

DANI OR - Curriculum Vitae

NORTHEAST UTILITIES FOUNDATION CHAIR PROFESSOR IN ENVIRONMENTAL ENGINEERING DIRECTOR ENVIRONMENTAL ENGINEERING GRADUATE PROGRAM

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RESEARCH INTERESTS AND PROFESSIONAL EXPERTISE

Modeling, measurement and interpretation of mass and energy flow and transformation in porous media; *in situ* characterization of soil hydraulic and mechanical properties; development of electromagnetic techniques for characterization of earth materials (geophysics); modeling and measurement of soil structural dynamics affecting hydraulic properties; modeling interfacial pore scale processes affecting liquid organization and behavior in porous media; analytical and lattice Boltzmann methods for modeling intermittent and unstable flows in fractured rock and structured media; liquid behavior in porous media under reduced gravity for space exploration; quantitative tools to study physical constraints affecting biological activity in the vadose zone.

EDUCATION

Ph.D. Soil Science and Biometeorology (Soil Physics)

Utah State University, Logan, UT. 1990.

M.Sc. Soil and Water Sciences, *Cum Laude*.

The Hebrew University of Jerusalem, Rehovot, Israel. 1987.

B.A. Soil and Water Sciences, *Cum Laude*.

The Hebrew University of Jerusalem, Rehovot, Israel. 1985.

PROFESSIONAL EXPERIENCE

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| 2002 - | NU Chair professor CEE/ENVE | University of Connecticut |
| 2000 - 2002 | Professor of Soil Physics | Utah State University |
| 1997 - 2000 | Assoc. Professor of Soil Physics | Utah State University |
| 1993 - 1997 | Assist. Professor of Soil Physics | Utah State University |
| 1991 - 1992 | Post-Doctorate (Civil Eng.) | University of California, Berkeley |
| 1990 - 1991 | Post-Doctorate (Hydrologic Sci.) | University of California, Davis |
| 1988 - 1990 | Research Assistant | Utah State University |
| 1986 - 1988 | Research Assistant | ARO Volcani Center, Israel |
| 1982 - 1986 | Experiments Coordinator | Exp. Station, Upper Galilee, Israel |

PROFESSIONAL AFFILIATIONS

Editorial Board of *Vadose Zone Hydrology Journal* (2001-present)
Assistant Editor *Water Resources Research* (1999-2002)
European Geophysical Union
American Geophysical Union
Soil Science Society of America

AWARDS AND HONORS

Elected Fellow of the Soil Science Society of America, 2004
Awarded the SSSA *Kirkham Soil Physics Award* (2001)
Awarded Presidential competitive fellowships (USU, 1988).
Awarded the I.E.F. (Israel Endowment Fund) Prize for M.S. Thesis (Israel, 1987).

PUBLICATIONS

SCIENTIFIC JOURNALS (Refereed) --

- (1) Or, D., and R.J. Hanks. 1992. Spatial and Temporal Soil Water Estimation Considering Soil Variability and Evapotranspiration Uncertainty. *Water Resour. Res.* 28(3):803-814.
- (2) Or, D., and R.J. Hanks. 1992. Soil-Water and Crop Yield Spatial Variability Induced by Irrigation Non-uniformity. *Soil Sci. Soc. Am. J.* 52:226-233.
- (3) Or, D., and R.J. Hanks. 1992. Measurement of Crop Production Functions Using Point Source Sprinkler Irrigation. *Irrigation Sci.* 13:55-64.
- (4) Govindaraju, R.S., D. Or, M.L. Kavvas, D.E. Rolston, and J. Biggar. 1992. Error Analyses of Simplified Unsaturated Flow Models Under Large Uncertainty in Hydraulic Properties. *Water Resour. Res.* 28(11):2913-2924.
- (5) Rubin, Y., and D. Or. 1993. Stochastic Modeling of Unsaturated Flow in Heterogeneous Soils with Water Uptake by Plant Roots: The Parallel Columns Model. *Water Resour. Res.* 29(3):619-631.
- (6) Indelman, P., D. Or and Y. Rubin. 1993. Stochastic Analysis of Unsaturated Flow Through Bounded Heterogeneous Formations. *Water Resour. Res.* 29(4):1141-1148.
- (7) Or, D., and Y. Rubin. 1993. Stochastic Modeling of Unsaturated Flow in Heterogeneous Soils with Water Uptake by Plant Roots: Tests of the Parallel Columns Model Under Two-Dimensional Flow Conditions. *Water Resour. Res.* 29 (12): 4109-4119.
- (8) Marion J., D. Or, D.E. Rolston, M.L. Kavvas, and J.W. Biggar. 1994. Evaluation of Methods for Determining Soil Water Retentivity and Unsaturated Hydraulic Conductivity. *Soil Science.* 158(1):1-13.
- (9) Or, D., and D.P. Groenveeld. 1994. Stochastic Estimation of Plant-Available Soil Water in Owens Valley Under Fluctuating Water Table Depths. *J. Hydrology* 163:43-64.
- (10) Groenveeld, D. P., and D. Or. 1994. Water Table-Induced Shrub-Herbaceous Ecotone in Owens Valley California. *Water Resour. Bull.* 30:911-920.
- (11) Or, D. 1994. Book Review "An Inventory of Irrigation Software for Microcomputers" by Lenselink K.J. and M. Jurriens. *Irrigation Sci.* 15:196.
- (12) Or, D. 1995. Stochastic Analysis of Soil Water Monitoring for Drip Irrigation Management in Heterogeneous Soils. *Soil Sci. Soc. Am. J.* 59:1222-1233.
- (13) Shani, U., and D. Or. 1995. In-situ Method for Estimating Subsurface Unsaturated Hydraulic Conductivity. *Water Resour. Res.* 31:1863-1870.
- (14) Coelho, F.E., D. Or, and C.L. Andrade. 1995. Evaluation of Steady State Regime and Sensor Placement for Determining Water Content and Matric Potential in Drip Irrigation (in Portuguese). *Pesq. Agropec. Bras. Brasilia* 30(11):1327-1333.

- (15) Or, D. and Wynn R. Walker. 1996. Effects of Spatially Variable Intake Properties on Surface Irrigation Advance. *J. Irrig. and Drain. ASCE* 122:122-130.
- (16) Kavvas, M.L., Z.-Q. Chen, R.S. Govindaraju, D.E. Rolston, T. Koos, A. Karakas, D. Or, S. Jones, J. Biggar. 1996. Probability Distribution of Solute Travel Time for Convective Transport in Field-Scale Soils Under Unsteady-Nonuniform Flows. *Water Resour. Res.* 32:875-889.
- (17) Or, D. and U. Shani. 1996. Reply to comment on "In-situ Method for Estimating Subsurface Unsaturated Hydraulic Conductivity". *Water Resour. Res.* 32(6):1897
- (18) Coelho, F.E., and D. Or. 1996. A Parametric Model for Two-Dimensional Water Uptake Intensity by Corn Roots Under Drip Irrigation. *Soil Sci. Soc. Am. J.* 60:1039-1049.
- (19) Or, D. and H.R. Silva. 1996. Prediction of Surface Irrigation Advance Trajectories Using Soil Intake Properties. *Irrig. Sci.* 16:159-167.
- (20) Or, D. 1996. Drip Irrigation in Heterogeneous Soils: Steady State Field Experiments for Stochastic Model Evaluation. *Soil Sci. Soc. Am. J.* 60:1339-1349.
- (21) Or, D. 1996. Wetting-Induced Soil Structural Changes: The Theory of Liquid Phase Sintering. *Water Resour. Res.* 32:3041-3049.
- (22) Or, D. and E.F. Coelho. 1996. Soil Water Dynamics Under Drip Irrigation: Transient Flow and Uptake Models. *Trans. ASAE* 39:2017-2025.
- (23) Coelho, F.E. and D. Or, 1996. Flow and Uptake Patterns Affecting Soil Water Sensor Placement for Drip Irrigation Management. *Trans. ASAE* 39:2007-2016.
- (24) Malek, E., G. E. Bingham, D. Or, and G. McCurdy. 1997. Annual Mesoscale Study of Water Balance in a Great Basin Heterogeneous Desert Valley. *J. Hydrology* 191:223-244.
- (25) Coelho, F.E., and D. Or. 1997. Applicability of Analytical Solutions for Water Flow From Point Sources to Drip Irrigation Management. *Soil Sci. Soc. Am. J.* 61:1331-1341.
- (26) Jones, S.B., and D. Or. 1999. Particulated Growth Media for Optimal Liquid and Gaseous Fluxes to Plant Roots in Microgravity. *Adv. Space Res.* 22(10):1413-1418.
- (27) Jones, S.B., and D. Or. 1999. A Capillary-Driven Root Module for Plant Growth in Microgravity. *Adv. Space Res.* 22(10):1407-1412.
- (28) Jones, S.B., and D. Or. 1998. Design of Porous Media for Optimal Liquid and Gaseous Fluxes to Plant Roots. *Soil Sci. Soc. Am. J.* 62:563-573.
- (29) Wraith J.M., and D. Or. 1998. Nonlinear Parameter Estimation Using Spreadsheet Software. *J. Nat. Resour. Life. Sci. Edu.* 27:13-19.
- (30) Friel, R., and D. Or. 1999. Frequency Analysis of Time Domain Reflectometry (TDR) with Applications to Dielectric Spectroscopy of Soil Constituents. *Geophysics* 64(3):1-12.
- (31) Coelho, F. E., and D. Or. 1999. A Model for Soil Water and Matric Potential Distribution under Drip Irrigation with Water Extraction by Roots. *Pesq. Agropec. Bras. Brasilia* 34(2):225-

234 (in Portuguese).

- (32) Wraith, J.M., and D. Or. 1999. Temperature effects on time domain reflectometry measurement of soil bulk dielectric constant: experimental evidence and hypothesis development. *Water Resour. Res.* 35:361-369.
- (33) Or, D., and J.M. Wraith. 1999. Temperature effects on time domain reflectometry measurement of soil bulk dielectric constant: A physical model. *Water Resour. Res.* 35:371-383.
- (34) Coelho, F. E., D. Or, and V.F. De Sousa. 1999. Evaluation of Soil Hydraulic Parameters for Soil Water Distribution Models Under Drip Irrigation. *Pesq. Agropec. Bras., Brasilia* 34(4):651-657 (in Portuguese).
- (35) Jones, S.B., and D. Or. 1999. Microgravity Effects on Water Flow and Distribution in Unsaturated Porous Media: Analyses of Flight Experiments. *Water Resour. Res.* 35:929-942.
- (36) Stothoff, S, D. Or, D.P. Groeneveld, and S.B. Jones. 1999. The effect of vegetation on infiltration in shallow soils underlain by fissured bedrock. *J. Hydrology* 218:169-190.
- (37) Coelho, F. E., and D. Or. 1999. Root Distribution and Water Uptake Patterns under Surface and Subsurface Drip Irrigation. *Plant and Soil* 206:123-136.
- (38) Tuller M., D. Or, and L.M. Dudley. 1999. Adsorption and capillary condensation in porous media - liquid retention and interfacial configurations in angular pores. *Water Resour. Res.* 35:1949-1964.
- (39) Or, D., and M. Tuller. 1999. Liquid Retention and Interfacial Area in Variably Saturated Porous Media: Upscaling from Single Pore to Sample Scale Model. *Water Resour. Res.* 35:3591-3606.
- (40) Or, D., and J. M. Wraith. 1999. A New TDR-Based Soil Matric Potential Sensor. *Water Resour. Res.* 35:3399-3407.
- (41) Or, D., and M. Tuller. 2000. Liquid Flow in unsaturated fractured media: Hydraulic conductivity of rough surfaces, *Water Resour. Res.* 36:1165-1177.
- (42) Or, D., and J. M. Wraith. 2000. Comment on "On water vapor transport in field soils" by Anthony T. Cahill and Marc B. Parlange (*Water Resour. Res.* 34: 731-739, 1998). *Water Resour. Res.* 36:3103-3105.
- (43) Or, D. and T.A. Ghezzehei. 2000. Dripping into cavities from unsaturated fractures under evaporative conditions. *Water Resour. Res.* 36:381-393.
- (44) Ghezzehei, T.A., and D. Or. 2000. Dynamics of soil aggregate coalescence governed by capillary and rheological processes. *Water Resour. Res.* 36:367-379.
- (45) Or., D., F.J., Leij, V. Snyder, and T.A. Ghezzehei. 2000. Stochastic model for post-tillage soil pore size evolution. *Water Resour. Res.* 36:1641-1652.
- (46) Bingham, G.E., S.B. Jones, D. Or., D., I.G. Podolski, M.A. Levinskikh, V.N. Sytchov, T. Ivanova, P. Kostov, S. Sapunova, I. Dandolov, D.B. Bubenheim, G. Jahns. 2000. Microgravity

effects on water supply and substrate properties in porous matrix root support systems. *Acta Astronautica* 47:1-10.

(47) Or, D., U. Shani, and A.W. Warrick. 2000. Subsurface tension permeametry. *Water Resour. Res.* 36:2043-2053.

(48) Mmolawa, K. B., and D. Or, 2000. Root zone solute dynamics under drip irrigation: A review. *Plant and Soil* 222:161-189.

(49) Serbin G, Or D., and D. Blumberg. 2001. Thermodielectric effects on radar backscattering from wet soils. *IEEE TGARS* 39:897-901.

(50) Mmolawa, K. B., and D. Or, 2001. Water and solute dynamics under a drip irrigated crop: Experiments and analytical model. *Transactions of the ASAE* 43(6):1597-1608.

(51) Or, D., 2001. Who invented the tensiometer? *Soil Sci. Soc. Am. J.* 65:1-3.

(52) Tuller, M. and D. Or, 2001. Hydraulic conductivity of variably saturated porous media: Film and corner flow in angular pore space, *Water Resour. Res.* 37:1257-1276.

(53) Ghezzehei, T.A., and D. Or. 2001. Rheological properties of wet soils and clays under steady and oscillatory stresses. *Soil Sci. Soc. Am. J.* 65:624-637.

(54) Wraith, J.M., and D. Or. 2001. Soil water characteristic determination from concurrent water content measurements in reference porous media. *Soil Sci. Soc. Am. J.* 65:1659-1666.

(55) Ryel, R.J., M.M. Caldwell, C.K. Yoder, D. Or, and A.J. Leffler. 2002. Hydraulic redistribution in a stand of *Artemisia tridentata*: Evaluation of benefits to transpiration assessed with a simulation model. *Oecologia* 130:173-184.

(56) Or, D., and T.A. Ghezzehei. 2001. Modeling post-tillage structural dynamics in aggregated soil: A review. *Soil Tillage Res.* 1651:1-19.

(57) Leij, F.J., T.A. Ghezzehei, and D. Or. 2001. Modeling the dynamics of the soil pore size distribution. *Soil Tillage Res.* 64:61-78.

(58) Jones, S.B., J.M. Wraith, and D. Or. 2002. Time Domain Reflectometry (TDR) measurement principles and applications. *Hydrol. Proc.* 16:141-153.

(59) Jones, S.B., and D. Or. 2002. Thermal and geometrical effects on bulk permittivity of porous mixtures containing bound water. *J. Non-Crystalline Solids* 305(1-3):247-254.

(60) Leij, F.J., T.A. Ghezzehei, and D. Or. 2002. Analytical models for soil pore size distribution after tillage. *Soil Sci. Soc. Am. J.* 66:1104-1114

(61) Tuller, M. and D. Or, 2002. Unsaturated hydraulic conductivity of structured porous media: A review of liquid configuration-based models. *Vadose Zone J.* 1(1):14-37.

(62) Bialkowski, S., L. M. Dudley, and D. Or. 2002. Using Expectation Maximization to obtain dielectric relaxation time spectra of aqueous montmorillonite clay suspensions. *J. Applied*

Spectroscopy 56(11):1470-1474.

(63) Or, D., and M. Tuller. 2002. Cavitation during desaturation of porous media under tension. *Water Resour. Res.*38(5) 10.1029/2001WR000282.

(64) Ghezzehei, T.A., and D. Or. 2003. Dynamics of pore space in soil aggregate bed under static and dynamic external loads. *Soil Sci. Soc. Am. J.* 67:12-16.

(65) Mmolawa, K. B., and D. Or, 2003. Experimental and numerical evaluation of analytical volume balance model for soil water dynamics under a drip irrigation. *Soil Sci. Soc. Am. J.* 67: 1657-1671.

(66) Dudley, L. M., S. Bialkowski, and D. Or. 2003. Low frequency behavior of Montmorillonite suspensions. *Soil Sci. Soc. Am. J.* 67:518-526.

(67) Or, D., and M. Tuller, 2003. Hydraulic conductivity of unsaturated fractured porous media: Flow in a cross-section. *Adv. Water Resour.*, Vol.26, No.8, 883-898.

(68) Ghezzehei, T.A., and D. Or. 2003. Stress induced shrinkage of isolated pores in a wet soil matrix. *Water Resour. Res.* 39(3) 1067,10.1029/2001WR001137.

(69) Tuller, M. and D. Or, 2003. Hydraulic functions for swelling soils: pore scale considerations. *J. Hydrology* 272:50-71.

(70) Sukop M.C., and D. Or, 2003. Invasion percolation of single component, multiphase fluids with lattice Boltzmann models. *Physica B* 338:298-303.

(71) Jones, S.B., and D. Or, 2003, Time domain reflectometry (TDR) measurement of water content in high surface area porous media. *Physica B* 338:284-290.

(72) Or, D., 2003. Physical processes affecting microbial habitats and activity in unsaturated porous media. *Agric. Sci.* 7(2):39-45.

(73) Serbin, G. and D. Or, 2003. Near-surface soil water content measurements using horn antenna radar – methodology and overview. *Vadose Zone J.* 2:500-510

(74) Or, D., and M. Tuller. 2003. Response to comment by Toker et al. on “Cavitation during desaturation of porous media under tension”. *Water Resour. Res.*39(11), 1306, doi:10.1029/2003WR002492

(75) Jones, S.B., D. Or, and G. Bingham. 2003. Gas diffusion measurement and modeling in coarse-textured porous media. *Vadose Zone J.* 2:602-610.

(76) Robinson D.A., S.B. Jones, J.M. Wraith, D. Or, and S.P. Friedman. 2003. A review of advances in dielectric and electrical conductivity measurement in soils using time domain reflectometry. *Vadose Zone J.* 2:444-474

(77) Souza, C.F., D. Or, and E. E. Matura, 2004. A variable-volume TDR probe for measuring water content in large soil volumes. *Soil Sci. Soc. Am. J.* 68:25-3

- (78) Sukop M.C., and D. Or, 2004. Lattice Boltzmann method for modeling liquid-vapor interfacial configurations in porous media. *Water Resour. Res.* 40 (1), 1509,10.1029/2003WR002333.
- (79) Grant S. A., D. Or (2004), Relationship between temperature sensitivity of capillary pressure and soil particle size, *Geophys. Res. Lett.*, 31, L07501, doi:10.1029/2003GL019211
- (80) Dudley,L.M., Bialkowski,D. and D. Or, 2004, Response to "Comments on 'Low Frequency Impedance Behavior of Montmorillonite Suspensions: Polarization Mechanisms in the Low Frequency Domain'" *Soil Sci. Soc. Am. J.*, 68: 1024
- (81) Serbin, G. and D. Or, 2004. Ground-penetrating radar measurement of soil water content dynamics using a suspended horn antenna. *IEEE TGARS (in press)*
- (82) Jones, S.B., and Or D. 2004. Frequency domain analysis to extend water content measurement in highly saline soils using short TDR probes. *Soil Sci. Soc. Am. J.* (in press)
- (83) Berli, M. and D. Or, 2004. Deformation of pores in viscoplastic soil material. *Géotechnique (in review)*
- (84) Turcu, V.E, Jones, S.B., and Or D. 2004. Continuous monitoring of soil CO₂ and O₂ concentrations for gradient-based surface gaseous flux estimates. *Soil Sci. Soc. Am. J.* (in review)
- (85) Serbin, G. and D. Or, 2004. Ground-penetrating radar for measurement of crop and soil water content dynamics. *Remote Sens. Environ.* (in review)
- (86) Talbot, C.A., F.L., Ogden, and D. Or. 2004. Comment on "Layer averaged Richards' equation with lateral flow" by Praveen Kumar (*Adv. Water Resour.* 27(5):521-31, 2004). *Adv. Water Resour.* (in press).
- (87) Jones, S.B., Mace W.R. and Or D. 2004. A TDR Coaxial Cell for Control and Monitoring of Matric Potential and Electrical Conductivity of Variably Saturated Porous Media. *Vadose Zone J.* (accepted)
- (88) Berli, M., M. Accorsi, and D. Or, 2004. Size and shape evolution of pores in a viscoplastic matrix under compression. *International Journal for Numerical and Analytical Methods in Geomechanics (in review)*
- (89) Sukop M.C., and D. Or, 2004. Lattice Boltzmann method for homogeneous and heterogeneous cavitation. *Phys. Rev. Letters (in review)*.

BOOKS AND BOOK CHAPTERS (Refereed) --

- (90) Kavvas, M.L., R.S., Govindaraju, D.E. Rolston, D. Or, and J. Biggar. 1992. On the stochastic pollution transport equations. *In:* M. Quintard and Todorovic (eds.), *Heat and Mass Transfer in Porous Media*. Elsevier, New York. pp. 136-142.
- (91) Or, D., and R.J. Hanks. 1993. Irrigation Scheduling Considering Soil Variability and Climatic Uncertainty: Simulation and Field Studies. *In:* Russo D. and G. Dagan (eds.), *Water Flow and*

Solute Transport in Soils: Developments and Applications, pp. 263-283, Springer-Verlag, Heidelberg.

(92) Hipps, L. E., D. Or, and C.M.U. Neale. 1996. Spatial Structure and Scaling of Surface Fluxes and Governing Properties in a Great Basin Ecosystem. (Invited) *in*: Stewart et al. (eds.), *Scaling up in Hydrology using Remote Sensing*, pp. 113-125, John Wiley & Sons, Chichester, England.

(93) Or, D., and J.M. Wraith. 1999. Soil Water Content and Water Potential Relationships. *In*: Sumner M. (ed.) *Handbook of Soil Science*, pp. A53-A85. CRC Press, Boca Raton, FL.

(94) Dasberg, S. and D. Or. 1999. ***Drip Irrigation*** (a new book). Springer-Verlag, Heidelberg.

(95) Stothoff, S., and D. Or. 2000. A Discrete-Fracture Boundary Integral Approach to Simulating Coupled Energy and Moisture Transport in a Fractured Porous Medium. *In: Dynamics of Fluids in Fractured Rocks: Concepts and Recent Advances*, Geophysical Monograph Series, American Geophysical Union, Washington, DC.

(96) Or, D., and M. Tuller. 2001. Adsorption and Capillarity in Variably Saturated Porous Media Pore Scale Hydrostatic and Hydrodynamic Considerations. (invited) *In*: Selim M., and D.L. Sparks (eds.) *Physical and Chemical Processes of Water and Solute Transport and Retention in Soils*, SSSA Special Publication 56, 1-50.

(97) Warrick, A., and D. Or. 2001. Effect of gravity on steady infiltration from spheroids. *In: J.R. Philip Tribute*, Geophysical Monograph Series, American Geophysical Union, Washington, DC.

(98) Or, D., and J.M. Wraith. 2001. Soil Water Content and Potential. *In*: Warrick A. (ed.), *Soil Physics Companion*. CRC Press, Boca Raton, FL.

(99) Gee. G.W., and D. Or. 2002. Particle Size Analysis. *In*: Dane J. and C. Topp. (ed.) *Methods of Soil Analysis*, ASA, Madison, WI (pp. 255-293).

(100) Berli, M. and D. Or, 2002. Modeling bulk soil compaction using a rheologically based pore closure model. *In*: L. Vulliet, B. Schrefler and L. Laloui (Editors), *Environmental Geomechanics*, Monte Verita, Switzerland.

(101) Jones, S. B. and D. Or. 2004. Thermal and Geometrical Effects on Bulk Permittivity of Porous Mixtures. *In*: *Electromagnetic Wave Interaction with Water and Moist Substances*. ed. K. Kupfer, Springer (*in press*)

(102) Warrick, A., and D. Or. 2004. Soil Water Concepts. *In*: Lamm F. (ed.), *Microirrigation*.

(103) Or, D. and M. Tuller. 2004. Capillarity. *In*: Hillel D. (ed.) *Encyclopedia of Soils in the Environment*, Elsevier Science, Oxford. (*in press*)

(104) Tuller, M. and D. Or. 2004. Retention of Water in Soil and the Soil Water Characteristics Curve. *In*: Hillel D. (ed.) *Encyclopedia of Soils in the Environment*, Elsevier Science, Oxford. (*in press*)

(105) Or, D., M. Tuller, and J.M. Wraith. 2004. Soil Water Potential. *In*: Hillel D. (ed.)

Encyclopedia of Soils in the Environment, Elsevier Science, Oxford. (in press)

(106) Durner, W. and Or, D. 2004 Soil Water Potential Measurement. In: Anderson, M.G. (ed.) *Encyclopedia of Hydrological Sciences*, John Wiley & Sons, Ltd, Chichester, (in review)

SCIENTIFIC REPORTS --

(1) Hanks, R.J., L.M. Dudley, R.L. Cartee, W.R. Mace, E. Pomela, R.L. Kidman, J.M. Wraith, and D. Or. 1989. Use of saline waste water from electrical power plants for irrigation, 1988 Report. Part 1: Soils, irrigation water and crop yield studies. **Utah Agr. Expt. Res. Rep. 128.**

(2) Wraith, J.M., R.L. Kidman, D. Or, and R.J. Hanks. 1990. Predicting seasonal evapotranspiration of wheat at Maricopa. The **MAC IV** Experiment. Univ. Arizona, Maricopa Agricultural Center.

(3) Or, D., D. P. Groeneveld, K. Loague, and Y. Rubin. 1991. Evaluation of Single and Multi-Parameter Methods for Estimating Soil-Water Characteristic Curves. Geotechnical Engineering Report No. **UCB/GT/91-07**, University of California, Berkeley, 54 pp.

(4) Rubin, Y., and D. Or. 1992. Stochastic Modeling of Unsaturated Flow in Laterally-Heterogeneous Media with Water Uptake by Plant Roots: I. Development of a Parallel Columns Model; II. Tests and Applications of the Parallel Columns Model Under Two-Dimensional Flow Conditions. Geotechnical Engineering Rep. **UCB/GT/92-02**, U. of California, Berkeley, 88 pp.

(5) P. Indelman, Y. Rubin and D. Or. 1992. Stochastic Analysis of Unsaturated Flow Through Bounded and Vertically-Heterogeneous Formations: Steady Flows and Small Scale of Medium Heterogeneity. Geotechnical Engineering Rep. **UCB/GT/92-03**, U. of California, Berkeley, 40 pp.

(6) Or, D., Y. Rubin and D. P. Groeneveld. 1992. Interpretation and Error Analyses of Time Domain Reflectometry Measurements in Owens Valley, California. Geotechnical Engineering Report No. **UCB/GT/92-04**, University of California, Berkeley, 32 pp.

(7) Rubin, Y., D. Or and D. P. Groeneveld. 1992. Characterization of Soil Spatial Variability for Upgrading Soil Water Monitoring in Owens Valley, California. Geotechnical Engineering Report No. **UCB/GT/92-08**, University of California, Berkeley, 315 pp.

(8) Or, D., and D. P. Groeneveld. 1994. Characterization of Soil Spatial Variability for Upgrading Soil Water Monitoring in Owens Valley, California - Phase II. Report prepared for Inyo County Water Dept. and City of Los Angeles Dept. of Water and Power. 112 pp.

(9) Or, D., and D. P. Groeneveld. 1994. Characterization of Soil Spatial Variability for Upgrading Soil Water Monitoring in Owens Valley, California - Final Report. Report prepared for Inyo County Water Dept. and City of Los Angeles Dept. of Water and Power. 120 pp.

(10) Dudley, L.M., J.W. MacAdam, D. Or, W.R. Mace, A.P. Low. 1994. Use of Saline Waste Water From Electrical Power Plants for Irrigation: 1993 Report. Part 1: Soil, Irrigation Water, and Crop Yields. **Utah Agric. Exp. Sta. Res. Rpt. 150.**

(11) Dudley, L.M., D. Or, J.W. MacAdam, W.R. Mace, A.P. Low. 1995. Use of Saline Waste Water From Electrical Power Plants for Irrigation: 1994 Report. Part 1: Soil, Irrigation Water, and Crop Yields Studies. **Utah Agric. Exp. Sta. Res. Rpt. 153.**

(12) Dudley, L.M., D. Or, W.R. Mace. 1996. Use of Saline Waste Water From Electrical Power Plants for Irrigation: 1994 Report. Part 1: Soil, Irrigation Water, and Crop Yields Studies. **Utah Agric. Exp. Sta. Res. Rpt. #165.**

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(127) Wraith, J.M., S. Qureshi, R.E. Martin, D. Macur, and D. Or. , 2003, Pore Size and Wetness Impacts on Microbial Community Selection., SSSA Annual Meeting Abstracts, November 2-6, Denver, Colorado.

(128) Or, D and T.A. Ghezzehei, 2003, Fingering and Intermittent Flow in Unsaturated Fractured Porous Media, American Geophysical Union - Fall Meeting 2003, San Francisco, CA. EOS pp Fxxx.

(129) Or, D., M. Tuller, and S.B. Jones, 2004. Liquid-Gas Interfacial Configurations in Angular Pores under Microgravity. 9th ASCE Aerospace Division International Conference, March 7-10, 2004, Houston, Texas.

(130) Jones, S.B., D. Or and G.E. Bingham, 2004. Automated systems for Oxygen diffusion measurements in porous media at 1g and 0g. Proceedings of the ASCE Earth and Space Conference. March 7-10, 2004, Houston, TX.

(131) Or, D, Wraith J.M., Serbin, G. Chen Y. and Jones S.B., 2004. Bound Water and Thermodielectric Phenomena Affecting Soil Water Content Measurement using Time Domain Reflectometry and Radar Remote Sensing. AGU Spring Meeting, May 17-21, Montreal, Canada.

(132) Serbin, G, Or D, and Rasmussen P., 2004. Horn Antenna GPR Measurement of Crop Canopy Biophysical and Near-Surface Hydrologic Parameters. AGU Spring Meeting, May 17-21, Montreal, Canada.

(133) Long, T. and Or D., 2004. Diffusion Fragmentation and Spatial Constraints on Soil Microbial Diversity. AGU Spring Meeting, May 17-21, Montreal, Canada.

(134) Chen, Y. and Or D., 2004. Effect of Temperature on the Maxwell-Wagner Dielectric Behavior of Wet Soils. AGU Spring Meeting, May 17-21, Montreal, Canada.

(135) Chau J.F., Or D., Jones S.B., and Sukop M., 2004. Lattice Boltzmann Modeling of Gaseous Diffusion in Unsaturated Porous Media under Variable Gravity Conditions. AGU Spring Meeting, May 17-21, Montreal, Canada.

INVITED PRESENTATIONS

- *Three-Dimensional Imaging of Soil Water Content Fields with Applications to Monitoring in Owens Valley, CA. 1992. Invited seminar (Hydrology Series), University of California at Berkeley, Berkeley, CA.*
- *Parametric Models for Water Retention. 1992. Invited seminar, Chevron Oil Company, La-Habra, CA.*
- *Soil Spatial Variability and Soil Water Dynamics. 1994. Invited Workshop Presentation. Los Angeles Water and Power/ Inyo County Water Dept., Bishop, CA.*
- *Dielectric Spectroscopy of Soil Constituents at DC to Microwave Frequencies with Application to Time-Domain Reflectometry Measurements. 1996. Invited seminar. Soil Crop & Atmospheric Sciences, Cornell University, Ithaca, NY.*
- *Temperature Effects on Near-surface Soil Water Measurements Using Time Domain Reflectometry (TDR), 1997. Symposium on "Soil Moisture Measurement: Integration From Point to Field Scale", AGU Spring Meeting. Baltimore, MD.*
- *Monitoring Soil Water Dynamics Under Drip Irrigation Using Time Domain Reflectometry (TDR) 1997. Invited seminar. CNPMS-EMBRAPA, Sete Lagoas, Brazil*
- *Adsorption and Capillary Condensation in Partially-Saturated Porous Media, June 1998. Dept. of Environmental Sciences, UCR and US Salinity Lab, Riverside, CA.*
- *Adsorption and Capillary Condensation in Partially-Saturated Porous Media, October 1998. SSSA Annual meeting, S1/S2 special symposium, Baltimore, MD.*
- *Liquid Retention and Interfacial Area in Variably Saturated Porous Media, April 1999. The Inst. of Soil and Water, The Volcani Center - ARO, Bet Dagan, Israel.*
- *Liquid Retention and Interfacial Area in Variably Saturated Porous Media: Upscaling from Single Pore to Sample Scale, May, 3, 1999. The Water Resour. Res. Inst., The Technion (Israel Institute of Technology), Haifa, Israel.*
- *Pore Scale Models for Liquid Retention and Hydraulic Conductivity of Unsaturated Porous Media, March, 6, 2000. Soil, Water and Environmental Science Dept., University of Arizona, Tucson, AZ.*
- *Dripping from Unsaturated Fractures Into Subterranean Cavities, March, 20, 2000. Dept. of Mathematics (Applied Math Seminar), University of Utah, Salt Lake City, UT.*
- *Hydraulic Functions for Unsaturated Porous Media Based on Pore Scale Processes, May, 3, 2000. The Agricultural University of Vienna, Vienna, Austria.*
- *Hydraulic Functions for Unsaturated Porous Media From Equilibrium Liquid Configurations in Angular Pore Spaces, August, 10, 2000. Gordon Research Conference Modeling of Flow in Permeable Media, Proctor Academy, Andover, New Hampshire.*
- *Presented an invited talk in a symposium on "Future Directions in Soil Physics Research" at the SSSA annual meeting in Minneapolis, MN, NC, Nov. 2000.*

- *Hydraulic Properties of Unsaturated Fractured Porous Media*, April, 25, 2001, Hydrology Dept., Hoenggenberg, ETH Zurich, Switzerland.
- *Dripping , Liquid Bridges, and Intermittent Flow Regimes in Unsaturated Fractured Porous Media*, May, 29, 2001, University of Bern, Switzerland.
- *Physical Processes Affecting Microbial Habitats and Activity in Unsaturated Porous Media*, May, 25, 2001, Inst. Terrestrial Ecology, ETH Zurich, Switzerland.
- *Extending TDR Measurement Range in Saline Soils Using Frequency-Domain Methods*, July, 18, 2001. University of Campinas, SP, Brazil.
- *Thermal and Geometrical Effects on Bulk Permittivity of Porous Mixtures Containing Bound Water*, July, 19, 2001. University of Campinas, SP, Brazil.
- *Unstable and Intermittent Flow Regimes in Unsaturated Porous Media*, August, 27, 2001, Czech Technical University, Prague, Czech Republic.
- *Presented an invited talk in a Don Nielsen symposium on "Hydraulic Functions For Swelling Soils" and other presentations at the SSSA annual meeting in Charlotte, NC, Oct. 2001.*
- *Physical Processes Affecting Microbial Habitats and Activity in Unsaturated Porous Media*, February, 22, 2002, University of Idaho, Moscow, Idaho.
- *Time domain reflectometry measurement of bulk permittivity of porous mixtures containing bound water (Invited Speaker), Electrical Transport and Optical Properties of Inhomogeneous Media Conference (ETOPIM 6), July, 15, 2002, Snowbird, Utah.*
- *Physical Processes Affecting Microbial Habitats and Activity in Unsaturated Porous Media*, January, 20, 2003, (keynote Speaker) Int. Conference on Soil and Groundwater Contamination and Cleanup in Arid Countries, Sultan Qaboos University, Oman.
- *Dripping and Intermittent Flow Regimes in Unsaturated Fractured Porous Media*, March 19, 2003, Duke University, NC.
- *Diffusion Processes and Microbial Habitats and Activity in the Vadose Zone*, April 27, 2004. IGERT Seminar, Oregon State University, Corvallis, Oregon.
- *Liquid Fragmentation and Intermittent Flow in Unsaturated Fractured Rock*, April 28, 2004, Oregon State University, Corvallis, Oregon.

RESEARCH ACTIVITIES

Grants and Contracts --

As PI/Co-PI:

| <u>Year</u> | <u>Dollars</u> | <u>Agency, Title, Investigator(s)</u> |
|-------------|----------------|--|
| 92-95 | \$375,000 | NASA. <i>Mesoscale Study of Surface Heat Fluxes and Boundary Layer Processes in a Desert Region</i> . Bingham, G., L. Hipps, C. Neale, E. Malek, J. Boettinger, D. Or |
| 93-94 | \$21,000 | Los Angeles Water and Power Dept. and Inyo County Water Dept. <i>Characterization of Soil Spatial Variability for Upgrading Soil Water Monitoring in Owens Valley</i> . D. Or. |
| 93-94 | \$75,000 | PacificCorp. <i>Using Saline Waste Water from Electrical Power Plants for Irrigation</i> . L. Dudley, J. MacAdam, D. Or. |

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|----------------|---------------------|---|
| 93-96 | \$264,000 | BARD. <i>Drip Irrigation Management by TDR Monitoring of Soil Water and Solute Distributions</i> . S. Dasberg, J. Hopmans, D. Or. |
| 93-94 | \$15,000 | USU New Faculty Research Grants. <i>In situ Characterization of Temporal Changes in Soil Structural and Hydraulic Properties</i> . D. Or. |
| 94-95 | \$75,000 | PacificCorp. <i>Using Saline Waste Water from Electrical Power Plants for Irrigation</i> . L. Dudley, J. MacAdam, D. Or. |
| 94-95 | \$14,000 | USU New Faculty Research Grants. <i>In situ Characterization of Temporal Changes in Soil Structural and Hydraulic Properties - Phase II</i> . D. Or. |
| 95-96 | \$75,000 | PacificCorp. <i>Using Saline Waste Water from Electrical Power Plants for Irrigation</i> . L. Dudley and D. Or. |
| 95-98 | \$290,615 | BARD. <i>In situ Evaluation of Unsaturated Hydraulic Properties Using Subsurface Point Sources</i> . A. Warrick, U. Shani, D. Or. |
| 96-97 | \$80,000 | PacificCorp. <i>Using Saline Waste Water from Electrical Power Plants for Irrigation</i> . L. Dudley and D. Or. |
| 97-99 | \$299,400 | BARD. <i>Characterization of Post-Tillage Soil Fragmentation and Rejoining Affecting Soil Pore Space Evolution and Transport Properties</i> . V. Snyder, D. Or, and A. Hadas. |
| 97-99 | \$100,000 | NRI-USDA <i>Post-Tillage Soil Pore Space Dynamics</i> . D. Or and V. Snyder. |
| 97-98 | \$39,000 | NRI-USDA Equipment Grant + USU matching - <i>Impedance Analyzer for Characterization of Dielectric Properties of Soils and Grains</i> . D. Or and L. Dudley. |
| 98-2000 | \$285,000 | BARD. <i>Geometrical Considerations and Interfacial Processes Affecting Electromagnetic Measurement of Soil Water Content Using TDR and Remote Sensing Methods</i> . S. Friedman, J. Wraith, and D. Or. |
| 98-2001 | \$300,000 | NSF-EAR. <i>Thin Liquid Films in Unsaturated Porous Media - Effects on Flow and Transport</i> . D. Or, L.M. Dudley, and S. Bialkowski. |
| 98-2003 | \$2,000,000* | NSF-GPG. <i>Pulsing of plant-available moisture and nitrogen in Great Basin communities</i> . M.M. Caldwell, L.H. Higgs, J.M. Stark, C.M. Neale, and D. Or. |
| 99-2003 | \$307,420 | NRI-USDA. <i>Electromagnetic Characterization of Soil Electrochemical and Geometrical Factors Affecting Transport Processes</i> . Dudley, L., D. Or, and S. Bialkowski. |
| 99-2000 | \$25,000 | Campbell Scientific Inc. and HarvestMaster. <i>Dielectric Mixing Models for Grain Water Content Measurement</i> . Or, D. and S.B. Jones. |
| 2000-03 | \$229,500 | NRI-USDA. <i>Hydraulic Conductivity of Unsaturated Porous Media – Film and Corner Flows in Angular Pore Space</i> . D. Or, and M. Tuller. |
| 2000-04 | \$100,000 | NASA - <i>Advanced Life Support. Optimization of Root Zone Substrates for Reduced Gravity Experiments</i> . Bingham, G., D. Or, S.B. Jones, and B. Morrow. (2000-2004 \$878,098) |
| 2000-01 | \$55,000 | Pioneer Hi-Bred International Inc. <i>TDR Measurement of Corn-Ear Water Content</i> . Or, D. and S.B. Jones. (Cont.) |

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| 2000-01 | \$25,000 | Campbell Scientific Inc. and HarvestMaster. <i>Dielectric Mixing Models for Grain Water Content Measurement.</i> Or, D. and S.B. Jones. (Cont.) |
| 2001-03 | \$275,000 | NRI-USDA (Soils and Soil Biology). <i>Thermodielectric Measurement of Soil Specific Surface Area and Bound Water.</i> Wraith J.M. and D. Or. |
| 2002-05 | \$1,554,554 | NASA - Flow and distribution of fluid phases through porous plant growth media in microgravity. Steinberg S. (NASA JSC); Alexander I. (NASA Glenn); Or D. and Jones S. (USU); Lakshmi R. and Kluetenberg G. (KSU); Tuller M. (UI) |
| 2001-03 | \$50,000 | Pioneer Hi-Bred International Inc. <i>TDR Measurement of Corn-Ear Water Content.</i> Or, D. and S.B. Jones. (Cont.) |
| 2002-05 | \$335,000 | BARD - <i>Physical Processes Affecting Microbial Habitats And Activity In Unsaturated Agricultural Soils</i> Or, D, S.P.Friedman, J. Norton |
| 2004-05 | \$193,000 | NRI-USDA (Soils and Soil Biology) <i>Compaction of Tilled Soils - Microscale Structural Dynamics Affecting Pore Space and Hydraulic Properties.</i> Or, D. |
| 2004-07 | \$436,000 | NSF-EAR (Hydrologic Sciences) <i>Diffusional Constraints Affecting Microbial Distribution and Activity in Unsaturated Porous Media.</i> Or, D, and B. Smets. |
| 2004-07 | \$353,000 | NRI-USDA (Soils and Soil Biology) <i>Shrink-Swell Behavior and Hydraulic Properties of Clay Soils.</i> Tuller M. and Or, D. |

Total amount awarded in Grants and Contracts as PI/Co-PI -- **\$8,246,500**

(* bold font for active projects)

Utah Agricultural Experiment Station (UAES) Projects --

| <u>Year</u> | <u>Dollars</u> | <u>Title</u> |
|-------------|----------------|--|
| 1993-03 | ~\$15,000/yr | <i>Water and Solute Flow Management as Related to Changes in Soil Physical Properties.</i> ~\$150,000 |

TEACHING ACTIVITIES

Regular Courses Taught –

| <u>Number</u> | <u>Title</u> | <u>Year Taught</u> | <u>Enrollment</u> |
|-------------------|---|---------------------------------|-------------------|
| • SOILS 5650/6650 | <i>Applied Soil Physics</i> | 93-2001 | 25/yr |
| • SOILS 566/666 | <i>Applied Soil Physics Laboratory</i> | 93- 98 (combined w/5650) | 18/yr |
| • SOILS 614 0 | <i>Unsaturated Flow and Transport</i> | 95-2001 (Alt. Year) | 7/yr |
| • SOILS 7200 | <i>Interfacial Processes & Reactive</i> | 2002 (Alt. Year) | 9/yr |
| • CE/ENVE 320-3 | <i>Vadose Zone Hydrology</i> | 2004 (Alt. Year) | 18/yr |
| • CE/ENVE 320-4 | <i>Environmental Measurements</i> | 2004 (Alt. Year) | 8/yr |

Special Courses Taught

- ETH, Zurich *Modern Approaches to Liquid Behavior in Porous Media* 4-6, 2001 25
- DTU, Copenhagen *Modern Approaches to Liquid Behavior in Porous Media (revised)* 6-7, 2002 15

Graduate Students Supervised --

| <u>Date Graduated</u> | <u>Name</u> | <u>Degree</u> |
|-----------------------|-------------------|---------------|
| 1995 | Henoque R. Silva | Ph.D. |
| 1996 | Eugenio F. Coelho | Ph.D. |
| 1997 | Scott Jones | Ph.D. |
| 2000 | Khumo Mmulawa | Ph.D. |
| 2001 | Teamrat Ghezzehei | Ph.D. |
| 2004 | Guy Serbin | Ph.D. |

Current

| | |
|-----------------------|-------|
| Alberto Colombo | Ph.D. |
| Vasile Turcu (USU) | Ph.D. |
| Yongping Chen (UConn) | Ph.D. |
| Jessica Chau (UConn) | M.S. |
| Tao Long (UConn) | Ph.D. |
| Chris Eggers (UConn) | M.S. |

Advising --

(Present)
 Number of Graduate Committees: **3 M.S. 8 Ph.D.**
 (Cumulative 1993-present)
 Number of Graduate Committees: **10 M.S. 18 Ph.D.**

Other Teaching Support --

- Developed a comprehensive set of class notes (in textbook format) in cooperation with Dr. J.M. Wraith from MSU for Soils 5650/6650 entitled: *Agricultural and Environmental Soil Physics* by Or, D. and J.M. Wraith, 225 pp.
- Designed new labs and developed new lab manual for Soils 5660/6660.
- Developed class notes Soils 6140 - *Unsaturated Flow and Transport*, Or, D., 149 pp.
- Maintains a *Soil Physics* homepage on the World Wide Web (<http://tal.agsci.usu.edu>) for student information and use.
- Supervised Work Study and Cooperative Ed. Internship students (2)
- Guest lecturer:
 - Biomet. 6150 - Principles of Remote Sensing
 - PS&B 1050 - PS&B Orientation

MAJOR COMMITTEES AND PROFESSIONAL SERVICE

University, College and Department --

- University - Scholarships Committee - 1997 - present
- University - Radiation Safety Committee - 1999 - present
- College of Agric. and PS&B - Dept. Head Search Committee - 1995
- College of Agric. - Quality Teaching Committee - 1994 - 1997
- College of Agric. - Annual Retreat Committee - 1995
- PS&B - Chair of Computer and Secretarial Support - 1996 - present

- PS&B - Surface Hydrologist Search Committee - 1999

National --

- W-188 Regional Research Committee (1993-present)
Secretary 1994-95
Chair 1995-96
- Soil Sci. Soc. Am. - *Kirkham Soil Physics Award Committee* - 1998-2000
- Irrigation Science Journal - *Advisory Editor* - 1994 - present
- Symposium co-convener - *Pore Scale Soil Processes: Interdisciplinary Perspectives* (ASA/SSSA Annual Meeting, SLC, UT (Nov. 1999)
- Water Resources Research - *Associate Editor* - 2000 – present
- Vadose Zone Journal - *Associate Editor* - 2001 – present
- Soil Sci. Soc. Am. - *Soil Physics Division (S-1) Chair elect* – 2001
- Gordon Conference on Transport in Porous Media, Andover, NH – *Session co-chair* – August, 2002

International Activities --

- Proceedings Committee - the 5th International Microirrigation Congress - 1995
- Hosted Dr. Arie Nadler (ARO, The Volcani Center, Israel) - 1994
- Co-hosted Dr. Uri Shani (Arava Research Center, Israel) - 1994
- Hosted Dr. Victor Snyder (Univ. of Puerto Rico, PR) - 1996
- Visit and collaborative agreement with CNPMS-EMBRAPA, Brazil - 1997
- Hosted Dr. D. Chung for 2 months (Chungnam Univ., Korea) - Summer 1997
- Hosted Dr. J.R. Philip (CSIRO-Environmental Mechanics, Australia) - 1997
- Proceedings Committee - the 5th International Microirrigation Congress – 1995
- Symposium co-convener - *Soil Dynamic Processes* (European Geophysical Society, Nice, France April 2000)
- Facilitator - *Preferential Flow Workshop* (CTU, Prague, Czech Republic, August, 2001)
- CMWR International Conference (Delft, June 2002) *Panel member* – 2002
- Keynote speaker International Conference on Soil and Groundwater Contamination and Cleanup in Arid Countries, Sultan Qaboos University, Oman (Oman, January, 2003)
- Symposium co-convener - *Soil Dynamic Processes* (European Geophysical Society, Nice, France April 2003)

Industry Collaboration --

- **Campbell Scientific Inc.** (Logan, Utah) - Interest in using WinTDR program for controlling a newly-developed TDR-100 unit.
- **HarvestMaster Inc.** (Logan, Utah) - Expanding the work on electromagnetic methods for measurement of soil constituents to the measurement of grain moisture and density as part of a yield monitoring system.
- **Pioneer Hi-Bred International Inc.** - Potential collaboration (w/CSI and HarvestMaster on electromagnetic measurement technology for grain moisture.
- **Resource Management Inc.** - Consulting Firm (Telluride, CO) - Provide professional services in Hydrology, Soil Physics and Environmental Statistics.

Public Service Activities --

- Developed and maintains a *Soil Physics* and **Win-TDR** program and webpage providing information and software on TDR for researchers and practitioners. (<http://soilphysics.usu.edu/wintdr/>)

Peer reviewer:

Journals: (Averaging 8 papers per year)

Irrigation and Drainage Journal, ASCE
Irrigation Science
Journal of Environmental Quality
Journal of Geophysical Research - Atmospheres
Journal of Geophysical Research - Solid Earth
Journal of Hydrology
Soil Science
Soil Science Society of America Journal
Transactions of the ASAE
Water Resources Research
Vadoze Zone Hydrology

Competitive Research Grant Proposals:

NSF - Hydrologic Sciences and other program areas
NOAA - Climate and Global Change
USDA/NRI - several program areas
USDA/CSREES SBIR (Small Business Innovative Research)
BARD (Binational US-Israeli Agric. and Resource Development)

Internal manuscript reviews:

PSB - Department and College of Agriculture
UAES - Utah Agricultural Experimental Station projects

CONSULTING ACTIVITIES

- 1992-97; 2002-03 Los Angeles Water and Power and Inyo County Water Depts. - *Upgrading Soil Water Monitoring Network in Owens Valley, CA.*
- 1996- present Center for Nuclear Waste Regulatory Analysis, San Antonio, TX (NRC) - *Hydrological Impacts of Vegetation on Long-Term Predictions of Deep Recharge in Yucca Mountain, NV.*
- June 15-30, 1997 CNPMS-EMBRAPA, Sete Lagoas, Brazil - Soil Water and Solute Dynamics Under High-Intensity Irrigation in Sandy Soils. Jaiba Project (Minas Gerais, Brazil)