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Ryan D. Stewart

POSITION

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY Blacksburg, VA
Assistant Professor – Critical Zone Physics December 2013 - present
Department of Crop and Soil Environmental Science

EDUCATION

OREGON STATE UNIVERSITY Corvallis, OR
Post-Doctoral Scholar June 2013 – December 2013
Designed and set up roadside runoff/infiltration monitoring plots for Oregon Department of Transportation-sponsored project "Determination of the appropriate width of filter strips for natural dispersion of stormwater in western Oregon"
Advisor: Chad W. Higgins

Doctorate of Philosophy in *Water Resources Engineering* June 2013
Minor in *Soil Science*
Dissertation: Characterization of Hydrologic Parameters and Processes in Shrink-swell Clay Soils
Advisor: John S. Selker

Master of Science in *Water Resources Engineering* April 2010
Thesis: Infiltration and Temperature Characterization of a Wastewater Hyporheic Discharge System
Advisor: John S. Selker

CALIFORNIA POLYTECHNIC STATE UNIVERSITY San Luis Obispo, CA
Bachelor of Science in *Mechanical Engineering* December 2002

RESEARCH EXPERIENCE

- Assessing soil health based on physical, chemical and biological properties
- Evaluating effects of agricultural practices on soil characteristics and biogeochemical cycling
- Developing novel instrumentation to monitor environmental processes
- Quantifying hydrological processes in structured and macroporous soils
- Measuring and interpreting soil physical and hydraulic properties
- Creating soil physical/hydrologic models using analytical and numerical solutions
- Assessing and modeling hydrological processes within vegetated filter strips
- Understanding soil controls on exchange of water vapor and greenhouse gases
- Measuring solute transport (e.g., pesticides and nutrients) through variably-saturated soils
- Understanding wildfire effects on soil properties and watershed hydrology in humid forests

PEER-REVIEWED PUBLICATIONS (* indicates student collaborator)

1) *Gyawali, A. J. and **R. D. Stewart**. 2018. An improved method for quantifying soil aggregate stability. Soil Science Society of America Journal. doi: 10.2136/sssaj2018.06.0235.

2) **Stewart, R. D.**, J. Jian, *A. J. Gyawali, W. E. Thomason, B. D. Badgley, M. S. Reiter, and M. S. Strickland. 2018. What We Talk about When We Talk about Soil Health. Agricultural & Environmental Letters, 3(1). doi: 10.2134/ael2018.06.0033.

3) **Stewart, R. D.** 2018. A dynamic multi-domain Green and Ampt infiltration model for shrink-swell soils. Water Resources Research. 54(9):6844-6859. doi: 10.1029/2018WR023297.

4) *Chen, J., C. Shang, M. J. Eick, and **R. D. Stewart**. 2018. Water repellency decreases vapor sorption of clay minerals. Water Resources Research. 54(9):6114-6125. doi: 10.1029/2018WR023352.

5) **Stewart, R. D.** and M. R. Abou Najm. 2018. A brief overview of field measurements of soil cracks. *Soil Science Society of America Journal.* doi: 10.2136/sssaj2018.01.0044.

6) **Stewart, R. D.** and M. R. Abou Najm. 2018. A comprehensive model for single ring infiltration 1: Influence of initial water content and soil hydraulic properties. *Soil Science Society of America Journal.* doi: 10.2136/sssaj2017.09.0313.

7) **Stewart, R. D.** and M. R. Abou Najm. 2018. A comprehensive model for single ring infiltration 2: Estimating field-saturated hydraulic conductivity. *Soil Science Society of America Journal.* doi: 10.2136/sssaj2017.09.0314.

8) *de la Mota, F. J., S. D. Day, J. S. Owen, **R. D. Stewart**, M. S. Steele, V. Sridhar. 2018. Porous-Permeable Pavements Promote Growth and Establishment and Modify Root Depth Distribution of Platanus ×acerifolia (Aiton) Willd. in Simulated Urban Tree Pits. Urban Forestry & Urban Greening. In press.

9) *McCourty, M., *A.J. Gyawali, and **R. D. Stewart**. 2018. Of macropores and tillage: influence of biomass incorporation on cover crop decomposition and soil respiration. *Soil Use and Management.* doi: 10.1111/sum.12403.

10) *Radolinski, J., *J. Wu, K. Xia, and **R. D. Stewart**. 2017. Transport of a neonicotinoid pesticide, thiamethoxam, from artificial seed coatings. *Science of the Total Environment.* doi: 10.1016/j.scitotenv.2017.11.031.

11) **Stewart, R. D.**, J. G. Lee, R. A. Darner and W. D. Shuster. 2017. Modeling hydrological response to a fully-monitored urban bioretention cell. *Hydrological Processes.* doi:10.1002/hyp.11386.

12) *Bierer, A. M., R. O. Maguire, M. S. Strickland, W. E. Thomason, and **R. D. Stewart**. 2017. Effects of dairy slurry injection on carbon and nitrogen cycling. *Soil Science.* doi: 10.1097/SS.0000000000000209.

13) **Stewart, R.D.**, M. R. Abou Najm, D. E. Rupp, and J. S. Selker. 2016. Modeling multi-domain hydraulic properties of shrink-swell soils. *Water Resources Research.* doi: 10.1002/2016WR019336.

14) **Stewart, R. D.**, D. Moreno, C. T. Gregory and J. S. Selker. 2016. Evaluation of infiltration discharge as a strategy to meet effluent temperature limits. *Journal of Sustainable Water in the Built Environment.* doi: 10.1061/JSWBAY.0000818.

15) **Stewart, R. D.**, D. E. Rupp, M. R. Abou Najm, and J. S. Selker. 2015. A unified model for soil shrinkage, subsidence and cracking. *Vadose Zone Journal.* 15(3): 1-15. doi: 10.2136/vzj2015.11.0146.

16) **Stewart, R. D.**, Z. Liu, D. E. Rupp, C. W. Higgins and J. S. Selker. 2015. A new instrument to measure plot-scale runoff. *Geoscientific Instrumentation, Methods and Data Systems.* 4: 57-64. doi: 10.5194/gi-4-57-2015.

17) **Stewart, R. D.**, D. Moreno, and J. S. Selker. 2015. Quantification and scaling of infiltration from a constructed infiltration wetland. *Journal of Hydrologic Engineering*. 20(10). 04015007. doi: 10.1061/(ASCE) HE.1943-5584.0001164.

18) **Stewart, R. D.**, M. R. Abou Najm, D. E. Rupp, J. W. Lane, H. C. Uribe, J. L. Arumí, and J. S. Selker. 2015. Hillslope runoff thresholds in shrink-swell clay soils. *Hydrological Processes*. 29(4): 557-571. doi: 10.1002/hyp.10165.

19) **Stewart, R. D.**, M. R. Abou Najm, D. E. Rupp, and J. S. Selker. 2014. Non-destructive quantification of macropore volume using shear-thinning fluid. *Soil Science Society of America Journal*. doi: 10.2136/sssaj2013.08.0346.

20) Uribe, H. C., D. E. Rupp, J. L. Arumí, **R. D. Stewart**, and J. S. Selker. 2014. Assessment of current and potential yield of hand-dug wells in a semi-arid zone in south-central Chile using an analytical methodology. *Chilean Journal of Agricultural Research*. doi: 10.4067/S0718.

21) Petrides, A. C., **R. D. Stewart**, R. Bower, R. Henry, and R. H. Cuenca. 2014. Scaling recharge rates from pilot projects of managed artificial aquifer recharge. *Journal of Hydrologic Engineering*. 20(8). 05014028. doi: 10.1061/(ASCE).HE.1943-5584.0001102.

22) **Stewart, R. D.**, D. E. Rupp, M. R. Abou Najm, and J. S. Selker. 2013. Modeling effect of initial soil moisture on sorptivity and infiltration. *Water Resources Research*. 49(10): 1737-1747. doi: 10.1002/wrcr.20508.

23) **Stewart, R. D.**, R. W. Hut, D. E. Rupp, H. Gupta, and J. S. Selker. 2012. A resonating rainfall and evaporation recorder. *Water Resources Research*. 48(8): W08601. doi: 10.1029/2011WR011529.

24) **Stewart, R. D.**, M. R. Abou Najm, D. E. Rupp, and J. S. Selker. 2012. An image-based method for determining bulk density and the soil shrinkage curve. *Soil Science Society of America Journal*. 76(4):1 217-1221. doi: 10.2136/sssaj2011.0276n.

25) **Stewart, R. D.**, M. R. Abou Najm, D. E. Rupp, and J. S. Selker. 2012. Measurement tool for dynamics of soil cracks. *Vadose Zone Journal*. 11(2): 1-6. doi:10.2136/vzj2011.0048.

BOOK CHAPTERS

1) **Stewart, R. D.** and M. R. Abou Najm. 2017. Field Measurements of Soil Cracks. *Methods of Soil Analysis, 2017*(*1*). Soil Science Society of America. (ed.) S. Logsdon. doi:10.2136/msa2015.0043.

CONFERENCE PROCEEDINGS (* indicates student collaborator)

1) *de la Mota, F., S. D. Day, J. S. Owen, and **R. D. Stewart**. Porous pavement effects on rooting depth and development of newly planted trees in sidewalk cutouts. Acta Hort. - International Symposium Soilless Substrate Analysis Proceedings. Athens, Greece, 2016.

2) *Fields, J. S., J. Owen, **R. D. Stewart**, and J. Heitman. Utilizing the HYDRUS Model as a Tool for Understanding Soilless Substrate Water Dynamics. Acta Hort. - International Symposium Soilless Substrate Analysis Proceedings. Vienna, Austria, 2015.

INVITED REVIEWS

1) Selker, J. S. and **R. D. Stewart**. 2011. Soil Physics with HYDRUS: Modeling and Applications. *Vadose Zone Journal*.

WHITE PAPERS

1) **Stewart, R. D.** 2015. Soil Health at the Nexus of Food, Energy, and Water. Crop Science Society of America Food-Energy-Water White Paper Database. https://www.crops.org/science-policy/white-papers/view/4

INVITED PRESENTATIONS/SEMINARS (* indicates student collaborator)

1) **Stewart, R. D.** and *A. J. Gyawali. Quantifying effects of tillage and cover crops on dynamic soil health parameters. Presented at the 2017 Virginia Soil and Water Conservation Society Annual Meeting. Ferrum, VA. October 17, 2017.
2) **Stewart, R. D.** Hydrological thresholds in shrink-swell soils: linking properties and processes across scales. Presented at the Luxembourg Institute of Science and Technology (LIST), Belval, Luxembourg. May 19, 2017.
3) **Stewart, R. D.** Hydrogeochemical transport through macroporous soils. Presented at the University of Wisconsin, Madison, WI. June 30, 2016.
4) **Stewart, R. D.**, D. E. Rupp, M. R. Abou Najm, and J. S. Selker. 2015. Modeling hydraulic properties and hydrological processes in shrink-swell clay soils. Presented at 2015 AGU Fall Meeting. San Francisco, CA. December 17, 2015.
5) **Stewart, R.D.** 2014. Soil-water interactions in shrink-swell clay soils: measurements and models across scales. Presented at VT CSES Departmental Seminar, Blacksburg, VA. February 20, 2014.

OTHER PRESENTATIONS/SEMINARS

62 since joining Virginia Tech; 14 prior to joining Virginia Tech.

FUNDING

1) **Stewart, R. D.**, K. Xia, and T. Roulston. *Sustainable management of neonicotinoid seed coatings: reducing flows from fields while avoiding ecological traps*. USDA NIFA Agricultural Food and Research Initiative (AFRI) grant. 2018-2021.
2) Daniels, W. L., **R. D. Stewart**, and M. S. Reiter. *Reclamation of Mineral Sands Mining*. Iluka, Inc. 2017.
3) Abaye, A. O., **R. D. Stewart**, and M. S. Reiter. *Global and Local Service Learning: Addressing the challenges of food security*. Agronomic Society of America Reinvest Grant. 2017-2019.
4) McLaughlin, D. L., **R. D. Stewart**, K. J. McGuire, and B. D. Strahm. *Integrated environmental quality sensing system, Phase II*. DOE-SBIR/STTR. 2017-2019.
5) Daniels, W. L., **R. D. Stewart**, and M. S. Reiter. Reclamation of Mineral Sands Mining. Iluka, Inc. 2017..
6) McLaughlin, D. L., K. J. McGuire, **R. D. Stewart**, and B. D., Strahm. Integrated environmental quality sensing system. DOE-SBIR/STTR. 2016.
7) **Stewart, R. D.**, M. Schreiber, D. L McLaughlin. Surface-subsurface connectivity in karst landscapes: implications for terrestrial water and carbon fluxes. Virginia Tech Global Change Center Seed Fund. 2016.
8) **Stewart, R. D.**, K. Xia, and W. C. Hession. The environmental fate and transport of pesticide seed coatings. Virginia Tech Institute of Critical Technology and Applied Science. 2015-2017.
9) **Stewart, R. D.**, M. S. Reiter, T. D. Reed, W. E. Thomason and M. S. Strickland. Quantifying soil health: Measuring the impacts of tillage and cover crop practices on nutrient retention and soil physical, biological and chemical properties. USDA NRCS National Conservation Innovation Grant. 2014-2017.

10) Reiter, M. S., S. L. Rideout and **R. D. Stewart**. Improving soil health and crop productivity by utilizing diverse and high residue cover crops in Virginia. USDA NRCS State Conservation Innovation Grant. 2014-2017.

11) Hession, W. C., L. A. Krometis, B. D. Badgley, Z. Easton, L. House, L. Juran, E. Kaufman, D. Scott, M. Steele, **R. D. Stewart**, T. L. Thompson, K. Xia. REU Site: Dynamics of Water and Societal Systems – An Interdisciplinary Research Program at the Virginia Tech StREAM Lab. NSF Engineering Education and Centers. Awarded 2012-2015. (Collaborator Role).

12) Higgins, C. W. Determination of appropriate width of filter strips for natural dispersion of stormwater in western Oregon. Oregon Department of Transportation. Awarded 2013-2015. (**R. D. Stewart** led proposal writing to fund post-doctoral position).

13) **Stewart, R. D.**, M. R. Abou Najm, D. E. Rupp, J. W. Lane and J. S. Selker. Integrating Geophysical Methods in Field Hydrology Instruction. CUAHSI HydroGeoPhysics Travel Grant. 2010.

TEACHING EXPERIENCE

Instructor of Record (Virginia Tech):

CSES/ENSC 3634 – Physics of Pollution (40 students)	Fall 2014-present
CSES/ENSC 3614 – Soil Physical and Hydrological Properties (28 students)	Spring 2016-present
FREC 5144 – Hillslope and Watershed Hydrology (co-instructor; 8 students)	Spring 2018
CSES 5984 – Soil Physics: Current Methods and Models (10 students)	Fall 2014, 2016

Co-Instructor (Virginia Tech):

CSES 3954 – Study Abroad, Ecuador: Cultural Immersion through Food (5 students)	Summer 2016

Guest Lectures (Virginia Tech):

CSES/ENSC 4764 – Bioremediation	Fall 2014/2015
FOR 3104 – Principles of Watershed Hydrology (2 lectures)	Spring 2015
CSES 5004 – Graduate Seminar (3 class sessions)	Spring 2015
Governor's School of Agriculture	Summer 2015/2016/2017
GEO 4804 – Groundwater Hydrology	Fall 2016
FREC 5984 – Advanced Soils	Spring 2018

Teaching Assistant:

Oregon State University: Teaching Assistant for BEE 542 – Vadose Zone Hydrology	Fall 2010

Other:

Oregon State University/Universidad de Concepcion, Chillan (Chile):

Planned/co-taught 2-week international field hydrology course for 23 undergrads	January 2011

ADVISING

Virginia Tech:

Major Professor for 4 PhD students (1 graduated)	Fall 2014 – present
Major Professor for 2 MS students	
Committee Member for 9 PhD students and 5 MS students	
Undergraduate Research Advisor for 10 students and 2 independent projects	
Mentored Multicultural Academic Opportunities Program student	Summer 2016
Faculty Advisor for the Environmental Student Organization (ESO)	Fall 2014 - present

MULTI-STATE PROJECT AFFILIATIONS

W3188: Environmental Soil Physics	2014 – present

PROFESSIONAL AFFILIATIONS

Soil Science Society of America 2012 – present
American Geophysical Union 2010 – present
Oregon Society of Soil Scientists 2010 –2013

CERTIFICATIONS

Fundamentals of Engineering May 2002

AWARDS, PRIZES AND RECOGNITIONS

2016 Editors' Citation for Excellence in Refereeing December 2016
Reviews of Geophysics

Virginia Tech Scholar of the Week March 2016
Awarded by the Virginia Tech Office of the Vice President for Research

Wade Rain Irrigation Scholarship May 2013
Oregon State University Department of Biological & Ecological Engineering

Ralph M. Lunde Memorial Award May 2011
Oregon State University Department of Biological & Ecological Engineering

Myron G. Cropsey Award May 2010
Oregon State University Department of Biological & Ecological Engineering