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HISTORY OF EMPLOYMENT

- **Lawrence Berkeley National Laboratory, Earth and Environmental Sciences Area, Energy and Geosciences Division, Berkeley, California:** Staff Scientist, 04/1995 – present.
- **University of California, Berkeley, California, Department of Materials Science and Mineral Engineering:** Research Engineer, 02/1991-03/1996.
- **Kiev State University, Kiev, Ukraine:** Head of Laboratory for Hydrogeological and Engineering Geology Forecasting (1986-1990); Head of Laboratory of Land Reclamation Hydrogeology (1983-1986); Senior Scientist (1977-1983); Engineer, Senior Engineer, and Head of Field Expedition (1970-1977).

DEGREES

- *Doctor of Sciences* (1988), Moscow State University of Environmental Engineering, Moscow, Russia.
- *Diploma* (1985), Institute of Management, Standardization, and Metrology, Kiev, Ukraine.
- *Ph.D.* (1978), Institute of Hydraulic Engineers and Land Reclamation, Moscow, Russia.
- *B.S. and M.S.* (1970), Hydrogeology and Engineering Geology, Geological Department, Kiev State University, Ukraine.

LECTURER

- **International Atomic Energy Agency (IAEA):** Groundwater Pollution, Hydrology, Modeling, and Remediation: Vienna, Austria, December 2014; Kyrgyzstan, May 2015; Vienna, Austria, virtual, October 2021.
- **University of California, Berkeley:** Department of Civil and Environmental Engineering, Graduate course *Vadose Zone Hydrology*, CE202 (1998); Department of Nuclear Engineering, Guest Lecturer (NE290-October 2014, October 2015, February 2019; NE124- February and April 2019; April 2021); Department of Environmental Science, Policy, and Management, NE171A, February 2019, February 2021.
- **Chernivtsy National University, Department of Soil Sciences, Chernivtsy, Ukraine:** Invited lecturer on *Vadose zone and Groundwater Modeling* (2016, virtual).
- **Kiev State University, Faculty of Geology, Hydrogeology Department, Kiev, Ukraine:** Courses *Vadose Zone Hydrology*; *Groundwater Dynamics*; *Land Reclamation Hydrogeology*; *Hydrogeochemistry* (1977-1990).

RESEARCH EXPERIENCE

- Field, laboratory, theoretical and modeling investigations of liquid flow and chemical transport in soil, vadose zone and groundwater related to site characterization, monitoring and remediation of organic, metal, and radioactively contaminated soil and groundwater, and nuclear waste disposal in geological formations. Led multi-institutional environmental remediation field studies that were conducted at Idaho National Laboratory (1995-2000) and at Hanford (2003-2010). Lead author of the

Yucca Mountain report “Technical Basis Document No.1 *Climate and Infiltration.*”

- Theoretical studies and numerical modeling of liquid flow and chemical transport in unsaturated-saturated fractured-porous media using the methods of nonlinear dynamics and chaos, as well as fuzzy systems modeling.
- Statistical analysis and Quality Assurance and Quality Control (QA/QC) of hydrological, geochemical, radiological, and meteorological data, which have been part of several U.S. DOE projects -- AmeriFlux eddy covariance network sites measuring ecosystem CO₂, water and energy fluxes; NGEET Tropic sites, and Science Focus Area East River Watershed project.
- PI and Co-PI of projects conducted at the U.S. DOE radioactively and VOC contaminated sites, and radioactively contaminated and nuclear waste disposal sites in other countries—Chernobyl (Ukraine); Fukushima Daichi NPP (Japan); Mayak, Karachay Lake, Krasnoyarsk, Tomsk (Russia); Ezeiza Nuclear Waste disposal site and the Areco site (Argentina).

CONSULTING EXPERIENCE

- Witherspoon, Inc., Geological and Petroleum Consultants (1991-2008). Projects on contaminant transport in groundwater and long-term underground gas storage project.
- Weiss & Associates Environmental Consulting Company, Emeryville, CA; SOMA Environmental Engineering, Inc., San Ramon, CA. Projects on flow and contaminant transport in soil and groundwater.

SERVICE TO THE COMMUNITY

Editor

- Member of the Geological Society of America (GSA) Membership and Fellowship Committee (since 2020).
- Member of AGU’s Paul Witherspoon Mid-Career Lecture Nomination Committee (2016-2019) and the Fund-raising Committee (2016-present).
- *Senior Editor, Environmental Sciences, Oxford Research Encyclopedia, Oxford University Press, 2014-Present.*
- *Associate Editor, Vadose Zone Journal (2003-2011, 2016).*
- *Guest Editor*
 - International Journal *Water*, Special Issue on *Water and Solute Transport in Vadose Zone*, 2016-2018;
 - *Vadose Zone Journal*, Special Issue on Complex Soil Systems, 2015-2016;
 - International Journal *Environmental Science and Pollution Research*, Special Issue No.1 on Chernobyl, December 2003;
- *Co-Editor of five AGU/Wiley Geophysical Monographs Series: Dynamics of Flow and Transport in Fractured Rock (2000 and 2005); Groundwater Vulnerability: Chernobyl Nuclear Disaster (2014); Fluid Dynamics in Complex Fractured-Porous Systems (2015); Hydrogeology, Chemical Weathering, and Soil Formation (2021).* Am currently a leading co-editor of the AGU/Wiley monograph *Fuzzy Systems Modeling for Environmental Management and Human Health Risk Assessment.*
- Co-Editor of the Fifth Worldwide Review on International Approaches for Nuclear Waste Disposal in Geological Formations (2017).

International Activities

- Member of the Committee on Chernobyl of the National Academy of Sciences of Ukraine (1986-1990).
- Six missions to Chernobyl, Ukraine, on behalf of U.S. DOE and International Atomic Energy Agency (IAEA) (since 2001).
- Lead author of the IAEA recommendations on the decommissioning and remediation of the

Chernobyl Cooling Pond (2009) and co-author of the final recommendations (2017).

- Member of the technical expert group on the IAEA recommendations on *Groundwater Remediation of Uranium Mining Sites, and Remediation of Acid and Metalliferous Drainage (AMD) at Uranium Mining Sites* (since 2015).
- Supported the U.S. State Department in preparation of proposal on characterization of radioactive contamination in Tajikistan, Middle Asia, 2016.

Co-Chair of the Organization Committees (partial list)

- 5th Worldwide Review Workshop on the *Challenging Problems of Nuclear Waste Disposal in Geological Formations*, May 2016, Berkeley, CA.
- *Complex Soil Systems Conference* (Soil Sciences Society of America (SSSA) Bouyoucos funds, Berkeley Lab, and DOE), September 2014, Berkeley, CA.
- Special Session on *Flow and Transport in Fractured Rock* at the Fall 2012 AGU Meeting.
- *Dynamics of Fluids and Transport in Fractured Rock* Symposiums, 1999, 2004, Berkeley, CA.

Member of Scientific and Professional Societies

American Geophysical Union; Geological Society of America; Soil Sciences Society of America; National Groundwater Association; Interagency Steering Committee on Multimedia Environmental Modeling (ISCMEM); Extreme Events Working Group (ESEWG) of the Federal Subcommittee on Hydrology of the Advisory Committee on Water Information (ACWI).

Awards:

- 2019 Lawrence Berkeley National Laboratory Directors' Award for Exceptional Achievement in the Area of Societal Impact.
- Foreign Member of the National Academy of Agrarian Sciences of Ukraine (Elected October 2020).

Over 70 invited and keynote presentations and multiple contributed presentations at Conferences, Workshops, and Symposiums.

SELECTED BIBLIOGRAPHY

Authored and co-authored over 150 peer-reviewed scientific publications, and 7 patents.

Book Co-Editor (published):

Hunt, M.Egli, and B.Faybishenko, *Hydrogeology, Chemical Weathering, and Soil Formation*, Geophysical Monograph 257, AGU/Wiley, 2021, ISBN: 978-1-119-56396-9

Faybishenko, B., J.Birkholzer, D.Sassani, and P.Swift (eds.), *International Approaches for Nuclear Waste Disposal in Geological Formations: Geological Challenges in Radioactive Waste Isolation—Fifth Worldwide Review*. United States: 2017. Web. doi:10.2172/1353043.

Faybishenko, B., J. Gale, and S.Benson (eds.), *Fluid Dynamics in Complex Fractured-Porous Systems*, 2015, AGU/Wiley.

Faybishenko, B., T.Nicholson (eds.), *Groundwater Vulnerability: Chernobyl*. AGU/Wiley, 2014.

Faybishenko, B., P.A.Witherspoon, and J.Gale (eds.), *Dynamics of Fluids and Transport in Fractured Rock*, Geophysical Monograph Series, Vol. 162, 2005. [ISBN 0-87590-427-0].

Faybishenko, B., P.A. Witherspoon, and S.M. Benson (eds.), *Dynamics of Fluids in Fractured Rock*, Geophysical Monograph No. 122, 2000.

Book Co-Editor (Chapters are currently in review and preparation):

Faybishenko, B., R.Sadiq, and A.Despande, *Fuzzy Systems Modeling for Environmental Management and Human Risk Assessment*, AGU/Wiley. Am now serving as a lead co-editor.

Book author and coauthor (peer-reviewed)

- Dzekunov, N.E., I.E. Zhernov, and B.A. **Faybishenko**, *Thermodynamic Methods of Investigating the Water Regime in the Vadose Zone*, Moscow, Nedra, 177 p., 1987. (in Russian)
- Faybishenko**, B.A., *Water-Salt Regime of Soils Under Irrigation*, Moscow, Agropromizdat, 304 pp., 1986. (in Russian)
- Faybishenko, B.** *Solute Transport in the Vadose Zone*, Textbook, Kiev State University, Kiev, 1982. (in Russian)

Book Chapters (peer-reviewed)

- Hunt, A., M.Egli, **B.Faybishenko**, Where Are We and Where Are We Going? Pedogenesis Through Chemical Weathering, Hydrologic Fluxes, and Bioturbation, Chapter 14 in: Hunt et al. (eds), *Hydrogeology, Chemical Weathering, and Soil Formation*, AGU/Wiley, 2021.
- Faybishenko**, B., S.M. Benson, J.E. Gale, and F.Molz, A Complex Systems Approach to Describing Flow and Transport in Fractured-Porous Media, In: **Faybishenko** et al. (eds), *Fluid Dynamics in Complex Fractured-Porous Systems*, AGU Monograph, 5-20, 2015.
- Faybishenko**, B. and T.Nicholson, Lessons learned from assessment of groundwater vulnerability at Chernobyl, Chapter in Monograph “Groundwater Vulnerability: Chernobyl Nuclear Disaster,” AGU/Wiley, 2015.
- Faybishenko, B.**, P.A. Witherspoon, G.S. Bodvarsson, and J.Gale, Emerging Issues in Fractured-Rock Flow and Transport Investigations: Introduction and Overview, In: *Dynamics of Fluids and Transport in Fractured Rock*, **Faybishenko**, B., P.A. Witherspoon, and J.Gale (Editors), *Geophysical Monograph Series, Vol. 162, pp. 1-11, 2005*.
- Faybishenko**, B., Introduction to modeling of hydrogeologic systems using fuzzy differential equations, In: “*Fuzzy Partial Differential Equations and Relational Equations*” (M. Nickraves, L.A. Zadeh, and V. Korotkikh (Eds.), Vol. 142, Springer Verlag, the Series *Studies in Fuzziness and Soft Computing*, pp. 267-284, 2003. [ISBN 3-540-20322-2].
- Faybishenko**, B., P. A. Witherspoon, C. Doughty, J. Geller, T. Wood, and R. Podgorney, Multi-Scale Investigations of Liquid Flow in a Fractured Basalt Vadose Zone, AGU Monograph “*Flow and Transport Through Unsaturated Fractured Rock*,” Second Edition D.D. Evans, T.J. Nicholson, and T. Rasmussen (eds.), 161-182, 2001.
- Faybishenko**, B. (Lead Author), Vadose Zone Characterization and Monitoring: Current Technologies, Applications, and Future Developments, Chapter 3 of Book “*Vadose Zone Science and Technology Solutions*,” (eds. B. Looney and R.Falta), Battelle Press, OH, 133-396, 2000.
- Faybishenko**, B., and S. Finsterle, Tensiometry in fractured rocks, in Zhang, D., and Winter, C.L., eds., Theory, Modeling, and Field Investigation in Hydrogeology: A Special Volume in Honor of Shlomo P. Neuman’s 60th Birthday: Boulder, Colorado, Geological Society of America Special Paper 348, 161–174, 2000.

Partial List of Publications

- Faybishenko**, B., R.Versteeg, G.Pastorello, D. Dwivedi, C. Varadharajan, D. Agarwal, Challenging Problems of Quality Assurance and Quality Control (QA/QC) of Meteorological Time Series Data, *Stochastic Environmental Research and Risk Assessment*, November 2021, DOI: [https://doi.org/10.1007/s00477-021-02106-w\(0123456789\(\).,-volIV\)\(0123456789\(\).,-volIV\)](https://doi.org/10.1007/s00477-021-02106-w(0123456789().,-volIV)(0123456789().,-volIV))
- Molz, F, **B.Faybishenko**, Mathematical analysis of laboratory microbial experiments demonstrating deterministic chaotic dynamics, *Biologia Futura*, 72:307–316, 2021 <https://doi.org/10.1007/s42977-021-00079-z>
- Kim, J., A.H.Goldstein, R.Chakraborty, K.Jardine, R.Weber, P.O. Sorensen, S.Wang, **B.Faybishenko**, P.K. Misztal, E.L. Brodie, Measurement of Volatile Compounds for Real-time Analysis of Soil

- Microbial Metabolic Response to Simulated Snowmelt, *Frontiers in Microbiology*, 12, 2021, doi: <https://doi.org/10.3389/fmicb.2021.679671>
- Hunt, A. G., **Faybishenko**, B., & Ghanbarian, B. (2021). Predicting characteristics of the water cycle from scaling relationships. *Water Resources Research* doi: 10.1029/2021WR030808.
- Hunt, A. G., **Faybishenko**, B., & Ghanbarian, B. (2021). Non-linear hydrologic organization. *Nonlinear Processes in Geophysics* doi.org/10.5194/npg-2021-4.
- Mital U, D.Dwivedi, J.B.Brown, B.**Faybishenko** B, S.L.Painter, and C.I.Steefel, Sequential Imputation of Missing Spatio-Temporal Precipitation Data Using Random Forests. *Front. Water* 2:20, 2020 doi: 10.3389/frwa.2020.00020
- Müller, J., B.**Faybishenko**, D.Agarwal, S.Bailey, C.Jiang, Y.Ryu, C.Tull, L.Ramakrishnan Assessing data change in scientific datasets, *Concurrency Computat Pract Exper.* 2021;e6245. <https://doi.org/10.1002/cpe.6245>
- Sahu, R.K., J.Müller, J.Park, C.Varadharajan, B.Arora, B.**Faybishenko**, and D.Agarwal, Impact of Input Feature Selection on Groundwater Level Prediction From a Multi-Layer Perceptron Neural Network, *Frontiers in Water, Water and Hydrocomplexity*, 2:573034, 2020.
- Hunt, A. G., B.**Faybishenko**, and B. Ghanbarian, 2020, Predicting the water balance from optimization of plant productivity, *GSA Today* 30(9).
- Negron-Juarez, R.N., S. Ferreira, B. **Faybishenko**, M.T. Monteiro, L. Candido, R. Ribeiro, R. Oliveira, A. Araujo, J.M. Warren, B. Newman, B. Gimenez, C. Varadharajan, D. Agarwal, L. Borma, J. Tomasella, and J. Chambers. "Calibration, Measurement and Characterization of Soil Moisture Dynamics in a Central Amazonian Tropical Forest," *Vadose zone Journal*, Volume 19, Issue, 2020, e20070 <https://doi.org/10.1002/vzj2.20070>
- Hunt, A. G., B. **Faybishenko**, and T. L. Powell, A new phenomenological model to describe root-soil interactions based on percolation theory, *Ecological Modelling* 433, 2020. <https://doi.org/10.1016/j.ecolmodel.2020.109205>
- Hunt, A.; **Faybishenko**, B.; Ghanbarian, B.; Egli, M.; Yu, F. Predicting Water Cycle Characteristics from Percolation Theory and Observational Data. *Int. J. Environ. Res. Public Health* **2020**, *17*, 734. doi: [10.3390/ijerph17030734](https://doi.org/10.3390/ijerph17030734).
- Wang, W., B.**Faybishenko**, T.Jiang, J.Dong, and Y.Li, Seepage Characteristics of a Single Ascending Relief Well Dewatering an Overlying Aquifer, *Water* 2020, 12, 919; doi:10.3390/w12030919.
- Tokunaga, T.K., J.Wan, K.H. Williams, W.Brown, A.Henderson, Y.Kim, A.P.Tran, M.E. Conrad, M.Bill, R.W.H.Carroll, W.Dong, Z.Xu, A.Lavy, B.Gilbert, S.C.Romero, J.N. Christensen, B. **Faybishenko**, B.Arora, E.R. Siirila-Woodburn, R.Versteeg, J.Raberg, J.E. Peterson, and S.S. Hubbard, Hillslope responses to snowmelt, *Depth- and Time-Resolved Distributions of Snowmelt-Driven Hillslope Subsurface Flow and Transport and Their Contributions to Surface Waters*, 55(11), 9474-9499, 2019.
- Tran, A.P., J.Rungee, B.**Faybishenko**, B.Dafflon, S.Hubbard, Assessment of Spatiotemporal Variability of Evapotranspiration and Its Governing Factors in a Mountainous Watershed, *Water*, 2019, 11(2), 243; <https://doi.org/10.3390/w11020243> (Note: Related to the SFA project.)
- Varadharajan, C., **Faybishenko**, B., et al., Challenges in Building an End-to-End System for Acquisition, Management, and Integration of Diverse Data from Sensor Networks in Watersheds: Lessons from a Mountainous Community Observatory in East River, Colorado, *IEEE Access*, 7,8924700, 2019, pp. 182796-182813.
- Koven, C.D., ... B. **Faybishenko**, et al., Benchmarking and Parameter Sensitivity of Physiological and Vegetation Dynamics using the Functionally Assembled Terrestrial Ecosystem Simulator (FATES) at Barro Colorado Island, Panama, *IEEE Xplore*, 7(1), 182796-182813, 2019. DOI: [10.1109/ACCESS.2019.2957793](https://doi.org/10.1109/ACCESS.2019.2957793)
- Tran, A.P.; Rungee, J.; **Faybishenko**, B.; Dafflon, B.; Hubbard, S.S. Assessment of Spatiotemporal Variability of Evapotranspiration and Its Governing Factors in a Mountainous Watershed. *Water* **2019**, *11*, 243. doi: [10.3390/w11020243](https://doi.org/10.3390/w11020243)

- Arora, B., D.Dwivedi, **B.Faybishenko**, R.B. Jana, H.Wainwright, Understanding and Predicting Vadose Zone Processes, *Reviews in Mineralogy & Geochemistry*, Vol. 85, 2019, Mineralogical Society of America.
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- Bill, M., M.E.Conrad, **B.Faybishenko**, J.T Larsen, J.T.Geller, S.E. Borglin, H.R.Beller, Use of carbon stable isotopes to monitor biostimulation and electron donor fate in chromium-contaminated groundwater, *Chemosphere*, Vol.235, pp. 440-446, 2019.
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- Faybishenko**, B., F.Molz and D.Agarwal, Nonlinear Dynamics Simulations of Ecological Processes: Model, Diagnostic Parameters of Deterministic Chaos, and Sensitivity Analysis, Invited Chapter in the book "*Stochastic Processes and Algebraic Structures–From Theory Towards Applications*," Springer, 2018.
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- Faybishenko**, B., Detecting dynamic causal inference in nonlinear two-phase fracture flow, *Advances in Water Resources* (2017), <http://dx.doi.org/10.1016/j.advwatres.2017.02.011>.
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Inventions

US Patents:

- Vadose zone water fluxmeter, #6,957,573, 2005;
- Electrical Resistivity Probes, #6,636,046 B2, Oct 21, 2003;
- Tensiometer for Shallow or Deep Measurements Including Vadose Zone and Aquifers, #5,941,121, 1999.

USSR Inventor's Certificates:

- Device for the Extraction of Pore Solutions from Soils with Different Moisture #1493882, 1988;
- Tensiometer, #1408258, 1988;
- Device to Measure the Groundwater Level, #1046673, 1982;
- Device for the Determination of the Water Potential, #591761, 1977.