SCOTT W. TYLER

Foundation Professor
Department of Geological Sciences and Engineering
University of Nevada, Reno
(775) 784-6250
email: styler@unr.edu
http://scotttylerhydro.com/
http://www.ctemps.org

EDUCATION

Ph.D. Hydrology/Hydrogeology, University of Nevada, Reno, Nevada
Dissertation Title: *Fractal Applications to Soil Hydraulic Properties***.** August 1990

M.S. Hydrology, New Mexico Institute of Mining and Technology; Socorro, New Mexico
Thesis Title: *Field Results of Borehole Infiltration Tests*. June 1983

B.S. Mechanical Engineering, University of Connecticut; Storrs, Connecticut. June 1978

PROFESSIONAL EXPERIENCE

2009-Present **Director**, Center for Transformative Environmental Sensing Programs, University of Nevada, Reno.

2006-Present **Professor**, Department of Geological Sciences and Engineering, Department of Civil and Environmental Engineering (Adjunct), University of Nevada, Reno.

2016-2018 Co-**Director,** Graduate Program of Hydrologic Sciences and Professor Department of Geological Sciences, University of Nevada, Reno.

2005-2006 **Visiting Professor**, Pontificia Universidad Católica de Chile, Santiago, Chile and Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland. (sabbatical year)

2000-2005 **Director,** Graduate Program of Hydrologic Sciences and Professor jointly appointed in the Department of Environmental and Resource Science and the Department of Geological Sciences, University of Nevada, Reno.

2000-2006 **Professor**, jointly appointed Department of Natural Resources and Environmental Sciences and the Department of Geological Sciences and Engineering, University of Nevada, Reno.

1998 **Sabbatical year** spent with the French National Research Organization, CNRS in Grenoble, France. Research during sabbatical focused on the reactive transport of arsenic in unsaturated media, nitrogen leaching in agricultural soils and transport of radioisotopes from low-level radioactive waste disposal sites.

1998 - 1999 **Professor**, jointly appointed in the Water Resources Center, Desert Research Institute and Department of Environmental and Resource Sciences, University of Nevada, Reno.

1992 - 1998 **Associate Professor**, Desert Research Institute and Department of Environmental and Resource Sciences (UNR). From 1992 through 1998, Dr. Tyler was jointly appointed to the Department of Environmental and Resource Sciences and the Desert Research Institute

1990 - 1991 **Sabbatical year** spent with Australia's CSIRO's Centre for Environmental Mechanics in Canberra and the Centre for Groundwater Studies of the Division of Water Resources in Adelaide. Research included convection in porous media, scaling of infiltration equations, and recharge estimation techniques in arid climates.

1986 - 1992 **Assistant Research Soil Scientis**t, Water Resources Center, Desert Research Institute, University and Community College System of Nevada.

1983 - 1985 **Staff Hydrologist**, Water Resources Center, Desert Research Institute

1982 - 1983 **Research Engineer**, Battelle Pacific Northwest Laboratory. Conducted research in the fields of waste disposal on ground-water quality.

1978 - 1980 **Senior Sanitary Engineer**, Connecticut Dept. of Health Services. Responsible for inspection and review of municipal water treatment plants and ground water protection.

REFEREED PUBLICATIONS

PUBLISHED

1. Mancewicz, L. L. Davisson, S. J. Wheelock, E.R. Burns, S.R. Poulson and S.W. Tyler (In Review) Impacts of Climate Change on Groundwater Availability and Spring Flows: Observations from the Highly Productive Medicine Lake Highlands/Fall River Springs Aquifer System Journal of the American Water Resources Assoc.

2. Weisberg, P,, Thomas E. Dilts, Jonathan A. Greenberg, Kerri N. Johnson, Henry Pai, Chris Sladek, Christopher Kratt, Scott W Tyler, Alice Ready. *In Revision*, Phenology-based classification of invasive annual grasses to the species level. *Remote Sensing of the Environment*

3. Clark, M.P., C.H.Luce, A. AghaKouchak, W. Berghuijs, C. H. David, Q. Duan, S. Ge, I. van Meerveld, C. Zheng, M. Parlange and S. W. Tyler. (2021). Open Scienc: Open Data,…and Open Publications?. *Water Resources Res.* https://doi.org/10.1029/2020WR029480

4. Cooper, A. E., Kirchner, J. W., Wolf, S., Lombardozzi, D. L., Sullivan, B. W., Tyler, S. W., & Harpold, A. A. (2020). Snowmelt causes different limitations on transpiration in a Sierra Nevada conifer forest. *Agricultural and Forest Meteorology*, *291*, 108089. doi:10.1016/j.agrformet.2020.108089

5. Meira Neto, A.A., Niu, GY., Roy, T. Tyler, S. and Troch, P. (2020). Interactions between snow cover and evaporation lead to higher sensitivity of streamflow to temperature. *Commun Earth Environ* **1,** 56. https://doi.org/10.1038/s43247-020-00056-9

6. Tyler, S.W. (2020) Are arid regions always that appropriate for waste disposal? Examples of complexity from Yucca Mountain Nevada. *Geosciences.10(1)* https://doi.org/10.3390/geosciences10010030

7. Kratt, C.B., Woo, D.K., Johnson, K.N., Haagsma, M., Kumar, P., Selker, J. and Tyler, S. (2019) Field trials to detect drainage pipe networks using thermal and RGB data from unmanned aircraft. *Agric. Water Manag.* https://doi.org/10.1016/j.agwat.2019.105895.

8. Hallnan, R., Saito, L., Busby, D. and Tyler, S. (2019) Modeling Shasta Reservoir water temperature responses for the 2015 drought and future climate change. *ASCE Jour. of Water Res. Planning and Manag*. In Press.

9. Pestana, S., Chickadel, C.C., Harpold, A., Kostadinov, T.S., Pai, H. Tyler, S., Webster, C. and Lundquist, J.D. (2019). Bias correction of airborne thermal infrared observations over forests using melting snow. *Water Res. Research*. https://doi.org/10.1029/2019WR025699

10. Wang, H., X. Comas, and S. Tyler (2019), Fiber-optic networks find a new use as seismic sensor arrays, *Eos, 100,* https://doi.org/10.1029/2019EO119897.

11. Tyler, S., O. P. Jensen, Z. Hogan, S. Chandra, L. Galland, J. Simmons and the 2017 Taiman Research Team (2018). Perspectives on the application of unmanned aircraft for freshwater fisheries census. *Fisheries. Vol 43(11)* https://doi.org/10.1002/fsh.10167

12. Kostadinov, T., A. Harpold, M. Haunser, K. Bormann, R. Gaffney, K. McGwire, T. Painter, S. Tyler and R. Schumer (2019). Lidar and in-situ mapping of fractional snow cover in montane forests: Implications for optical remote sensing of seasonal snow. *Remote Sensing of Environment*. https://doi.org/10.1016/j.rse.2018.11.037

13. Wilson, C.G., B.Abban, and others (2018). The Intensively managed landscape critical zone observatory: A scientific testbed for understanding critical zone processes in agroecosystems. *Vadose Zone Journal*. doi:10.2136/vzj2018.04.0088

14. Pai, H., H. Malenda, M. Briggs, K. Singha, R. González-Pinzón, M. Gooseff, S.W. Tyler, and the AirCTEMPS Team (2017). Potential for small unmanned aircraft systems applications for identifying groundwater-surface water exchange in a meandering river reach. *Geophy. Res. Letters*. doi:10.3390/s16101712

15. Tyler, S., S. Chandra, and G. Grant (2017). Management strategies for sustainable western water, *Eos, 98,* https://doi.org/10.1029/2017EO071701

16. Ceperley, N. C., Mande, T., van de Giesen, N., Tyler, S., Yacouba, H., and Parlange, M. B. (2017). Evaporation from cultivated and semi-wild Sudanian Savanna in west Africa, *Hydrol. Earth Syst. Sci.*, 21, 4149-4167, https://doi.org/10.5194/hess-21-4149-2017.

17. Ceperley, N.C., T. Mande, M. Parlange, S. Tyler and N. van de Giesen. (2017). Energy Balance, Tambarga, Burkina Faso, 2009-2010. TU Delft. Dataset. https://doi.org/10.4121/uuid:0dbbaf01-bea4-4520-aee9-c3ebd354b27c

18. Cram, D., C. Ochoa, C. Hatch and S. Tyler. (2016). Use of Distributed Temperature Sensing Technology to Characterize Fire Behavior. *Sensors*. 16, 1712; doi:10.3390/s16101712

19. Huang, X., J. Liu, C. Lui, S. Tyler, J. Selker and C. Zheng. (2016). Assimilation of temperature and hydraulic gradients for qualifying the spatial variability of streambed hydraulics. *Water Resources Res. doi:10.1002/2015WR018408.*

20. Dong, J. S. Steele-Dunne, T. Oschner, C. Hatch, C. Sayde, J. Selker, S. Tyler, M. Cosh, and N. van de Giesen. (2016). Mapping high resolution soil moisture and properties using distributed temperature sensing data and an adaptive Particle Batch Smoother. *Water Resour. Res.* doi:10.1002/2016WR018943

21. Lucas, R., F. Suarez, M. Conklin, S. Tyler and J. Moran. (2016) Polymictic pool behavior in a montane meadow, Sierra, Nevada. CA. *Hydrologic Processes* DOI: 10.1002/hyp.10834.

22. Hut, R., S. Tyler and T. van Emmerik. (2016). Proof of concept: Temperature-sensing waders for environmental sciences. *Geosci. Instrum. Methods and Data Sys*. doi:10.5194/gi-5-45-2016.

23. Hausner, M.B., Kryder, L., Klenke, J., Reinke, R., and Tyler, S.W. (2016). Interpreting variations in groundwater flows from repeated distributed thermal perturbation tests. *Groundwater*, doi: 10.1111/gwat.12393.

24. Assouline, S., Li, D., Tyler, S., Tanny, J., Cohen, S., Bou-Zeid, E., Parlange, M. and Katul, G. G. (2015) On the variability of the Priestley-Taylor coefficient over water bodies. *Water Resour. Res*. doi:10.1002/2015WR017504

25. Fisher, A.T., K. Mankoff, S. Tulaczyk, S. Tyler, N. Foley, and the WISSARD Science Team.(2015). High Geothermal Heat Flux Measured below the West Antarctic Ice Sheet. *Science Advances*. DOI: 10.1126/sciadv.1500093

26. Hausner, M.B., Wilson, K.P., Gaines, D.B., Suárez, F., Scoppettone, G.G., and Tyler, S.W. (2015). Projecting the impacts of climate change and water management on Devils Hole pupfish (Cyprinodon diabolis) survival. *Ecohydrology*, doi:10.1002/eco.1656.

27. Suárez, F., J. A. Ruskowitz, S.W. Tyler and A.E.Childress. (2015). Renewable water: direct contact membrane distillation coupled with solar ponds. *Applied Energy. doi:10.1016/j.apenergy.2015.08.110*

28. Mande, T., N. Ceperley, G. Katul, S. Tyler, H. Yacouba and M. B. Parlange, Suppressed convective rainfall by agricultural expansion in southeastern Burkina Faso. (2015). *Water Resources Research*. DOI: 10.1002/2015WR017144

29. Selker, J, S. Tyler and M. Wing. CTEMPs Begins Support of Unmanned Aerial Systems for Earth Science Investigators, (2015). *EOS. 96, doi:10.1029/2015EO035405*

30. Hausner, M. B., K. P. Wilson, D. B. Gaines, F. Suarez, G. Gary Scoppettone, and S. W. Tyler (2014). Life in a fishbowl: Prospects for the endangered Devils Hole pupfish (*Cyprinodon diabolis*) in a changing climate, *Water Resour. Res*., doi:10.1002/2014WR015511.

31. Kobs, S.,D.Holland, V. Zagorodnov,A. Stern,and S. Tyler (2014). Novel monitoring of Antarctic ice shelf basal melting using a fiber-optic distributed temperature sensing mooring, *Geophys. Res. Lett*., 41,doi:10.1002/2014GL061155.

32. Zagorodnov, V, S. Tyler, D. Holland, A. Stern, L.G. Thompson, C. Sladek, S.Kobs, and J. Nichols (2014). New technique for access-borehole drilling in shelf glaciers using lightweight drills. *Journal of Glaciology*, Vol. 60, No. 223, 2014 doi: 10.3189/2014JoG13J211

33. Selker, J. S., S. Tyler, and N. van de Giesen *(*2014). Comment on "Capabilities and limitations of tracing spatial temperature patterns by fiber-optic distributed temperature sensing" by Liliana Rose et al., *Water Resour. Res*., 50, 5372–5374, *doi:*10.1002/2013WR014979.

34. Suarez, F., J. Ruskowitz, A. Childress and S. Tyler (2014). Understanding the expected performance of large-scale solar ponds from laboratory-scale observations and numerical modeling. *Applied Energy*. http://dx.doi.org/10.1016/j.apenergy.2013.12.005.

35. Ruskowitz, J, F. Suarez, S. W. Tyler and A. Childress (2014). Evaporation suppression and solar energy collection in a salt-gradient solar pond. *Solar Energy.* http://dx.doi.org/10.1016/j.solener.2013.10.035.

36. Stern, A., M. Dinnimin, S. Tyler, V. Zagarodnov and D. Holland (2013). Mode three intrusion of warm surface water beneath the McMurdo Ice Shelf, Antarctica. *Jour. Geophys. Research-Oceans.* DOI: 10.1002/2013JC008842.

37. Hausner, M., K. Wilson, D. Gaines, F. Suarez and S. Tyler (2013). Thermal regime of Devils Hole pupfish, Death Valley National Park. *Limnology and Oceanography: Fluids and Environments.*

38. Aravena, J., M. Berli, S. Ruiz, F. Suarez, T. Ghezzehei and S. Tyler (2013). Quantifying geo-engineering of roots using X-ray microtomography and numerical simulations, *Plant and Soil.* DOI: 10.1007/s11104-013-1946-z.

39. Assouline, S., S. Tyler, J. Selker, I. Lunati, C. Higgins and M. Parlange (2013). Evaporation from a shallow water table: Diurnal dynamics of measured and simulated water and heat regime at the drying front. *Water Resources Research*. DOI: 10.1002/wrcr.20293

40. Tyler, S.W., W., D. Holland, V. Zagorodnov, A. Stern, C. Sladek, S. Kobs, W. White, F. Suárez and J. Bryenton (2013). Using Distributed Temperature Sensors to monitor an Antarctic ice shelf and sub-ice shelf cavity. *Jour. Of Glaciology*. doi:10.3189/2013JoG12J207.

41. Hausner, M.B., K. P. Wilson, D. G. Gaines and S.W. Tyler (2012). Interpreting seasonal convective mixing in Devils Hole, Death Valley National Park, from temperature profiles observed by fiber-optic distributed temperature sensing. *Water Resour. Res.*, 48, 5, doi:10.1029/2011WR010972.

42. van de Giesen N, S.C. Steele-Dunne, J. Jansen, O. Hoes, M.B. Hausner, S. Tyler and J. Selker (2012). Double-ended calibration of fiber-optic Raman spectra distributed temperature sensing data. *Sensors* 12(5):5471-85.

43. Huwald, H., J. S. Selker, S. W. Tyler, M. Calaf-Bracons, N. Van de Giesen, and M. B. Parlange (2012). Carbon monoxide as a tracer of gas transport in snow and other natural porous media, *Geophys. Res. Lett.*, doi:10.1029/2011GL050247.

44. Suárez, F., J. E. Aravena, M. B. Hausner, A. E. Childress, and S. W. Tyler (2011). Assessment of a vertical high-resolution distributed-temperature-sensing system in a shallow thermohaline environment. *Hydrol. Earth Syst. Sci*., 15, 1081-1093.

45. Suarez, F., S. W. Tyler (2011).Comments on "Evaluation of systems coupling vacuum membrane distillation and solar energy for seawater desalination. *Chemical Engineering Journal*.

46. Hausner, M.B., Francisco Suárez, Kenneth E. Glander, Nick van de Giesen, John S. Selker and Scott W. Tyler(2011).. Calibrating Single-Ended Fiber-Optic Raman Spectra Distributed Temperature Sensing Data. *Sensors 11*(11). 10859-10879. doi:10.3390/s111110859

47. Huntington, J., J. Szilagyi, S. W. Tyler and G. Pohll (2011). Evaluating the use of the complementary relationship for estimating evapotranspiration from arid shrublands. *Water Resources Research* doi:10.1029/2010WR009874.

48. Suarez, F., A.E. Childress and S.W. Tyler (2010). Temperature evolution of an experimental salt-gradient solar pond *Journ. of Water and Climate Change.* doi:10.2166/wcc.2010.101

49. Aravena, J.E., M. Berli, T. Ghezzehei and S.W. Tyler (2010). Effects of Root-induced compaction on rhizosphere hydraulic properties: X-ray micro-tomography imaging and numerical simulation*. Envir. Science and Technology* doi*:* 10.1021/es102566j. .

50. Suarez, F., A. Childress and S.W. Tyler (2010). A theoretical study of a direct contact membrane distillation system coupled to a salt-gradient solar pond for terminal lakes reclamation. *Water Research.* doi:10.1016/j.watres.2010.05.050.

51. Suarez, F., A.E. Childress and S.W. Tyler (2010). A fully-coupled, transient double diffusive convection model for salt-gradient solar ponds.. *International Journal of Heat and Mass Transfer.* 53:1718-1730.

52. Neilson, B.T., C.E. Hatch and S.W. Tyle (2010).Effects of solar radiative heating on fiber optic cables used in aquatic settings. *Water Resources Res* doi:10.1029/2009WR008354.

53. Sayde, C., C. Gregory, M. Rodriguez, N. Tufillaro, S. Tyler, N. van de Giesen, M. English, R. Cuenca and J. Selker (2010). Feasibility of soil moisture monitoring with fiber optics. *Water Resources Res* doi:10.1029/2009WR007846.

54. Steele-Dunne, S., M. Rutten, D. Krzeminska, M. Hausner, S. W. Tyler, J. Selker, T. Bogaard and N. Van de Giesen (2010). Feasibility of soil moisture estimation using passive distributed temperature sensing. *Water Resources Res.* doi:10.1029/2009WR008272.

55. Assouline, S., K. Narkis, S.W. Tyler, I. Lunati, M.B. Parlange and J.S. Selker (2010). On the diurnal soil water content dynamics during evaporation using dielectric methods. 2010. *Vadose Zone Journal*. doi:10.2136/vzj2009.0109.

56. Menon, M., R.T. Parratt, C. Kropf and S.W. Tyler (2010). Impact of Vegetation on nitrate accumulations in desert vadose zones. *Journal of Arid Environments.* Doi:10.1016/j.jaridenv.2010.03.005.

57. Tyler, S.W. and J. Selker. New User Facility for Environmental Sensing (2009). EOS – Transactions of the American Geophysical Union. pp. 483

58. Tyler, S.W., J.S. Selker, M.B. Hausner, C.E. Hatch, T. Torgersen and S. Schladow *(*2009). Environmental temperature sensing using Raman spectra DTS fiber optic methods. *Water Resources Res* doi: 10.1029/2008WR007052.

59. Saito, L., M. Walker, W. Miller and S. Tyler (2009). Ecohydrology as an undergraduate degree: Challenges in developing an interdisciplinary major. *Journ. of College Science Teaching.* 38(4):40-45.

60. Tyler, S.W., S. Burak, J. McNamara, A. Lamontagne, J. Selker and J. Dozier (2008). Spatially distributed temperatures at the base of two mountain snowpacks measured with fiber-optic sensors. *Journal of Glaciology.* 54(187):673-679.

61. Moffett, K., S. Tyler, T. Torgersen, M. Menon, J. Selker and S. Gorelick (2008). Distributed temperature sensing of thermal trends and anomalies in the bed of an intertidal salt marsh and channel: The tidal thermal blanket effect. *Environ. Science and Tech*. 42(3); 671-676. DOI: 10.1021/es071309m.

62. Assouline, S., S. Tyler, J. Tanny, S. Cohen, E. Bou-Zeid, G. Katul and M. Parlange (2008). Evaporation from three water bodies of different size and climates under unstable conditions: Measurements and scaling analysis. *Advances in Water Resources*. 31(1):160-172.

63. Webb, G., S. W. Tyler, D. Van Zyl, J. Collard, T. Halihan and T. Fenstemaker (2008*).* Field scale analysis of flow mechanism in highly heterogeneous mining media. *Vadose Zone Journal.*7(2):899-908.

64. Suarez, F., J. Bachmann, J.F. Munoz, C. Ortiz, S. Tyler, C. Alister and M. Kogan (2007). Transport of Simazine in unsaturated sandy soils and prediction of leaching under field conditions. *Journ. of Contaminant Hydrology* 94(3/4):166-177.

65. Tyler, S.W., J. Munoz and W. Wood *(*2006).The response of playa and sabkha hydraulics and mineralogy to climate forcing. *Groundwater.* Vol. 44(3):329-339.

66. Kampf, S.K. and S. W. Tyler (2006). Spatial characterization of evaporation and land surface energy budgets at the Salar de Atacama using ASTER image classification. *Advances in Water Resources.* Vol. 29(2):336-354.

67. Illangasekare, Tissa; Tyler, Scott W.; Clement, T. Prabhakar; Villholth, Karen G.; Perera, A. P. G. R. L.; Obeysekera, Jayantha; Gunatilaka, Ananda; Panabokke, C. R.; Hyndman, David W.; Cunningham, Kevin J.; Kaluarachchi, Jagath J.; Yeh, William W.-G.; van Genuchten, Martinus T.; Jensen, Karsten (2006).. Impacts of the 2004 tsunami on groundwater resources in Sri Lanka, *Water Resour.Res.* Vol. 42, No. 5, W0520110.1029/2006WR004876.

68. Albright, W.H., C. H. Benson, G. W. Gee, T. Abichou, S. W. Tyler, and S. A. Rock (2006). Field Performance of Three Compacted Clay Landfill Covers .*Vadose Zone J.* 5: 1157-1171.

69. Albright, W.H., C. H. Benson, G. W. Gee, T. Abichou, E. V. McDonald, S. W. Tyler, and S. A. Rock (2006). Field Performance of a Compacted Clay Landfill Final Cover at a Humid Site, *J. Geotech. and Geoenvir. Engineering*. 132:1393-1399.

70. Decker, D.L,, C. Papelis, S.W. Tyler, M. Logsdon and J. Simunek (2006). Arsenate and Arsenite Sorption on Carbonate Hosted Precious Metals Ore**.** *Vadose Zone J.* 5:419-429.

71. Decker, D.L, J. Simunek, S. W. Tyler, C. Papelis, and M. J. Logsdon (2006). Variably Saturated Reactive Transport of Arsenic in Heap-Leach Facilities. *Vadose Zone J.* 5:430-444.

72. Phoenix, V.R., P.C. Bennett, A.S. Engel, S.W. Tyler and F.G. Ferris (2006). Chilean high-altitude hot spring sinters: A model system for UV screening mechanism by early Precambrian cyanobacteria. *Geobiology*. Vol 4(1):15-28.

73. Parlange, Marc B., B. Berkowitz, A. Porporato, T. Torgersen, and S.W. Tyler (2005). Editorial: Future of Water Resources Research *Water Resour. Res*., Vol. 41, No. 1, W01001 10.1029/2004WR00.

74. Kampf, S.K., S. W. Tyler, C. O. Astete, J. F. Munoz and P. Adkins (2005). Evaporation and land surface energy budget at the Salar de Atacama, Northern Chile. *J. of Hydrology*. Vol. 310 (1-4):236-252.

75. Gee, G.W., Z.F. Zhang, S.W. Tyler, W.H. Albright and M. J. Singleton (2005). Chloride-mass balance for predicting increased recharge after land use change. *Vadose Zone Jour.* 4:72 – 78.

76. Tyler, S.W., S.E. Silliman and M.E. Campana (2004). Undergraduate Program Focuses on International Issues in Water Resources. *EOS, Transactions of the American Geophysical Union*, Vol 85(9): 89, 92.

77. Constanz, J., S.W. Tyler and E Kwicklis (2003). Temperature-Profile Methods for Estimating Percolation Rates in Arid Environments. *Vadose Zone Journal* 2:12-24.

78. Kampf, S., M. Salazar and S. Tyler (2002). Preliminary Investigation of Effluent Drainage from Mine Heap Leach Facilities. *Vadose Zone Journal* 1: 186-196.

79. Walvoord, M.A., F.M. Phillips, S.W. Tyler and P.C. Hartsough (2002). Deep arid system hydrodynamics Part 2: Application to paleohydrologic reconstruction using vadose zone profiles from the Northern Mojave Desert. *Water Resources Research*. 38(12) 1291, doi:10.1029/2001WR000825,.

80. Qualls, R. G., B.L. Haines, W.T. Swank and S. W. Tyler (2002). Retention of soluble organic nutrients by a forested ecosystem. *Biogeochemistry*, 61:135-171.

81. Edmunds, W.M. and S.W. Tyler (2002). Unsaturated zones as archives of paleoclimate: Towards a new proxy for continental regions. *Hydrogeology Journ*. 10: 216-228.

82. Hartsough, P., S.W. Tyler, J. Sterling and M. Walvoord (2001). A 14.6 kyr record of nitrogen flux from desert soil profiles as inferred from vadose zone pore waters. *Geophysical Research Letters*. Vol. 28(15):2955-2958.

83. Cooper, C., R.J. Glass and S.W. Tyler (2001). The effect of buoyancy ratio on the development of double diffusive finger convection in a Hele-Shaw cell. *Water Resources Research*, 37(9): 2323-2331.

84. Qualls, R. G., B.L. Haines, W.T. Swank and S. W. Tyler (2000). Soluble Organic and Inorganic Nutrient Fluxes in Clearcut and Mature Deciduous Forests. *Soil Science Soc. Of Am. Journ*. 64(3):1068-1077.

85. Decker, D.L. and S.W. Tyler (1999).. Evaluation of Flow and Solute Transport Parameters for Heap Leach Recovery Materials. *Jour. of Env. Quality*. Vol. 28(2): 543-555

86. Tyler, S.W., P.G. Cook, A.Z. Butt, J.M. Thomas, P.T. Doran and W.B. Lyons (1998). Evidence of Deep Circulation in Two Perennially Ice-Covered Antarctic Lakes. *Limnology and Oceanography*. Vol 43(4): 625-635.

87. Lyons, W.B., S.W. Tyler, R.A. Wharton, D.M. McKnight and B.H. Vaughn (1998). A Late Holocene Dessication of Lake Hoare and Lake Fryxell, McMurdo Dry Valleys, Antarctica. *Antarctic Science*. Vol. 10(3): 247-256.

88. Tyler, S.W., S. Kranz, M.B. Parlange, J. Albertson, G. Cochran, B. Lyles and G. Holder (1997). Measurement of Evaporation and Salt Flux at Owens Dry Lake in Eastern California, U.S.A. *Journal of Hydrology.* Vol. 200: 110-135.

89. Scanlon, B.R., S.W. Tyler and P. J. Wierenga (1999). Hydrologic issues in arid, unsaturated systems and implications for contaminant transport. Reviews of Geophysics. Vol. 35(4): 461-490 DOI: 10.1029/97RG01172.

90. Wooding, R.A., S.W. Tyler and I. White (1997) Convection in Groundwater below an Evaporating Salt Lake: 1. Onset of Instability. *Water Resources Research.* Vol. 33(6): 1199-1218.

91. Wooding, R.A., S.W. Tyler, I. White and P. Anderson (1997). Convection in Groundwater below an Evaporating Salt Lake: 2. Evolution of Fingers or Plumes. *Water Resources Research.* Vol. 33(6): 1219-1228.

92. Cooper, C., R. J. Glass, and S.W. Tyler **(**1997*).* Experimental Verification of Double-Diffusive Convection in Porous Media. *Water Resources Research* Vol. 33(4): 517-526.

93. Burcar, S., W.W. Miller, S. W. Tyler and R.R. Blank (1997). Moist and dry season nitrogen transport in Sierra Nevada soils. Soil Science of America Journal. Vol. 61(6): 1774-1780.

94. Friedman, I., J. Bischoff, C. A. Johnson, S.W. Tyler and J.P. Fitts *(*1997). Movement and Diffusion of Pore Fluids in Owens Lake Sediments from Core OL-92 as shown by Salinity and Deuterium-Hydrogen Ratios. *Geological Society of America Bulletin Special Paper 317*.pp. 49-65.

95. Tyler, S.W., J. B. Chapman, S. Conrad, D. Hammermiester, D. Blout, J. Miller, M. Sully and J. Ginanni (1996*).* Soil Water Flux on the Nevada Test Site: Temporal and Spatial Variations over the Last 120,000 Years. *Water Resources Research.* Vol. 32(6): 1481-1499.

96. Sullivan, M., J.J. Warwick, and S.W. Tyler (1996). Quantifying and Delineating Spatial Heterogeneities of Surface Infiltration in a Small Watershed. *Journal of Hydrology.* Vol. 181(1-4): 149-168.

97. Pohll, G.M., J.J. Warwick and S.W. Tyler (1996). Coupled Surface/subsurface Hydrologic Model of a Nuclear Subsidence Crater at the Nevada Test Site. *Journal of Hydrology.* Vol. 186 (1-4): 43-62.

98. Liesing, J., S.W. Tyler and W.W. Miller (1995). Convection of Saline Brines in Enclosed Lacustrine Sedimentary Basins: A Mechanism for Potassium Metasomatism. *Geological Society of America Bulletin.* Vol. 107(10): 1157-1163.

99. Lyons, W.B., S.W. Tyler and H.E. Gaudette (1995).. The Use of Strontium Isotopes in Determining the Groundwater Mixing and Brine Salt-Fingering in a Playa Discharge Zone, Lake Tyrrell, Australia. *Journal of Hydrology.* Vol.167: 225-239.

100. Albertson, J.D., M.B. Parlange, G.G. Katul, C.-R. Chu, H. Stricker and S.W. Tyler **(**1995). Sensible Heat Flux from Arid Regions: A Simple Flux-Variance Method. *Water Resources Research.* Vol 31(4). pp 969-974.

101. Tyler, S.W. and G.R. Walker (1994). Impacts of the Root Zone on Tracer Transport. *Soil Science Society of America Journal.* Vol 58(1): 25-31.

102. Allison, G.B., G.W. Gee and S.W. Tyler **(**1994) Recharge Estimation in Arid and Semiarid Regions. *Soil Science Society of America Journal.* Vol. 58(1): 6-14.

103. Katul, G., J. Albertson, C. Chu, M. Parlange, H. Stricker and S. W. Tyler **(**1994) Sensible and Latent Heat Flux Predictions Using Conditional Sampling Methods. *Water Resources Research.* Vol 30(11): 3053-3059.

104. Nicholl, M., S.W. Wheatcraft, S.W. Tyler and B. Burkowitz. (1994). Is Old Faithful a Strange Attractor? *Journal of Geophysical Research*, 99:B3: 4495-4503.

105. Burcar, S., W.W. Miller, S.W. Tyler and D. Johnson (1994*)*. Preferential Flow Phenomenon in Two Sierra Nevada Watersheds. *Soil Science Society of America Journal.* Vol. 58: 1555-1561.

106. Tyler, S.W. and S.W. Wheatcraft (1992). Fractal Scaling of Soil Particle Size Distributions: Analysis and Limitations. *Soil Science Society of America Journal*, Vol. 56(2): 362–369.

107. Tyler, S.W., S.A. McKay and T. Mihevc (1992). Assessment of Soil Moisture Movement in Nuclear Subsidence Craters. *Journal of Hydrology*, Vol. 139: 159-181.

108. Tyler, S.W**.** and S.W. Wheatcraft (1992). Reply to Comment of J.R. Phillip on "An Explanation of Scale Dependent Dispersivity in Heterogeneous Aquifer Using Concepts of Fractal Scaling. *Water Resources Research*, Vol. 28(5): 1487-1490

109. Tyler, S.W**.** and S.W. Wheatcraft (1992). Reply to Comment of Brakensiek and Rawls on "Fractal Processes in Soil Water Retention." *Water Resources Research*, Vol. 28(5): 1487–1490.

110. Tyler, S.W**.** and S.W. Wheatcraft (1990). Fractal Processes in Soil Water Retention. *Water Resources Research*, Vol. 26(5). pp. 1047-1054.

111. Tyler, S.W. and S.W. Wheatcraft (1990). The Consequences of Fractal Scaling in Heterogeneous Soils and Porous Media. In: *Scaling in Soil Physics: Principles and Applications*, D. Hillel and D. Elrich, eds., Agronomy Society of America.

112. Tyler, S.W**.** and R.L. Jacobson (1990). Soil Moisture Flux Studies on the Nevada Test Site: A Review of Results and Techniques. In: *Hydraulics/Hydrology of Arid Lands; Proceedings of the International Symposium.* R.H. French, ed., July 1990. San Diego, CA.

113. Tyler, S.W. and S.W. Wheatcraft (1989). Application of Fractal Mathematics to Soil Water Retention Estimation. *Soil Science Society of America Journal*, 53(4): 987-996.

114. Tyler, S.W. and S.W. Wheatcraft (1989). Fractal Aspects of Soil Porosity, In: *Proceedings of Indirect Methods for Estimating the Hydraulic Properties of Unsaturated Soils*, October 11-13, 1989, Riverside, CA.

115. Tyler, S.W**.** (1988). Calibration of Neutron Moisture Meters in Large Diameter Boreholes. *Soil Science Society of America Journal*, Vol. 52(3): 890-893.

116. Wheatcraft, S.W. and S.W. Tyler (1988). An Explanation of Scale-Dependent Dispersivity in Heterogeneous Aquifers using Concepts of Fractal Geometry. *Water Resources Research*, Vol. 24(4): 566-578.

117. Russell, C.A., J.W. Hess and S.W. Tyler (1987). Hydrologic Investigations of Flow in Fractured Tuffs in Rainier Mesa, Nevada Test Site. In: *Flow and Transport Through Unsaturated Fractured Rock*, D.D. Evans and T.J. Nicholson, eds., *AGU Geophysical Monograph* 42: 43-50.

BOOK CHAPTERS

1. Aravena, J. E., M. Berli, M. Menon, T. A. Ghezzehei, A. K. Mandava, E. E. Regentova, N. S. Pillai, M. H. Young, P.S. Nico, and S. W. Tyler Synchrotron X-Ray Microtomography—New Means to Quantify Root Induced Changes of Rhizosphere Physical Properties. 2012. In: *Soil–Water–Root Processes: Advances in Tomography and Imaging. S*SSSA Special Publication 61. S.H. Anderson and J.W. Hopmans.
2. Suárez, F. M. B. Hausner, J. Dozier, J. S. Selker and S. W. Tyler., 2011. Heat Transfer in the Environment: Development and Use of Fiber-Optic Distributed Temperature Sensing, Developments in Heat Transfer, Marco Aurélio dos Santos Bernardes (Ed.). ISBN: 978-953-307-569-3, InTech,
3. Tyler, S.W**.**, B.R. Scanlon, G.W. Gee and G.B. Allison., 1999. Water and Solute Transport in Arid Vadose Zones: Innovations in Measurement and Analysis. In: *Vadose Zone Hydrology: Cutting Across Disciplines*, J. Hopmans and M. Parlange, editors. Oxford University Press. Pp 334-373.
4. Tyler, S.W., I. White and R.A. Wooding,. 1997. Anthropogenic Impacts on the Distribution of Playa Lake Salinity. In: Subsurface Hydrological Responses to Land Cover and Land Use Changes. M. Taniguchi, Editor. Kluwer Academic Publishers. pp. 73-86.
5. Tyler, S.W., J. B. Chapman, S. Conrad and D. Hammermeister,. 1995. Paleoclimatic Response of a Deep Vadose Zone in Southern Nevada as Inferred from Soil Water Tracers. In: Applications of Tracers in Arid Zone Hydrology. IAHS Publication No. 232. pp. 351-362.
6. Tyler, S.W., and S. W. Wheatcraft., 1992. Fractal Aspects of Soil Porosity. In : Indirect Measurements for Estimating the Hydraulic Properties of Unsaturated Soil. Edited by M.Th. Van Genuchten, F.J. Leij, and L. J. Lund. U. S. Salinity Laboratory Press. pp. 53-64.
7. Tyler, S.W**.** and S.W. Wheatcraft., 1990. The Consequences of Fractal Scaling in Heterogeneous Soils and Porous Media. In: Scaling in Soil Physics: Principles and Applications. SSSA Special Publication 25. pp. 109-122.
8. Wheatcraft, S.W., G.A. Sharp and S.W. Tyler., 1990. Fluid Flow and Solute Transport in Fractal Heterogeneous Porous Media. In: *Dynamics of Fluids in Hierarchical Porous Media*, J.H. Cushman, ed., Academic Press, 505 pp.
9. Stephens, D.B., S.W. Tyler, K. Lambert and S. Yates., 1983. Field Experiments to Determine the Saturated Hydraulic Conductivity in the Vadose Zone. In: *Role of the Unsaturated Zone in Radioactive and Hazardous Waste Disposal*, J. Mercer; ed., Ann Arbor Press, pp. 113-126.

OTHER PUBLICATIONS

National Research Council. 1995. *Ward Valley: An examination of seven issues in earth sciences and ecology*. Washington, DC: The National Academies Press. https://doi.org/10.17226/4939.

National Research Council. 2012. *Challenges and opportunities in the hydrologic sciences*. Washington, DC: The National Academies press. https://doi.org/10.17226/13293.

National Academies of Sciences, Engineering, and Medicine. 2020. *Effectiveness and impacts of dust control measures for Owens Lake*. Washington, DC: The National Academies Press. https://doi.org/10.17226/25658.

PROFESSIONAL ACHIEVEMENTS

SOCIETY ACTIVITIES

Associate Editor for Vadose Zone Journal (2013-2015)

Associate Editor for Advances in Water Resources (2009- 2015)

Associate Editor for Geological Society of America Bulletin (2009-2011)

Editor for Water Resources Research (2005-2009)

Hydrogeology Division Chairman, Geological Society of America (2007)

Associate Editor for *Water Resources Research* (1995-2001).

Deputy Editor for *Water Resource Research* (2002-2005)

Associate Editor for *Groundwater (2002-2005)*

Associate Editor for *Hydrogeology Journal (2002-2005)*

AGU Unsaturated Zone Technical Committee (2007-present)

AGU Large-Scale Field Experiment Technical Committee (2001-2006)

Geological Society of America Nominations Committee (2008-2009, Chair 2010)

Geological Society of America Meinzer Award Committee (2002-2004; Chair 2005)

Soil Science Society of America Journal Guest Editor, responsible for publication of six invited papers on the subject of recharge in arid and semi-arid regions published in the January/February 1994 issue.

Serve as Peer Reviewer for the following journals: *Water Resources Research, Journal of Hydrology, Ground Water, Soil Science Society of America, and Soil Science Society of Canada.*

Serve as Proposal Reviewer for the National Science Foundation, U.S. Dept. of Agriculture, U.S. Environmental Protection Agency.

APPOINTMENTS

National Academy of Sciences Panel Member (2019-2020) Owens Lake Scientific Advisory Panel

Past-President: Hydrology Section of the AGU Hydrology Section (2021-2022)

President: Hydrology Section of the American Geophysical Union (2019-2020)

American Geophysical Union Council Leadership Team (2017-2020)

President-Elect: Hydrology Section of the American Geophysical Union (2016-2018)

Chair Board of Directors of the Consortium for the Advancement of Hydrologic Sciences (2013-2014)

National Academy of Sciences Panel member: Challenges and Opportunities in the Hydrologic Sciences. (2009-2011)

Consortium for the Advancement of Hydrologic Sciences (CUAHSI) Board of Directors Member (2009-2015)

Dept. of Energy Review Panel: Net Infiltration Modeling License Input for Yucca Mountain under Current and Future Climate Scenarios (2007-2008)

IAEA Mission to Egypt for Intermediate Waste Management (2007-2008)

National Science Foundation Hydrologic Sciences Peer Review Panel (2003-2005)

National Academy of Sciences Panel member (1994-1995) to review the proposed low-level nuclear waste disposal site at Ward Valley, California.

Co-chairman of joint ASA/SSSA Symposium entitled “Recharge in Arid and Semi-Arid Areas" held in Denver, Colorado, 1991.

Chairman, USDA Western Regional Research Project entitled “Characterization and Management of Soil Water and Solutes in Field Soils", 1988.

AWARDS AND RECOGNITION

CUAHSI Distinguished Service Award (2018)

Inducted in the University of Connecticut Academy of Distinguished Engineers (2016)

Fellow of the American Geophysical Union (2015)

2015 Recipient, Hydrology Days Lecturer. Colorado State University.

2013 Recipient John Hem Award for Excellence in Science and Engineering, National Groundwater Association.

2012 University of Nevada Foundation Professor

2010 Geological Society of America Hydrogeology Division Outstanding Service Award

2010 Mackay School of Mines Faculty Achievement Award

2005 University of Nevada System Regents Outstanding Graduate Advisor

Fellow of the Soil Science Society of America and Agronomy Society of America (2003)

Fellow of the Geologic Society of America (1997)

1999 Distinguished Darcy Lecturer (National Ground Water Association)

1999 University and Community System of Nevada Regents Outstanding Employees and Students Award

1998 University and Community System of Nevada Regents Outstanding Employees and Students Award

Cited by the UNS Board of Regents for outstanding achievement as a faculty member of the University of Nevada System (for BBC program and 1990 *Encyclopedia Britannica Yearbook of Science and the Future* citation). January, 1990.

Cited by the Soil Science Society of America for Excellence in Editorial Review, 1991.

Antarctic Service Medal for participation in joint NSF/NASA studies during the Austral Summer of 1993 at Lake Hoare, Southern Victoria Land, Antarctica.

PROFESSIONAL AFFILIATIONS

American Geophysical Union
Geological Society of America
Soil Science Society of America
International Soil Science Society

MAJOR GRANTS & CONTRACTS

COLLABORATIVE RESEARCH: NSF: Distributed Acoustic Sensing Research Coordinating Network. Collaborator Investigator. March 2020-February 2023. ($115K-UNR portion)

Distributed Acoustic Sensing (DAS) on optical fibers represents a new and fundamentally different tool for monitoring acoustic signals in earth sciences. This RCN seeks to introduce the techniques originally developed in seismology and expand to all aspects of earth science research. The RCN focuses on training, collaboration and information exchange about applications of DAS for research. The RCN is led by the University of Wisconsin-Madison, with collaboration from UNR CTEMPs and IRIS-PASSCAL.

COLLABORATIVE RESEARCH: NSF-NERC: Thwaites-Amundsen Regional Survey and Network (TARSAN) Integrating Atmosphere-Ice-Ocean Processes affecting the Sub-Ice-Shelf Environment. (National Science Foundation). Collaborator Investigator. Dec 2018-December 2023. ($115K-UNR portion)

The Thwaites Glacier in west Antarctic is now recognized as the most unstable ice shelf on Antarctica and the most probable to collapse. Its collapse, and release of ice behind it, has the potential to dramatically raise sea level on very short time scales. This project, collaborative with Oregon State University and the University of Colorado seeks to instrument the floating portions of the Thwaites Glacier and monitor ice, ocean and climate behavior to better understand the stability and driving forces responsible for rapid melt.

COLLABORATIVE RESEARCH: LOGISTICALLY LIGHT INSTRUMENT DEPLOYMENT FOR ESTIMATION OF ANTARCTIC BASAL TEMPERATURES AND GEOTHERMAL HEAT FLUXES (National Science Foundation). Co-Principal Investigator. Dec 2016-December 2018. ($24K-UNR portion)

New observations of Antarctic ice sheet variables are essential for drill-site selection for climate records, for understanding how ice dynamics affect sea level, and for investigating the geologic history of the continent. Temperature depth-profiles are of particular current interest for estimating basal temperature and geothermal heat flux in Antarctica. Our long-term goal is the development, testing and commissioning of a new means of acquiring in-glacial temperature profiles at much lower costs than existing methods. To that end, we will undertake laboratory experiments and numerical modeling to develop to a new way to use ice melt probes, rather than traditional drilling, to deploy temperature measurement equipment to depths of a kilometer and greater.

COLLABORATIVE RESEARCH: FACILITY SUPPORT: CENTER FOR TRANSFORMATIVE ENVIROMENTAL MONITORING PROGRAMS (National Science Foundation). Principal Investigator. March 1, 2019 –February 2023. ($2.4M Total; $979K-UNR portion)

This continuation collaborative project with Oregon State University represents the continuation for four years of the Centers for Transformative Environmental Monitoring Programs (CTEMPS) serving the hydrology and environment science communities with fiber-optic distributed temperature sensing systems and developments.

COLLABORATIVE RESEARCH: FACILITY SUPPORT: CENTER FOR TRANSFORMATIVE ENVIROMENTAL MONITORING PROGRAMS (National Science Foundation). Principal Investigator. November 2014 -September 2018. ($2.2M Total; $961K-UNR portion)

This collaborative project with Oregon State University represents the continuation for four years of the Centers for Transformative Environmental Monitoring Programs (CTEMPS) serving the hydrology and environment science communities with fiber-optic distributed temperature sensing systems and developments. This renewal also includes the development of unmanned aircraft systems for environmental monitoring.

QUENCHING A THIRSTY WEST: INTEGRATED SCIENTIFIC KNOWLEDGE AND TECHNOLOGICAL INFRASTRUCTURE TO SOLVE WATER ISSUES IN THE WESTERN UNITED STATES (National Science Foundation). Co-Principal Investigator. August 2016-July 2017. November 2014 -September 2018. ($49-UNR portion)

The future management of water resources in the Western United States poses significant challenges from human-derived change, along with tremendous opportunities to improve the efficiency of water allocation for the very diverse needs of humans and ecology. This workshop brought together scientific and engineering leaders from academia to define the major issues and to develop a plan to guide research, technology and infrastructure capacity needs for the future. The workshop was held in conjunction with the Tahoe Summit which is attended by local, regional and national policy makers focused on the needs for water sustainability in the Western United States and the importance of science to guide sustainability development.

MAJOR RESEARCH INSTRUMENTATION: DEVELOPMENT OF DISTRIBUTED FIBER OPTIC SENSING SYSTEMS FOR ENVIRONMENTAL SCIENCE (National Science Foundation). Principal Investigator. October 2013 -September 2015. ($357K)

This MRI grant will develop both high resolution and field deployable distributed fiber optic sensing systems for hydrologic community use. The grant also supports the development of an affiliated node of CTEMPs at Smith College to promote its use in undergraduate education.

COLLABORATIVE RESEARCH: FACILITY SUPPORT: TRANSFORMATION OF DISTRIBUTED ENVIRONMENTAL SENSING (National Science Foundation). Principal Investigator. October 2011 -September 2014. ($548K-UNR portion)

This collaborative project with Oregon State University represents the continuation for three years of the Centers for Transformative Environmental Monitoring Programs (CTEMPS) serving the hydrology and environment science communities with fiber-optic distributed temperature sensing systems and developments.

COLLABORATIVE RESEARCH: DISTRIBUTED TEMPERATURE SENSING OF ANTARCTIC ICE SHELVES AND CAVITIES (National Science Foundation). Principal Investigator. July 2011 - June 2013. ($165K)

This collaborative project with New York University and the Ohio State University seeks to measure sub-ice shelf ocean temperatures and ocean dynamics. Ice shelf dynamics and melting are currently challenging to measure, with no continuous monitoring system yet designed to function over-winter. Using low power DTS systems and novel hot-point drilling methods, we have deployed an overwinter monitoring system on the Ross Ice Shelf in November 2011.

ASSESSMENT OF SOLAR POND-MEMBRANE DISTILLATION APPROACHES (Nevada Renewable Energy Consortium). Co-Principal Investigator. October 2010 - September 2011. ($150K)

This collaborative project with Civil and Environment Engineering focuses on improvements in solar pond design needed for commercial use with membrane distillation. Two major areas are under research: the development of wind and evaporation suppression mechanism on the solar ponds directly, and secondly, the role of fouling on membranes by carbonate/sulfate rich fluids typical of terrestrial brackish waters.

COLLABORATIVE RESEARCH: FACILITY SUPPORT: TRANSFORMATION OF DISTRIBUTED ENVIRONMENTAL SENSING (National Science Foundation). Principal Investigator. October 2009 -September 2012. ($875K)

This collaborative project with Oregon State University developed the first national center for fiber optic temperature sensing at the University of Nevada, Reno (UNR). UNR houses a national distribution center for both instruments, training and development for the hydrologic science community in the United States. This initial startup project focused on the dissemination of fiber optic distributed temperature sensing systems for use across the US. At UNR, we will provide direct, hands on training on instruments, as well as instrument quality control, and instrument development activities. Additionally, wireless remote sensing data logging platforms were supported by the Center.

COMPUTER X-RAY TOMOGRAPHY OF ROOT DEVELOPMENT AND ROOT/SOIL/WATER INTEACTIONS. (National Science Foundation). Principal Investigator. August 2008-July 2012 ($499K)

This collaborative project with Desert Research Institute, Lawrence Berkeley National Laboratory and UC-Merced seeks to use the advance X-ray source at LBL to probe at the micron scale, the development of plant/soil interfaces during root growth. Surprisingly, little understanding of the complex soil interactions that occur at this most important interface have been clearly seen. Using the X-ray sources at LBL, we are able to probe the interface at the sub-micron level, the finest resolution yet recorded.

ADVANCED DESIGN OF COUPLED DIRECT CONTACT MEMBRANE/SOLAR POND FOR LOW COST DESALINIZATION. . (Nevada Renewable Energy Consortium). Principal Investigator. October 2010-July 2012 ($375K)

This collaborative project with Desert Research Institute and the Department of Civil and Environmental Engineering will further test the design of direct contact membrane distillation in carbonate –rich brines as well as field testing of solar pond heat storage systems.

GROUNDWATER/SURFACE WATER INTERACTIONS AT GREAT BASIN NATIONAL PARK (National Park Service). Principal Investigator. August 2008-July 2013 ($375K)

This project focuses on the assessing the connections of National Park groundwater features such as caves and karst formations to the regional groundwater and surface. One of the goals of the project will be to provide quantitative information on the degree of connection between surface waters of the park, groundwaters in the park and ground waters of Snake Valley and the regional carbonate aquifer systems. In addition, stream habitat monitoring is planned to resolve thermal refugia for overwintering of native Bonneville Cutthroat trout.

DEVELOPMENT OF A HYDRODYNAMIC MODEL OF DEVILS HOLE, DEATH VALLEY NATIONAL PARK. (National Park Service and Nevada Division of Wildlife). Principal Investigator. December 2008- April 2013 ($140K)

This project focuses on developing a complete hydrodynamic model of the Devils Hole, the sole habitat for the Devils Hole pupfish. Our current understanding of the dynamics of mixing of this unique cave feature are very limited yet its understanding appears critical to the food web and eventual recovery of this threatened and endangered fish. In addition to computational fluid dynamics modeling of the Hole, the UNR team has deployed a 110m fiber optic cable deep in the cave system to continuously measure the water temperature and assess the deep water circulation.

WALKER RIVER BASIN (U.S. Bureau of Reclamation): RAMAN SCATTERING LIDAR DISTRIBUTED TEMPERATURE SENSING. Principal Investigator. February 2007-December 2009 ($572K)

This project focused on the development of fiber optic temperature sensing for the measurement and quantification of groundwater/surface water interactions in the Walker Basin, Nevada. Novel Raman spectral LIDAR was developed, along with up to 4 km of fiber optic cable laid to utilize heat and thermal signatures of the river and irrigation ditches to determine quantity of groundwater exchange. This Distributed Temperature Sensing system was used to determine the distribution of soil freezing beneath snow packs for runoff understanding and the measurement of seedbed temperatures following land conversion from irrigated alfalfa to low water use native species.

RING-TRUE II (NSF EPSCoR): SCIENCE AND ENGINEERING INFRASTRUCTURE FOR ARID REGIONS. (Co-Principal Investigator) 2006-2009. (~$6M)

This project consisted of several program elements. Tyler is co-PI on Element #2, "Development of mesoscale analysis systems to investigate fluxes of water, solute and energy in the vadose zone". Construction of a mesoscale lysimeter facility began in early 2006 and, coupled with existing FACE facility in southern Nevada, supported a wide range of experiments and modeling of fluxes at moderate scales. Specifically, Tyler's group developed nitrogen transport models and improved conceptual understanding of 3-dimensional water, chloride and nitrogen uptake in the root systems of desert species.

AN REU SITE FOR TRAINING IN INTERNATIONAL WATER SUPPLIES. NATIONAL SCIENCE FOUNDATION (Co-Principal Investigator) 2002-2005. ($287K)

This project was designed to train undergraduate students on issues and solutions to potable water supplies in developing countries. Specifically, undergraduates participated in month-long summer courses on the issues and problems facing developing countries in providing safe drinking water to all citizens. Following the in-class training, students were taken abroad for 2-3 weeks for field work in developing countries related to drinking water, water resource development and environmental issues facing third world nations.

RETENTION OF SOLUBLE ORGANIC NUTRIENTS IN ECOSYSTEMS DURING PRIMARY SUCCESSION AND SOIL DEVELOPMENT. National Science Foundation (Co-Principal Investigator). 1999-2002. ($542K)

This research focused on the quantification of dissolved organic nutrient (nitrogen, phosphorous and iron) transport on soil development across climatic regimes. In the past dissolved organic nutrients have been largely ignored as both a soil forming agent and as a potential pollutant. Field sites adjacent to Mt. Shasta and in Indiana were instrumented to quantify nitrogen fluxes across a transect of climate and soil development time.

THE ROLE OF ROAD CONSTRUCTION ON STREAM DEVELOPMENT AND CHANNEL INCISION. U.S. Forest Service (Co-Principal Investigator) 2000-2007 (268K)

This effort supported a graduate student to conduct research on the impacts of road development on stream geomorphology in mountainous watersheds of central Nevada. The research was extremely timely as there is significant debate on the relationships between roadway development and stream stability and riparian zone habitats. The effort was in collaboration with Dr. Jeanne Chambers (U.S. Forest Service) and Dr. Thomas Bullard (DRI).

MIGRATION OF CONCENTRATED ELECTROLYTE SOLUTIONS UNDERNEATH LEAKING HIGH-LEVEL WASTE TANKS: EVALUATION OF THE EFFECTS OF WETTED PATH GEOMETRY AND VAPOR-DRIVEN DILUTION ON PLUME MOBILITY. (Co-Principal Investigator). U.S. Department of Energy Environmental Management Science Program. 1998-2001. (~$760K)

This collaborative research with Oregon State University, Battelle Pacific Northwest National Laboratory, Sandia National Laboratory and Desert Research Institute investigated the migration of highly concentrations solutions contained in nuclear waste storage tanks at Hanford through the unsaturated zone. The research combined laboratory experiments, field experiments and numerical simulation (both continuum and Lattice Gas approaches) to determine the migration behavior of these fluids in a multiphase system. Results indicated that the high ionic strength solutions tend to finger through the vadose zone, magnified by local scale vapor transport from the surrounding soil moisture to the solute plumes.

DEVELOPMENT OF ENVIRONMENTAL TRACERS FOR WATER AND SOLUTE TRANSPORT IN ARID VADOSE ZONES (Principal Investigator): National Science Foundation 1997-2001 (~$160K)

This research focused on the use of stable chloride and ^{36}Cl to investigate recharge processes in the Great Basin province of the United States and role of paleoclimate in controlling recharge. Core analysis of deep vadose zone samples along with numerical analysis of flow and transport in very dry soils was conducted. Chloride and ^{36}Cl paleofluxes were estimated from interpretation of age dated groundwater. In addition, this research demonstrated, for the first time, the development of large pools of available nitrogen just below the active rooting zone.

MULTICOMPONENT CONVECTION IN POROUS MEDIA AND FRACTURES (Principal Investigator): U.S. Dept. of Energy Basic Energy Sciences Program. 1996-1999 ($228K)

Multicomponent or double diffusive convective processes have received limited attention in porous media studies yet may be an important mass transfer mechanism in natural and contaminated aquifer settings. This research combined detailed laboratory experiments of multicomponent convection in simulated porous media to develop mass transfer relationships and further verify theoretical stability criteria. Numerical modeling via lattice gas techniques was used to further investigate the importance of multicomponent convection in geologic and hydrologic settings. This effort was in collaboration with R. J. Glass and H. Stockman at Sandia National Laboratories.

GEOCHEMICAL, BIOLOGICAL AND ECONOMICAL EFFECTS OF ARSENIC AND OTHER OXYANIONS ON A MINING-IMPACTED WATERSHED (Co-PI with G. Miller, L. Papelis, D. Shaw and W. Miller): EPA/NFS Water and Watersheds Initiative. 1996-2000 ($778K)

Large-scale precious metal mining in the Humbolt River watershed of eastern Nevada has the potential to significantly increase arsenic and other oxyanion concentrations in surface and groundwaters. This research focused on the processes controlling oxyanion concentrations and fluxes from open pit mining, heap leach extraction and waste rock dumps from the mining activities. Activities focused on quantifying pit lake rock/water reactions, transport and reactions of recharging waters through spent cyanide heap leaches and the biological implications of oxyanions to aquatic communities.

EVALUATION OF EVAPORATION AND GROUNDWATER DISCHARGE AT OWENS DRY LAKE (Task Leader): $78K (1996-1997)

This research investigated ground water discharge from playa and saline sediments to develop both the water and solute budgets for Owens Dry Lake, which is a major air pollution source in Southern California. This study compared three techniques, micrometeorological, soil solute profiles and lysimeters, to determine the effect of varying time and length scales of measurements on the estimated evaporation. Data collected in this study was used to develop a detailed water and solute budget and to aid in the dust mitigation efforts. Funded by the California Great Basin Unified Air Pollution Control District for $83K in 1993, $33K in 1994 and currently under review for $78K in 1995.

INVESTIGATION OF THE ROLE OF SUBMARINE GROUNDWATER DISCHARGE ON THE NUTRIENT DYNAMICS OF LAKE TAHOE (Principle Investigator): $56K (1995-1999)

Ground water discharge is suspected of transporting significant quantities of nitrogen and, to a lesser extent, phosphorous, into the nutrient-deficient waters of Lake Tahoe. This research compared, via field measurement of discharge flux and discharge nutrient chemistry, the magnitude of ground water inflows under two conditions of land use practices (urbanized and relatively pristine). The research was funded by the Nevada Agricultural Experiment Station under Hatch funding.

ANALYSIS AND MEASUREMENT OF SOIL WATER FLUX FROM A LOW LEVEL WASTE DISPOSAL SITE (Task Leader): ~$325K (FY96)

This research investigated the role of deep unsaturated zones for waste disposal facilities. The project focused on measurement of soil water potential, isotopic composition and solute chemistry to estimate recharge at an arid site. Research included development of techniques to rapidly measure soil water potential and unsaturated hydraulic conductivity at very low water contents. Funded by the U.S. Department of Energy for $93K in 1992, $285K in 1993, $275K in 1994 and $265K in 1995

ANALYSIS OF LEACH PAD HYDRAULICS AND TRANSPORT BEHAVIOR DURING RINSING (Co-Principal Investigator with G. Danko, University of Nevada, Reno): $78K (FY95)

This research investigated the transport behavior of cyanide from spent leach pads. Studies focused on extending existing theories of unsaturated water movement in dual porosity media from traditional soil physics to the problem of cyanide leaching during rinsing of leach pads. Funded by the U. S. Bureau of Mines Mineral Institute Program for $78K in 1994.

IMPACTS OF FRACTURE COATINGS ON MATRIX IMBIBITION IN UNSATURATED TUFF (Co-PI): $115K (FY95)

This research investigated the role of fracture coatings on the infiltration of water into Yucca Mountain tuff. Research was focused on laboratory studies of imbibition through various natural fracture coatings. Funded by the State of Nevada for $81K in 1993 and $115K in 1994.

GROUND-WATER INTERACTIONS IN TAYLOR VALLEY, ANTARCTICA (Principal Investigator): 1993 ($25K)

This research investigated ground water inputs at Lake Hoare, a perennially ice-covered lake in the Dry Valley region of Antarctica. Conducted in 1992, work focused on measurement of submarine ground-water discharges beneath the perennial ice cover. Data suggested that ground water is entering the lake in spite of the large areas of deep permafrost. Funded by NASA/NSF and through an award of Institutional Project Assignment funds from the Desert Research Institute in 1992.

USE OF FRACTAL METHODS FOR GENERATION OF SYNTHETIC DATASETS AND SCIENTIFIC VISUALIZATION IN THE MODELING OF GROUNDWATER FLOW AND TRANSPORT. (Co-Principal Investigator with S. Wheatcraft): 1989-1991 ($225K)

This research investigated the development of fractal algorithms to reproduce important aspects of natural heterogeneity. The studies focused on development of gridding algorithms for sparse data for the purpose of using sparse data with scientific visualization software; development of computer graphic methods to simultaneously visualize 3-dimensional model input data (such as hydraulic conductivity) and 3-dimensional transient output data from models. Funded by the U.S. Environmental Protection Agency for approximately $400K over three years, 1990 through 1992.

EXAMINATION OF THE FRACTAL CHARACTERISTICS OF SOLUTE TRANSPORT IN POROUS MEDIA WITH FIELD SCALE HETEROGENEITY (Co-Principal Investigator with S. Wheatcraft): 1987-1989 ($240K)

This research investigated the fractal nature of aquifer heterogeneity and the interpretation of dispersion problems with respect to fractal geometry. Funded by the U.S. Department of Energy through the State of Nevada for approximately $200K per year from 1988 through 1990.

ESTIMATION OF RECHARGE FROM NUCLEAR SUBSIDENCE CRATERS: (Co-Principal Investigator) 1986-1988

This research investigated via drilling and analysis of soil physics and geochemical data the role of subsidence craters in recharge in arid environments. Research included innovative drilling and sampling procedures, coupled with isotopic analysis of soil water chemistry. Funded by the U.S. Department of Energy for $120K each year from 1985 through 1988.

TEACHING & ADVISEMENT

Vadose Zone Hydrology (GEOL 784): This graduate level course focuses on the flow and transport of water and solutes in unsaturated porous media. The course emphasis numerical methods and the course extensively uses a partially saturated flow and transport simulator for all aspects of the topics.

Ground Water Hydrology (GE 684): This course provides the basic introduction to ground water hydrology. It is required for all Hydrologic Sciences Program graduate students as well as all undergraduates in Geologic Engineering.

Evaporation and its Measurement (GEOL 782): This graduate level seminar is designed to introduce the concepts of evaporation and energy transport at the land surface. The course details commonly used empirical, energy budget and direct measurement techniques to estimate actual and potential evapotranspiration. Taught in 1995 and 2006.

Hydrologic Field Methods (GEOL 701Z): This graduate level course emphasis "hands-on" training of all major methods and equipment used for both surface water and ground water investigations. Components of the course include a 48 hour aquifer test, geochemical sampling of groundwater, construction and maintenance of an automated weather station, stream gauging, stream sediment analysis, and aquifer slug testing and basic surveying. This course is taught yearly.

Hydrology/Hydrogeology Seminar (GEOL 782): This is a required course of all Hydrologic Science Graduate students. The course emphasizes writing skills, presentation skills and review of seminal papers in the hydrologic sciences. Taught yearly since 1999.

Students Advised

Ben Serpa, Forest Management and Hydrology, MS. 2020

John Volk, Impacts of Climate Change on Mountain Hydrology, Ph.D. 2018

Theresa O'Halloran, Forest Management and Snow Dynamics, MS. 2018

Rowan Gaffney, Forest Health and thinning impacts on hydrology, MS. 2016

Scott Kobs, Analysis of Antarctic ice shelf melting. MS 2014

Mark Hausner, Hydrodynamics of Devils Hole, Death Valley National Park. , Ph.D. 2013

Jeff Kinder, Optimization of well locations for the Reno Sparks Indian Colony. MS 2012.

Lucas Williamson. Fiber optic temperature sensing in soils. MS 2012.

Jazmin Arevana, Microtomographic Analysis and Modeling of Root Growth and Water Uptake. Ph.D. 2011.

Francisco Suarez, Analysis of salinity-gradient solar ponds for water distillation. Ph.D. 2010.

Mark Hausner, Development of Raman spectra temperature sensing for distributed soil moisture estimation. M.S. 2010.

Ronald Parrett, Identification of nitrogen accumulation mechanisms in arid regions. M. S. 2010.

David Prudic: Coupled climate/groundwater/surface water modeling in arid regions. Ph.D. 2007

Edmund Bwoffo-Twum, Use of INSAR data to infer impacts of ground water depletion in alluvial basins. MS 2007

William Albright: Analysis of fluid flow through alternative landfill cover designs: Field measurement and simulation. Ph.D 2005

Jena Green: Storm water detention pond treatment of highway runoff in the Lake Tahoe Basin. MS 2005.

Christian Kroft, Well head protection delineation by Bayesian Methods in Spanish Springs Nevada. M.S. 2003

Geoff Webb, Unsaturated transport processes in gold heap leach mining. M.S 2003

Stephanie Kampf, Measurement of energy balance components on the Salar de Atacama M.S 2002

Jeff Gamlin, Sources and distribution of arsenic in Honey Lake Valley, California M.S. 2002

David Decker: Solute Mobilization and Transport of Arsenic and other Oxyanions from Spent Heap Leach Mining Activities. Ph.D. 2001

Peter Hartsough: Quantifying Paleorecharge through Vadose Zone Tracer Profiles. M.S. 2001

Fred Ramsing: The Role of Submarine Ground Water Discharge in Lake Tahoe. M.S. 2001

Clay Cooper: The Role of Double Diffusion in Subsurface Solute Transport.. Ph.D. 2000.

Joseph Leising: Evaporative Forcing of Brine Convection and its Relation to Alteration Mineral. .Ph.D. 2000.

Brian Andraski: Water Balance Studies at an Arid Low Level Waste Disposal Site.. Ph.D. 1998.

William Albright: The Role of Soil Amendments to Modify the Hydraulic Properties of Potential Waste Cover Soils at the Nevada Test Site. M.S. 1995.

David Decker: Modeling the Behavior of Cyanide Breakthrough in Heap Leach Rinsing Operations. M.S., 1996.

Karen Font: Geochemical Modeling of the Owens Dry Lake Ground Water System. M.S. 1995.

Scott Kranz: Measurement of Evaporative Flux from Owens Dry Lake.. M.S. 1995.

Vijay Chekuri: The Role of Fracture Coatings in Controlling Water Imbibition in Fractured Tuff. M.S. 1995.

Joseph Leising: The Role of Ground Water Convection in Controlling Potassium Metasomatism. M.S. 1994.

Post-Doctoral Researchers Advised

Dr. Ofer Dahan: Associate Professor, Ben Gurion University

Dr. Menoj Menon: Assistant Professor, Leeds University

Dr. Francisco Suarez: Assistant Professor, Catholic University of Chile

Dr. Christine Hatch: Assistant Professor, Univ. of Massachusetts

Dr. Mark Hausner, Desert Research Institute

Dr. Henry Pai, National Weather Service

Dr. Rachel Hatch, in progress