

# Susan Hubbard, PhD

## Curriculum Vitae

Deputy Laboratory Director, Science and Technology  
Oak Ridge National Laboratory  
<https://www.ornl.gov/staff-profile/susan-s-hubbard>

As the Deputy for Science and Technology at Oak Ridge National Laboratory (ORNL), Susan oversees one of the nation's most extensive fundamental science and energy research portfolios. In partnership with other ORNL leaders, Susan contributes to the planning and execution of Laboratory-level policies and initiatives. She also serves as ORNL's chief research liaison with the University of Tennessee, other national laboratories, ORNL core universities, and other institutional partners.

Susan's research focuses on quantifying terrestrial processes that govern water availability, water quality, carbon cycling, and agriculture through advancing geophysical and data fusion methods. She is recognized for her leadership in developing the field of hydrogeophysics. She is a member of the National Academy of Engineering, and an elected Fellow of the American Academy of Arts and Sciences, the American Geophysical Union, and the Geological Society of America. She has an extensive service record for the scientific professional community and the Department of Energy.

Dr. Hubbard is committed to fostering a diverse and inclusive culture, and to the development of early-career scientists.

### PROFESSIONAL POSITIONS

2022-present, Deputy Director for Science and Technology, Oak Ridge National Laboratory  
2015-2022, Founding Associate Laboratory Director, Berkeley Lab Earth & Environ. Sciences  
2015-2022, Full Professor Adjunct, UC Berkeley, Environmental Science, Policy and Mgmt.  
2010-2015, Director & Deputy Director Earth Sciences Division, Berkeley Lab  
2007-2010, Founding Associate Director, UC Berkeley Water Center  
1998-2022, Earth Scientist, Berkeley Lab  
1990-1993, Geophysicist, Industry  
1985-1987, Geologist, U.S. Geological Survey

### EDUCATION

Ph.D. Civil and Environmental Engineering, Hydrogeology focus, UC Berkeley  
M.S. Geophysics, Virginia Tech.  
B.S. Geology, University of California, Santa Barbara.

### AWARDS AND RECOGNITIONS (SELECT):

2023, Women We Admire Award: Top 50 Women in Technology  
2022, Society of Geophysicists Global Lecturer Award, Near Surface Geophysics  
2020, Elected Member, National Academy of Engineering  
2019, Elected Fellow, American Academy of Arts and Sciences  
2019, American Institute of Hydrology Robert G. Wetzel Award on Water Quality

2019, Distinguished Alumni, UC Santa Barbara Earth Sciences Department  
2019, Alameda County CA Women's Hall of Fame, Science Award  
2017, Elected Fellow, American Geophysical Union  
2016, Hal Mooney Award, Society of Exploration Geophysicists  
2014, Distinguished Alumni, Civil and Environmental Engineering Academy, UC Berkeley  
2014, Soc. for Technical Communication, Distinguished Technical Communication Award  
2013, Outstanding Women @ Berkeley Lab recognition  
2011, Elected Fellow, Geological Society of America  
2010, Birdsall-Dreiss Distinguished Lecturer Award, Geological Society of America  
2009, Top Associate Editor Award, Journal of Hydrology  
2009, Frank Frischknecht Leadership Award, Society of Exploration Geophysicists  
2008, Most influential article, SEG Leading Edge

## PROFESSIONAL SERVICE (SELECT):

### Advisory / Board Roles

2024-present, Member, National Renewable Energy Laboratory (NREL) Board and S&T Committee  
2023-present, Board of LaunchTN, Gubernatorial Appointee  
2023-present, Council of Competitiveness Technology Leadership and Strategy Initiative Member  
2022-present, UT Knoxville External Adv. Council for Research, Innovation and Econ. Dev.  
2022-present, Georgia Inst. Tech. Woodruff School of Mechanical Engineering Advisory Board  
2022-2023, ORNL Center for Bioenergy Innovation Science Advisory Board  
2021-present, Board of the Distinguished Alumni Academy, UC Berkeley C&E Engineering  
2021-2022, Board of Directors, California Council of Science and Technology (CCST)  
2000-2022, Member, Council of Energy, Climate and Environmental Deans, UC Berkeley  
2020-2022, Chair and Member, NAWI (National Alliance for Water Innovation) Hub board  
2017-2021, Advisory Board, International Soil Modeling Consortium  
2017-2022, Advisory Board, EPA Superfund Program 'Exposome' UCB  
2017-2019, Partnership Board, DOE-BER Environmental System Science Cyberinfrastructure  
2016-2019, Scientific Advisory Board, NSF Arctic Data Center UCSB  
2016-2019, Advisory Board, Civil and Environmental Engineering Dept, UC Berkeley  
2015-2020, Council member, California Council on Science and Technology (CCST)  
2015-2019, Director's Council, University of California Water Science  
2015-2018, Advisory Board, Interoperable design extreme scale software (IDEAS; DOE-BER)  
2014-2018, Advisory Board, Radionuclide Waste Disposal, EPSCoR Program, South Carolina  
2014-2017, Sr Advisor, DOE Advanced Simulation Capability for Env. Mgmt (ASCEM, DOE-EM)  
2011, Advisory Board, SmartGeo NSF IGERT, Colorado School of Mines  
2010-2015, Federal Advisory Committee, DOE-BER (BERAC)  
2010, Technical Advisory Committee, DOE-EM  
2006, Advisory Committee, Forschungszentrum Jülich National Laboratory, Germany

### Editorial Boards:

2010-2015, Associate Editor JGR-Biosciences  
2007-2013, Co-Editor Vadose Zone Journal  
2007-2010, Associate Editor, Journal of Hydrology

2001-2005, Associate Editor Water Res. Research

**Select Professional Community and DOE Service:**

2023-present, Vice Chair, National Academy of Engineering (NAE) Search Committee, Section 11  
2022-2023, Co-chair, Brookhaven Laboratory Director Search Committee  
2021-present, Member, Special Nominating Committee, National Academy of Engineering  
2020-2022, Chair Elect, Chair and Retiring Chair, AAAS Atmospheric and Hydrospheric Section  
2021, University of California Wildfire, CA Agency Engagement Leader  
2020-2021, Member, National Academy of Engineering Search Committee, Section 11  
2020-2022, Member, Program Committee, California Council of Science and Technology (CCST)  
2020-2021, Member, DOE LOB Working Group: Examining Opportunities for Improvements and Flexibilities Enhance Recruitment and Retention  
2020, External reviewer, select DOE National Lab Diversity Programs/Plans  
2020, Review Committee, Manaaki Whenua Landcare, New Zealand Natl. Lab  
2019, Review Committee, Virginia Tech Geosciences  
2020-2021, Canvassing Committee, American Geophysical Union  
2019-2021, Nominations Committee, American Geophysical Union  
2019-2022, Senior Leader, International Early Career Critical Zone Science Consortium  
2019-2020, Steering Committee, Interagency Conference on Research in Watersheds (ICRW)  
2018- 2020, Member, Macelwane Award Committee, American Geophysical Union  
2018- 2020, Member, Nominations Committee, Geological Society of America  
2018-2019, Member, California AB1281 Produced Water Executive Committee, CCST  
2018, Member, Executive Committee, California Water-Data AB1755 Governance & Funding  
2017, Co-chair, Fall meeting session, American Geophysical Union  
2018, Organizer, Collaborative Watershed Science Workshop, Crested Butte CO  
2017, Organizer, Open and Transparent California Water Data Capstone Workshop, Berkeley,  
2017, Writer, DOE-BER Grand Challenges in Biological and Environmental Sci. Chapter Report  
2017, Co-Organizer, Environmental Knowledgebase Workshop, BIDS, Berkeley  
2016, Co-Chair, DOE-BES Basic Research Needs Workshop Water-Energy, Wash DC  
2015, Panel Lead and Writer, DOE-BES Basic Research Needs for Environmental Mgmt.  
2015, Technical lead, DOE Subsurface Science Crosscut, National Laboratory Engagement Day  
2015, Committee member and Writer, DOE-BES Basic Research Needs for Water-Energy  
2014-2016 UC Global Food Initiative, Berkeley Lab Representative  
2014-2018, Co-lead, National Subsurface DOE 'crosscut' Initiative  
2014, Session Chair, Subsurface fracture control, Rock and Fluid Physics Conference, Shell Technology Center  
2014, Co-Chair, Complex Soil Systems SSSA/Bouyoucos Conference, Berkeley  
2013, External Review Committee, Helmholtz Association Terrestrial Program, Germany  
2012, External Review Committee, Stanford Dept of Energy Resources Engineering  
2013, Chair, Geological Society of America, Birdsall Dreiss Search Committee  
2012, Chair, Geophysical Characterization of Permafrost Systems Special Session, Fall AGU, San Francisco  
2012, Contributor/writer, DOE-BER Technology Innovation 'Virtual Laboratory' Report (DOE/SC-0156)

2010, Contributor/writer, DOE-BER “Grand Challenges for Biological and Environmental Research: A Long-Term Vision” (DOE/SC-1035, 2010)

2010, Co-lead and co-author, DOE-BER “Complex System Science for Subsurface Fate and Transport” (DOE/SC0123, 2010) and workshop

2010, Writer, DOE-EM Long-Range Deep Vadose Zone Program Plan (DOE/RL-2010-89)

2010, Session chair, Computational Methods in Water Res., Barcelona, June 2010,

2010, Session Chair, Goldschmidt conference, Session Chair Knoxville, TN, June 2010.

2010, Co-author, DOE-EM Scientific Opportunities to Reduce Risk in Groundwater and Soil Remediation (PNNL-18516).

2008, Co-organizer, Computational Methods in Water Resources Conference, San Francisco

2008, Co-organizer, Chapman Conference, Biogeophysics, Portland Maine

2006, Contributor, DOE-BES Basic Research Needs for Geosciences: Facilitating 21<sup>st</sup> Century Energy Needs

2002-2006, Chair, AGU Hydrogeophysics Technical Committee

2002, Founder, AGU Hydrogeophysics Technical Committee

2002-2006, US representative, International Ass. Hydrological Sci. “2020 “Working Group

2004, Panelist, DOE-BES workshop noninvasive Earth monitoring, Houston Tx

2005, Panelist, DOE EM Geop. Characterization and monitoring workshop.

2005, Chair, Watershed Characterization Special Session, Fall AGU, San Fran.

2004, Chair, Hydrogeophysics Special Session, Fall AGU, San Francisco.

2003, Chair, Hydrogeophysics Special Session, Fall AGU, San Francisco

2003, Organizer, Coupled Processes DOE-BER Workshop, Berkeley CA, LBNL

2003, Chair, Coupled Processes DOE-BER Subsurface Science Session, DOE EMSP, WA

2002, Co-Organizer, NATO Hydrogeophysics Advanced Study Inst., Czech Republic

2000, Chair, Breakthroughs in Field Scale Bacterial Transport, Fall AGU, S.F.

### INVITED SPEAKING ENGAGEMENTS (SELECT):

2023, Keynote, ‘Accelerating Technologies to Enable the Grid of the Future’, Institute of Electrical and Electronics Engineers (IEEE) Energy Conversion Congress and Expo (ECCE) Conference, Nashville

2022, Secretary of Energy Advisory Board (SEAB) annual meeting, ‘Climate resilient water systems’

2022, SEG Global Lecturer Award, ‘A Watershed Moment for Watershed Science’

2021, Panelist, DOE-BER Mountainous Hydroclimate Workshop

2021, Plenary speaker, DOE-BER ESS PI Meeting

2021, CUASHI Critical Zone - Watershed Seminar Series

2021, Moderator with California Agency Leaders, UC Wildfire Virtual Symposium

2021, University of California, Davis

2021, University of Washington, St. Louis

2021, University of Idaho and Washington State

2020, American Geophysical Union

2020, Interagency Conference on Research in Watersheds

2020, AAAS Panel Moderator, Wildfire Resilience through Science and Technology

2019, Commencement Speech, Virginia Tech, Geoscience Department

2019, American Geophysical Union Fall Meeting, San Francisco

2019, Stanford University, Geophysics Dept Seminar  
2019, CA Contemporary Groundwater Issues Council Panelist, UC Davis  
2019, Moderator, Wildfire Panel for CA Legislators, CCST, Sacto CA  
2019, University of Wyoming, Laramie, WY  
2019, Soil Science Society of America, San Diego, CA  
2018, American Geophysical Union Fall Meeting, San Francisco, CA  
2018, Tsinghua University, China  
2018, Peking University, China  
2018, Chinese Academy of Sciences, Tibetan Research Inst Beijing, China  
2018, Chinese Academy of Sciences, Env. and Ecosys. Science, Beijing Normal University, China  
2017, CA Department of Water Resources, Sacto CA  
2017, American Chemical Society, California Water Resiliency, Washington DC  
2017, American Geophysical Society Union Fall Meeting, Session H32D, New Orleans, LA  
2017, American Geophysical Society Union Fall Meeting, Session H31J, New Orleans, LA  
2017, Urbana Champaign Illinois University, Distinguished seminar, Urbana Champaign, Ill  
2018, OZCAR France Critical Zone meeting, Frejus, France  
2018, Colorado School of Mines Heiland Distinguished Speaker, Golden CA  
2018, National Academies Review, Washington DC  
2017, UC Berkeley Civil and Environmental Engineering Seminar, Berkeley CA  
2017, 27th Annual Intern. Conf. on Soil, Water, Energy, & Air, San Diego, CA  
2017, University of Southern California Distinguished Seminar, Los Angeles, CA  
2016, American Geophysical Union Fall Meeting, San Francisco  
2016, France National Polytechnical Institute, Bordeaux, Distinguished Seminar  
2016, University of Saskatchewan Saskatoon Distinguished Lecturer series, Saskatoon, Canada  
2016, UC Merced Distinguished Seminar, Merced CA  
2016, CUAHSI Big Data Workshop, Shepherdstown, WV  
2016, Geotech/Geoengineering Distinguished Lecture, UC Berkeley, CA  
2016, KOPRI Polar Science Symposium, Plenary Speaker, Seoul Korea  
2016, Waterloo Distinguished 'Watertalks' Lecture Series, Waterloo, Ontario, Canada  
2015, Water Resource Sustainability Issues on Tropical Islands Conference, Hawaii  
2015, American Geophysical Union Fall Meeting, B52C-04, San Francisco, CA  
2015, American Geophysical Union Fall Meeting, Union Session Invited San Francisco, CA  
2015, European Geophysical Union Invited Speaker, Vienna Austria  
2014, CUAHSI Big Data Bi-Annual Conference, Shepherdstown, WV  
2014, University of Wyoming Geology and Geop. Distinguished Lecturer Series, Laramie, WY  
2014, Complex Soils Systems 2014 Conference, Berkeley, CA  
2014, Jason Group, 'State of Stress in the Engineered Subsurface', Los Angeles, CA  
2014, US Energy Association, Research needs in Subsurface Energy Science, Arlington, VA  
2014, Shell Subsurface Complexity Workshop, Amsterdam, Netherlands  
2014, Env. Science and Policy Mgmt UCB Berkeley Seminar Series, Berkeley CA  
2014, DOE Subsurface Biogeochemistry and Terrestrial Ecosystems PI Meeting, Maryland  
2013, American Geophysical Union Fall Meeting, San Francisco, CA  
2013, Energy Biosciences Institute Seminar Series, Berkeley, CA  
2013, Keynote Presentation, Washington Hydrology Symposium, Tacoma, WA  
2013, Stanford Environmental Fluid Mechanics and Hydrology Colloquium

2012, American Geophysical Union H53F-1586 AGU, San Francisco, CA  
2012, American Geophysical Union, H33N-01 Fall Meeting, AGU, San Francisco, CA,  
2012, Water Research Horizon Conference, Berlin, Germany  
2012, European Geophysical Union Vienna, Austria  
2012, Battelle Chlorinated Conference Keynote, Monterey CA  
2011 Dept of Energy Biological and Env Advisory Committee, Washington DC  
2011, New Frontiers in Engineering Science for Sustainability, Texas A&M Water Scholar Seminar  
2011, University of Nevada, Seminar Speaker, Las Vegas Nevada  
2011, Duke University Distinguished Seminar, North Carolina  
2011, Advanced Dept of Energy Simulation Capability Workshop, Washington, DC  
2011, Rensselaer University Invited Seminar, NY  
2011, NSF Water Scholar Seminar Series Keynote, Texas A&M, College Station TX  
2010, University of Wisconsin, Madison Invited Seminar, Wisconsin  
2010, Argonne National Laboratory Distinguished Speaker, Illinois  
2010, Northern Illinois University, Dekalb, Distinguished Seminar, Illinois  
2010, Michigan State, East Lansing Michigan  
2010, Grand Valley University, Michigan  
2010, Groundwater Research Association Distinguished Speaker, Sacramento, CA  
2010, Inland Geological Society Invited Speaker, Riverside, CA  
2010, Computational Methods in Water Resources Keynote, Barcelona Spain  
2010, UC Davis Hydrological Seminar Series, Davis CA  
2010, National Groundwater Summit Keynote, Denver, CO  
2010, UC Berkeley Civil and Environmental Eng. Seminar Series, Berkeley CA  
2010, Dept of Energy Env Remediation Science Program Platform Presentation, Washington, DC,  
2010, Distinguished Environmental Lecture, Florida International University, Miami FLA  
2010, University of Florida Spring Seminar Series, Gainesville, FLA  
2010, Delaware Environmental Institute Distinguished Lecture  
2010, UMass Environmental Lecture Series, Amherst, Massachusetts  
2010, K. Douglas Nelson Lecture Series, Syracuse University, New York  
2009, Semi-Annual Dawdy Invited Lecture, Department of Geos., San Francisco State University  
2010, Oregon State University Geoscience Seminar Series  
2010, Portland Environmental Geology Seminar Series, Oregon  
2009, New Mexico Tech Hydrology Seminar, Socorro, NM  
2009, Frontiers in Geosciences' Distinguished Colloquium, Los Alamos Natl Laboratory  
2009, American Geophysical Union Fall Meeting, San Francisco  
2009, American Geophysical Union Spring Meeting, Toronto, Canada  
2009, Association for Env. Health and Sciences Invited platform speaker, San Diego  
2008, Stanford Environmental and Fluid Mechanics Invited Seminar  
2008, U.S.G.S. Water Research Division Seminar Series, Menlo Park, CA  
2008, Gordon Conference Flow in Porous Media, Oxford England  
2007, NRC Workshop on Uncertainty, sensitivity and parameter estimation Wash DC  
2007, American Geophysical Union Fall Meeting, San Francisco, CA  
2007, UC Davis Engineering Seminar Series, Davis CA  
2006 American Geophysical Union, Fall Meeting San Francisco, CA  
2006 Geological Society of America, Philadelphia, PA

2006, Groundwater Resources of California, Long Beach, CA  
2006, Oregon State University 'World-Class Women in Water' seminar series, Corvallis, OR  
2006, Seismological Laboratory Seminar Series, Berkeley CA  
2006, Computational Methods in Water Resources (CMWRC), Platform Speaker, Copenhagen  
2005, IWAGPR Conference Keynote, Delft, Netherlands  
2004, UC Merced Environmental Seminar Series, Merced CA  
2004, Univ of Texas at Austin, Austin, TX  
2004, Waste Management Conference Keynote, Tuscon AZ  
2005, American Geophysical Union Frontier Lecture, Spring Meeting Montreal, Canada  
2004, Dept of Energy Characterization and Monitoring Workshop Keynote, Salt Lake City  
2004, Univ of Buffalo, UB Geology Pegrem Speaker Series, New York  
2004, University of Kansas at Lawrence, Seminar Speaker, Lawrence Kansas  
2004, USGS Water Resources Seminar, Menlo Park, CA  
2003, Heiland Distinguished Lecturer, Colorado School of Mines, Golden, CO  
2003, Vadose zone characterization Series, University of Arizona, Tuscon, AZ  
2003, NRC-180 Precision Agriculture Conference, UC Davis, CA  
2002, American Geophysical Union Spring Meeting Washington DC  
2001, Geological Society of America Annual Meeting, Boston, MA  
2001, UC Berkeley Environmental Engineering Series, Berkeley CA  
2001, American Geophysical Union Fall Meeting, San Francisco  
2001, Kovacs Colloquium Speaker: Groundwater Resources at Risk, IAHS, Paris, France  
2001, American Geophysical Union Spring Meeting, Washington, DC  
2000, Boise State Geology Seminar Series, Boise, ID  
2000, UC Davis Hydrology Seminar Series, Davis, CA

## MEMBERSHIPS

National Academy of Engineering  
American Geophysical Union  
American Academy of Arts and Sciences  
American Association for Women in Science  
Geological Society of America  
Society of Exploration Geophysicists  
American Association for the Advancement of Science  
Soil Science Society of America

## PUBLICATIONS

[Researcher ID/Publons E-9508-2010](#); [Google Scholar](#)

### Journal Papers

1. Shirley, I. et al, (2023), Disentangling the effect of geomorphological features and tall shrubs on snow depth variation in a sub-Arctic watershed using UAV derived products, EGU sphere, <https://doi.org/10.5194/egusphere-2023-968>
2. Newcomer et al., (2023). Prolonged Drought in a Northern California Coastal Region Suppresses Wildfire Impacts on Hydrology, Water Resources Research. WRCR26769

3. Uhlemann, S. et al., (2023). Estimating permafrost distribution using co-located temperature and electrical resistivity measurements, *Geophysical Research Letters*, doi.org/10.1029/2023GL103987
4. Dafflon, B. et al., (2023). Advanced monitoring of soil-vegetation co-dynamics reveals the successive controls of snowmelt on soil moisture and on plant seasonal dynamics in a mountainous watershed, *Frontiers in Earth Science* 11, 976227
5. Shirley, I. et al., (2022). Surface Hydrology and Soil Properties Drive Heterogeneity in Permafrost Distribution, Vegetation Dynamics, and Carbon Cycling in a Subarctic Watershed, *Journal of Geophysical Research: Biogeosciences* 127 (9), e2022JG006864
6. McLachlan, P. et al., (2022). Estimating grapevine-relevant physicochemical soil zones using apparent electrical conductivity and in-phase data from EMI methods, *Geoderma*, Volume 426,2022
7. Dafflon, B. et al. (2022). A distributed temperature profiling system for vertically and laterally dense acquisition of soil and snow temperature. <https://doi.org/10.5194/tc-2021-292>
8. Uhlemann, S. et al. (2022). Surface parameters and bedrock properties co-vary across a mountainous watershed: Insights from Machine Learning and Airborne EM, *Science Advances*, DOI: 10.1126/sciadv.abj2479
9. McLachlan, P. et al., (2022). Estimating grapevine-relevant physicochemical soil zones using apparent electrical conductivity and in-phase data from EMI methods, *Geoderma*, Volume 426,2022, <https://doi.org/10.1016/j.geoderma.2022.116033>.
10. Springer, M. et al., (2022). Variability of snow and rainfall partitioning into evapotranspiration and summer runoff across nine mountainous catchments. *Geophysical Research Letters*, <https://doi.org/10.1029/2022GL099324>
11. Dwivedi, D. et al. (2022). Imputation of contiguous gaps and extremes of subhourly groundwater time series using random forests, *Journal of Machine Learning for Modeling and Computing*. DOI: 10.1615/JMachLearnModelComput.2021038774
12. Varadharajan, C. et al.,(2022). BASIN-3D: A brokering framework to integrate diverse environmental data, *Computers and Geosciences*, <https://doi.org/10.1016/j.cageo.2021.105024>
13. Shirley, I.A. et al. (2022), Rapidly changing high-latitude seasonality: implications for the 21<sup>st</sup> century carbon cycle in Alaska, *Environmental Research Letters* 17(1), DOI 10.1088/1748-9326/ac4362
14. Dwivedi, D. et al., (2022). From Legacy Contamination to Watershed Systems Science: A Review of Scientific Insights and Technologies Developed through DOE-Supported Research in Water and Energy Security. *Environmental Research Letters*, 17 043004
15. Carroll, R. et al. (2022). Variability in observed stable water isotopes in snowpack across a mountainous watershed in Colorado, *Hydrological Processes*. <https://doi.org/10.1002/hyp.14653>
16. Shirley, I. A., Mekonnen, Z. A., Wainwright, H., Romanovsky, V. E., Grant, R. F., Hubbard, S. S., et al. (2022). Near-surface hydrology and soil properties drive heterogeneity in permafrost distribution, vegetation dynamics, and carbon cycling in a Sub-Arctic watershed. *Journal of Geophysical Research: Biogeosciences*, 127, e2022JG006864. <https://doi.org/10.1029/2022JG006864>
17. Shirley, I. et al., (2022). Rapidly changing high-latitude seasonality: implications for the 21<sup>st</sup> century carbon cycle in Alaska. *Environmental Research Letters* 17 (1), 014032
18. Wainwright, H. et al. (2022), Watershed zonation through hillslope clustering for tractably quantifying above-and below-ground watershed heterogeneity and functions, *Hydrology and Earth System Sciences* 26(2), <https://doi.org/10.5194/hess-26-429-2022>
19. Chen, J. A., B. Dafflon, H.M. Wainwright, A. Tran and S.S. Hubbard (2021). A Subseasonal Regime Approach for Assessing Intra-annual Variability of Evapotranspiration and Application to the Colorado River Basin, *Frontiers in Water*, 2021
20. Cantor, A., Kiparsky, M., Hubbard, S. S., Kennedy, R., Pecharroman, L. C., Guivetchi, K., Darling, G., McCready, C., & Bales, R. (2021). Making a water data system responsive to information needs of decision makers. *Frontiers in Climate*, 2021, <https://doi.org/10.3389/fclim.2021.761444>



21. Varadharajan, C., V.C. Hendrix, D.S. Christianson, M. Burrus, C. Wong, S.S. Hubbard, D.A. Agarwal, (2021), BASIN-3D: A brokering framework to integrate diverse environmental data, *Computers and Geosciences*, 2021,105024, ISSN 0098-3004,
22. doi: 10.1016/j.cageo.2021.105024
23. Dafflon, B., Uhlemann, S., Hubbard, S.S., (2021) Permafrost-Through-Canopy Investigation of Thermal and Ecohydrological Processes in Arctic Systems, *Technical Articles*, Vol. 26. 3 *Climate Change and Critical Zone Geophysics*, EEGS Fast Times, <https://fasttimesonline.co/permafrost-through-canopy-investigation-of-thermal-and-ecohydrological-processes-in-arctic-systems/>
24. Yan, Q., Wainwright, H., Dafflon, B., Uhlemann, S., Steefel, C. I., Falco, N., Kwang, J., & Hubbard, S. S. (2021). A hybrid data–model approach to map soil thickness in mountain hillslopes. *Earth Surface Dynamics*, 9(5), 1347–1361. <https://doi.org/10.5194/esurf-9-1347-2021>
25. Chen, J., Dafflon, B., Tran, A. P., Falco, N., & Hubbard, S. S. (2021). A deep learning hybrid predictive modeling (HPM) approach for estimating evapotranspiration and ecosystem respiration. *Hydrology and Earth System Sciences*, 25(11), 6041–6066. doi: 10.5194/hess-25-6041-2021
26. Dwivedi, D., Mital, U., Faybishenko, B., Dafflon, B., Varadharajan, C., Agarwal, D., Williams, K. H., Steefel, C., & Hubbard, S. (2021). Imputation of contiguous gaps and extremes of subhourly groundwater time series using random forests. *Journal of Machine Learning for Modeling and Computing*. <https://doi.org/10.1615/jmachlearnmodelcomput.2021038774>
27. Revil, A., Schmutz, M., Abdulsamad, F., Balde, A., Beck, C., Ghorbani, A., & Hubbard, S. S. (2021). Field-scale estimation of soil properties from spectral induced polarization tomography. *Geoderma*, 403, 115380. doi: 10.1016/j.geoderma.2021.115380
28. Wan, J., Tokunaga, T. K., Brown, W., Newman, A. W., Dong, W., Bill, M., Beutler, C. A., Henderson, A. N., Harvey-Costello, N., Conrad, M. E., Bouskill, N. J., Hubbard, S. S., & Williams, K. H. (2021). Bedrock weathering contributes to subsurface reactive nitrogen and nitrous oxide emissions. *Nature Geoscience*, 14(4), 217–224. doi: 10.1038/s41561-021-00717-0
29. Matheus Carnevali, P.B. et al (2021). Meanders as a scaling motif for understanding of floodplain soil microbiome and biogeochemical potential at the watershed scale. *Microbiome*, 9(1). doi: 10.1186/s40168-020-00957-z
30. Wainwright, H. et al. (2021), High-resolution Spatiotemporal Estimation of Net Ecosystem Exchange in Ice-Wedge Polygon Tundra Using In Situ Sensors and Remote Sensing Data, *Land*, <https://doi.org/10.3390/land10070722>
31. Hubbard, S.S., Schmutz, M., Balde, A. et al. (2021) Estimation of soil classes and their relationship to grapevine vigor in a Bordeaux vineyard: advancing the practical joint use of electromagnetic induction (EMI) and NDVI datasets for precision viticulture. *Precision Agric*. doi: 10.1007/s11119-021-09788-w
32. Rogers, D.B., Newcomer, M.E., Raberg, J.H., Dwivedi, D., Steefel, C., Bouskill, N., Nico, P., Faybishenko, B., Fox, P., Conrad, M., Bill, M., Brodie, E., Arora, B., Dafflon, B., Williams, K.H. and Hubbard, S.S. (2021) Modeling the Impact of Riparian Hollows on River Corridor Nitrogen Exports. *Front. Water* 3:590314. doi: 10.3389/frwa.2021.590314
33. Kakalia, Z., Varadharajan, C., Alper, E., Brodie, E. L., Burrus, M., Carroll, R. W. H., Christianson, D. S., Dong, W., Hendrix, V. C., Henderson, M., Hubbard, S. S., Johnson, D., Versteeg, R., Williams, K. H., & Agarwal, D. A. (2021). The Colorado East River Community Observatory Data Collection. *Hydrological Processes*, 35( 6), e14243. doi: 10.1002/hyp.14243
34. Falco, N., Wainwright, H. M., Dafflon, B., Ulrich, C., Soom, F., Peterson, J. E., Brown, J. B., Schaettle, K. B., Williamson, M., Cothren, J. D., Ham, R. G., McEntire, J. A., & Hubbard, S. S. (2021). Influence of soil heterogeneity on soybean plant development and crop yield evaluated using time-series of UAV and ground-based geophysical imagery. *Scientific Reports*, 11(1). doi: 10.1038/s41598-021-86480-z
35. Uhlemann, S., Dafflon, B., Peterson, J., Ulrich, C., Shirley, I., Michail, S., & Hubbard, S. S. (2021). Geophysical Monitoring Shows that Spatial Heterogeneity in Thermohydrological

- Dynamics Reshapes a Transitional Permafrost System. *Geophysical Research Letters*, 48, e2020GL091149. <https://doi.org/10.1029/2020GL091149>
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