David Scott Mackay

Professor & Chair — Department of Geography, University at Buffalo
Professor — Department of Environment and Sustainability, University at Buffalo
Editor — Water Resources Research, American Geophysical Union

Contact Information:	**Work Address:**	**Home Address:**
Phone: (716) 645-0477	Department of Geography	
Fax: (716) 645-2329	University at Buffalo	
Email: dsmackay@buffalo.edu	105 Wilkeson Quadrangle,	
http://water.geog.buffalo.edu/mackay	Buffalo, NY 14261 USA	

ORCID iD: https://orcid.org/0000-0003-0477-9755

Academic Qualifications

Ph.D (Civil Engineering, Minor – Artificial Intelligence/Computer Science), 1997, University of Toronto
Dissertation Title: *Representation of heterogeneous topography and forest cover for long-term hydroecological simulation modelling*

M.Sc. (Physical Geography), 1991, University of Toronto
Thesis Title: *Classification of higher order topographic objects on digital elevation models*

B.Sc. (Specialist - Biophysical Systems, Minor - Computer Science), 1989, University of Toronto

Awards and Distinctions

Editor, *Water Resources Research*, American Geophysical Union, 2013 to present
Gamma Sigma Delta, Honor Society, Inducted in 2001
EcoResearch Doctoral Fellow, Canada Tri-Council, 1993 to 1996
Natural Science and Engineering Research Council Doctoral Fellowship, 1991 to 1993
Natural Science and Engineering Research Council Graduate Fellowship, 1990 to 1991
Ontario Graduate Fellowship, 1989
University of Toronto Special Top-Up Award, 1989

Positions Held

August 2020 to present	Chair, Department of Geography, University at Buffalo
2019 (September)	Visiting Scholar, USDA ARS, Fort Collins, CO
2019 to present	Professor, Department of Environment and Sustainability (Joint Appointment)
Aug 2017 to Dec 2018	Senior Associate Dean, College of Arts & Sciences (CAS), University at Buffalo
Aug 2012 to Aug 2017	Associate Dean, Graduate Studies, CAS, University at Buffalo
2010 to present	Professor, Department of Geography, University at Buffalo
2010 (January):	Visiting Scholar, Woods Hole Research Center, Falmouth, MA
2010 (March-April):	Visiting Faculty, Institute for the Environment, UNC-Chapel Hill, NC
2005 to 2009	Director of Graduate Studies, Department of Geography, University at Buffalo
2005 to 2010	Associate Professor, Department of Geography, University at Buffalo
2003 to 2005	Assistant Professor, Department of Geography, University at Buffalo
1997 to 2003	Assistant Professor, Forest Ecology and Management, and IES, UW-Madison

Professional Memberships

American Geophysical Union (AGU), 1992-present
Association of American Geographers (AAG), 2004-2017
Association for Computing Machinery (ACM), Professional member, 1991-present
Ecological Society of America (ESA), 2015-present

Grant Support

Extramural Grants Awarded

15. Co-PI (U. Buffalo) with Brent Ewers (PI, U. Wyoming, lead institution), Cynthia Weinig (U. Wyoming), Daniel Kliebenstein (UC Davis), and C. Robertson McClung (Dartmouth), September 1 2016 to August 31 2021, *Predicting Genotypic Variation in Growth and Yield under Abiotic Stress Through Biophysical Process Modeling*. NSF - Plant Genome Research Project, IOS 1547796. Total award $3,457,977 (UB portion $380,477).

14. Collaborator (U. Buffalo) with Ying Fan Reinfelder (PI Rutgers, lead institution), David Gochis, Martyn Clark, David Lawrence (NCAR), and Richard Hooper (CUAHSI), August 1 2015 to July 31, 2018, *INSPIRE: A CUAHSI-NCAR Collaboration to Improve Hydrologic Process Representation in Weather, Climate and Earth System Models.* NSF - Hydrologic Sciences, EAR 1528298. Provides funding for travel to collaborative workshops.

13. Co-PI (U. Buffalo) with Cynthia Weinig (PI, U. Wyoming, lead institution), Lois Maignien (MBL), Micheal Covington (UC Davis), and Brent Ewers (U. Wyoming), June 1 2015 to May 31 2020, *A Systems Analysis of Plant Growth Promotion by the Rhizosphere Microbiome.* NSF - Plant Genone Research Program, IOS 1444571. Total award $3,224,403 (UB Portion $340,826).

12. PI (U. Buffalo) with John Sperry (PI, U. Utah, lead institution), Paul Brooks and William Anderegg (U. Utah), May 15 2015 to April 30 2019, *Collaborative Research: Integrating Plant Hydraulics with Climate and Hydrology to Understand and Predict Responses to Climate Change.* NSF - Integrated Organismal Systems, IOS 1450679. Total award to UB $196,128.

11. PI (U. Buffalo) with Ankur Desai (U. Wisconsin, lead institution), September 1 2007 to June 30 2011, *Improving prediction of climate change impacts on wetland-rich landscapes: Testing model mechanisms with flux data assimilation at multiple sites*. DOE - National Institute for Climate Change Research, Midwestern region sub-agreement 050516Z20. Total award to UB $93,777.

10. PI (U. Buffalo, lead institution) with Brent Ewers (U. Wyoming) and Eric Kruger (U. Wisconsin), April 1 2004 to March 31 2008, *Collaborative research: Restricted plasticity of canopy stomatal conductance: Conceptual basis for simplified models of canopy transpiration.* NSF - Hydrological Sciences, EAR-0405306. Total award to UB $178,278 (Project total $388,000).

9. Co-PI (U. Buffalo and U. Wisconsin) with Richard C. Lathrop (PI, U. Wisconsin, lead institution), D.E Armstrong, John Hoopes, K.G. Karthikeyan, Peter Nowak, John Panuska, Ken Potter, Chin Wu (U. Wisconsin), and Michael Penn (U. Wisconsin – Plattesville), November 1 2002 to October 31 2006, *Measuring and modeling the source, transport and bioavailability of phosphorus in agricultural watersheds.* EPA - STAR, Nutrient Science for Improved Watershed Management Program, R830669, Total award $749,307 (UB portion $75,000).

8. Collaborator (U. Buffalo and U. Wisconsin) with Ken Davis (PI, Penn. State, lead institution), January 1 2002 to December 31 2007, *Chequamegon Ecosystem-Atmosphere Study*. NSF - Division of Biological Sciences, Research Collaboration Network Program, Total award $375,000 paid for inter-lab and workshop travel.

7. Collaborator (U. Buffalo and U. Wisconsin) with Theo Dillaha (PI, U. Virginia, lead institution), October 1 2001 to September 30 2006, *Development and Evaluation of TMDL Planning and Assessment Tools and Processes*. USDA, CSREES Regional Project, DC 00-02.

6. Co-PI (U. Wisconsin) with Thomas M. Lillesand (PI, U. Wisconsin), 2000 to 2004, *Maximizing mutual opportunities: Partnership among NASA, UW-Madison, and private industry to Advance the commercial application of remote sensing and attending Geospatial Information Technologies.* NASA, Stennis Space Center Commercial Research Program, Total award $1050K.

5. PI (U. Wisconsin) with Tom Gower (U. Wisconsin), 1999 to 2003, *Long-term water flux changes from converting old-growth pine forests to hardwood forests in northern Wisconsin.* NASA - Office of Earth Science, Land Surface Hydrology Program, NAG5-8554, Total award $359,185.

4. PI (U. Wisconsin), March 1999 to August 2000, *Effects of parameter spatial aggregation on agricultural non-point source pollution models.* EPA Sub-contract from Wisconsin Department of Natural Resources, Total award $15K.

3. PI (U. Wisconsin) with numerous co-PIs (U. Wisconsin), 1997 to 1999, *Remote Sensing Teaching and Research in Support of Creating a Vision for the Environment as a Whole.* NASA, Mission to Planet Earth, Centers of Excellence in Applications of Remote Sensing to Regional and Global Integrated Environmental Assessments, NAG5-6535, Total award $424K.

2. Co-PI (U. Wisconsin) with Thomas M. Lillesand (PI, U. Wisconsin), 1996-1999, *Affiliated Research Center.* NASA, Stennis Space Center Visiting Investigator Program.

1. PI (U. Toronto), 1993 to 1996, *Distributed knowledge for regional scale ecological simulation modelling.* Canada Tri-Council EcoResearch Doctoral Fellowship Program, Total award $54K.

Intramural Grants

9. Co-PI (U. Buffalo) with Mohammed Sultan (PI, U. Buffalo), 2004 to 2005, *Visible Near Infra-red Portable Spectroradiometer; A key to understanding and calibrating remote sensing data.* UB IRCAF Grant, Total award $46K.

8. PI (U. Wisconsin), 2000 to 2004, *Distributed parameter non-point source pollution modeling in nested watersheds: Guide to implementing Legislated surface water quality restrictions in Wisconsin*. USDA CSREES Hatch, Total award $90K.

7. Co-PI (U. Wisconsin) with K.G. Karthikeyan (PI, U. Wisconsin), July 2002 to June 2003, *Quantifying non-point source phosphorus losses from field to watershed scales.* Wisconsin Alumni Research Foundation, Interdisciplinary Award, Total award $23,353.

6. PI (U. Wisconsin), July 2001 to June 2002, *Characterization of evapotranspiration and forest water relations in northern Wisconsin*. Wisconsin Alumni Research Foundation, Total award $16K.

5. PI (U. Wisconsin), July 2000 to June 2001, *Context elicitation to support the semantic integration of environmental models*. Wisconsin Alumni Research Foundation, Total award $15K.

4. PI (U. Wisconsin), January to May 1999, *Web-Grant II.* Instructional improvement grant offered by the Division of Information Technology, University of Wisconsin – Madison, Total award $750.

3. PI (U. Wisconsin), 1998, *Long-term water flux changes from converting old-growth pine forests to hardwood forests in northern Wisconsin.* Wisconsin Alumni Research Foundation, Total award $20K (Awarded as insurance on an extra-mural grant from NASA, which was funded.)

2. Co-PI (U. Wisconsin) with Tom Gower (PI, U. Wisconsin), 1997 to 2001, *Coupling forest ecosystem process-based models to groundwater models: tools to guide natural resource management in northern Wisconsin.* USDA CSREES McIntire-Stennis, Total award $200K.

1. PI (U. Wisconsin), July 1997 to June 1998, *Scaling spatial simulation of forest disturbance on watershed processes*. Wisconsin Alumni Research Foundation, Total award $20K.

Publications (An asterisk * indicates author / co-author was my advisee)

Refereed Journals (ISI H-Index = 30; Google H-Index = 37, i10-Index = 62)

74. Wang, D.R.*, M.D. Venturas, D.S. Mackay, D.J. Hunsaker, K.R. Thorp, M.A. Gore, and D. Pauli. 2020. Use of hydraulic traits for modeling genotype-specific acclimation in cotton under drought. *New Phytologist*, 228(3), 898-909, doi:10.1111/nph.16751.

73. Guadagno, C.R., D. Millar, R. Lai, B.E. Ewers, **D.S. Mackay**, J.R. Pleban, C.R. McClung, D.R. Wang*, and C. Weinig. 2020. Use of transcriptomic data to inform biophysical models via Bayesian networks. *Ecological Modelling*., 429, 109086, doi:10.1016/j.ecolmodel.2020.109086.

72. Pleban, J.R.*, C.R. Guadagno, **D.S. Mackay**, B.E. Ewers, and C. Weinig. 2020. Rapid chlorophyll a fluorescence light response curves mechanistically inform photosynthesis modeling. *Plant Physiology*, 183, 602-619, doi:10.1104/pp.19.00375.

71. Kulmatiski, A., K. Yu, **D.S. Mackay**, M.C. Holdredge, C. Staver, A. Parolari, Y. Liu, S. Mahumder, and A. Trugman, 2020. Forecasting semi-arid biome shifts in the Anthropocene. *New Phytologist*, 226(2), 351-361, doi:10.1111/nph.31239.

70. Chien, H.* and **D.S. Mackay**. 2020. Assessing effects of model complexity and structure on predictions of hydrological responses using serial and parallel design. *Hydrological Processes*, 34(2), 404-419, doi:10.1002/hyp.13594.

69. **Mackay, D.S.**, P.R. Savoy, C. Grossiord, X. Tai*, J.R. Pleban*, D.R. Wang*, N.G. McDowell, H.D. Adams, and J.S. Sperry. 2020. Conifers depend on established roots during drought: results from a coupled model of carbon allocation and hydraulics. *New Phytologist*., 225(2), 679-692, doi: 10.1111/nph.16043.
[Highlighted with a Commentary, https://nph.onlinelibrary.wiley.com/doi/10.1111/nph.16381]
[Media coverage, https://www.eurekalert.org/pub_releases/2019-12/uab-hdc123019.php]

68. Tai, X.*, **D.S. Mackay**, B.E. Ewers, A.D. Parsekian, D. Beverly, H. Speckman, P.D. Brooks, and W.R.L. Anderegg, 2019, Plant hydraulic stress explained tree mortality and tree size explained bark beetle attack in a mixed conifer forest. *Journal of Geophysical Research – Biogeosciences*., 124(11), 3555-3568, doi: 10.1029/2019JG005272.

67. **Mackay, D.S.** 2019. Ecohydrology: what's in a name? *EOS*, 100, https://doi.org/10.1029/2019EO123093. Published on 13 May, 2019.

66. McDowell, N.G., C. Grossiord, H.D. Adams, S. Pinzon-Navarro, **D.S. Mackay**, D.D. Breshears, C.D. Allen, I. Borrego, L.T. Dickman, A. Collins, M. Gaylord, N. McBranch, W.T. Pockman, A. Vilagrosa, B. Aukema, D. Goodsman, and C. Xu. 2019. Mechanisms of a coniferous woodland persistence under drought and heat. *Environmental Research Letters.* **14** 045014, doi:10.1088/1748-9326/ab0921.

65. *Wang, D.R., C.R. Guadagno, X. Mao, **D.S. Mackay**, J.R. Pleban*, R.L. Baker, C. Weinig, J.-L. Jannink, and B.E. Ewers. 2019. A framework for genomics-informed ecophysiological modeling in plants. *Journal of Experimental Botany*. doi: 10.1093/jxb/erz090.

64. Fan, Y., M. Clark, D.M. Lawrence, S. Swenson, L.E. Band, S.L. Brantley, P.D. Brooks, W.E. Dietrich, A. Flores, G. Grant, J.W. Kirchner, **D.S. Mackay**, J.J. McDonnell, P.C.D. Milly, P.L. Sullivan, C. Tague, H. Ajami, N. Chaney, A. Hartmann, P. Hazenberg, J. McNamara, J. Pelletier, J. Perket, E. Rouholahnehad-Freund, T. Wagener, X. Zeng, E. Beighley, J. Buzan, M. Huang, B. Livneh, B.P. Mohanty, B. Nijssen, M. Safeeq, C. Shen, W. van Verseveld, J. Volk, and D. Yamazaki. 2019. Hillslope hydrology in global change research and Earth system modeling. *Water Resources Research*, 55(2), 1737-1772, doi:10.1029/2018WR023903.

63. Love, D.M., M.D. Venturas, J.S. Sperry, P.D. Brooks, J.L. Pettit, Y. Wang, W.R.L. Anderegg, X. Tai*, and **D.S. Mackay**. 2019. Dependence of aspen stands on a subsurface water subsidy: Implications for climate change impacts. *Water Resources Research*, 55, 1833-1848, doi:10.1029/2018WR023468.

62. *Tai, X., **D.S. Mackay**, J.S. Sperry, P. Brooks, W.R.L. Anderegg, L.B. Flanagan, S.B. Rood, and C. Hopkinson. 2018. Distributed plant hydraulic and hydrological modeling to understand the susceptibility of riparian woodland trees to drought-induced mortality. *Water Resources Research*, 54(7), 4901-4915, doi:10.1002/2018WR022801.
[Highlighted with cover of journal issue]

61. *Pleban, J.R., **D.S. Mackay**, B.E. Ewers, T.L. Aston, and C. Weinig. 2018. Phenotypic trait identification using a multimodel Bayesian method: A case study using photosynthesis in *Brassica rapa* genotypes. *Frontiers in Plant Science*, 8, 448, doi:10.3389/fpls.2018.00448.

60. *Mitra, B., **D.S. Mackay**, E. Pendall, B.E. Ewers, H. Kwon, M.B. Cleary, and K.J. Naithani. 2018. Model-data fusion approach to quantify evapotranspiration and net ecosystem exchange across the sagebrush ecosystem at different temporal resolutions. *Ecohydrology*, 11:e1957, doi: 10.1002/eco.1957.

59. Johnson, D.M., J.-C. Domec, Z.C. Berry, A.M. Schwantes, D.R. Woodruff, K.A. McCulloh, H.W. Polley, R. Wortemann, J.J. Swenson, **D.S. Mackay**, N.G. McDowell, and R.B. Jackson. 2018. Co-occurring woody species have diverse hydraulic strategies and mortality rates during an extreme drought. *Plant, Cell & Environment*, 41(3), 576-588, doi:10.1111/pce/13121.

58. Millar, D., B.E. Ewers, **D.S. Mackay**, S.D. Peckham, D. Reed, and A. Sekoni. 2017. Improving ecosystem-scale modeling of evapotranspiration using ecological mechanisms that account for compensatory responses following disturbance. *Water Resources Research*, 53, 7853-7868, doi:10.1002/2017WR020823.

57. Clark, M.P., J.A. Bahr, M.F.P. Bierkens, X. Cai, T.S. Hogue, C.H. Luce, J.D. Lundquist, **D.S. Mackay**, H.J. (Ilja) van Meerveld, H. Rajaram, X. Sanchez-Vila, and P.A. Troch. 2017. Editorial: A vision for Water Resources Research. *Water Resources Research*, 53, doi:10.1002/2017WR021050.

56. Sperry, J.S., M. Venturas, W.R.L. Anderegg, M. Mencuccini, **D.S. Mackay**, Y. Wang, D. Love. 2017. Predicting stomatal response to the environment from the optimization of photosynthetic gain and hydraulic cost. *Plant, Cell & Environment*, 40(6), 816-830, doi:10.1111/pce.12852.

55. *Tai, X., **D.S. Mackay**, W.R.L. Anderegg, J.S. Sperry, and P.D. Brooks. 2017. Plant hydraulics improves and topography mediates prediction of aspen mortality in southwestern U.S. *New Phytologist*, 213(1), 113-127, doi:10.111/nph.14098.

54. *Mitra, B., **D.S. Mackay**, B.E. Ewers, and E. Pendall. 2016. Response of sagebrush carbon metabolism to experimental precipitation pulses. *Journal of Arid Environments*, 135, 181-194.

53. Sperry, J.S., Y. Wang, B.R. Wolfe, **D.S. Mackay**, W.R.L. Anderegg, N.G. McDowell, and W.T. Pockman. 2016. Pragmatic hydraulic theory predicts stomatal responses to climatic water deficits. *New Phytologist*, 212, 577-589, doi:10.1111/nph.14059.

52. McDowell, N.G., A.P. Williams, C. Xu, W.T. Pockman, L.T. Dickman, S. Sevanto, R. Rangle, J. Limousin, J. Plaut, **D.S. Mackay**, J. Ogee, J.C. Domec, C.D. Allen, R.A. Fisher, X. Jiang, J.D. Muss, D.D. Breshears, S.A. Rauscher, and C. Koven. 2016. Multi-scale predictions of massive conifer mortaility due to chronic temperature rise. *Nature Climate Change*, 6, 295-300, doi:10.1038/nclimate2873.

51. Rajaram, H., J. Bahr, G. Bloschl, X. Cai, **D.S. Mackay**, A. Michalak, Montanari, A., X. Sanchez-Villa, and G. Sander. 2015. A reflection on the first 50 years of Water Resources Research. *Water Resources Research*, 51(10), 7829-7837, doi:10.1002/2015WR018089.

50. Montanari, A., J. Bahr, G. Bloschl, X. Cai, **D.S. Mackay**, A. Michalak, H. Rajaram, and G. Sander. 2015. 50 years of Water Resources Research: Legacy and perspectives for the science of hydrology introduction. *Water Resources Research*, 51(9), 6797-6803, doi:10.1002/2015WR017998.

49. **Mackay, D.S.**, *D.E. Roberts, B.E. Ewers, J.S. Sperry, N.G. McDowell, and W.T. Pockman. 2015. Interdependence of chronic hydraulic dysfunction and canopy processes can improve integrated models of tree response to drought. *Water Resources Research*, 51(8), 6156-6176, doi:10.1002/2015WR017244.

48. Clark, M.P., Y. Fan, D.M. Lawrence, J.C. Adam, D. Bolster, D.J. Gochis, R.P. Hooper, M. Kumar, L.R. Leung, **D.S. Mackay**, R.M. Maxwell, C. Shen, S.C. Swenson, and X. Zeng. 2015. Improving the representation of hydrologic processes in Earth System Models. *Water Resources Research*, 51(8), 5929-5956, doi:10.1002/2015WR017096.

47. *Savoy, P. and **D.S. Mackay**. 2015. Modeling the seasonal dynamics of leaf area index based on environmental constraints to canopy development. *Agricultural and Forest Meteorology*, 200, 46-56.

46. *Chien, H. and **D.S. Mackay**. 2014. How much complexity is needed to simulate watershed streamflow and water quality? A test combining time-series and hydrological models. *Hydrological Processes*, 28, 5624-5636.

45. *Mitra, B., **D.S. Mackay**, E. Pendall, B.E. Ewers, and M.B. Cleary. 2014. Does vegetation structure regulate the spatial structure of soil respiration within a sagebrush steppe ecosystem? *Journal of Arid Environments*, 103, 1-10.

44. Montanari, A., G. Bloschl, X. Cai, **D.S. Mackay**, A. Michalak, H. Rajaram, and G. Sander. 2013. Editorial: Towards 50 years of Water Resources Research. *Water Resources Research*, 49, 1-2, doi:10.1002/2013WR014986.

43. McDowell, N.G., R.A. Fisher, C. Xu, J.C. Domec, T. Holtta, **D.S. Mackay**, J.S. Sperry, A. Boutz, L. Dickman, N. Gehres, J.M. Limousin, A. Macalady, J. Martinez-Vilalta, M. Mencuccini, J.A. Plaut, J. Ogee, R.E. Pangle, D.P. Rasse, M.G. Ryan, S. Sevanto, R.H. Waring, A.P. Williams, E.A. Yepez, and W.T. Pockman. 2013. Tansley Review: Evaluating theories of drought-induced vegetation mortality using a multi-model-experiment framework. *New Phytologist*, 200, 304-321.

42. **Mackay, D.S.**, B.E. Ewers, Loranty, M.M., E.L. Kruger, and S. Samanta. 2012. Bayesian analysis of canopy transpiration models: A test of posterior parameter means against measurements. *Journal of Hydrology*, 432-433, 75-83, doi:10.1016/j.hydrol.2012.02.019.

41. *Loranty, M.M., **D.S. Mackay**, B.E. Ewers, E. Traver, and E.L. Kruger, 2010. Competition for light between individual trees lowers reference canopy stomatal conductance: results from a model. *Journal of Geophysical Research - Biogeosciences*, 115, G04019, doi:10.1029/2010JG001377.

40. Sulman, B.N., A.R. Desai, N.Z. Saliendra, P.M. Lafleur, L.B. Flanagan, O. Sonnentag, **D.S. Mackay**, A.G. Barr, and G. van der Kamp, 2010, Carbon fluxes at northern fens and bogs have opposite responses to inter-annual fluctuations in water table, *Geophysical Research Letters*, 37, L19702, doi:10.1029/2010GL044018.

39. *Trawinski, P.R. and **D.S. Mackay**. 2010. Identification of environmental covariates of West Nile Virus mosquito population abundance, *Vector-Borne and Zoonotic Diseases*, 10(5), 515-526, doi: 10.1089/vbz.2008.0063.

38. **Mackay, D.S.**, B.E. Ewers, M.M. Loranty, and E.L. Kruger. 2010. On the representativeness of plot size and location for scaling transpiration from trees to a stand. *Journal of Geophysical Research - Biogeosciences*, 115, G02016, doi:10.1029/2009JG001092.

37. *Loranty, M.M., **D.S. Mackay**, B.E. Ewers, E. Traver, and E.L. Kruger. 2010. Competition for light contributes to within-species variability in stomatal conductance. *Water Resources Research*, 46, W05516, doi:10.1029/2009WR008125.

36. Traver, E., B.E. Ewers, **D.S. Mackay**, and *M.M. Loranty. 2010. Tree transpiration varies spatially in response to atmospheric but not edaphic conditions. *Functional Ecology*, 24, 273-282, doi: 10.1111/j.1365-2435.2009.01657.x.

35. **Mackay, D.S.** and L.E. Band. 2009. Integrated ecohydrologic research and hydro-informatics, *Journal of Contemporary Water Research & Education*, 142, 16-24. (Opinion paper)

34. Sulman, B.N., A.R. Desai, B.D. Cook, N. Saliendra, and **D.S. Mackay**. 2009. Contrasting carbon dioxide fluxes between a drying shrub wetland in northern Wisconsin, USA, and nearby forests, *Biogeosciences*, 6, 1115-1126.

33. *Trawinski, P.R. and **D.S. Mackay**. 2009. Spatial autocorrelation of West Nile Virus vector mosquito abundance in a seasonally wet suburban environment, *Journal of Geographical Systems*, 11, 67-87, doi:10.1007/s10109-008-0070-8.

32. *Samanta, S., M.K. Clayton, **D.S. Mackay**, E.L. Kruger, and B.E. Ewers. 2008. Quantitative comparison of canopy conductance models using a Bayesian approach. *Water Resources Research*, 44, W09431, doi:10.1029/2007WR006507.

31. *Trawinski, P.R. and **D.S. Mackay**. 2008. Meteorologically conditioned time-series predictions of West Nile Virus vector mosquitoes. *Vector-Borne and Zoonotic Diseases*, 8(4), 505-522, doi:10.1089/vbz.2007.0202.

30. *Loranty, M.M., **D.S. Mackay**, B.E. Ewers, J.D. Adelman, and E.L. Kruger. 2008. Environmental drivers of spatial variation in whole-tree transpiration in an aspen-dominated upland-to-wetland forest gradient. *Water Resources Research*, 44, W02441, doi:10.1029/2007WR006272.

29. Adelman, J.D., B.E. Ewers, and **D.S. Mackay**. 2008. Using temporal patterns in vapor pressure deficit to explain spatial autocorrelation dynamics in tree transpiration. *Tree Physiology*, 28, 647-658.

28. Ewers, B.E., **D.S. Mackay**, J. Tang, P. Bolstad, and S. Samanta, 2008. Intercomparison of Sugar Maple (*Acer saccharum* Marsh.) stand transpiration responses to environmental conditions from the Western Great Lakes region of the United States. *Agricultural and Forest Meteorology*, doi:10.1016/j.agrformet.2007.08.003, 148, 231-246.

27. *Samanta, S., **D.S. Mackay**, M. Clayton, E.L. Kruger, and B.E. Ewers. 2007. Bayesian analysis for uncertainty estimation of a canopy transpiration model. *Water Resources Research*, 43, W04424, doi: 10.1029/2006WR005028.

26. **Mackay, D.S.**, B.E. Ewers, B.D. Cook, and K.J. Davis. 2007. Environmental drivers of evapotranspiration in a shrub wetland and an upland forest in northern Wisconsin. *Water Resources Research*, 43, W03442, doi:10.1029/2006WR005149.

25. *Ewers, B.E., **D.S. Mackay**, and S. Samanta. 2007. Interannual consistency in canopy stomatal conductance control of leaf water potential across seven tree species. *Tree Physiology*, 27, 11-24. [Cited on the Faculty of 1000 Biology Database]

24. *Ahl, D.E., S.T. Gower, **D.S. Mackay**, S.N. Burrows, J.M. Norman, and G. Diak, 2005. The effects of aggregated land cover data on estimating NPP in northern Wisconsin. *Remote Sensing of Environment*, 97, 1-14.

23. *Ahl, D.E., S.T. Gower, **D.S. Mackay**, S.N. Burrows, J.M. Norman, and G. Diak, 2004. Light use efficiency of a heterogeneous forest in northern Wisconsin: Implications for remote sensing and modeling net primary production. *Remote Sensing of Environment*, 93, 168-178.

22. *Chen E. and **D.S. Mackay**. 2004. Effects of combining non-spatial simulation units and explicit models of sediment delivery on an agricultural nonpoint source pollution model. *Journal of Hydrology*, 296, 211-224.

21. *Burrows, S.N., S.T. Gower, J.M. Norman, G. Diak, **D.S. Mackay**, *D.E. Ahl, and M.K. Clayton, 2003. Spatial variability of net primary production for a forested landscape in northern Wisconsin. *Canadian Journal of Forest Research*, 33, 2007-2018.

20. **Mackay, D.S.**, *S. Samanta, R.R. Nemani, and L.E. Band, 2003. Multi-objective parameter estimation for simulating canopy transpiration in forested watersheds. *Journal of Hydrology*, 277(3-4), 230-247.

19. *Samanta, S. and **D.S. Mackay**, 2003. Flexible automated parameterization of hydrologic models using fuzzy logic. *Water Resources Research*, 39(1), 1009, doi:10.1029/2002WR001349.

18. **Mackay, D.S.**, *D.E. Ahl, *B.E. Ewers, *S. Samanta, S.T. Gower, and *S.N. Burrows, 2003. Physiological tradeoffs in the parameterization of a model of canopy transpiration. *Advances in Water Resources*, 26(2), 179-194.

17. **Mackay, D.S.**, *S. Samanta, *D.E. Ahl, *B.E. Ewers, S.T. Gower, and *S.N. Burrows. 2003. Automated parameterization of land surface process models using fuzzy logic. *Transactions in GIS*, 7(1), 139-153.

16. *Burrows, S.N., S.T. Gower, M.K. Clayton, **D.S. Mackay**, *D.E. Ahl, J.M. Norman, and G. Diak, 2002. Application of geostatistics to characterize LAI for flux towers to landscapes. *Ecosystems*, 5(7), 667-679.

15. **Mackay, D.S.**, *D.E. Ahl, *B.E. Ewers, S.T. Gower, *S.N. Burrows, *S. Samanta, and K.J. Davis, 2002. Effects of aggregated classifications of forest composition on estimates of evapotranspiration in a northern Wisconsin forest. *Global Change Biology*, 8(12), 1253-1265.
[Featured cover article for the December 2002 issue of the journal]

14. *Ewers, B.E., **D.S. Mackay**, S.T. Gower, *D.E. Ahl, *S.N. Burrows, *S. Samanta. 2002. Tree species effects on stand transpiration in northern Wisconsin. *Water Resources Research*, 38(7), doi:10.1029/2001WR000830.

13. **Mackay, D.S.**, 2001. Evaluation of hydrologic equilibrium in a mountainous watershed: Incorporating forest canopy spatial adjustment to soil biogeochemical processes. *Advances in Water Resources*, 24(9-10), 1211-1227.

12. Zhu, A.-X. and **D.S. Mackay**, 2001. Effects of spatial detail of soil information on watershed modeling. *Journal of Hydrology,* 248, 54-77.

11. *FitzHugh, T.W. and **D.S. Mackay**, 2001. Impact of subwatershed partitioning on modeled source- and transport-limited sediment yields in an agricultural nonpoint source pollution model. *Journal of Soil and Water Conservation.*, 56(2), 137-143.

10. *FitzHugh, T.W. and **D.S. Mackay**, 2000. Effects of parameter spatial aggregation on an agricultural nonpoint source pollution model. *Journal of Hydrology*, 236(1-2), 35-53.

9. *Liang, C. and **D.S. Mackay**, 2000. A general model of watershed extraction and representation using globally optimal flow paths and up-slope contributing areas. *International Journal of Geographical Information Scienc*e, 14(4), 337-358.

8. **Mackay, D.S.** and V.B. Robinson, 2000. A multiple criteria decision support system for testing integrated environmental models. *International Journal of Fuzzy Sets and System*s, 113(1), 53-67.

7. **Mackay, D.S.** 1999, Semantic integration of environmental models for application to global information systems and decision-making. *ACM SIGMOD Recor*d, 28(1), 13-19.

6. **Mackay, D.S.** and L.E. Band, 1998. Extraction and representation of nested catchment areas from digital elevation models in lake-dominated topography. *Water Resources Research*, 34(4), 897-902.

5. **Mackay, D.S.** and L.E. Band, 1997. Forest ecosystem processes at the watershed scale: dynamic coupling of distributed hydrology and canopy growth. *Hydrological Processes*, 11(9), 1197-1217.

4. Band, L.E., **D.S. Mackay**, I.F. Creed, R. Semkin, and D. Jeffries, 1996. Ecosystem processes at the watershed scale: sensitivity to potential climate change. *Limnology and Oceanography*, 41(5), 928-38.

3. Robinson, V.B. and **D.S. Mackay**, 1996. Semantic modeling for the integration of geographic information and regional hydroecological simulation management. *Computers, Environment, and Urban Systems*, 19(5/9), 321-39.

2. **Mackay, D.S.**, V.B. Robinson and L.E. Band, 1993. An integrated knowledge-based system for managing spatiotemporal ecological simulations. *AI Applications*, 7(1), 29-36.

1. **Mackay, D.S.**, V.B. Robinson and L.E. Band, 1992. Classification of higher order topographic objects on digital terrain models. *Computers, Environment, and Urban Systems*, 16, 473-496.

Invited Seminars and Presentations

53. **Mackay, D.S.** 2020. Evidence of BA, HF, and CS underlying tree mortality: Plants to organs to cells. Online international workshop on "Carbon starvation, hydraulic failure, and biotic agents revisited: how do plants die during drought?" in a series of Zoom meetings, April-May, 2020. Hosted by Nate McDowell, Pacific Northwest National Laboratories.

53. **Mackay, D.S.**, D.R. Wang, C. Grossiord, N. McDowell, and J. Sperry. 2019. Grow deep roots now or wait? A coupled carbon-hydraulic framework for understanding how trees acquire groundwater subsidy during drought. American Geophysical Union Fall Meeting, Washington, D.C., December 9-13.

52. **Mackay, D.S.** 2019. Linking plant traits and hydrology in a biophysical process based model: Ecosystems to crops. Colorado State University, September 18, 2019.

51. **Mackay, D.S.** 2019. Biophysical process-based modeling for plant, ecosystem, and hydrology research. University of Wyoming, September 11, 2019.

50. **Mackay, D.S.**, X. Tai, C. Grossiord, D.M. Johnson, B.E. Ewers, N. McDowell, and J. Sperry. 2018. Do surviving trees foretell forest growth declines under warm drought climates? American Geophysical Union Fall Meeting, Washington, D.C., December 10-14.

49. **Mackay, D.S.**, C. Grossiord, D.M. Johnson, N.G. McDowell, P. Savoy, and J. Sperry. 2018. Belowground processes mediate tree responses to global change. Abstract #70230, Ecological Society of America Annual Meeting, New Orleans, Louisiana, August 5-10, 2018.

48. **Mackay, D.S.** 2018. Opportunities for combining belowground traits and hydraulics to understand multi-scale responses to drought. Gordon Research Conference on Multiscale Plant Vascular Biology: Plasticity in Plant Vascular Systems: Roles, Limits and Consequences, June 17-22, Mount Snow, West Dover, VT.

47. **Mackay, D.S.**, C. Grossiord, D.M. Johnson, N.G. McDowell, P. Savoy, and J. Sperry. 2018. Plant hydraulic modeling helps in understanding the cost-benefit tradeoffs of deep roots for surviving droughts. Abstract HS34-A005, Asia Oceania Geosciences Society 15th Annual Meeting, June 3-8, Honolulu, HA.

46. **Mackay, D.S.** 2017. Recent developments and emergent challenges in Ecohydrology: Focus on the belowground frontier. Abstract H42F-04, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.

45. **Mackay, D.S.**, C. Grossiord, D.M. Johnson, N.G. McDowell, P. Savoy, and J. Sperry. 2017. The belowground frontier is key to understanding terrestrial ecosystem responses to global change. Abstract B11I-02, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.

44. **Mackay, D.S.** 2017. Using plant hydraulics as a framework for understanding ecosystem responses to global change. Department of Biological Sciences, University at Buffalo, September 21, 2017.

43. **Mackay, D.S.** 2017. Design for a healthy society, Panel Discussion. *Erich Bloch Memorial Symposium in Materials Design and Innovation: Harnessing the science of innovation for materials*, May 31st – June 1st 2017.

42. **Mackay, D.S.** 2016. A framework for understanding threats to forests and crops under novel environments. Indiana University, School of Public and Environmental Affairs, Bloomington Indiana, March 10, 2016.

41. **Mackay, D.S.** 2014. Plant hydraulics: Integrator of coupled processes in the critical zone. Pennsylvania State University, Critical Zone Observatory Annual All-Hands Meeting, May 2014.

40. **Mackay, D.S.**, B.E. Ewers, S.D. Peckham, *P.R. Savoy, D. Reed, J. Frank, N.G. McDowell. 2013. Hydraulic controls over the susceptibility of trees to mortality following climate-enhanced disturbances. *Ecological Society of America Annual Meeting*, Minneapolis, MN, August, 2013.

39. **Mackay, D.S.** 2013. The terrestrial regional ecosystem exchange simulator (TREES). *Plant hydraulics workshop*, Bordeaux, France, June 2013.

38. **Mackay, D.S.** 2013. Ecosystem patterns and processes: Points, paint-by-numbers, and spatial continua. *Landscapes Across the Disciplines Seminar*, University at Buffalo, February 20, 2013.

37. **Mackay, D.S.**, B.E. Ewers, D. Reed, E. Pendall, and N.G. McDowell. 2012. Plant hydraulic controls over ecosystem responses to climate-enhanced disturbances. *Eos Trans. AGU*, 93(52), Fall Meet. Suppl., Abstract B23I-02 INVITED. Presented at American Geophysical Union Fall Meeting, San Francisco, CA, December, 2012.

36. **Mackay, D.S.** 2012. Terrestrial Regional Ecosystem Exchange Simulator (TREES): Putting plant hydraulics at the core of terrestrial models. *Workshop on the TREES Model*, University of Wyoming, Laramie, Wyoming, May 7-11. [Training workshop for Departments of Botany, Plant Sciences, Geology, Program in Ecology, and the Hydrogeophysics EPSCoR Program]

35. **Mackay, D.S.**, J. Frank, D. Reed, F. Whitehouse, B.E. Ewers, E. Pendall, W.J. Massman, and J.S. Sperry. 2012. Modeling evapotranspiration based on plant hydraulic theory can predict spatial variability across an elevation gradient and link to biogeochemical fluxes. *Geophysical Research Abstracts*, Vol. 14. EGU 2012, EGU General Assembly, April 2012.

34. **Mackay, D.S.** 2011. *Analysis with a coupled carbon-water budget model of tree mortality.* New Phytology Workshop on Forest Mortality, Santa Fe, NM, November 1-3, 2011. [Forthcoming article to appear in *New Phytologist*]

33. **Mackay, D.S.** 2011. *Effects of disturbance on plant water use in climate tension zones.* Evolution, Ecology & Behavior Seminar, University at Buffalo, February 25, 2011.

32. **Mackay, D.S.** 2010. *From "what the flux" to "where the flux:" Vegetative controls over water and carbon cycling along spatial continua*. Institute for the Environment, University of North Carolina – Chapel Hill, March 26, 2010.

31. **Mackay, D.S.** 2010. *Vegetative controls over water and carbon cycling as spatial continua*. Environmental Engineering Seminar, Department of Civil and Environmental Engineering, University at Buffalo, February 5, 2010.

30. **Mackay, D.S.** 2010. *Vegetative controls over water and carbon cycling: "Paint-by-numbers" or spatial continua?* Ecopresentation, Woods Hole Research Center, Falmouth, MA, January 22, 2010.

29. **Mackay, D.S.**, A.R. Desai, B.N. Sulman, and D.E. Roberts. 2009. *Quantifying the role of water table dynamics on net ecosystem exchange of CO_2 in a northern temperate shrub wetland.* American Geophysical Union Spring Meeting, Toronto, Canada, May 22-25, 2009.

28. **Mackay, D.S.** 2008. *Scaling in ecology and hydrology: Moving beyond unexplained space-time variability to process explanations*, Department of Biology, Dartmouth College, Hanover, NH, October 24, 2008.

27. **Mackay, D.S.** 2008. *Spatial heterogeneity of forest canopy transpiration and its implications for watershed hydrology*, Department of Civil & Environmental Engineering, Pennsylvania State University, University Park, March 28, 2008.

26. **Mackay, D.S.** 2007. *Towards a mechanistic framework for predicting evapotranspiration in time and space*, IGERT Seminar, NCGIA, University at Buffalo, November 30, 2007.

25. **Mackay, D.S.** and B.E. Ewers. 2007. *Biogeochemical and ecophysiological significance of phenology.* Coordinating a Northeast Phenology Network Workshop, November 8-9, Durham, NH.

24. **Mackay, D.S.**, B.E. Ewers, and E.L. Kruger. 2006. *Model estimates of leaf area and reference canopy stomatal conductance suggest correlation between phenology and physiology in both trembling aspen and red pine*, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract B33F-04 INVITED. Presented at American Geophysical Union Fall Meeting, San Francisco, CA, December, 2006. (30-min oral).

23. **Mackay, D.S.** 2006. *Environmental and biological controls on forest canopy-atmosphere energy exchange: Towards a unifying approach.* Environmental Engineering Seminar, Department of Civil, Structural, and Environmental Engineering, University at Buffalo, September 29, 2006.

22. **Mackay, D.S.** 2005. *Spatial variability of transpiration and its regulation by stomata in semi-arid and humid landscapes*, Department of Geography, University of Southern California, February 25, 2005.

21. **Mackay, D.S.** 2005. *Remote sensing requirements in support of forest canopy processes*, USGS Science Seminar, Restin, Virginia, February 11, 2005.

20. **Mackay, D.S.** 2004. *A framework for scaling up transpiration in heterogeneous watersheds*. Joint Geography, Civil Engineering, and Geology (Pegrum Lecture Series) Colloquium, University at Buffalo, February 20, 2004.

19. **Mackay, D.S.** 2004. *Biophysical controls on interannual variability of forest evapotranspiration: Implications for land surface process models*, Department of Geography and Planning, Buffalo State College, February 19, 2004.

18. **Mackay, D.S.** 2003. *A conceptual framework for representing spatiotemporal heterogeneity in models of forest transpiration*. IGERT Seminar, NCGIA, University at Buffalo, September 5, 2003.

17. **Mackay, D.S.** 2003. *Spatially adaptive forest canopy models: Conceptual basis and implications for representing land surface processes*, Soil Physics Seminar, Department of Soil Science, University of Wisconsin, April, 2003.

16. **Mackay, D.S.** 2003. *Spatially adaptive forest canopy models: Conceptual basis and implications for ecohydrology.* Hydrology Seminar Series, Ralph Parson Laboratory, MIT, Cambridge, MA, February 13, 2003.

15. **Mackay, D.S.** 2003. *Spatially adaptive forest canopy models: Conceptual basis and implications for representing land surface processes*, Ecological Climatology Seminar Series, Department of Geography, Boston University, Boston, MA, February 14, 2003.

14. **Mackay, D.S.** 2002. *Multi-objective parameter estimation for simulating transpiration in forested watersheds.* AGU Fall Meeting, San Francisco, CA, December 6-10, 2002.

13. **Mackay, D.S.** 2002. *Simplified representation of distributed land surface processes: Conceptual basis, application to ecohydrology, and broader implications.* State University of New York at Buffalo, December 18, 2002.

12. **Mackay, D.S.** 2002. *Canopy transpiration models and global classification systems: Implications for landscape water flux*, Spatial Information and Analysis Consortium Fall Seminar Series, University of Wisconsin.

11. **Mackay, D.S.** 2002. *Measuring and modeling transpiration, or what the flux is hydrology?* Presented at the Chequamegon Ecosystem Atmosphere Study NSF Sponsored Workshop, Kemp Natural Resources Station, Minocqua, WI, August 15-20, 2002.

10. **Mackay, D.S.** 2002. *Transpiration: Measurement and modeling in northern Wisconsin.* Presented at the Regional Hydro-Ecological Simulation System Workshop, University of Montana, Missoula, MT, July 11-12, 2002.

9. **Mackay, D.S.**, 2001. *Short- and Long-Term Feedbacks on Vegetation Water Use: Unifying Evidence from Observations and Modeling.* AGU Spring Meeting. *Eos Trans. AGU*, 82(20), Spring Meet. Suppl., Abstract B52B-01. (Presentation).

8. **Mackay, D.S.** 2000. *Remote Sensing of Forest Ecosystems -- The Chequamegon Forest*, Earth Science Seminar, Department of Atmospheric Sciences, University of Wisconsin.

7. **Mackay, D.S.** 2000. *Evidence of a vegetation-hydrology equilibrium from corroborating thermal remote sensing data and distributed hydrological modeling*, Environmental Monitoring Seminar, Institute for Environmental Studies, University of Wisconsin.

6. **Mackay, D.S.**, 1998. *The role of spatial patterns of dynamic vegetation on catchment hydrologic response.* EOS, Trans. AGU, 79(17) Supplement, S100. (Presentation).

5. **Mackay, D.S.** 1997. *Hydroecological Processes over Spatially Heterogeneous Areas*, Ecological Modeling Seminar, Department of Zoology, University of Wisconsin.

4. **Mackay, D.S.** 1997. *Integrated Remote Sensing Resource Center*, Environmental Monitoring Seminar, Institute for Environmental Studies, University of Wisconsin

3. **Mackay, D.S.** 1997. *GIS, Map Accuracy, Error, and Uncertainty*, Landscape Ecology Seminar, Department of Forestry, University of Wisconsin.

2. **Mackay, D.S.** 1996. *Dynamic Coupling of Forest Canopy Growth and Hydrology Within a GIS-Based Hydroecological Model*, Department of Forestry & Institute for Environmental Studies, University of Wisconsin.

1. **Mackay, D.S.** 1996. *Using GIS to Support Simulation of Hydrological and Ecological Systems at Watershed Scales*, Earth Science Seminar, Department of Atmospheric Sciences, University of Wisconsin.

Refereed Book Chapters

5. Ewers, B.E., B. Bond-Lamberty, and **D.S. Mackay**. 2011. Consequences of stand age and species' functional trait changes on ecosystem water use of forests. In "Size- and age-related changes in tree structure and function" eds Rick Meinzer, Todd Dawson, Barb Lachenbruch. Springer, Dordrecht, 481-506.

4. Noormets A, Ewers B, Sun G, **Mackay S**, Zheng D, McNulty S, Chen J, 2006. Water and carbon cycles in heterogeneous landscapes: an ecosystem perspective. In: *Linking ecology to landscape hierarchies* (Eds. Jiquan Chen, Sari C. Saunders, Kimberly D. Brosofske, and Thomas R. Crow), Nova Publishing, Carbondale, IL, USA, pp. 89-123.

3. **Mackay, D.S.**, 2003. Watershed management: A regional to global perspective. In Young, R.A. and R.L. Giese (Eds.). *Introduction to Forest Ecosystem Science and Management*, 3rd Edition, Wiley, New York, 337-361.

2. **Mackay, D.S.** and L.E. Band, 1997. Forest ecosystem processes at the watershed scale: dynamic coupling of distributed hydrology and canopy growth. In Beven, K.J. (Ed.). *Distributed Hydrological Modelling: Applications of the TOPMODEL Concept*, Wiley, 85-106.

1. **Mackay, D.S.**, V.B. Robinson and L.E. Band, 1994. A knowledge-based approach to the management of geographic information systems for simulation of forested ecosystems. In Michener, W.K., J.W. Brunt, and S.G. Stafford (Eds.). *Environmental Information Management and Analysis: Ecosystems to Global Scales*, Taylor & Francis, London, pp. 515-538.

Book Reviews

1. **Mackay, D.S.** 2003. Book review for "GIS for Water Resources and Watershed Management" by John Lyon. *Transactions in GIS*, 7(4), 529-531.

Technical Reports

3. **Mackay, D.S.**, K. Gardels, J. Radke, and others, 1996. Interoperability of Geographic Information. University Consortium on Geographic Information Science UCGIS Research Priority, November 1996.

2. Robinson, V.B. and **D.S. Mackay**, 1994. On heterogeneous geographic information systems, architectures, spatial data models, transactions, and database languages. In Robinson, V.B. and H. Tom (Eds.). *Towards SQL database extensions for geographic information systems*, Silicon Press, Summit, NJ, 1-35.

1. **Mackay, D.S.** and V.B. Robinson, 1992. *Towards a Heterogeneous Information Systems Approach to Geographic Data Interchange*, ILIM Discussion Paper 92/1, distributed at the First International Workshop on Standards for the Exchange of Geographic Data, Mississauga, Ontario, June, 1992.

Contributed Proceedings Articles

(Unless otherwise indicated these were oral presentations with non-refereed papers)

11. **Mackay, D.S.**, *S. Samanta, R.R. Nemani, and B.E. Ewers. 2004. Remotely sensed estimates of canopy stomatal conductance for regions around flux towers, in Teuling *et al.* (Eds.). *Proceedings of the 2nd international CAHMDA workshop on: The Terrestrial Water Cycle: Modelling and Data Assimilation Across Catchment Scales*, pp. 63–65, Princeton, NJ, October 25–27.

10. **Mackay, D.S.**, 2000. Integrated vegetation-hydrologic response to environmental change: Computational tools for scaling forest water use, In. L.R. Bentley, J.F. Sykes, C.A. Brebbia, W.G. Gray and G.E. Pinder (Eds.). *Computational Methods in Water Resources,* Balkema, Rotterdam, 1139-1146.

9. Zhu, A-X. and **D.S. Mackay**, 2000. Effect of soil landscape parameterization on watershed system responses. *Proceedings of the 4th International Conference on Integrating GIS and Environmental Modeling: Problems, Prospects and Research Needs*, Banff, Alberta, Canada, September 2-8, 2000.

8. *Ahl, D.E., **D.S. Mackay**, *S. Burrows, and S.T. Gower, 1999. Remote Sensing, Sampling, and Ecological Modeling Techniques for Scaling Temperate Forest Ecosystem Processes. *Proceedings ASPRS.* (Poster).

7. **Mackay, D.S.**, 1998. Characterization of Emergent Behavior in a Spatially Explicit Ecological Hydrology Model Under Fuzzy Logic. *Proceedings of GIS/LIS'98*, 424-435.

6. *Liang, C. and **D.S. Mackay**, 1997. Feature based optimization of flow directions and upslope areas in flat areas in grid digital elevation models. *Proceedings of GIS/LIS'97*, American Society for Photogrammetry and Remote Sensing, Bethesda, MD., 45-52. (Poster)

5. **Mackay, D.S.**, 1997. Coupling self-evaluating hydrological and ecological models of different spatial scales. *Proceedings of GIS/LIS'97*, American Society for Photogrammetry and Remote Sensing, Bethesda, MD., 486-498.

4. Robinson, V.B. and **D.S. Mackay**, 1996. Intelligent visual query in a knowledge-based coupling of geographical information systems and ecosystem simulation. *GIS/LIS'96*. (Poster)

3. Robinson, V.B. and **D.S. Mackay**, 1995. Knowledge-based land information manager and simulator (KBLIMS) for forested ecosystem simulation management. *IJCAI-95 Workshop on Artificial Intelligence and the Environment,* International Joint Conference on Artificial Intelligence, Montreal, Canada, 100-8. (Refereed)

2. **Mackay, D.S.**, V.B. Robinson, and L.E. Band, 1992. Development of an integrated knowledge-based systems for managing spatiotemporal ecological simulations. *Proceedings of GIS/LIS'92*, American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland, pp. 494-503.

1. **Mackay, D.S.**, L.E. Band, and V.B. Robinson, 1991. An object-oriented system for the organization and representation of terrain knowledge for forested ecosystems, *Proceedings of GIS/LIS'91*, American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland, pp. 617-26.

Contributed Conference Presentations with Abstracts

As Presenter

34. **Mackay, D.S.**, P. Savoy, *J.R. Pleban, *X. Tai, B.E. Ewers, J. Sperry, and C. Weinig. 2016. Modeling coupled nitrogen and water use strategies of plant productivity through hydraulic traits. AGU Fall Meeting, San Francisco, CA, December 2016.
33. **Mackay, D.**, *P. Savoy, *J. Pleban, *X. Tai, and B. Ewers. 2015. The integrated role of water availability, nutrient dynamics, and xylem hydraulic dysfunction on plant rooting strategies in managed and natural ecosystems. AGU Fall Meeting, San Francisco, CA, December 2015.
32. **Mackay, D.S.**, B.E. Ewers, J.S. Sperry, J. Frank, and D. Reed. 2014. On the transient role of plant xylem impairment over optimal root area and root depth distribution. AGU Fall Meeting, San Francisco, CA, December 2014.
31. **Mackay, D.S.**, B.E. Ewers, S.D. Peckham, *P.R. Savoy, D.E. Reed, and J.M. Frank. 2013. Towards scaling interannual ecohydrological responses of conifer forests to bark beetle infestations from individuals to landscapes. *AGU Fall Meeting*, San Francisco, CA, December 2013.
30. **Mackay, D.S.**, B.E. Ewers, *D.E. Roberts, N. McDowell, and E. Pendall. 2012. A dynamic plant water and carbon balance model for testing tree mortality mechanisms under climate-driven disturbances. *Computational Methods in Water Resources XIX International Conference*, University of Illinois at Urbana-Champaign, June 17-21, 2012.
29. **Mackay, D.S.**, B.E. Ewers, D.E. Roberts, N.G. McDowell, E. Pendall, J.M. Frank, D.E. Reed, W.J. Massman, and *B. Mitra. 2011. A coupled carbon and plant hydraulic model to predict ecosystem carbon and water flux responses to disturbance and environmental change. *AGU Fall Meeting*, San Francisco, CA, December 5-9.

28. **Mackay, D.S.**, A.R. Desai, B.N. Sulman, S. Samanta, and B.E. Ewers. 2010. Bayesian synthesis of multiple data sources to test specific structural hypotheses within an integrated model of water and carbon flow, Abstract H31L-06 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
27. **Mackay, D.S.**, A.R. Desai, S. Samanta, *M.M. Loranty, and B.E. Ewers. 2009. Quantifying complexity and data needs for coupled models of hydrological and carbon flux processes, *Eos Transactions AGU*, 90(52), Fall Meeting Supplement, Abstract H23L-02.
26. **Mackay, D.S.**, A.R. Desai, B.N. Sulman, and *D.E. Roberts. 2009. Ecohydrologic controls on net ecosystem exchange of carbon in a wetland-rich forested landscape, *Second International Conference on Forests and Water in a Changing Environment*, Raleigh, North Carolina, September 14-16, 2009.
25. **Mackay, D.S.**, *M.M. Loranty, B.E. Ewers, E. Traver, E.L. Kruger, and *D.E. Roberts. 2009. Representativeness of plots for scaling hydrological and ecological processes in forests, *Association of American Geographers Annual Meeting*, Las Vegas, NV, March 22-27, 2009.
24. **Mackay, D.S.**, *M.M. Loranty, B.E. Ewers, E.L. Kruger, E. Traver, and *D.E. Roberts. 2008. On the representativeness of plots for scaling ecohydrologic processes in forests, *Eos Trans. AGU, 89(53), Fall Meet. Suppl.,* Abstract H14A-07.
23. **Mackay, D.S.** and B.E. Ewers. 2007. Coupled hydraulic and photosynthetic feedbacks on forest transpiration throughout the growing season, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract B24C-02.
22. **Mackay, D.S.**, B.E. Ewers, and E.L. Kruger. 2007. Correlation between leaf phenology and leaf physiology in northern temperate mixed forests. Association of American Geographers 2007 Annual Meeting, San Francisco, CA.
21. **Mackay, D.S.**, E.L. Kruger, B.E. Ewers, *M. Loranty, and J.D. Adelman. 2005. Leaf-level light responses and canopy light distribution corroborate hydraulic controls on spatially variable canopy transpiration. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 5-9.
20. **Mackay, D.S.**, *M. Loranty, J. Adelman, B.E. Ewers, and E.L. Kruger. 2005. Spatially explicit observations and modeling of forest canopy transpiration along moisture gradients in semi-arid and humid climates. *Association of American Geographers Annual Meeting*, Denver CO, April 7.
19. **Mackay, D.S.**, *M. Loranty, J. Adelman, B.E. Ewers, and E.L. Kruger. 2004. Spatially explicit observations elucidate simple scalars of forest canopy transpiration along moisture gradients in semi-arid and humid climates. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 12-17 (poster).
18. **Mackay, D.S.**, *S. Samanta, and B.E. Ewers. 2004. A parameter restriction and selection scheme for distributed land surface models and their supporting databases. North American Fuzzy Information Processing Society Annual Conference, Banff, Alberta, June 27-30, 2004.
17. **Mackay, D.S.**, B.E. Ewers, *S. Samanta, D.E. Ahl. 2003. Interannual variability of water fluxes in northern Wisconsin. *Chequamegon Ecosystem-Atmosphere Study 6th Annual Meeting*, Kemp Natural Resources Station, Minoqua, WI, June 29 to July 2, 2003.
16. **Mackay, D.S.**, B.E. Ewers, *S. Samanta, and S.N. Burrows. 2003. Predictive uncertainty and scalability of transpiration in heterogeneous watersheds. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 2003.
15. **Mackay, D.S.** and *E. Chen, 2002. Are We Putting Our Eggs in a Reliable Basket? Implications of Semi-Distributed Models for Predicting Soil Loss at Watershed Scales. *American Geophysical Union Spring Meeting,* Washington, DC, May, 2002.
14. **Mackay, D.S.**, 2002. Downscaling model predictions of transpiration from daily to diurnal level by retrieving physiologically consistent model parameters from sap flux data. *American Geophysical Union Spring Meeting,* Washington, DC, May, 2002.
13. **Mackay, D.S.**, S.T. Gower, *B.E. Ewers, *D.E. Ahl, S. Samanta, and *S.N. Burrows. 2001. Long-term water flux changes from converting old-growth pine forests to hardwood forests in northern Wisconsin. *NASA/ NOAA GAPP and Hydrology Meeting*, April 30-May 4, 2001, Potomac, MD. (Presentation and poster)

12. **Mackay, D.S.**, *D.E. Ahl, *B.E. Ewers, *S. Samanta, *S.N. Burrows, and S.T. Gower, 2001. The role of detailed land cover data on modeling transpiration in a managed forested landscape. *American Geophysical Union Spring Meeting*, Boston. *Eos Trans. AGU*, 82(20), Spring Meet. Suppl., Abstract H31F-06.
11. **Mackay, D.S.**, *B.E. Ewers, *D.E. Ahl, *S. Samanta, and S.T. Gower, 2001. Short-term prediction of transpiration from managed forested in northern Wisconsin. *Ecological Society of America Annual Meeting*, Madison, WI, August 4-7, 2001.
10. **Mackay, D.S.**, *S. Samanta, *D.E. Ahl, *B.E. Ewers, *S.N. Burrows, and S.T. Gower, 2001. Multi-scale data assimilation for predicting water fluxes in changing forest landscapes. In E.E. van Loon and P.A. Troch (Eds.). *Book of Abstracts: International Workshop on Catchment-Scale Hydrological Modeling and Data Assimilation*, Report 101, Sub-department Water Resources, Wageningen University, Wageningen, The Netherlands. September 3-5, 2001, Wageningen, the Netherlands. (Presentation and poster)
9. **Mackay, D.S.**, *D.E. Ahl, *S. Samanta, *B.E. Ewers, *S.N. Burrows, S.T. Gower, 2001. Physiological tradeoffs in the spatial simulation of canopy transpiration in heterogeneous forest ecosystems. *American Geophysical Union Fall Meeting,* San Francisco, CA., December 2001. *Eos Trans. AGU*, 82(47), Fall Meet. Suppl., Abstract H31F-06.
8. **Mackay, D.S.**, 2000. Long-Term Adjustment of Forest Canopy Water Use to Soil Hydrologic and Biogeochemical Processes. *American Geophysical Union Spring Meeting,* Washington, D.C.
7. **Mackay, D.S.**, *B.E. Ewers, *D.E. Ahl, *S. Samanta, *S. Burrows, and S.T. Gower, 2000. Characterization of uncertainty in estimates of transpiration in a heterogeneous northern Wisconsin landscape. *American Geophysical Union Fall Meeting*, San Francisco, CA.
6. **Mackay, D.S.** and A. Zhu, 1999. Sensitivity to Soil Spatial Variability of Daily and Inter-Annual Processes in a Distributed Hydro-Ecological Model. *American Geophysical Union Spring Meeting.* (Poster)
5. **Mackay, D.S.**, S.T. Gower, *B.E. Ewers, *S. Samanta, *D.E. Ahl, and *S.N. Burrows, 1999. Long-term water flux changes: Scaling vegetation-hydrology relations in northern Wisconsin. *NASA Land Surface Hydrology Program Investigators Meeting*, Columbia, MD, November 2-3, 1999. (Poster)
4. **Mackay, D.S.**, 1999 Evidence of a vegetation-hydrology equilibrium from corroborating thermal remote sensing data and distributed hydrologic modeling in a snowmelt dominated environment. *EOS*, 80(46), F340.
3. **Mackay, D.S.**, R.R. Nemani, and L.E. Band, 1996. Spatial validation of a hydro- ecological model using multi-temporal remote sensing. American Geophysical Union Spring Meeting, Baltimore, MD, May, 1996.
2. **Mackay, D.S.** and L.E. Band, 1994. Extraction and representation of watershed structure including lakes and wetlands from digital terrain and remotely sensed data, presented at American Geophysical Union Spring Meeting, Baltimore, Maryland, May 1994.
1. **Mackay, D.S.**, L.E. Band, and V.B. Robinson, 1994. Extraction and representation of watershed structure including lakes and wetlands to support hydrological modeling. Decision Support Systems 2001, Toronto, Ontario, September 1994.

Conference Presentations with Abstracts
As Contributing Author

84. Tai, X., P.D. Brooks, W. Anderegg, J. Sperry, **D.S. Mackay**, and L. Nesbitt. 2018. Quantifying groundwater contribution in mediating plant response to drought across various geology and climate conditions. American Geophysical Union Fall Meeting, Washington, D.C., December 10-14.
83. Venturas, M.D., D.M. Love, J.S. Sperry, P.D. Brooks, J.L. Pettit, Y. Wang, W.R.L. Anderegg, *X. Tai, and **D.S. Mackay**. 2018. Dependency of Utah aspen forests on groundwater and winter snowpack: implications for climate impacts. Gordon Research Conference on Multiscale Plant

Vascular Biology, Plasticity in Plant Vascular Systems: Roles, Limits and Consequences, June 17-22, Mount Snow, West Dover, VT.

82. *Wang, D.R., C. Guadagno, **D.S. Mackay**, and B. Ewers. 2018. Transient drought effects on *Brassica rapa* leaf growth dynamics: implications for whole-plant modeling. Gordon Research Conference on Salt and Water Stress in Plants: Abiotic Stress and the Future of Agriculture, June 3-8, Waterville Valley, NH.
81. *Wang, D.R., **D.S. Mackay**, C. Guadagno, *J. Pleban, B. Ewers. 2018. A framework for genomics-informed biophysical modeling of *Brassica rapa*. 41st New Phytologist Symposium, April 11-13, Nancy, France.
80. Millar, D., A. Parsekian, J. Mercer, B.E. Ewers, **D.S. Mackay**, D.G. Williams, D.J. Cooper, and M.J. Ronayne. 2017. Ecohydrological dynamics of peatlands and adjacent upland forests in the Rocky Mountains. Abstract H43C-1662, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.
79. *Tai, X., **D.S. Mackay**, B.E. Ewers, A. Parsekian, J. Sperry, D. Beverly, H.N. Speckman, N. Ohara, N. Fantello, T. Kelleners, and A.T. Fullhart. 2017. Topographic variations of water supply and plant hydraulics in a mountainous forest. Abstract H23H-1774, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.
78. *Malas, J., *J.R. Pleban, *D.R. Wang, C. Riley, and **D.S. Mackay**. 2017. Chloroplast movement may impact plant phenotyping and photochemistry results. Abstract B51A-1775, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.
77. Ewers, B.E., *J.R. Pleban, T. Aston, D. Beverly, H.N. Speckman, Atefeh Hosseini, Mario Bretfeld, C. Edwards, Y. Yarkhunova, C. Weinig, and **D.S. Mackay**. 2017. Chlorophyll fluorescence is a rigorous, high throughput tool to analyze the impacts of genotype, species, and stress on plant and ecosystem productivity. Abstract B42A-03, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.
76. Sperry, J., M. Venturas, D. Love, W. Anderegg, and **D.S. Mackay**. 2017. From plant hydraulics to ecohydrology: a case study of water limitation in aspen forests. Abstract B12D-01, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.
75. *Tai, X., **D.S. Mackay**, J.S. Sperry, L.B. Flanagan, S.B. Rood, and C. Hopkinson. 2017. How does groundwater mediate plant water supply when rainfall is variable? Ecological Society of America Annual Meeting, Portland, OR, August 2017.
74. *Pleban, J.R., **D.S. Mackay**, B.E. Ewers, C. Weinig, and C.L. Guadagno. 2016. Forecasting *Brassica rapa*: Merging climate models with genotype specific process models for evaluation whole species response to climate change. AGU Fall Meeting, San Francisco, CA, December 2016.
73. Sperry, J., W. Anderegg, **D.S. Mackay**, and M. Venturas. 2016. How plant hydraulics can improve the modeling of plant and ecosystem responses to environment. AGU Fall Meeting, San Francisco, CA, December 2016.
72. Ewers, B.E., M. Bretfeld, D. Millar, J.S. Hall, D. Beverly, J.S. Hall, F.L. Ogden, and **D.S. Mackay**. 2016. Confronting a process-based model of temperate tree transpiration with data from forests in central Panama exposed to drought. AGU Fall Meeting, San Francisco, CA, December 2016.
71. *Tai, X. and **D.S. Mackay**. 2016. Topography mediates plant water stress: coupling groundwater flow and rhizosphere-xylem hydraulics. AGU Fall Meeting, San Francisco, CA, December 2016.
70. Millar, D., A. Parsekian, J. Mercer, H.N. Speckman, D. Beverly, B.E. Ewers, and **D.S. Mackay**. 2016. Using stable water isotopes and borehole NMR to inform an ecohydrological model in a subalpine and upper montane catchment in the Rocky Mountains. AGU Fall Meeting, San Francisco, CA, December 2016.
69. Millar, D., B.E. Ewers, **D.S. Mackay**, B. Borkhuu, A. Sekoni, S.D. Peckham, D. Reed, J.M. Frank, W.J. Massman, E. Pendall, and U. Norton. 2016. Vegetation dynamics lead to compensatory responses in ecosystem-scale water fluxes in forests affected by beetle mortality. Ecological Society of America Annual Meeting, August 7-12, 2016, Fort Lauderdale, FL.

68. *Pleban, J., **D. Mackay**, T. Aston, B. Ewers, and C. Weinig. 2016. Modeling photosynthetic electron transport in Brassica rapa: Quantifying impacts of model structure on trait estimates. Plant Biology 2016, Austin, Texas, July 9-13.
67. *Savoy, P. and **D. Mackay**. 2015. The use of leaf functional traits for modeling the timing and rate of canopy development. AGU Fall Meeting, San Francisco, CA, December 2015.
66. *Tai, X. and **D. Mackay**. 2015. Plant survival and mortality during drought can be mediated by co-occurring species' physiological and morphological traits: Results from a model. AGU Fall Meeting, San Francisco, CA, December 2015.
65. Millar, D., B. Ewers, S. Peckham, **D. Mackay**, J. Frank, W. Massman, D. Reed. 2015. Modeling compensatory responses of ecosystem-scale water fluxes in forests affected by pine and spruce beetle mortality. AGU Fall Meeting, San Francisco, CA, December 2015.
64. *Pleban, J., **D. Mackay**, B. Ewers, C. Weinig, and T. Aston. 2015. Investigating genotype specific response in photosynthetic behavior under drought stress and nitrogen limitation in *Brassica rapa*. AGU Fall Meeting, San Francisco, CA, December 2015.
63. Ewers, B., E. Pendall, U. Norton, D. Millar, **D. Mackay**, J. Frank, W. Massman, and K. Hyde. 2015. Bark beetle-induced mortality impacts on forest biogeochemical cycles are less than expected. AGU Fall Meeting, San Francisco, CA, December 2015.
62. *Savoy, P.R. and **D.S. Mackay**. 2015. Comparison of meteorological and plant hydraulic based water stress functions for modeling canopy phenology. Ecological Society of America Annual Meeting, August 9-14, 2015, Baltimore, Maryland.
61. *Tai, X., **D.S. Mackay**, W. Anderegg, and J.S. Sperry. 2014. Influence of lateral flow on the predistribution of aspen mortality during drought. AGU Fall Meeting, San Francisco, CA, December 2014.
60. *Pleban, J., **D.S. Mackay**, T. Aston, B.E. Ewers, and C. Wienig. 2014. Evaluation of the biophysical limitations on photosynthesis of 4 varietals of *Brassica rapa*. 2014. AGU Fall Meeting, San Francisco, CA, December 2014.
59. Ewers, B.E., S. Peckham, **D. Mackay**, E. Pendall, J. Frank, W. Massman, D. Reed, and B. Borkhu. 2014. A tale of two forests: Simulating contrasting lodegpole pine and spruce forest water and carbon fluxes following mortality from bark beetles. AGU Fall Meeting, San Francisco, CA, December 2014.
58. Peckham, S.D., B.E. Ewers, **D.S. Mackay**, E. Pendall, J. Frank, and W. Massman. 2013. Simulating stand-level water and carbon fluxes in beetle-attacked conifer forests of the Western U.S. *AGU Fall Meeting*, San Francisco, CA, December 2013.
57. *Pleban, J.R., **D.S. Mackay**, T. Aston, B.E. Ewers, and C. Wienig. 2013. Quantitative comparisons of three modeling approaches for characterizing drought response of a highly variable, widely grown crop species. *AGU Fall Meeting*, San Francisco, CA, December 2013.
56. *Savoy, P.R. and **D.S. Mackay**. 2013. Predicting leaf area index based on environmental constraints to canopy development. *AGU Fall Meeting*, San Francisco, CA, December 2013.
55. Ewers, B.E., **D.S. Mackay**, C.R. Guadagno, S.D. Peckham, E. Pendall, B. Borkhuu, T. Ashton, J. Frank, W. Massman, D. Reed, Y. Yakhumova, C. Weinig. 2013. Nonstructural carbon dynamics predicted by photosynthesis and plant hydraulics during bark beetle induced mortality and herbaceous plant response to drought. *AGU Fall Meeting*, San Francisco, CA, December 2013.
54. Ewers, B.E., **D.S. Mackay**, S. Peckham, E. Pendall, D. Reed, J. Frank, U. Norton, F. Whitehouse, B. Borkhuu, N. Brown, A. King, C.R. Guadagno, J. Biederman, and P. Brooks. 2013. Causes and consequences of bark beetle-induced mortality on water, carbon and nitrogen cycling. *Ecological Society of America Annual Meeting*, Minneapolis, MN, August, 2013.
53. Ewers, B.E., **D.S. Mackay**, E. Pendall, J.M. Frank, D.E. Reed, W.J. Massman, A.T. Llewellyn, J.L. Angstmann, K. Nathani, and B. Mitra. 2012. Use of plant hydraulic theory to predict plant controls over mass and energy fluxes in response to changes in soils, elevation and mortality. *Ecological Society of America 97th Annual Meeting*, Portland, OR, August 2012.

52. Ewers, B.E., E. Pendall, D. Reed, H. Barnard, F. Whitehouse, J. Frank, W. Massman, P. Brooks, J. Biederman, K. Nathani, *B. Mitra, and **D.S. Mackay**. 2011. Use of plant hydraulic theory to predict ecosystem fluxes across mountainous gradients in environmental controls and insect disturbances. *AGU Fall Meeting*, San Francisco, CA, December 5-9.
51. *Marshall, S., *K. Brown, and **D.S Mackay**. 2011. Spatial dynamics of nitrate in a developing wetland within a mixed-use watershed. *AGU Fall Meeting*, San Francisco, CA, December 5-9.
50. Sulman, B.N., A.R. Desai, N.Z. Saliendra, P. Lafleur, L. Flanagan, O. Sonnentag, **D.S. Mackay**, A. Barr, L.N. Murphy, and W.J. Riley. 2011. Challenges for wetland carbon cycling modeling, *2011 AmeriFlux Science Meeting & 3rd NACP All-Investigators Meeting*, January 31 – February 4, 2011, New Orleans, LA.
49. Ewers, B.E., E. Pendall, D. Reed, B. Mitra, **D.S. Mackay**, J. Angstmann, K. Nathani, H. Barnard, T. Aston, U. Norton, D. Williams, and R. Sivanpillai. 2010. Scaling plant water use from organs to ecosystems in semiarid shrub and forest ecosystems responding to drought and bark beetles, *3rd USGS Modeling Conference: Understanding and Predicting for a Changing World*, June 7-10, 2010.
48. *Mitra, B., **D.S. Mackay**, E. Pendall, and B.E. Ewers. 2010. Modeling the Spatial Distribution of Soil Respiration in a Sagebrush-Steppe Ecosystem, AAG 2010 Annual Meeting, April 14, 2010.
47. *Mitra, B., **D.S. Mackay**, E. Pendall, and B.E. Ewers. 2009. A mechanistic understanding of the role drought-induced stress respiration play in regulating photosynthetic and respiration activities of the sagebrush after a precipitation pulse event, *Eos Transactions AGU*, 90(52), Fall Meeting Supplement, Abstract H41E-0936.
46. Buffam, I., A.R. Desai, **D.S. Mackay**, M.G. Turner, S.R. Carpenter, and P.C. Hanson. 2009. Temporal coherence in surface-atmosphere CO_2 exchange among forests, wetlands and lakes: Implications for regional climate sensitivity, *Gordon Research Conference on Catchment Science*, July 2009.
45. Sulman, B.N., A.R. Desai, B.D. Cook, N. Saliendra, and **D.S. Mackay**. 2009. The impact of a declining water table on observed carbon fluxes at a northern temperate wetland, *Society of Wetland Scientists Joint International Conference*, Madison, WI, Jun 21-26, 2009.
44. *Trawinski, P.R. and **D.S. Mackay**. 2009. Spatial prediction of West Nile Virus vector mosquitoes in a suburban environment, *Association of American Geographers Annual Meeting*, Las Vegas, NV, March 22-27, 2009.
43. *Loranty, M., **D.S. Mackay**, B.E. Ewers, E.L. Kruger, P.V. Bolstad, B. Cook, and R. Anderson. 2009. Linking form and function: using LiDAR to detect variable stomatal conductance, *Association of American Geographers Annual Meeting*, Las Vegas, NV, March 22-27, 2009.
42. Desai, A.R., **D.S. Mackay**, B.R. Helliker, and P.R. Moorcroft. 2009. Impacts of phenology and water table on interannual variability of region carbon fluxes in mixed landscapes, *2nd Annual North American Carbon Program (NACP) All Investigators Meeting*, San Diego, CA, February 16-20, 2009, #163 (poster).
41. *Loranty, M.M., **D.S. Mackay**, R.E. Anderson, B.E. Ewers, E.L. Kruger, P.V. Bolstad, B. Cook, E. Traver, and D.E. Roberts. 2008. Linking form and function: Using LiDAR to detect variable stomatal conductance, *Eos Trans. AGU, 89(53), Fall Meet. Suppl.,* Abstract B43C-0445.
40. *Mitra, B., **D.S. Mackay**, M.B. Cleary, K. Naithani, H. Kwon, E.G. Pendall, and B.E. Ewers. 2008. Constraining a carbon-water flux model for a sagebrush ecosystem with multiple data sources, *Eos Trans. AGU, 89(53), Fall Meet. Suppl.,* Abstract B11A-0342.
39. Ewers, B.E., **D.S. Mackay**, J.L. Angstmann, *M.M. Loranty. 2008. Connecting temporal and spatial scaling of transpiration from trees to stands: the use of sap flux measurements and environmental drivers, *7th International Workshop on Sap Flow*, Seville, Spain, October 21-24, 2008.
38. Desai, A.R., B.N. Sulman, and **D.S. Mackay**. 2008. Impacts of leaf phenology and water table on interannual variability of carbon fluxes in subboreal uplands and wetlands: Implications for regional fluxes in the upper Midwest USA, *AmeriFlux Science Meeting*, Boulder, Colorado, October 15-17, 2008.

37. Ewers, B.E., **D.S. Mackay**, *M.M. Loranty, S. Samanta, K. Naithani, and *B. Mitra. 2008. Improving models of plant transpiration in time and space by incorporating hydraulic controls over canopy stomatal conductance, *Ecological Society of America Annual Meeting*, August, 2008.
36. Sulman, B.N., A.R. Desai, **D.S. Mackay**, S. Samanta, B.D. Cook, N. Saliendra. 2008. Interactions of carbon and water cycles in north temperate wetlands: Modeling and observing the impact of a declining water table trend on regional biogeochemistry, *18th Conference on Atmospheric BioGeosciences*, Orlando, Florida, April 28 – May 2, 2008.
35. *Loranty, M.M., **D.S. Mackay**, R. Anderson, P.V. Bolstad, B.D. Cook, B.E. Ewers, E.L. Kruger, *D.E. Roberts, E. Traver. 2008. Using LiDAR to detect factors controlling variations in forest transpiration, *Association of American Geographers Annual Meeting*, Boston, MA, April 15-19, 2008.
34. *Chien, H. and **S. Mackay**. 2008. A phosphorus concentration model developed for the shallow impoundment bottom sediment, *Association of American Geographers Annual Meeting*, Boston, MA, April 15-19, 2008.
33. *Mitra, B., **D.S. Mackay**, H. Kwon, B.E. Ewers, E. Pendall. 2007. Coupled water and carbon exchange processes in a sagebrush-steppe ecosystem, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract B33D-1586.
32. *Loranty, M.M., **D.S. Mackay**, B.E. Ewers, E.L. Kruger, E. Traver. 2007. Reference canopy stomatal conductance explains spatiotemporal patterns of tree transpiration, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract H33C-1456.
31. *Chien, H., **S. Mackay**, and M. Penn. 2007. Assessing the effects of transient and long term phosphorus storage on the total phosphorus yields in distributed hydrologic model, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract H41C-0662.
30. *Loranty, M.M., **D.S. Mackay**, B.E. Ewers, E. Traver, and E.L. Kruger. 2007. Using geostatistics to compare spatial patterns of transpiration across forest transitions. Association of American Geographers 2007 Annual Meeting, San Francisco, CA.
29. Traver, E., B.E. Ewers, *M. Loranty, and **D.S. Mackay**. 2006. Does spatial variation in soil characteristics affect tree transpiration responses to vapor pressure deficit?, *Eos Trans. AGU*, 87(52), Abstract B41E-0233. Poster presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 11-15, 2006.
28. *Chien, H., **S. Mackay**, and M. Penn. 2006. Spatially explicit reservoirs improve the prediction of sediment and nutrient storage and transport within distributed simulations of agricultural watersheds, *Eos Trans. AGU*, 87(52), Abstract H43E-0542. Poster presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 11-15, 2006.
27. *Roberts, D.E., **D. Mackay**, *M. Loranty, B. Ewers, E. Kruger. 2006. Examining variability of methods for determining within plot soil moisture content, *Eos Trans. AGU*, 87(52), Abstract H11F-1320. Poster presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 11-15, 2006.
26. *Loranty, M.M., **D.S. Mackay**, *D.E. Roberts, B.E. Ewers, E.L. Kruger, E. Traver. 2006. Incorporating spatially explicit crown light competition into a model of canopy transpiration, *Eos Trans. AGU*, 87(52), Abstract H13A-1369. Poster presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 11-15, 2006.
25. Ewers, B.E., E. Traver, J. Angstmann, J. Adelman, *M. Loranty, **D.S. Mackay**. 2006. Quantifying and Explaining Spatial Patterns of Transpiration Across Environmental Gradients Using Plant Hydraulics and Geostatistics. IUFRO-Canopy Processes Meeting Oct. 7th-12th, 2006 Northeastern US.
24. *Chien, H., **S. Mackay**, P.E. Cabot, and K. Karthikeyan. 2005. Parameterization of natural depressions in distributed hydrologic models: Implications for scaling up predictions of sediment and nutrient yields in ungauged agricultural watersheds. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 5-9.

23. *Loranty, M.M., **D.S. Mackay**, B.E. Ewers, J.D. Adelman, and E.L. Kruger. 2005. Inferences of competitive effects on transpiration from spatial patterns in stomatal conductance. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 5-9.
22. Ewers, B.E., J.D. Adelman, **D.S. Mackay**, *M. Loranty, E. Traver, and E.L. Kruger. 2005. Use of Geostatistics and plant hydraulics to explain patterns of transpiration across environmental gradients. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 5-9.
21. *Loranty, M., B.E. Ewers, **D.S. Mackay**, J. Adelman, and E.L. Kruger. 2004. Spatially explicit observations of forest canopy transpiration elucidate simple transpiration scalars across environmental gradients. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 12-17 (poster).
20. Ewers, B., **D. Mackay**, S. Burrows, D. Ahl, *S. Samanta. 2004. Interannual variations in transpiration and canopy stomatal conductance are dependent upon tree species. *Ecological Society of America Annual Meeting,* Portland, Oregon, August, 2005.
19. Davis, K.J., D.R. Ricciuto, M.P. Butler, A.R. Desa, W. Wang, C. Yi, P.S. Bakwin, B.D. Cook, P.V. Bolstad, E. Carey, J. Martin, R. Teclaw, **D.S. Mackay**, B.E. Ewers, J. Chen, A. Noormets, F.A. Heinsch, A.S. Denning. 2003. A challenge to the flux-tower upscaling hypothesis? A multi-tower comparison from the Chequamegon Ecosystem-Atmosphere Study. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 2003.
18. Ewers, B.E., **D.S. Mackay**, S.N. Burrows, D.E. Ahl, and *S. Samanta. 2003. Interannual variation in stand transpiration is dependent upon tree species. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 2003.
17. *Samanta, S. and **D.S. Mackay**. 2003. Automated parameterization of a transpiration model: A comparative study of Bayesian analysis and a procedure based on fuzzy set. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 2003. (Poster)
16. Zhu, A.X. and **D.S. Mackay**, 2002. Effect of soil landscape parameterization on watershed modeling with change of scale. *Association of American Geographers Annual Meeting*, March 19 - March 23, 2002, Los Angeles, California.
15. *Chen, E. and **D.S. Mackay**, 2002. Tortured numbers will tell you anything: a case of the MAUP. Poster presented at the Wisconsin Land Information Association Annual Meeting. (Poster).
14. *Samanta, S. and **D.S. Mackay**. 2002. Effects of increasing model complexity on output and parameter estimates of a land surface energy balance model. *American Geophysical Union Fall Meeting,* San Francisco, CA., December 2002.
13. *Samanta, S. and **D.S. Mackay**, 2001. Influence of event characteristics on predictive uncertainty of a hydrological model. *American Geophysical Union Spring Meeting*, Boston. *Eos Trans. AGU*, 82(20), Spring Meet. Suppl., Abstract H41B-02.
12. *Ewers, B.E., **D.S. Mackay**, *D.E. Ahl, *S.N. Burrows, *S. Samanta, and S.T. Gower, 2001. Modeling the impact of land use change on regional water flux in northern Wisconsin - Species effects on transpiration and canopy average stomatal conductance. *American Geophysical Union Spring Meeting*, Boston. *Eos Trans. AGU*, 82(20), Spring Meet. Suppl., Abstract B51B-12.
11. *Burrows, S.N., S.T. Gower, **D.S. Mackay**, *D.E. Ahl, J.M. Norman, G. Diak, and M.K. Clayton, 2001. Spatial-temporal variation of leaf area index (LAI) and aboveground net primary productivity (NPPA) of a northern Wisconsin forested landscape. *Ecological Society of America Annual Meeting*, Madison, WI, August 4-7, 2001.
10. *Ewers, B., **D. Mackay**, *D. Ahl, *S. Burrows, *S. Samanta, S. Gower, 2001. The impact of heterogeneous forest cover on water flux rates at tree, stand, and regional scales. *Ecological Society of America Annual Meeting*, Madison, WI, August 4-7, 2001.
9. *Ewers, B.E., **D.S. Mackay**, *S. Samanta, *D.E. Ahl, *S.N. Burrows, and S.T. Gower, 2001. Impact of canopy coupling on canopy average stomatal conductance across seven tree species in northern Wisconsin. *American Geophysical Union Fall Meeting,* San Francisco, CA., December 2001. *Eos Trans. AGU*, 82(47), Fall Meet. Suppl., Abstract H31F-05.

8. *Ewers, B.E., **D.S. Mackay**, *D.E. Ahl, *S. Samanta, *S. Burrows, and S.T. Gower, 2000. Interactive effects of species and environmental controls on stand transpiration in northern Wisconsin. *American Geophysical Union Fall Meeting*, San Francisco, CA.
7. Zhu, A., **D.S. Mackay**, and L.E. Band, 1999. Sensitivities of hydro-ecological modeling to soil landscape parameterization. *AAG Meeting*.
6. *Fitzhugh, T. and **D.S. Mackay**. 1999. Effects of parameter spatial aggregation on an agricultural nonpoint source pollution model applied in southern Wisconsin. *Proceedings ASPRS.*
5. *Ahl, D.E., *S.N. Burrows, **D.S. Mackay**, and S.T. Gower, 1999. Comparison of Statistical Methods Used to Derive LAI: Implications for Using Process Models. *EOS*, 80(46), F475.
4. *Burrows, S.N., *D.E. Ahl, S.T. Gower, **D.S. Mackay**, and M. Clayton, 1999. Characterizing LAI, vegetation cover, and NPP over multiple scales: the use of geostatistics. *EOS*, 80(46), F453. (Poster)
3. Kongoli, C.E., W.L. Bland, and **D.S. Mackay**, 1997. Modification of an index-based, spatially-distributed hydrology model for winter manure spreading in agricultural catchments. American Geophysical Union Fall Meeting, San Francisco. *Eos, Trans. AGU*, 78(18), F320.
2. Band, L.E., I.F. Creed, and **D.S. Mackay**, 1996. Distributed simulation of the factors controlling nitrogen export from watersheds: spatial and temporal trends. *Chapman Conference on Nitrogen Cycling in Forested Catchment*, September 16-20, Sunriver, Oregon.
1. Band, L.E., I. Creed, **D.S. Mackay**, D.S. Jeffries, J. Nicolson, 1994. Distributed simulation of integrated hydrological and ecological processes in the Turkey Lakes experimental watershed. *Regional Assessment of Freshwater Ecosystems and Climate Change in North America*, October 24-26, 1994, Leesburg, VA.

Teaching

University Courses Taught: Course title (Institution)

Undergraduate: Physical and Environmental Geography I (University at Buffalo)
Global Climate Change (University at Buffalo)
Climatic Geomorphology (University at Buffalo)
Remote Sensing Visual Image Interpretation (UW-Madison)
Computational Aspects of GIS (UW-Madison)
Regional Hydrology (UW-Madison)
Geographic Information and Mapping I (University of Toronto)

Graduate: Ecohydrology (University at Buffalo)
Introduction to Graduate Geography (University at Buffalo)
Remote Sensing Visual Image Interpretation (UW-Madison)
Computational Aspects of GIS (UW-Madison)
Regional Hydrology (UW-Madison)
Environmental Monitoring Seminar (UW-Madison)
Environmental Monitoring Practicum I, II (UW-Madison)

Post-Doctoral Supervision: Name (Years, Location, Funding Source), Current Position

4. Jonathan R. Pleban (September to December 2018, UB, CAS Dean), Postdoctoral Associate

3. Diane R. Wang (June 2017 to December 2019, UB, NSF & CAS Dean), Postdoctoral Associate; Assistant Professor, Department of Agronomy, Purdue University.

2. Douglas E. Ahl (2002 to 2003, UW-Madison, NASA), Technical Director, Energy Center of Wisconsin, Madison, WI

1. Brent E. Ewers (1999 to 2002, UW-Madison, NASA), Professor, Department of Botany and Program in Ecology, University of Wyoming

Graduate Dissertation Committees:

PhD	Current (3)	Supervising (1)
PhD	Graduated (23)	Supervised (11)
MA/MS	Current (2)	Supervising (2)
MA/MS	Graduated (34)	Supervised (28)

Ph.D. Supervision

Name (Year), Department, Institution, *Dissertation Title* (Funding source), Current position

12. Mitchell Hitchcock (2019-present), Ecology, Evolution & Behavior, Department of Environment and Sustainability, University at Buffalo, *Growth promotion by the microbiome* (State, NSF).

11. Xiaonan Tai (2018), Geography, University at Buffalo, *Spatial variations of drought-induced forest mortality: Integrating plant hydraulics and distributed hydrology* (Teaching Assistant, NSF); Postdoctoral Fellow, Department of Geology & Geophysics, University of Utah. Starting August 2020 Xiaonan will be an Assistant Professor, Department of Biology, New Jersey Institute of Technology.

10. Jonathan Pleban (2018), Geography, University at Buffalo, *Advances in phenotyping photosynthesis: An experimental modeling approach using crop species Brassica rapa* (IGERT, ISEP, NSF). Treasury Quantitative Analyst II, M&T Bank, Buffalo, NY.

9. Phillip Savoy (2016), Geography, University at Buffalo, *Monitoring and modeling interspecific patterns of phenology: addressing issues of heterogeneity on land surface phenology* (Research Assistant, CAS Dissertation Fellowship); Post Doc, Department of Biology, Duke University.

8. Huicheng Chien (2011), Geography, University at Buffalo, *Time-series analysis for watershed scale predictions of water quantity and quality export from agricultural watersheds* (EPA, NSF); First position was Post Doc at University of St. Louis; Current position is Associate Professor with tenure, Department of Geography, SUNY New Paltz.

7. Bhaskar Mitra (2011), Geography, University at Buffalo, *Role of plant hydraulics in influencing the spatial distribution of carbon flux across the sagebrush-steppe ecosystem – a quantitative analysis* (UB Presidential Fellow, DOE NICCR), Research Scientist, Texas A&M University; Previously Post-Doc, School of Natural Resources and the Environment, The University of Arizona.

6. Michael Loranty (2009), Geography, University at Buffalo, *Towards a mechanistic understanding of spatial patterns of forest transpiration, and its implications for scaling* (NSF Hydrology, NSF IGERT, CAS Dissertation Fellowship); First position was Post Doc at Woods Hole Research Center in Falmouth MA; Current position is Associate Professor with tenure, Department of Geography, Colgate University.

5. Warit Silavisesrith (2008), Geography, University at Buffalo, *Contextually-based framework for improved data reduction in regional scale analytic element groundwater models*; Current position is Senior GIS Applications Developer, Wendel Companies, Buffalo, New York.

4. Patricia Trawinski (2007), Geography, University at Buffalo, *Spatial modeling of West Nile Virus vector species using mixed model methodology*; Current position is Assistant Professor, ECC.

3. Sudeep Samanta (2005), Forest Ecology & Management, UW-Madison, *Bayesian analysis of a conceptual transpiration model with a comparison of canopy conductance sub-models* (NASA, Graduate School, Hatch); Assistant Research Scientist, Woods Hole Research Center, Falmouth, MA.

2. Sean N. Burrows (2002), Forest Ecology & Management, UW-Madison, *Geostatistical estimation of leaf area index and net primary production of five North American biomes* (Co-advised with S.T. Gower; Funding: McIntire-Stennis); Analyst with Ascend Analytics, Adjunct at Montana State University.

1. Douglas E. Ahl (2002), Environmental Monitoring, UW-Madison, *A measurement and modeling perspective on requirements for future remote sensing vegetation indices and classifications* (McIntire-Stennis and NASA); Technical Director of the Energy Center of Wisconsin.

Ph.D. Dissertation Committee Member

13. Chenyang Wei, Geography, University at Buffalo, 2017-present

12. James Boyle, Ecology, Evolution and Behavior, University at Buffalo, 2018

11. David Spiering, Geography, University at Buffalo, 2011 to present.

10. Fernando Rios, Geography, University at Buffalo, 2015; Post Doc, Johns Hopkins

9. Steve Tulowiecki, Geography, University at Buffalo, 2015

8. Lee Gordon, Geography, University at Buffalo, 2011; Lead Geologist, NYSERDA West Valley NY

7. Youngsang Kwon, Geography, University at Buffalo, 2011; Assistant Professor, The University of Memphis, Department of Geological Sciences

6. Taesoo Lee, Geography, University at Buffalo, 2008; Assistant Professor in S. Korea

5. Gaurav Sinha, Geography, University at Buffalo, 2008; Associate Professor, Ohio University, Department of Geography

4. John Panuska, Biological Systems Engineering, University of Wisconsin, 2002; Distinguished Faculty Associate, University of Wisconsin – Madison, Department of Biological Engineering

3. Tracy Twine, Atmospheric Science, University of Wisconsin, 2002; Associate Professor, University of Minnesota, Department of Soil, Water, and Climate

2. Jonathan Chipman, Environmental Monitoring, University of Wisconsin, 2001; Director, Citrin Family GIS/Applied Spatial Analysis Laboratory, Dartmouth University.

1. Dan Rooney, Soil Science, University of Wisconsin, 2001

Ph.D. Dissertation Committee as External Examiner:

2. John Frank, Botany, University of Wyoming, August 9, 2016, *Ecosystem energy, water, and carbon processes are impacted by spruce beetles, predicted through sublimation, and uncertain due to sonic anemometry*, Program in Ecology, University of Wyoming; Engineer, U.S. Forest Service.

1. J. Cory Pettijohn, April 7, 2008, *Soil, Vegetative and Atmospheric Controls on the Relationship between Actual and Potential Evaporation*, Department of Earth Sciences, Boston University; Research Assistant Professor, University of Illinois at Urbana-Champaign, Department of Earth Sciences

MA/MS Supervision:

Name (Year), Degree Department, Institution, *Thesis Title* (Funding source), Current position

30. Kimberly Miller (2021 anticipated), M.S. Ecology, Evolution and Behavior, University at Buffalo

29. Danqing Wang (2020 anticipated), M.S., Geographic Information Science, University at Buffalo

28. Xiaohan Rui (2019), M.S., Geographic Information Science, University at Buffalo

27. Spencer Podsiadlo (2018), M.A., Geography, University at Buffalo

26. Ruidong (Matthew) Chen (2016), M.S., Geographic Information Science, University at Buffalo

25. Erin Cavagnaro (2015) M.S., Geography, University at Buffalo, Management Consultant, ARCADIS US, New York City.

24. Shana Chapman (2014) M.A., Geography, University at Buffalo

23. Kevin Ludwig (2014) M.S., Geography, University at Buffalo

22. Michael Ruffino (2014) M.A., Geography, University at Buffalo, Project Coordinator GIS & Tax maps, Town of Amherst, NY.

21. Kathryn Brown (2014), M.A., Geography, University at Buffalo, *Investigating the death of a river: Identifying correlations between channel processes and state of channel decline*, Earth Sciences Teacher, Fredonia Central School District.

20. Zeshing Cai (2013), M.S., Geography, University at Buffalo

19. Jiaqi Wang (2013), M.A., Geography, University at Buffalo

18. Shikai Jin (2013), M.S., Geography, University at Buffalo

17. Zhou Chen (2012), M.A., Geography, University at Buffalo

16. Ryan Stotz (2014), M.A., Geography, University at Buffalo

15. David Roberts (2012), M.S., Geography, University at Buffalo, *The Development of a Coupled Ecosystem Exchange Plant Hydraulic Model to Explore Drought Related Plant Mortality* (NSF, DOE), Senior GIS Programmer/Analyst, Resource Data Inc., Portland, Oregon.

14. Alexander Jackson (2012), M.A., Geography and School of Informatics, University at Buffalo

13. Brian W. Conley (2011), M.A., Geography, University at Buffalo, GIS Research Analyst at the University at Buffalo Regional Institute.

12. Aaron Forisha (2011), M.A., Geography, University at Buffalo, GIS Analyst, Agrinetx, Rochester, NY.

11. Taryn Tomasik (2011), M.A., Geography, University at Buffalo, Environmental Conservation Officer, NY Department of Environmental Conservation.

10. Brian Dudek (2009), M.A., Geography, University at Buffalo, Portfolio.

9. Ryan Cassens (2009), M.A., Geography, University at Buffalo, *Using ASTER IIa data to identify locations of Japanese knotweed (Fallopia japonica) along the West Kill and Schoharie creaks in Green County, NY.*

8. Michael Graham (2007), M.A., Geography, University at Buffalo, Portfolio.

7. Jose Humberto Covarrubias Rocha (2007), M.A., Geography, University at Buffalo, *Multi-temporal remote sensing evaluation of vegetal coveral in the Bolivian Andean Plate (Kori Kollo Mine).*

6. Bryson Okeoma (2006), M.A. Geography, University at Buffalo, Portfolio.

5. Steven Knapp (2004), M.A. Geography, University at Buffalo, Portfolio. Geologist at National Fuel Gas, Amherst, NY. Previously with Verdi & Company, Buffalo, NY.

4. Larry Cutforth (2003), M.S. Environmental Monitoring, UW-Madison. Agency GIS Coordinator at Wisconsin Department of Agriculture, Trade, and Consumer Protection, Madison, Wisconsin.

3. Eileen Chen (2002), M.S. Environmental Monitoring, *Effects of distribution-based parameter aggregation on a spatially distributed agricultural nonpoint source pollution model* (Hatch), Hydrogeologist, Alameda County Water Division.

2. Sudeep Samanta (2001), M.S. Environmental Monitoring, UW-Madison, *Influence of event characteristics on predictive uncertainty of a hydrological model* (UW Graduate School, Hatch), Assistant Research Scientist, Woods Hole Research Center, Woods Hole, MA.

1. Thomas W. FitzHugh (1999), M.S. Environmental Monitoring, UW-Madison, *Effects of parameter spatial aggregation on an agricultural nonpoint source pollution model* (Wisconsin Department of Natural Resources); Supervising Water Resources Scientist, MWH Global, Bellevue, WA. Previous positions: Hydrologist with United States Bureau of Reclamation, Sacramento, CA; GIS Specialist, The Nature Conservancy.

Undergraduate Supervision (Name, School, Time, Funding)

8. Kevin Tan, University at Buffalo, June to December 2017, CAS Dean, *Use of forest inventory analysis data and climate models to predict tree mortality.*

7. Judy Malas, Loyola University, Summer 2017, NSF REU, *Chloroplast movement may influence plant phenotyping results*. Currently a Ph.D. student at U. Illinois – Chicago.

6. Aileen Zebrowski, University of Minnesota, Summer 2016, NSF REU, *Influences of nitrate concentration on the productivity of four Brassica Rapa genotypes*.

5. J. Lynn Hickerson, Portland State University, Summer 2014, NSF REU, *Quantifying stress response of Brassica rapa genotypes tolerating experimental drought in two nitrogen treatments*

4. Shelby Marshall, UNC Chapel-Hill, Summer 2011, NSF REU, *Spatial dynamics of nitrate in Conewango Creek, New York*

3. Mary Friess, Stoneybrook University, Summer 2010, NSF REU, *Modeling plant hydraulic strategies under drought conditions in a northern hardwood forest*

2. David Roberts, UB, 2006-2008, NSF EAR; Did M.S. with me; Now Senior programmer

1. Aga Shirazi, UB, 2004, NSF EAR

Professional Service

Promotion and tenure reviews

Clark University, Colorado State University, ETH Zurich, SUNY ESF, Texas A&M, U. Delaware, U. of Tennessee, U. Mass – Amherst, U. Mass – Boston, UNC-Chapel Hill, U. Oregon, U. of Virginia, Washington State University, University of Nevada - Reno

Program Reviews

Clark University School of Geography, April 16-17, 2019

Editorships

6. Editor, *Water Resources Research*, April 1, 2013 to December 31, 2020 (Two terms)

5. Associate Editor, *Water Resources Research*, October 1, 2009 to December 31, 2013. [Invited to serve another two-year term] [In this capacity I handled the review process for 30 manuscripts per year]

4. Board of Associate Editors, *Transactions in GIS*, 2003 to present. [Term renewed for 2017 onward]

3. Associate Editor, *Water Resources Research*, 2003 to 2006. [In this capacity I handled the review process for 40 manuscripts]

2. Board of Associate Editors, *Journal of Hydrology*, 2002 to 2008.

1. Guest editor (single manuscript) for *Forest Science*, 1996 to 1997.

Proposal panels and related official appointments

5. Panel member, National Science Foundation, May 2016

4. Panel member, NASA Interdisciplinary Science Program, January 2010

3. College of Reviewers, Canada Research Chairs Program, January 2010 to present

2. Panel member, National Science Foundation, 2008

1. Panel member and reviewer of 12 proposals, 21st Century Research and Technology Fund, State of Indiana, May 2000

Committees and Elected Board Appointments

8. Board of Directors, Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI), January 1 2015 to December 31 2017, Elected December 2014.
7. Chair, Standing Committee on Informatics, Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI), August 2011 to January 2015.
6. Committee member, Standing Committee on Synthesis, Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI), July 2010 to August 2011.
5. Board of Directors, University Consortium on Geographic Information Science (UCGIS), 2005 to 2008, Elected February 2005.
4. Chair, American Geophysical Union *Surface Water Technical Committee*, July 2003 to December 2005; Acting chair, Fall 2001; Member, 2000 to present.
3. Chair, Research Projects Committee, University Consortium on Geographic Information Science (UCGIS), 2004 to 2005.
2. Board of Directors, University Consortium on Geographic Information Science (UCGIS), 2003 to 2004 (appointed by the President of UCGIS).
1. Steering Committee Member, Chequamegon Ecosystem-Atmosphere Study, NSF Research Collaboration Network, 2002-2008.

Conference Organization

Conference Session Chair/Convener:

GIS/LIS'98;
American Geophysical Union (AGU) Fall Meetings
(1999, 2000, 2001, 2002, 2003, 2005, 2007, 2008, 2010, 2012);
AGU Spring Meeting (2002);
2009 AAG meeting

Journal Reviews (159 total)

Annals of the AAG (5), Advances in Water Resources (7), Agricultural and Forest Meteorology (3), Agroforestry Systems (1), Biogeosciences (2), Cartography and Geographic Information Systems (2), Computers and Electronics in Agriculture (1), Computers & Geosciences (3), Ecological Applications (2), Ecology (1), Environmental Management (1), Functional Ecology (2), Geophysical Research Letters (4), Hydrological Processes (10), Hydrology and Earth System Sciences (1), International Journal of Geographic Information Science (16), Journal of the American Water Resources Association (1), Journal of Climate (1), Journal of Hydrology (19), Journal of Hydrometeorology (3), Journal of Geophysical Research – Atmospheres (3), Journal of Geophysical Research – Biogeosciences (5), Landscape Ecology (1), Nature Climate Change (1), New Phytologist (12), Oecologia (2), Physical Geography (1), Plant, Cell & Environment (1), PLOS ONE (1), Proceedings of the National Academy of Science (2), Professional Geographer (5), Transactions in GIS (21), Vadose Zone Journal (1), Water Resources Research (28)

Proposal Reviews (53 Proposals Reviewed)

NSERC (Canada), NOAA/NASA *GEWEX Continental-scale International Project* (2), NASA/NOAA *GWEC Program* (3), DOE NICCR (1), NSF *Hydrological Sciences* (30), NSF *Atmospheric Sciences* (1), NSF *Geography and Regional Science* (4), NSF *Arctic Research* (1), NSF *Coupled Biogeosciences* (3), NSF *Ecosystem Studies* (6), NSF *GLOBE* (1), U.S. Civilian Research and

Development Foundation for the Independent States of the Former Soviet Union (2), Sea Grant (2), Canada NSERC Tier 1 Research Chair (2), NSERC Tier 2 Research Chair (4)

University Service

University at Buffalo

Department

Executive Committee, Department of Geography, 2010-2012
Director of Graduate Studies, Department of Geography, 01/01/05 to 06/30/09
Executive Committee, Department of Geography, 2008 to 2009
Graduate Committee, Department of Geography, 2003 to 2009
Chair, *Ad hoc* Web Committee, Department of Geography

College/University

Panel member, UB IMPACT grant program, June 2016
Search committee, Associate Dean of the Graduate School, Fall 2015
Executive committee, iSEED, 2014-2018
Steering committee, Institute for Strategic Enhancement of Educational Diversity (iSEED), 2014-2018
Faculty advisory committee, Sustainability Undergraduate Academy, 2013-present
Faculty steering committee, RENEW proposal development, 2013
Executive committee, Environmental Geoscience Program, 2011 to present
Honors Program Director Hiring Committee, December 2011 to February 2012
Faculty member, Program in Evolution, Ecology & Behavior, 2010 to present
CAS Fellowships Committee, January 2006 to June 2010
CAS Divisional Committee, January 2005 to June 2009
CAS Graduate Faculty Nominations Committee, 2005 to 2009
GIScience IGERT Steering Committee, 2007 to 2012

University of Wisconsin-Madison

Department Committees

Chair, Web Site Committee, Department of Forest Ecology & Management
Computer Committee, Department of Forest Ecology and Management
Chair, Computer Committee, Environmental Remote Sensing Center, 1997 to 1998
Computer Committee, Institute for Environmental Studies, 1997 to present
Biometry Search Committee, Department of Forest Ecology & Management, 1998 to 2000
Faculty Secretary, Department of Forest Ecology & Management, 1997 to 2000

College/University Committees

Panel member, Hatch/McIntire-Stennis Program, UW-Madison, Fall 2000
Research Advisory Committee, College of Agriculture & Life Sciences, Fall 2000
Founding Director, Integrated Remote Sensing Resource Center (a NASA Center of Excellence in Remote Sensing), 1997 to 2001, University of Wisconsin