**Scott L. Painter**

Distinguished R&D Staff Member

Climate Change Science Institute and Environmental Sciences Division

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**Education and Training**

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| 19901987 | University of Tennessee, Knoxville, Nuclear Engineering, PhDUniversity of Tennessee, Knoxville, Nuclear Engineering, MS |
| 1985 | University of Tennessee, Knoxville, Nuclear Engineering, BS |

**Research and Professional Experience**

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| 2014–present 2010–2014  | Climate Change Science Institute and Environmental Sciences Division, Oak Ridge National LaboratorySubsurface Flow and Transport Team, Earth and Environmental Sciences Division, Los Alamos National Laboratory.  |
| 2008–2010 | Institute Scientist. Geosciences and Engineering Division, Southwest Research Institute.  |
| 1998–20081997  | Various Positions, Geosciences and Engineering Division, Southwest Research Institute. Visiting Scholar, Royal Institute of Technology, Stockholm. Sweden.  |
| 1993–19981991–1993 | Senior Research Scientist, Division of Petroleum Resources, Commonwealth Scientific and Industrial Research Organization. Postdoctoral Fellow, Research School of Physical Sciences, Australian National University. |

**Awards and Honors**

R&D 100 – 2020.

R&D 100 – 2017.

R&D 100 – 2008.

Frontiers of Engineering Symposium. 2002

**Selected Publications (partial list)** (h-index: 37, i-10-index: 65, google scholar)

G Konapala, S-C Kao, SL Painter and D Lu. 2020. Machine learning assisted hybrid models can improve streamflow simulation in diverse catchments across the conterminous US. Environmental Research Letters 15(10).

A. Jan, E. T. Coon, and S.L. Painter. 2020. Evaluating integrated surface/subsurface permafrost thermal hydrology models in ATS (v0.88) against observations from a polygonal tundra site. Geoscientific Model Development 13(5).

A. Jan and S.L. Painter. 2020. Permafrost thermal conditions are sensitive to shifts in snow timing. Environmental Research Letters

L. Guo, S.L. Painter, S.C. Brooks, J. M. Parks, J.C. Smith. 2019. A probabilistic perspective on thermodynamic parameter uncertainties: Understanding aqueous speciation of mercury. Geochimica et Cosmochimica Acta. 263(15)

Zheng, J., Thornton, P. E., Painter, S. L., Gu, B., Wullschleger, S. D., and Graham, D. E.: Modeling anaerobic soil organic carbon decomposition in Arctic polygon tundra: insights into soil geochemical influences on carbon mineralization, Biogeosciences, 16, 663–680, https://doi.org/10.5194/bg-16-663-2019, 2019.

Lian, P., Guo, L., Devarajan, D., Parks, J. M.,  Painter, S. L.,  Brooks, S. C.,  Smith, J. C. 2019. The AQUA‐MER databases and aqueous speciation server: A web resource for multiscale modeling of mercury speciation. *J. Comput. Chem*.  41,  147– 155.

Painter, S. L. 2018. Multiscale framework for modeling multicomponent reactive transport in stream corridors. Water Resources Research, 54, 7216–7230. <https://doi.org/10.1029/2018WR022831>

TA Olsen, KA Muller, SL Painter, and SC Brooks. 2018. Kinetics of Methylmercury Production Revisited. Environmental Science & Technology 52 (4), 2063-2070. DOI: 10.1021/acs.est.7b05152

Dhiman, I., Bilheux, H., DeCarlo, K., Painter, S.L., Santodonato, L., Warren, J.M. 2018 Quantifying root water extraction after drought recovery using sub-mm in situ empirical data. *Plant Soil* 424.

Jan, A., Coon, E.T., Painter, S.L., Garimella, R., and Moulton, J.D. 2018. An intermediate-scale model for thermal hydrology in low-relief permafrost-affected landscapes. Computational Geosciences.

Painter, S. L., E. T. Coon, A. L. Atchley, M. Berndt, R. Garimella, J. D. Moulton, D. Svyatskiy, and C. J. Wilson 2016. Integrated surface/subsurface permafrost thermal hydrology: Model formulation and proof-of-concept simulations, Water Resour. Res., 52, 6062–6077, doi:10.1002/2015WR018427.

AL Atchley, ET Coon, SL Painter, DR Harp, CJ Wilson 2016. Influences and interactions of inundation, peat, and snow on active layer thickness. Geophysical Research Letters.

G. Tang, J. Zheng, X. Xu, Z. Yang, D.E. Graham, B. Gu, **S.L. Painter** and P.E. Thornton. 2016. Biogeochemical modeling of CO2 and CH4 production in anoxic Arctic soil microcosms. Biogeosciences.

Coon, E., D. Moulton and S.L. Painter, **2016**. Managing complexity in land surface and near-surface simulations. Environmental Modeling and Software

Atchley, A. L., Painter, S. L., Harp, D. R., Coon, E. T., Wilson, C. J., Liljedahl, A. K., and Romanovsky, V. E. **2015**. Using field observations to inform thermal hydrology models of permafrost dynamics with ATS (v0.83), Geosci. Model Dev. Discuss., 8, 3235-3292, doi:10.5194/gmdd-8-3235-2015.

Hyman, J.D., S. Karra, N. Makedonska, C.W. Gable, **S.L. Painter**, and H.S. Viswanathan. 2015. dfnWorks: A discrete fracture network framework for modeling subsurface flow and transport. Computers and Geosciences.

Makedonska, N., S. L. Painter, Q. M. Bui, C. W. Gable, and S. Karra. **2015** Particle tracking approach for transport in three-dimensional discrete fracture networks. Computational Geosciences.

Karra, S., N. Makedonska, H. Viswanathan, S.L. Painter and J. Hyman. **2015** Effect of advective flow in fractures and matrix diffusion on natural gas production. Water Resources Research

Painter, S. L. and S Karra. **2014**. Constitutive model for unfrozen water content in subfreezing unsaturated soils. Vadose Zone Journal

Karra, S., SL Painter and PC Lichtner. **2014**. Three-phase model for subsurface hydrology in permafrost-affected regions. The Cryosphere.

Hyman, J.D., CW Gable, and SL Painter. **2014**. Conforming Delaunay triangulation of stochastically generated three-dimensional discrete fracture networks: A feature rejection algorithm for meshing strategy. SIAM Journal on Scientific Computing.

Painter, S.L., JD Moulton, CJ Wilson. **2013**. Modeling challenges for predicting hydrologic response to degrading permafrost Hydrogeology Journal, 1-4

Frampton, A., SL Painter, G Destouni. **2013**. Permafrost degradation and subsurface flow changes caused by surface warming trends. Hydrogeology Journal 21 (1), 271-280.

Painter, S.L., CW Gable, S Kelkar. **2012** Pathline tracing on fully unstructured control volume grids Computational Geosciences, 1-10

Painter, S.L., BA Robinson, ZV Dash **2012** Calculation of resident groundwater concentration by post-processing particle-tracking results. Computational Geosciences, 1-8

Painter, S. L. **2011**. Three-phase simulations of moisture dynamics in freezing porous media: Model formulation and validation. *Computational Geosciences* 15(1).

Frampton, A., S. L. Painter, S. Lyon, and G. Destouni, **2011**. Non-isothermal, three-phase simulations of near-surface flows in a model permafrost system under seasonal variability and climate change. *J. Hydrology*.

Grimm, R., and S. L. Painter. **2009**. On the secular evolution of groundwater on Mars. *Geophysical Research Letters*.

Painter, S. **2003**. *Statistical Analysis of Spatial Variability in Sedimentary Rock, in Heterogeneity in the Crust and Upper Mantle*, edited by J. Goff and K. Hollinger.

Painter, S. L., V. Cvetkovic, J. W. Mancillas, and O. Pensado-Rodriguez. **2008**. Time Domain Particle Tracking Methods for Simulating Transport with Retention and First-order Transformation. *Water Resources Research*, Vol. 44, doi:10.1029/2007WR005944.

Painter, S, A. Woodbury, and Y. Jiang. **2007**. Transmissivity characterization for highly heterogeneous aquifers: Comparison of three methods applied to the Edwards Aquifer. *Hydrogeology Journal*.

Sun, A, S. Painter, and G. Wittmeyer. **2006**. Constrained robust least squares method for contaminant source identification. *Water Resources Research*.

Painter, S., and V. Cvetkovic. **2006**. Upscaling discrete fracture network simulations: An alternative to continuum transport models. *Water Resources Research*.

Cvetkovic, V., S. Painter, N. Outters, and J.-O. Selroos. **2004**. Stochastic simulation of radionuclide migration in discretely fractured rock near the Äspö Hard Rock Laboratory, *Water Resources Research* 40(2), doi:10.1029/2003WR002655.

Jiang, Y., A. Woodbury, and S. Painter. **2004**. Full-Bayesian inversion of the Edwards Aquifer. *Ground Water* 42(5), 724–733.

Benke, R., and S. Painter. **2003**. Modeling conservative tracer transport in fracture networks with a hybrid approach based on the Boltzmann transport equation. *Water Resources Research* 39(11), doi:10.1029/2003WR001966.

Painter, S., J. R. Winterle, and A. Armstrong. **2003**. Using temperature to test models of flow near Yucca Mountain, Nevada. *Ground Water* 41(5), 657–666.

Painter, S., V. Cvetkovic, and J. O. Selroos. **2002**. Power law velocity fluctuations in fracture networks: Numerical evidence and implications for tracer transport. *Geophysical Research Letters* 29(14).

Painter, S., V. Cvetkovic, D. Pickett, and D. Turner. **2002**. Significance of kinetics for radionuclide sorption on inorganic colloids: Modeling and experimental interpretation issues. *Environmental Science & Technology* 36, 5369–5375.

Cvetkovic, V., S. Painter, D. Turner, D. Pickett, and P. Bertetti. **2004**. Parameter and model sensitivities for colloid-facilitated radionuclide transport on the field scale. *Water Resources Research* 40(6), doi:10.1029/2004WR003048.

Painter, S. and V. Cvetkovic. **2001**. Effect of heterogeneity on radionuclide retardation in the alluvial aquifer near Yucca Mountain, Nevada. *Ground Water* 39(3).

Cvetkovic, V., S. Painter, and J.-O. Selroos. **2002**. Comparative measures of radionuclide containment in the crystalline geosphere. *Nuclear Science and Engineering* 142(3), 292–304.

Painter, S., V. Cvetkovic, and J-O. Selroos. **1998**. Transport and retention in fractured rock: Consequences of a power-law distribution for fracture lengths. *Phys. Rev. E* 57(6), 6917–6922.

Painter, S. **1996**. Evidence for nonGaussian Scaling Behavior in Heterogenous Sedimentary Formations. *Water Resources Research* 32, 1183–1195.

**Invited Presentations (partial list)**

S. Painter and others. Microtopography-resolving simulations of surface and subsurface hydrology in thawing and topographically evolving permafrost regions. American Geophysical Union Fall Meeting. December 2013.

S. Painter. Recent advances in particle methods for simulating solute transport in the subsurface. American Geophysical Union Fall Meeting. December 2012.

S. Painter and C. Gable. *Development of discrete fracture network modeling capabilities*, presented at the Nuclear Waste Technical Review Board, Fall 2011 meeting.

S. Painter. *Modeling geosphere transport in performance assessments of geologic disposal systems*. Nuclear Waste Management: Research Challenges for the Future, Cambridge UK, September 2010.

S. Painter and A. Sun. *Experience with dual-conductivity models of karst aquifers*, Geological Society of America, Philadelphia Pennsylvania, November 2006.

S. Painter, *Conditional simulation of subsurface properties using models with long-range dependence*, Chapman Conference on Fractal Scaling, Chaos and Nonlinear Dynamics in Hydrologic Science, March 1998.

S. Painter and A. Sun, *A MODFLOW-based approach for modeling flow in karst aquifers*, Geological Society of America, Denver, Colorado, November 2004.

S. Painter, *Industrial applications of stochastic models with long-range spatial dependence*, European Geophysical Society, Nice, France, March 2000.

S. Painter, *Flexible Scaling Model for Use in Stochastic Simulation of Heterogeneous Reservoir Properties*, American Association of Petroleum Geologists Hedberg Research Conference, Houston, Texas, December 2000.

S. Painter, *The case for a neoclassical approach to subsurface heterogeneity modeling*, America Geophysical Union, December 2000.