

## **BRIAN MCPHERSON**

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### **EDUCATION**

**Ph.D. in Geophysics**, 1996, University of Utah, Salt Lake City.

Dissertation: Three-Dimensional Model of the Geologic and Hydrodynamic History of the Uinta Basin, Utah: Analysis of Overpressures and Oil Migration.

Advisors: John D. Bredehoeft (USGS) and David S. Chapman (University of Utah)

**M.S. in Geophysics**, 1992, University of Utah, Salt Lake City,

**B.S. in Geophysics**, 1989, University of Oklahoma, Norman

### **PROFESSIONAL BACKGROUND**

Dr. McPherson is the USTAR Professor of Civil and Environmental Engineering at the University of Utah. Since 1997, Dr. McPherson has conducted carbon management and engineering research, especially geological sequestration studies, but including other modes of carbon management as well, such as biomimetic and other approaches. Technical focus areas include groundwater and reservoir simulation, multiphase flow analysis and simulation, rock deformation, and subsurface chemically reactive transport analysis and simulation. McPherson and his research group maintain a high pressure/high temperature laboratory capable of combined multiphase flow and rock mechanical response experimentation, and are currently conducting flow tests to quantify diagenetic changes on rocks during CO<sub>2</sub> sequestration. Other research that Dr. McPherson continues to pursue includes coupled heat and fluid processes in sedimentary basins and geothermal systems, and petroleum generation and migration processes.

### **PROFESSIONAL POSITIONS**

**USTAR Professor of Civil and Environmental Engineering**, July, 2013 - Present,  
Department of Civil and Environmental Engineering, University of Utah (position endowed by USTAR, the Utah Science, Technology and Research initiative).

**Staff Member**, August 2006 - Present, Energy & Geoscience Institute at the University of Utah.

### **CURRENT RESEARCH PROJECTS (as Principal Investigator)**

**PI**, Improving Production in the Emerging Paradox Oil Play, Total federal funding: \$7,999,999 (total funding including industry contribution: \$9,999,999), 10/2019 – 9/30/2022: U.S. Department of Energy. *Status: Active*

**PI**, Southwest Regional Partnership on Carbon Sequestration, Phase 3, \$8,090,485 (Oct, 2007 – July, 2022): U.S. Department of Energy. *Status: Active*

**Total Career Funding as PI: \$134,255,631 (USD)**

## 2019-2020 Peer-Reviewed Publications

\* Indicates senior author of publication is McPherson student advisee or co-advisee.

\*Patil, V. & McPherson, B. (2020). Identifying Hydrogeochemical Conditions for Fault Self-Sealing in Geological Storage. *Water Resources Research*. Vol. 56, e2018WR024436.

Dai, Zhenxue & Xu, L., Xiao, T., McPherson, B., Zhang, X., Zheng, L., Dong, S., Yang, Z., Soltanian, M. R., Yang, C., Ampomah, W., Jia, W., Yin, S., Xu, T., Bacon, D., Viswanathan, H., (2020). Reactive chemical transport simulations of geologic carbon sequestration: Methods and applications. *Earth-Science Reviews*. Vol. 208, 103265-103280.

<https://doi.org/10.1016/j.earscirev.2020.103265>

\*Xiao, T. & Xu, H., Moodie, N., Esser, R., Jia, W., Zheng, L., Rutqvist, J., McPherson, B. (2020). Chemical-mechanical impacts of CO<sub>2</sub> intrusion into heterogeneous caprock. *Water Resources Research*. Vol. 56, e2020WR027193.

\*Patil, V. (2020). Modeling Coupled Reactive Transport Through Fault-zones: A Critical Review. *Environmental Engineering Science*. Vol. 10, 44-88.

<https://www.essoar.org/doi/10.1002/essoar.10504444.1>

\*Xiao, T. & McPherson, B., Esser, R., Dai, Z., Chu, S., Pan, F., Jia, W., Viswanathan, H. (2020). Chemical impacts of potential CO<sub>2</sub> and brine leakage on groundwater quality with quantitative risk assessment: A case study on the Farnsworth Unit. *Energies*. Vol. 13: 6574-6588 <https://www.mdpi.com/1996-1073/13/24/6574>

\*Moodie, Nathan; Ampomah, William; Jia, Wei; Heath, Jason; McPherson, Brian; (2019) Assignment and calibration of relative permeability by hydrostratigraphic units for multiphase flow analysis, case study: CO<sub>2</sub>-EOR operations at the Farnsworth Unit, Texas; *International Journal of Greenhouse Gas Control* 81:103-114

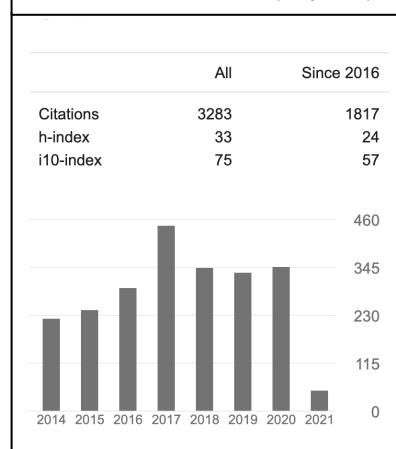
\*Xiao, Ting; McPherson, Brian; Esser, Richard; Jia, Wei; Moodie, Nathan; Chu, Shaoping; Lee, Si-Yong; (2019) Forecasting commercial-scale CO<sub>2</sub> storage capacity in deep saline reservoirs: Case study of Buzzard's bench, Central Utah; *Computers & geosciences* 126:41-51

Tavakol-Davani, Hessam E; Tavakol-Davani, Hassan; Burian, Steven J; McPherson, Brian J; Barber, Michael E; (2019) Green infrastructure optimization to achieve pre-development conditions of a semiarid urban catchment; *Environmental Science: Water Research & Technology* 5(6): 1157-1171

Lei, Gang; Cao, Nai; McPherson, Brian J; Liao, Qinzhuo; Chen, Weiqing; (2019) A novel Analytical Model for pore Volume compressibility of fractal porous *Scientific Reports* Volume 9: Article number: 14472 (2019) <https://www.nature.com/articles/s41598-019-51091-2>

Tavakol-Davani, Hassan; Rahimi, Reyhaneh; Burian, Steven J; Pomeroy, Christine A; McPherson, Brian J; Apul, Defne; (2019) Combining Hydrologic Analysis and Life Cycle Assessment Approaches to Evaluate Sustainability of Water Infrastructure: Uncertainty Analysis, *Water* 11(12): 2592

Citations and h-index (all years)



## Recent University of Utah Courses

CVEEN 7430, Advanced Subsurface Modeling

CVEEN 7920, Groundwater Hydraulics

CVEEN 5410 Hydrology

CVEEN 7450, Carbon Capture and Storage

CVEEN 7920, Coupled Hydrologic Processes

## 2020-2021 Current Graduate Students

Eric Edelman, University of Utah - Civil and Environmental Engineering, Ph.D.

Zhidi Wu, University of Utah - Civil and Environmental Engineering, Ph.D.

Aaron Meyer University of Utah - Civil and Environmental Engineering, M.S.

Alec Nelson University of Utah - School of Computing, M.S.