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HISTORY OF EMPLOYMENT

- **Lawrence Berkeley National Laboratory, 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, Kiev State University, Ukraine.

LECTURER

- **International Atomic Energy Agency (IAEA):** Groundwater Pollution, Hydrology, Modeling, and Remediation, Vienna Austria, December 2014; Kyrgyzstan, May 2015.
- **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); Department of Environmental Science, Policy, and Management, NE171A, February 2019.
- **Chernivtsy National University, Department of Soil Sciences, Chernivtsy, Ukraine:** Invited lecturer on *Vadose zone and Groundwater Modeling* (2016, via interactive video conferencing).
- **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. 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. Preparation of the Yucca Mountain "Technical Basis Document No.1 *Climate and Infiltration."*
- Statistical analysis and Quality Assurance and Quality Control (QA/QC) of hydrological, geochemical, radiological, and meteorological data, and development of new statistical approaches

for the QA/QC analysis (AmeriFlux eddy covariance network sites measuring ecosystem CO_2, water and energy fluxes; NGEE Tropic sites, and Science Focus Area 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); Fukushina Daichi NPP (Japan); Mayak, Karachay Lake, Krasnoyarsk, Tomsk (Russia); Ezeiza NW disposal site and Areco sites (Argentina).

CONSULTING EXPERIENCE

- Witherspoon, Inc., Geological and Petroleum Consultants (1991-2008). Projects mostly associated with contaminant transport in groundwater and log-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

- *Senior Editor, Environmental Sciences, Oxford Research Encyclopedia, Oxford University Press, 2014-Present.*
- *Associate Editor, Vadose Zone Journal* (2003-2011, 2016).
- *Guest Editor*
  - International Journa*l 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 four published AGU/Wiley Monographs: *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). Two AGU/Wiley monographs are in print.
- Co-Editor of the Fifth Worldwide Review on International Approaches for Nuclear Waste Disposal in Geological Formations (2017).

AWARDS: 2019 Lawrence Berkeley National Laboratory Directors' Award for Exceptional Achievement in the area of Societal Impact.

Recent International Activities

- International Atomic Energy Agency (IAEA) (since 2009):
  - Four missions to Chernobyl, Ukraine, and Lead author of the IAEA recommendations on the decommissioning and remediation of the Chernobyl Cooling Pond.
  - Member of the technical expert group on the IAEA recommendations on *Groundwater Remediation of Uranium Mining Sites, and Remediation of Acid and Metaliferous 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

- 5th Worldwide Review Workshop on the *Challenging Problems of Nuclear Waste Disposal in Geological Formation*, 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).

Over 50 invited and keynote presentations at Conferences, Workshops, and Symposiums.

SELECTED BIBLIOGRAPHY

Authored and co-authored over 130 peer-reviewed scientific publications, and 8 patents.

Book Co-Editor:

Faybishenko, B, J.Birkholzer, D.Sassani, and P.Swift, International Approaches for Nuclear Waste Disposal in Geological Formations: Geological Challenges in Radioactive Waste Isolation—Fifth Worldwide Review. United States: N. p., 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.

Hunt, and M.Egli, and B.Faybishenko, *Hydrogeology, Chemical Weathering, and Soil Formation*, AGU/Wiley, 2020 (in print).

Despande, A., R.Sadiq, and B.Faybishenio, *Fuzzy Systems Modeling for Environmental Management and Human Risk Assessment*, AGU/Wiley (in print)

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)

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 Publisher, 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. Nickravesh, 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. Rassmusen (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.

Selected publications:

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.

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

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Miller, G.W. Moore, R.Negron-Juarez, C.Stahl, N.G. Swenson, V.Trotsiuk, C.Varadharajan, J.M. Warren, B.T.Wolfe, L.Wei, T.E.Wood, C.Xu, N.G. McDowell, Precipitation mediates sap flux sensitivity to evaporative demand in the neotropics, *Oecologia*, 2019 Nov;191(3):519-530. doi: 10.1007/s00442-019-04513-x. Epub 2019 Sep 20

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Christensen, J.N., B.Dafflon, A.E. Shiel, T.K.Tokunaga, J.Wan, B.**Faybishenko**, W.Dong, K.H.Williams, C.Hobson, S.T.Brown, S.S.Hubbard, Using strontium isotopes to evaluate the spatial variation of groundwater recharge , *Sci Total Environ*. 2018 Oct 1;637-638:672-685. doi: 10.1016/j.scitotenv.2018.05.019.

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Schmidt, F., H.Wainwright, B.**Faybishenko**, M.Denham, C.Eddy-Dilek, In Situ Monitoring of Groundwater Contamination Using the Kalman Filter, *Environmental Science & Technology*, 2018 Jul 3;52(13):7418-7425. doi: 10.1021/acs.est.8b00017. Epub 2018 Jun 22.

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Hubbard, S.S., K.H. Williams, D. Agarwal, J. Banfield, H. Beller, N. Bouskill, E. Brodie, R. Carroll, B. Dafflon, D. Dwivedi, N. Falco, B. Faybishenko, R. Maxwell, P. Nico, C. Steefel, H. Steltzer, T. Tokunaga, P.A. Tran, H. Wainwright, and C. Varadharajan. 2018. The East River, Colorado, Watershed: A mountainous community testbed for improving predictive understanding of multiscale hydrological–biogeochemical dynamics. *Vadose Zone J*. 17:180061. doi:10.2136/vzj2018.03.0061

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Yu, F.; Faybishenko, B.; Hunt, A.; Ghanbarian, B. A Simple Model of the Variability of Soil Depths. *Water* **2017**, *9*, 460. doi: 10.3390/w9070460

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.

Christianson, D., C. Varadharajan, B. Christoffersen, M. Detto, B. **Faybishenko**, K. Jardine, R.Negron-Juarez, B. Gimenez, G. Pastorello, T. Powell, J. Warren, B. Wolfe, J. Chambers, L. Kueppers, N. McDowell, and D. Agarwal. A metadata reporting framework (FRAMES) for synthesis of earth system science observations, *Ecological Informatics*, June 2017. ISSN 1574-9541

Yu,F., B.**Faybishenko**, A.G. Hunt, B. Ghanbarian, A simple model of the variability of soil depths, Special Issue "*Advances in Groundwater Flow and Solute Transport: Pushing the Hidden Boundary*," Journal *Water*, 2017, *9*(7), 460; 13pp., doi:10.3390/w9070460.

Wainwright, H., B. **Faybishenko**, S.Molins, M.Denham, M.Amidon, D.Moulton, K.Lipnikov, V. Freedman, M.Freshley, C.Eddy-Dilek, Coupling Big Data Analytics and Reactive Transport Modeling for Cost-effective Groundwater Monitoring, *Waste Management*, 2017, Paper 17163.

Pastorello, G.Z., D.K. Gunter, H. Chu, D.S. Christianson, B. **Faybishenko**, Y. Cheah, S.W. Chan, S. Dengel, T.F. Keenan, F.L. O'Brien, A. Elbashandy, and D.A. Agarwal, C. Trotta, D. Papale, N.F. Beekwilder, M. Humphrey, C.M. Poindexter, Hunting data rogues at scale: data quality control for observational data in research infrastructures, *eScience*.2017.64, 2017: 446-447.

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Wang W., W.Sui, B. **Faybishenko**, and W.T. Stringfellow, Permeability variations within mining-induced fractured rock mass and its influence on groundwater inrush, *J. of Environmental Earth Sciences*, 2016, 75:326, DOI 10.1007/s12665-015-5064-5.

Wang, W., T. Jiang, B.**Faybishenko**, Z.Wang, W.Hu, and Q. Zhao, Closure of Fracture Due to Cover Stress Re-establishment After Coal Mining, *Geotechnical and Geological Engineering,* October 2016, Volume 34, Issue 5, pp 1525–1537.

Arora, B., N.F.Spycher, C.I.Steefel, S.Molins, M.Bill, M.E. Conrad, W.Dong, B.**Faybishenko**, T.K. Tokunaga, J.Wan, K.H.Williams, S.B.Yabusaki, Influence of hydrological, biogeochemical and temperature transients on subsurface carbon fluxes in a flood plain environment, *Biogeochemistry*, pp 1-30, 2016.

Faybishenko, B., Hubbard, S., Brodie, E., Nico, P., Molz, F., Hunt, A., and Pachepsky, Y., 2016. Preface to the Special Issue of Vadose Zone Journal on Soil as Complex Systems. *Vadose Zone Journal*, 15(2), vzj2016.01.0005. https://doi.org/10.2136/vzj2016.01.0005.

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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.