.

38. Adventures in inverse analysis: hydrogeology edition, Theoretical Division, Los Alamos National Laboratory (2015); Los Alamos, New Mexico USA.

39. Decision-oriented optimal-experimental design, Postdoc Research Day, Los Alamos National Laboratory (2015); Los Alamos, New Mexico USA.

40. Science, uncertainty and decisions, Center for Nonlinear Studies, Los Alamos National Laboratory (2015); Los Alamos, New Mexico USA.

41. How long is this going to take & Science, uncertainty and decisions, Applied Mathematics and Statistics, Colorado School of Mines (2015); Golden, Colorado USA.

42. Science, uncertainty and decisions, Computational Earth Science Group, Earth and Environmental Sciences Division, Los Alamos National Laboratory (2015); Los Alamos, New Mexico USA.

43. Science, uncertainty and decisions. University of Colorado Denver (2015); Denver, Colorado USA.

44. Random dispersion coefficients and Tsallis entropy. Joint Mathematics Meeting (2015); San Antonio, Texas USA.

45. Decision support for groundwater remediation. University at Buffalo (2014); Buffalo, New York USA.

46. Science, uncertainty and decisions. New Mexico Institute of Mining and Technology (2014); Socorro, New Mexico USA.

47. Bayesian Information-Gap Uncertainty Quantification. The Climate Corporation (2014); San Francisco, California USA.

48. Pore-scale reactions combined with field-scale subsurface contaminant transport. Computational Methods in Water Resources XX (2014); Stuttgart, Germany.

49. Combining Bayes Analysis with Info-gap Decision Theory for Environmental Management. Computational Methods in Water Resources XX (2014); Stuttgart, Germany.

50. A method for identifying diffusive trajectories with stochastic models. 6th International Conference on Porous Media & Annual Meeting of the International Society for Porous media (2014); Milwaukee, Wisconsin USA.

51. Statistics applied to fracking, human-computer interaction, and groundwater remediation. Department of Mathematical Sciences, Binghamton University (2014); Binghamton, New York, USA.

52. Anomalous dispersion, Computational Earth Science Group, Earth and Environmental Sciences Division, Los Alamos National Laboratory (2013); Los Alamos, New Mexico USA.

53. The sound of diffusion, Department of Civil & Environmental Engineering & Earth Sciences, University of Notre Dame (2013); South Bend, Indiana USA.

54. Anomalous diffusion and nonstationary increments, Department of Bioengineering, University of Illinois, Chicago (2012); Chicago, Illinois USA.

55. Two scale renormalization group classification of diffusive processes, 4th International Conference on Porous Media & Annual Meeting of the International Society for Porous Media (2012); West Lafayette, Indiana USA.

56. Anomalous relaxation in diffusive processes with non-linear clocks, 4th International Conference on Porous Media & Annual Meeting of the International Society for Porous Media (2012); West Lafayette, Indiana USA.

57. Adaptive renormalization of stochastic dynamics with application to data assimilation and numerical modeling, European Geosciences Union General Assembly (2012); Vienna, Austria.

58. Fractional Brownian motion run with a non-linear clock, SIAM Conference on Mathematical & Computational Issues in the Geosciences (2011); Long Beach, California USA.

59. Diffusive processes run with non-linear clocks, INFORMS Annual Meeting (2010); Austin, Texas USA.

60. The chaotic dynamics of anomalous diffusion as modeled by a nonstationary extension of Brownian motion, SIAM Conference on Mathematical & Computational Issues in the Geosciences (2009); Leipzig, Germany.

61. Data compression and energy consumption on a wireless-networked handheld computing device, Department of Computer Science, Purdue University (2003); West Lafayette, Indiana USA.

Poster Presentations

1. O'Malley, D. An approach to quantum-computational hydrologic inverse analysis. Adiabatic Quantum Computing (2018); NASA Ames, Moffett Field, California USA.

2. O'Malley, D. Nonnegative/binary matrix factorization with a D-Wave quantum annealer. Physics Informed Machine Learning (2018); Santa Fe, New Mexico USA.

3. O'Malley, D. and V.V. Vesselinov. Quo vadis: Hydrologic inverse analyses using high-performance computing and a D-Wave quantum annealer. AGU Fall Meeting (2017); New Orleans, Louisiana USA.

4. O'Malley, D., S. Karra, R.P. Currier, N. Makedonska, J.D. Hyman, and H. Viswanathan. Where does water go during hydraulic fracturing? (2016); DOE-FE-NETL Shale Collaboration Meeting, Los Alamos, New Mexico USA.

5. O'Malley, D. and V.V. Vesselinov. Stochastic inverse tomography of highly heterogeneous aquifers. AGU Chapman Conference (2015); Valencia Spain.

6. O'Malley, D.. Decision-oriented optimal-experimental design, Postdoc Research Day, Los Alamos National Laboratory (2015); Los Alamos, New Mexico USA.

7. O'Malley, D. and V.V. Vesselinov. Bayesian Information-Gap (BIG) Decision Analysis Applied to a Geologic CO_2 Sequestration Problem. AGU Fall Meeting (2014); San Francisco, California USA.

8. Cushman, J.H, V.V. Vesselinov, and D. O'Malley. Random dispersion coefficients and Tsallis entropy. AGU Fall Meeting (2014); San Francisco, California USA.

9. Bakarji, J., D. O'Malley and and V.V. Vesselinov. A Social Dynamics Dependent Water Supply Well Contamination Model. LANL Student Symposium (2014); Los Alamos National Laboratory, Los Alamos, New Mexico USA. (**Outstanding Student Poster Award Winner**)

10. Benner, E., D. O'Malley and and V.V. Vesselinov. Residual Analysis and Optimization of Well Pressure Data for Interpretation of Aquifer Tests. LANL Student Symposium (2014); Los Alamos National Laboratory, Los Alamos, New Mexico USA.

11. O'Malley, D. and V.V. Vesselinov. A combined probabilistic/non-probabilistic decision analysis for contaminant remediation. Postdoc Research Day (2014); Los Alamos National Laboratory, Los Alamos, New Mexico USA.

12. Vesselinov, V.V. and D. O'Malley. Information Gap Decision Theory for Monitoring Network Design. Computational Methods in Water Resources XX (2014); Stuttgart, Germany.

13. Vesselinov, V.V. and D. O'Malley. Groundwater remediation using the information gap decision theory. Conference on Data Analysis (2014); Santa Fe, New Mexico USA.

14. O'Malley D. and V.V. Vesselinov. What matters when and where for anomalous dispersion/diffusion, AGU Fall Meeting (2013); San Francisco, California USA.

15. O'Malley D. and J.H. Cushman. Two-scale renormalization group classification of stochastic processes in geophysics, AGU Fall Meeting (2012); San Francisco, California USA.

16. O'Malley D. and J.H. Cushman. A geostatistical tool for stochastic processes with nonstationary increments, AGU Fall Meeting (2012); San Francisco, California USA.

Programmatic Reports

1. Quantum Computing CRADA Year 1 Report. CRADA between LANL and Booz Allen Hamilton. 2018.
2. Compendium of Technical Reports Related to the Deep Groundwater Investigation for the RDX Project at Los Alamos National Laboratory, LA-UR-18-21326, EP2018-0006, 2018.
3. Compendium of Technical Reports Conducted Under the Work Plan for Chromium Plume Center Characterization, LA-UR-18-21450, EP2018-0026, 2018.
4. Model-Assisted Decision Analyses Related to the Chromium Plume at LANL. 2016.
5. Interim Measures Work Plan for the Chromium Plume Control. 2015.
6. Completion Report for Groundwater Extraction Well CrEX-1. ESHID-600170-02. 2014.
7. Interim Measures Report for Source-Removal Testing at Well CdV-16-4ip. ERID-262526. 2014.
8. Interim Measures Work Plan For Source Removal Testing at Well CdV-16-4ip. ERID-239235. 2013.
9. Interim Measures Work Plan For The Evaluation of Chromium Mass Removal. ERID-241096, 2013.
10. Summary Report for the 2013 Chromium Groundwater Aquifer Tests at R-42, R-28, and SCI-2. ERID-255110. 2013.

Engagement and Service

Educator

EdTech co-founder and CTO

Fill Education
Developed and implemented a product to "fill" learning gaps. Key features of the product include: 1) an easy-to-use, teacher-facing quiz editor with advanced functionality such as image uploading, a point-and-click equation editor, and a LaTeX equaiton editor; 2) Student-facing software for taking quizzes; and 3) Software that intergrates students' quiz results with their schedules to find an opportunity for additional instruction if needed (i.e., if they have failed the quiz)

Primary Instructor

Department of Mathematics,
Purdue University
Taught an introductory algebra class to college freshman. Was the sole instructor for the course.

Teaching Assistant

Department of Mathematics,
Purdue University
Conducted recitation sessions for a variety of Calculus courses. Wrote and graded quizzes.

Science Advisory Council Member 2018–present
Information Science & Technology Institute,
Los Alamos National Laboratory
Advise the institute's leadership with respect to scientific directions as well as the selection of new and assessment of existing institutional activities.

Assistant Editor 2012–2016
InterPore Newsletter,
International Society for Porous Media
Edit and compose text for the newsletter. Recruit others to compose text for the newsletter.

Organizer
Organizing Committee, Machine Learning in Solid Earth Geoscience Conference, 2019
Program Committee, Workshop on Quantum Technology and Optimization, 2018
Session Organizer, Interpore, 2016
Session Organizer, AGU Fall Meeting, 2014-2017

Reviewer
DOE Office of Science
LANL Laboratory Directed Research & Development
Nature Scientific Reports
Nature Sustainability
Nature Computational Materials
Geophysical Research Letters
SIAM Journal on Scientific Computing
SIAM/ASA Journal on Uncertainty Quantification
Water Resources Research
Journal of Computational Physics
Transport in Porous Media
Energy & Fuels
Advances in Water Resources
Journal of Applied Physics
Stochastic Environmental Research and Risk Assessment
Journal of Contaminant Hydrology

Programmer Summer 2008
Google Summer of Code
Center for the Study of Complex Systems,
University of Michigan
Developed agent-based models for the Scientific Paper with Open Communication project. Funded by Google.

Contact Information

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