

Reza Soltanian

Curriculum Vitae

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Professional Employment

- 2022 - **Associate Professor of Hydrogeology**, *Departments of Geosciences and Environmental Engineering*, University of Cincinnati
- 2018 - **Director**, *Theis Environmental Monitoring & Modeling Site*, University of Cincinnati
- 2023 - **Team Member**, *Groundwater Sustainability Module*, Resource Nexus Analytics, Informatics, and Data (AID) Programme, United Nations University-FLORES
- 2022 - **Board Member**, *Confluence Water Technology Innovation Cluster*, Ohio River Valley Region
- 2018 - 2022 **Assistant Professor of Hydrogeology**, *Departments of Geosciences and Environmental Engineering*, University of Cincinnati
- 2015 - 2017 **Postdoctoral Researcher**, *School of Earth Sciences*, The Ohio State University
- 2015 - 2015 **Subsurface Modeling Lead**, Subsurface Insights
- 2010 - 2011 **Civil Inspector**, DAELIM Industrial Company

Education

- 2011 - 2015 **Ph.D. in Earth and Environmental Sciences**, *Wright State University*
Dissertation: Relating reactive plume spreading to hierarchical and multi-scale sedimentary architecture, adviser: Prof. Robert W. Ritzi
- 2008 - 2010 **M.Sc. in Water Structure Engineering**, *University of Tehran*
Thesis: Solutions for contaminant transport equations using numerical and analytical methods, adviser: Prof. A.R. Estabragh
- 2003 - 2008 **B.S. in Irrigation and Drainage Engineering**, *University of Shiraz*

Research Interests

Stochastic subsurface hydrogeology
Groundwater-surface water interactions
Machine learning and artificial intelligence in hydrogeology
Upscaling flow and transport in geological media
Carbon dioxide and hydrogen geological storage
Uncertainty analysis for complex environmental models
Application of geophysical imaging in hydrogeology
Methane migration in groundwater

Honors and Awards

- 2023 Nominated for the Hydrologic Sciences Early Career Award, *American Geophysical Union*
- 2021 Nominated for the Early Career Award for Applied Research, *Universities Council on Water Resources*
- 2019 Nominated for the Kohout Early Career Award, *Hydrogeology Division of Geological Society of America*
- 2018 Editor's Citation for Excellence in Refereeing, *Water Resources Research, American Geophysical Union*
- 2015 Research Excellence Award, *Wright State University*
- 2014 Graduate Research Award, *Geological Society of America*
- 2013 PhD Fellowship, College of Science and Mathematics, *Wright State University*
- 2008 Rank 4 in the Iranian National Entrance Exam, *Water Structure Engineering*

Professional Memberships

American Geophysical Union
Geological Society of America
International Society for Porous Media (Interpore)
National Ground Water Association

Research Grants

External Grants Funded

- 2023 Monitoring and predicting subsurface biogeochemical hot spots, Army Research Office, Role: PI, \$486,000.
- 2022 The influence of surface water-groundwater exchange on fate and transport of emerging contaminants, The Ohio Water Resources Center (USGS 104b). Role: co-PI, Project period: 9/01/2022 to 9/01/2023, \$35,000.
- 2021 The influence of hierarchical and multiscale river morphology and sediment heterogeneity on hyporheic exchange processes. National Science Foundation. EAR - Hydrologic Sciences, Role: PI, Project period: 9/01/2021 to 9/01/2024, \$520,884.
- 2021 The influence of surface water-groundwater exchange on fate and transport of emerging contaminants, Ohio Water Resources Center (USGS 104b). Role: PI, Project period: 9/01/2021 to 9/01/2022, \$34,599.
- 2021 Real-time water quality monitoring system for the Great Miami River, Duke Energy Foundation, Powerful Communities Nature grant. Role: PI, Project period: 9/01/2021 to 9/01/2022, \$25,263.

- 2020 Turnkey hydro-geophysical monitoring and decision support system for environmental cleanup and energy applications, DOE Office of Science, Phase II, Role: co-PI, Project period: 4/01/2020 to 4/01/2022, \$1,700,000 (UC Portion, \$312,000).
- 2020 Collaborative Research: Advancing fundamental and predictive understanding of the fate and transport of an emerging contaminant of concern (1,4-dioxane) during surface water-groundwater exchange using field-scale experiments and advanced numerical modeling, Confluence 2019 Water Research Consortium Challenge Grant Award, Role:PI, \$10,000.
- 2020 Turnkey hydro-geophysical monitoring and decision support system for environmental cleanup and energy applications, DOE Office of Science, Phase II, Role:PI, Project period: 02/19/2019 to 3/27/2020, \$225,000 (UC Portion, \$40,000).

Other External Funding

- 2021-present Annual maintenance cost for University of Cincinnati's Theis Environmental Monitoring & Modeling Site by Miami Conservancy District (MCD), \$2000/year.

Computational Time Awarded

- 2020 Developing predictive understanding of subsurface flow and reactive geochemical transport through the use of Akuna: An open source and high-performance workflow system for subsurface simulation. Environmental Molecular Science Laboratory, DOE. Annual allocation of 225,000 node computational hours on Cascade supercomputer, Role: co-PI.
- 2019 Developing predictive understanding of subsurface flow and reactive geochemical transport through the use of Akuna: An open source and high-performance workflow system for subsurface simulation. Environmental Molecular Science Laboratory, DOE. Annual allocation of 225,000 node computational hours on Cascade supercomputer, Role: co-PI.

Internal Grants Funded

- 2022 Travel support, UC Faculty Development Fund, \$1350.
- 2022 Materials for machine learning and artificial intelligence in geosciences course, UC Faculty Development Fund, \$500.
- 2021 Modeling Groundwater Chemistry, UC Faculty Development Fund, \$350.
- 2021 Real-time water quality monitoring system for the Great Miami River, UC Office of Research, Role: PI, Project Period: 9/01/2021 to 9/01/2022, \$25,000.
- 2018 Groundwater Flow & Transport Modeling Workshop, UC Faculty Development Fund, \$2500.

Pending Proposals

- 2023 Advancing multiscale understanding and optimization of CO₂ sequestration in basalt formations, DOE, Earthshots: Carbon Negative, Role: PI, \$6M (UC Portion, \$2.15M), Pre-proposal submitted.
- 2023 Accurate methane emissions modeling: Bridging the gap with molecular dynamics simulation and field-scale approaches, ACS Petroleum Research Fund, Role: PI, \$125,000.

Representative Proposals Previously Submitted (and Declined)

- 2023 The Good River Engine: Building the digital economy of the water-energy nexus in the Ohio River Basin, National Science Foundation–Regional Innovation Engines, Role: Core Collaborator, \$160M.
- 2023 Predicting PFAS behavior at the field scale: An adaptive and iterative modeling framework. Environmental Security Technology Certification Program (ESTCP), DoD., Role: PI, \$1.5M (UC Portion, \$900,000), Pre-proposal Discouraged.
- 2022 The science and technology center for hydrogen storage in depleted petroleum reservoirs (HYSPER), National Science Foundation Science and Technology Centers, Role: Collaborator.
- 2022 Deep learning for prediction of subsurface biogeochemical hot spots from multi-modal data and advanced numerical simulations, DOE Office of Science, Role: co-PI, \$200,000 (UC Portion, \$55,000).
- 2022 Omics grounded reactive transport modeling of 1,4-dioxane attenuation and degradation, The Strategic Environmental Research and Development Program (SERDP). Pre-proposal discouraged.
- 2021 Hyporheic zone sensing system, DOE Office of Science, Phase II, Role: PI, \$1,600,000 (UC Portion, \$282,000).
- 2021 Cyberinfrastructure for sustained innovations in groundwater science and engineering education. National Science Foundation. DUE – IUSE – Engaged Student Learning: Level III, 01/01/2022 to 12/31/2026, Role: co-PI, \$1,994,530 (UC Portion, \$200,000), Project participants: Michigan State University, University of Rhode Island.
- 2021 University of Cincinnati’s Superfund research program (SRP) Center grant, NIEHS/NIH, Role: co-PI, \$12,636,393.
- 2021 NRT HDR: Preparing Next Generation Technology Leaders: Distributed Intelligent Systems for Interdisciplinary Engineering Applications, National Science Foundation, Faculty Participant to develop Digital Water Project, \$2,999,051.
- 2021 An integrated, real-time groundwater monitoring and modeling framework, Environmental Security Technology Certification Program (ESTCP), Department of Defense, subcontract, \$2,177,270, (UC Portion, \$521,561), Pre-proposal discouraged.
- 2021 Spatial and temporal monitoring of biogeochemical hot spots during hot moments along river corridors. US Department of Energy, Office of Biological and Environmental Research, Announcement number DE-FOA-0002392, Science Research Area: Novel Methods for Studying “Hot Spots” and “Hot Moments” of Biogeochemical Activity, Role: PI, \$150,000, Pre-proposal encouraged & full proposal declined.
- 2020 LTER: A co-produced investigation of the mechanisms underlying ecosystem process in the Cincinnati urban mosaic. National Science Foundation. DEB - Long-Term Ecological Research, Role: Senior Personnel, \$6,830,118.
- 2020 New paradigms for understanding non-aqueous phase liquids (NAPLs) fate and transport in groundwater, Army Research Office. Role: PI, \$360,000.

- 2019 Development of a workflow to assess performance benefits and risks for hydraulic stimulation of carbon storage reservoirs. DOE, National Energy Technology Laboratory. Concept paper, Role: co-PI, \$900,000.
- 2019 CAREER: Advancing Understanding of Hyporheic Exchange Processes in Gravelly Rivers. National Science Foundation, Hydrologic Sciences Program, Role: PI, \$543,592.
- 2019 Collaborative Research: Advancing fundamental and predictive understanding of watershed hydrobiogeochemical processes. DOE, Office of Biological and Environmental Research, Ecohydrology and Hydro-biogeochemistry, Role: PI, \$600,000, Pre-proposal encouraged & full proposal declined.
- 2019 Collaborative Research Strasbourg University & University of Cincinnati: New paradigm in understanding CO₂ convective mixing during geological carbon sequestration. Thomas Jefferson Fund, Role: PI, \$20,000 (UC Portion, \$10,000).
- 2019 Evaluating hydrologic and green infrastructure improvements to achieve biological integrity in an urban watershed, Role: co-PI, \$20,000, UC Office of Research.
- 2018 Collaborative Research: Soil signal understanding through automated sensing and cloud-based data assimilation, modeling, and analysis. National Science Foundation. Call on Signals in the Soil (SitS), Role: PI, Pre-proposal declined.
- 2018 Advancing understanding of methane fate and transport in groundwater. National Science Foundation. Hydrologic Sciences Program, Role: PI, \$459,079.
- 2018 Hierarchical and multiscale influence of both stream morphology and streambed heterogeneity on hyporheic exchange processes in gravelly rivers. National Science Foundation. Hydrologic Sciences Program, Role: PI, \$284,948.

--- Student Awards & Achievements

- 2022 Water Management Association of Ohio Award through the Columbus Foundation to Teagan Kleman.
- 2022 Graduate Student Research Award, UC Geosciences Department to Reza Ershadnia.
- 2022 Graduate Student Research Award, UC Geosciences Department to Jeffery McGarr.
- 2022 Graduate Student Government Research Fellowship, University of Cincinnati to Jeffery McGarr.
- 2022 Dean's Fellow, University of Cincinnati Graduate School to Reza Ershadnia.
- 2021 Oak Ridge Institute for Science and Education (ORISE) fellowship to Jeffery McGarr.
- 2021 Alumni Research Award, UC Geosciences Department to Reza Ershadnia.
- 2021 Teaching Assistant Award, UC Geosciences Department to Jeffery McGarr
- 2020 Teaching Assistant Award, UC Geosciences Department to Jeffery McGarr
- 2019 Graduate Travel Award, Geological Society of America to Reza Ershadnia.

Publications

* denotes graduate students, † denotes postdoctoral researchers, £ denotes advisees outside University of Cincinnati, and ** denotes visiting scholars. All publications are in peer-reviewed journals. Citations can be found on my [Google Scholar page](#).

Currently in preparation

10. **Soltanian, M.R.**, Ershadnia*, R., Moeini*, F., Hosseini, S.A., Dai, Z., Assessing CO₂ storage efficiency in fluvial hydrocarbon reservoirs: A detailed analysis of CO₂-EOR potential. *Energies*
9. Li†, P., McGarr*, J.T., Moeini*, F., **Soltanian, M.R.**, Dissolved oxygen dynamics in a heterogeneous riparian floodplain. *Journal of Hydrology*.
8. Li†, P., McGarr*, J.T., Wallace†, C.D., Ford, R., **Soltanian, M.R.**, Spectral analysis of hydrogeochemical dynamics within the hyporheic zone of a gravel dominated riverbed. *Journal of Hydrology*.
7. Moeini*, F., Li†, P., McGarr*, J.T., **Soltanian, M.R.**, Application of long short-term memory and uncertainty quantification to predict hydrogeochemical dynamics within riparian floodplains. *Journal of Hydrology*.
6. McGarr*, J.T., Ford, R., Li†, P., Kleman*, T., Fields*, C., Trutschel*, L., Fritz, K., Rowe, A., Wallace†, C.D., Lupton*, L., Ward, D., **Soltanian, M.R.**, Uncovering the hidden world of riverbed sediments: The role of cross-bar channel fills in hydrogeochemical dynamics of the hyporheic zone. *Journal of Hydrology*.
5. Wallace†, C.D., Dai, Z., **Soltanian, M.R.**, 2021, The impact of future climate conditions on watershed-scale nitrous oxide emissions along river corridors. *Nat. Commun.*
4. **Soltanian, M.R.**, Wallace†, C.D., Dai, Z., de Barros, F., Geologically defined interfaces control flow and solute mixing in groundwater systems. *Geophys. Res. Lett.*
3. **Soltanian, M.R.**, McGarr*, J.T., Li†, P., Ren*, Dai, Z., Reactive solute dispersion in riverbed sediments. *Environ Sci Pollut Res*.
2. **Soltanian, M.R.**, de Barros, F., Temporal evolution of the maximum concentration of contaminants in multiscale heterogeneous sediments. *Journal of Hydrology*.
1. **Soltanian, M.R.**, Bemani, A., Ershadnia*, R., Moeini*, F., Hosseini, S.A., Dai, Z., Enhancing H₂ storage simulation with data driven modeling: Predicting thermodynamic properties accurately and efficiently. *Int. J. Hydrog. Energy*

Currently in review

1. Chen, W., Dai, Z., Samper, J., Ling, H., Zhan£, C., Ma£, F., Yang, Z., Zhang, X., **Soltanian, M.R.**, Impact of reactive mineral facies distributions on radionuclide sorption properties in multi-scale heterogeneous granite rocks. *Hydrogeology Journal*.

Published

Since joining University of Cincinnati

104. Wang[£], Y., Dai, Z., Chen, L., Shen, X., Chen, F., **Soltanian, M.R.**, 2023, An integrated multi-scale model for CO₂ transport and storage in shale reservoirs. *Appl. Energy*, 331, DOI:10.1016/j.apenergy.2022.120444.
103. Ershadnia^{*}, R., **Soltanian, M.R.**, Predicting methane plume migration in shallow unconfined aquifers using conditional deep convolutional generative adversarial network. *In revision, Water Resour. Res.*
102. McGarr^{*}, Mbonimpa, E., McAvoy, D., **Soltanian, M.R.**, PFAS fate and transport at AFFF discharge sites: A review. *Soil Systems*, 7(2), DOI:10.3390/soilsystems7020053.
101. Singh[£], M., Dai, Z., Chen, L., Shen, X., Chen, F., **Soltanian, M.R.**, 2023, Comparative study on heat extraction from Soultz-sous-Forêts geothermal field using supercritical carbon dioxide and water as the working fluid. *Energy*, 266, DOI:10.1016/j.energy.2022.126388.
100. Wang, Y., Zhen, P., Zhang, W., Huang, S., **Soltanian, M.R.**, Lichtfouse, E., Zhang^{**}, Z., 2023, Higher efficiency and lower environmental impact of membrane separation for carbon dioxide capture in coal power plants. *Environmental Chemistry Letters*, DOI: 10.1007/s10311-023-01596-0.
99. Jia[£], S., Dai, Z., Zhou, Z., Ling, H., Yang[£], Z., Qi, L., Wang, Z., Zhang, X., Thanh, H.V, **Soltanian, M.R.**, 2023, Upscaling dispersivity for conservative solute transport in naturally fractured media. *Water Res.*, 235, DOI: 10.1016/j.watres.2023.119844.
98. Zhan[£], C., Dai, Z., Yang[£], Z., Zhang, X., Ma[£], Z., Thanh, H.V, , **Soltanian, M.R.**, 2023, Subsurface sedimentary structure identification using deep learning: A review. *Earth Sci Rev.*, 239, DOI: 10.1016/j.earscirev.2023.104370.
97. Ren^{*}, W., **Soltanian, M.R.**, Dai, H., Dai., Z., 2023, Global sensitivity analysis of non-reactive and sorptive solute plume dispersion in multiscale heterogeneous sediments. *J. Hydrol*, DOI:10.1016/j.jhydrol.2023.129274.
96. Zhan[£], C., Dai, Z., **Soltanian, M.R.** and de Barros, F.P., 2022. Data-worth analysis for heterogeneous subsurface structure identification with a stochastic deep learning framework. *Water Resour. Res.*, 58(11), DOI:10.1029/2022WR033241.
95. Dai, Z., Ma[£], Z., Zhang, X., Chen[£], J., Ershadnia^{*}, R., Luan, X. and **Soltanian, M.R.**, 2022. An integrated experimental design framework for optimizing solute transport monitoring locations in heterogeneous sedimentary media. *J. Hydrol*, 614, DOI:10.1016/j.jhydrol.2022.128541.
94. Zhan[£], C., Dai, Z., **Soltanian, M.R.**, and Zhang, X., 2023. Stage-wise stochastic deep learning inversion framework for subsurface sedimentary structure identification. *Geophys. Res. Lett.*, 49(1), DOI:10.1029/2021GL095823.
93. Dai, Z., Ma[£], Z., Zhang, X., Chen[£], J., Ershadnia^{*}, R., Luan, X., **Soltanian, M.R.**, 2022, An integrated experimental design framework for optimizing solute transport monitoring locations in a heterogeneous sediment tank. *J. Hydrol*, 614, DOI:10.1016/j.jhydrol.2022.128541.
92. Xu[£], L., Cai, M., Dong, S., Yin, S., Xiao, T., Dai, Z., Wang, Y. **Soltanian, M.R.**, 2022. An upscaling approach to predict mine water inflow from roof sandstone aquifers. *J. Hydrol*, DOI:10.1016/j.jhydrol.2022.128314.

91. Zhang, X., Wang, Z., Reimus, P., Ma[£], F., **Soltanian, M.R.**, Xing, B., Zang, J., Dai, Z., 2022 Plutonium reactive transport in fractured granite: multi-species experiments and simulations. *Water Res.*, DOI: [10.1016/j.watres.2022.119068](https://doi.org/10.1016/j.watres.2022.119068).
90. Yu, Q., Xu, P., Dai, Z., Yin, S., **Soltanian, M.R.** and Liu, W., 2022. Numerical analysis of rock joints in tunnel construction during blasting. *Arab. J. Geosci.*, 15(1), DOI: [10.1007/s12517-021-09304-4](https://doi.org/10.1007/s12517-021-09304-4).
89. Chen[£], J., Dai, Z., Dong, S., Zhang, X., Sun, G., Wu, J., Ershadnia*, R., Yin, S., **Soltanian, M.R.**, 2022, Integration of deep learning and information theory for designing monitoring networks in heterogeneous aquifer systems. *Water Resour. Res.*, 58(10), DOI: [10.1029/2022WR032429](https://doi.org/10.1029/2022WR032429).
88. Ren*, W., Ershadnia*, R., Wallace[†], C.D., LaBolle, E. M., Dai, Z., de Barros, F., **Soltanian, M.R.**, 2022, Uncertainty quantification of solute spreading and mixing in multi-scale heterogeneous media. *Water Resour. Res.*, 58(9), DOI: [10.1029/2021WR031886](https://doi.org/10.1029/2021WR031886).
87. Ershadnia*, R., Yekta[†], A., Mahmoodpour[£], S., Singh[£], M., Chaudhuri, A., **Soltanian, M.R.**, 2022, Hydrogen geological storage in saline aquifers: Effects of geological and operational conditions. *Int. J. Hydrog. Energy*, DOI: [10.1016/j.ijhydene.2022.09.208](https://doi.org/10.1016/j.ijhydene.2022.09.208).
86. Jia[£], S., Dai, Z., Yang[£], Z., Du, Z., Zhang, X., Wang, J., Chen[£], L., Ershadnia*, R., **Soltanian, M.R.**, 2022, Uncertainty quantification of radionuclide migration in fractured granite. *J. Clean. Prod.*, 366 (15), DOI: [10.1016/j.jclepro.2022.132944](https://doi.org/10.1016/j.jclepro.2022.132944).
85. Zhan[£], C., Dai, Z., Samper, J., Yin, S., Ershadnia*, R., Zhang, X., Wang, Y., Yang, Z., Luan, X. and **Soltanian, M.R.**, 2022. An integrated inversion framework for heterogeneous aquifer structure identification with single-sample generative adversarial network. *J. Hydrol*, DOI: [10.1016/j.jhydrol.2022.127844](https://doi.org/10.1016/j.jhydrol.2022.127844).
84. Zhang, W., Wang, J., Chen[£], J., **Soltanian, M.R.**, Dai, Z. and WoldeGabriel, G., 2022. Mass-wasting-inferred dramatic variability of 130,000-year Indian summer monsoon intensity from deposits in the Southeast Tibetan plateau. *Geophys. Res. Lett.*, DOI: [10.1029/2021GL097301](https://doi.org/10.1029/2021GL097301).
83. Zhang, X., Ma[£], F., Dai, Z., Wang, J., Chen, L., Ling, H. and **Soltanian, M.R.**, 2022. Radionuclide transport in multi-scale fractured rocks: A review. *J. Hazard. Mater.*, 424, p.127550. DOI: [10.1016/j.jhazmat.2021.127550](https://doi.org/10.1016/j.jhazmat.2021.127550).
82. Zhan[£], C., Dai, Z., **Soltanian, M.R.**, Zhang, X., 2021, Stage-wise stochastic deep learning inversion framework for subsurface structure identification. *Geophys. Res. Lett.*, 49 (1), DOI: [10.1029/2021GL095823](https://doi.org/10.1029/2021GL095823).
81. Wallace[†], Tonina, D., McGarr*, J.T., P. J. de Barros, F., **Soltanian, M.R.**, 2021, Spatiotemporal dynamics of nitrous oxide emission hotspots in heterogeneous riparian sediments. *Water Resour. Res.*, 57(12), DOI: [10.1029/2021WR030496](https://doi.org/10.1029/2021WR030496).
80. Ershadnia*, R., Wallace[†], C.D., Hajirezaie, S., Hosseini, S.A., Nguyen, T. N., Sturmer, D.M., Dai, Z., **Soltanian, M.R.**, 2021, Hydro-thermo-chemo-mechanical modeling of carbon dioxide injection in fluvial heterogeneous aquifers. *Chem. Eng. J.*, DOI: [10.1016/j.cej.2021.133451](https://doi.org/10.1016/j.cej.2021.133451).

79. Chen[£], J., Dai, Z., Yang, Z., Pan, Y., Zhang, X., **Soltanian, M.R.**, 2021, An improved tandem neural network architecture for inverse modeling of multicomponent reactive transport in porous media. *Water Resour. Res.*, 57(12), DOI: [10.1029/2021WR030595](https://doi.org/10.1029/2021WR030595), **2021 Water Resour. Res. Editors' Choice Awards**.
78. Ershadnia^{*}, R., Wallace[†], C.D., Hosseini, S.A., Dai, Z., **Soltanian, M.R.**, 2021, Capillary heterogeneity controls methane migration in shallow unconfined aquifers. *Geophys. Res. Lett.*, 48(23), DOI: [10.1029/2021GL095685](https://doi.org/10.1029/2021GL095685).
77. Behzadi[†], F., Wallace[†], C.D., Ward, D., Zhou, Haiyan, Versteeg, R., **Soltanian, M.R.**, 2021, Bed form-induced hyporheic exchange and geochemical hotspots. *Adv. Water Resour.*, 156, DOI: [10.1016/j.advwatres.2021.104025](https://doi.org/10.1016/j.advwatres.2021.104025).
76. McGarr^{*}, J.T., Wallace[†], C.D., Ntarlagiannis, D., Sturmer, D.M., **Soltanian, M.R.**, 2021, Geophysical imaging of hyporheic mixing dynamics within compound bar deposits. *Hydrol Process.*, 35(9), DOI: [10.1002/hyp.14358](https://doi.org/10.1002/hyp.14358).
75. Zhang, X., Ma[£], F., Dai, Z., Wallace[†], C.D., **Soltanian, M.R.**, Ritzi, R.W., Ma[£], Ziqi, Zhuan, C., Lu, X., 2021, Application of upscaling methods for fluid transport in multi-scale heterogeneous media: A critical review. *Appl. Energy*, 303, DOI: [10.1016/j.apenergy.2021.117603](https://doi.org/10.1016/j.apenergy.2021.117603).
74. Cao, Y., Dong, S., Dai, Z., Zhu, L., Xiao, T., Zhang, X., Yin, S., **Soltanian, M.R.**, 2021, Adsorption model identification for chromium (VI) transport in unconsolidated sediments. *J. Hydrol.*, 598, DOI: [10.1016/j.jhydrol.2021.126228](https://doi.org/10.1016/j.jhydrol.2021.126228).
73. Singh[£], M., Chaudhuri, A., **Soltanian, M.R.**, Stauffer, P., 2021, Coupled multiphase flow and transport simulation to model CO₂ dissolution and local capillary trapping in permeability and capillary heterogeneous reservoir. *Int. J. Greenh. Gas Control.*, 108, DOI: [10.1016/j.ijggc.2021.103329](https://doi.org/10.1016/j.ijggc.2021.103329).
72. Ershadnia^{*}, R., Hajirezaie, S., Amooie, M.A., Wallace[†], C.D., Gershenzon, N.I., Hosseini, S.A., Sturmer, D.M., Ritzi, R.W., **Soltanian, M.R.**, 2021, CO₂ geological sequestration in multiscale heterogeneous aquifers: Effects of heterogeneity, connectivity, impurity, and hysteresis. *Adv. Water Resour.*, 151, DOI: [10.1016/j.advwatres.2021.103895](https://doi.org/10.1016/j.advwatres.2021.103895).
71. Wallace[†], C.D., **Soltanian, M.R.**, 2021, Surface water-groundwater exchange dynamics in buried-valley aquifer systems. *Hydrol Process.*, 35(3), DOI: [10.1002/hyp.14066](https://doi.org/10.1002/hyp.14066).
70. Wallace[†], C.D., **Soltanian, M.R.**, 2021, Underlying riparian lithology controls redox dynamics during stage-driven mixing. *J. Hydrol.*, 595, DOI: [10.1016/j.jhydrol.2021.126035](https://doi.org/10.1016/j.jhydrol.2021.126035).
69. Wang^{*}, Q., Zhou L., Algeo, T. J., **Soltanian, M.R.**, Liu, J., Feng, L., Liu, J., Peng, S., 2021, The geochemical behavior of molybdenum in the modern Yangtze Estuary and East China Sea shelf. *J. Hydrol.*, 595, DOI: [10.1016/j.jhydrol.2021.125997](https://doi.org/10.1016/j.jhydrol.2021.125997).
68. Ma[£], Z., Dai, Z., Zhang, X., Zhan[£], C., Gong, H., Zhu, L., Wallace[†], C.D. and **Soltanian, M.R.**, 2021. Dispersivity variations of solute transport in heterogeneous sediments: numerical and experimental study. *Stoch. Environ. Res. Risk Assess.*, 36, DOI: [10.1007/s00477-021-02040-x](https://doi.org/10.1007/s00477-021-02040-x).
67. Ma[£], Z., Dong, S., Yin, S., Dai, Z., Zhu, L., Jia, W., Wallace[†], C.D., **Soltanian, M.R.**, 2021, Experimental investigations on scale-dependent dispersivity in three-dimensional heterogeneous porous media. *Environ Sci Pollut Res*, DOI: [10.1007/s11356-020-12316-4](https://doi.org/10.1007/s11356-020-12316-4).

66. Zhang, G., Guo, J., Xu, B., Xu, L., Dai, Z., Yin, S. and **Soltanian, M.R.**, 2021, Quantitative analysis and evaluation of coal mine geological structures based on fractal theory. *Energies*, 14(7), DOI: [10.3390/en14071925](https://doi.org/10.3390/en14071925).
65. Estabragh, A.R., Ghayamara, F., **Soltanian, M.R.** and Babalar, M., 2020. Effect of ageing on the properties of a clay soil contaminated with glycerol. *Geomech. Geoengin.*, DOI: [10.1080/17486025.2020.1827165](https://doi.org/10.1080/17486025.2020.1827165).
64. Yekta[†], A., Salinas, P., Hajirezaie, S., Amooie, M.A., Pain, C.C., Jackson, M.D., Jacquemyn, C. and **Soltanian, M.R.**, 2020. Reactive transport modeling in heterogeneous porous media with dynamic mesh optimization. *Comput. Geosci.*, DOI: [10.1007/s10596-020-10009-y](https://doi.org/10.1007/s10596-020-10009-y).
63. Liu^{*}, Y., Wallace[†], C.D., Zhou, Y.Q., Ershadnia^{*}, R., Behzadi[†], F., Dwivedi, D., Xue, L., **Soltanian, M.R.**, 2020, Influence of streambed heterogeneity on hyporheic flow and sorptive solute transport. *Water*, 12(6), DOI: [10.3390/w12061547](https://doi.org/10.3390/w12061547).
62. Zhang, X., Chen, J., Hu, B.X., So, J., Zhang, J., Dai, Z., Yin, S., **Soltanian, M.R.**, Ren^{*}, W., 2020 Application of risk assessment in determination of soil remediation targets. *Stoch. Environ. Res. Risk Assess.*, 34, DOI: [10.1007/s00477-020-01857-2](https://doi.org/10.1007/s00477-020-01857-2).
61. Zhang, X., Dong, F., Dai, H., Hu, B.X., Qin, G., Li, D., Lv, X., Dai, Z. and **Soltanian, M.R.**, 2020. Influence of lunar semidiurnal tides on groundwater dynamics in estuarine aquifers. *Hydrogeol. J.*, 28, DOI: [10.1007/s10040-020-02136-8](https://doi.org/10.1007/s10040-020-02136-8).
60. Dai, Z., Xu[£], L., Xiao, T., McPherson, B., Zhang, X., Zheng, L., Dong, S., Yang, Z., **Soltanian, M.R.**, Yang, C. and Ampomah, W., 2020, Reactive chemical transport simulations of geologic carbon sequestration: Methods and applications. *Earth Sci Rev.*, 208, DOI: [10.1016/j.earscirev.2020.103265](https://doi.org/10.1016/j.earscirev.2020.103265).
59. Sturmer, D. M., Tempel, R. N., **Soltanian, M.R.**, 2020, Geological carbon sequestration: Mafic rock carbonation using point-source flue gases. *Int. J. Greenh. Gas Control.*, 99, 103106, DOI: [10.1016/j.ijggc.2020.103106](https://doi.org/10.1016/j.ijggc.2020.103106).
58. Sun, Q., Ampomah, W., Kutsienyo, E.J., Appold, M., Adu-Gyamfi, B., Dai, Z., **Soltanian, M.R.**, 2020, Assessment of CO₂ trapping mechanisms in partially depleted oil-bearing sands. *Fuel*, 278 DOI: [10.1016/j.fuel.2020.118356](https://doi.org/10.1016/j.fuel.2020.118356).
57. Ershadnia^{*}, Wallace[†], C.D., **Soltanian, M.R.**, 2020, CO₂ geological sequestration in heterogeneous binary media: Effects of geological and operational conditions. *Adv. Geo-Energy Res.*, 4(4), DOI: [10.46690/ager.2020.04.05](https://doi.org/10.46690/ager.2020.04.05).
56. Wallace[†], C.D., Sawyer, A., **Soltanian, M.R.**, Barnes, R., 2020, Nitrate removal within heterogeneous riparian zones under tidal influence. *Geophys. Res. Lett.*, 47(10), DOI: [10.1029/2019GL085699](https://doi.org/10.1029/2019GL085699).
55. **Soltanian, M.R.**, Behzadi[†], F., de Barros, F., 2020, Dilution of non-reactive solutes in heterogeneous porous media with multimodal conductivity and hierarchical organization across scales. *J. Hydrol*, 587, DOI: [10.1016/j.jhydrol.2020.125025](https://doi.org/10.1016/j.jhydrol.2020.125025).
54. Yu, Q., Xiong, Z., Du, C., Dai, Z., **Soltanian, M.R.**, Yin, S., Liu, W., Liu, C., Wang, C. and Song, Z., 2020. Identification of rock pore structures and permeabilities using electron microscopy experiments and deep learning interpretations. *Fuel*, 268,

[DOI:10.1016/j.fuel.2020.117416](https://doi.org/10.1016/j.fuel.2020.117416).

53. Hemmati-Sarapardeh, A., Nait Amar, M., **Soltanian, M.R.**, Dai, Z. and Zhang, X., 2020. Modeling CO₂ Solubility in water at ultra high pressure and temperature conditions. *Energy & Fuels*, 34(4), [DOI:10.1021/acs.energyfuels.0c00114](https://doi.org/10.1021/acs.energyfuels.0c00114).
52. Wallace[†], Sawyer, A. H., C.D., Barnes, R.B, **Soltanian, M.R.**, Gabor, R. S., Wilkins, M. J, Moore, M.T., 2020, A model analysis of the tidal engine that drives nitrogen cycling in coastal riparian aquifers. *Water Resour. Res.*, 56(4), [DOI:10.1029/2019WR025662](https://doi.org/10.1029/2019WR025662).
51. Hemmati, A., Hajirezaei, S., **Soltanian, M.R.**, Mosavi, A., Nabipor, N., Shamshirband, S., Chau, K., 2020, Modeling natural gas compressibility factor using a hybrid group of data handling. *Eng. Appl. Comput. Fluid Mech.*, 14(1), [DOI:10.1080/19942060.2019.1679668](https://doi.org/10.1080/19942060.2019.1679668).
50. Zhang^{**}, Z., Baena-Moreno, F. M., Soltanian, M.R., Zhen, P., Liu, Z., 2020, Effect of porous media and its distribution on methane hydrate formation in the presence of surfactant. *Appl. Energy*, 261, [DOI:10.1016/j.apenergy.2019.114373](https://doi.org/10.1016/j.apenergy.2019.114373).
49. Estabragh, A.R., Amini, M., **Soltanian, M.R.**, 2020, Aging effects on the swelling behavior of compacted bentonite. *Bull. Eng. Geol. Environ.*, 79, [DOI:10.1007/s10064-019-01708-7](https://doi.org/10.1007/s10064-019-01708-7).
48. Dai, Z., Zhan[£], C., Dong, S., Yin, S., Zhang, X., **Soltanian, M.R.**, 2020 How does resolution of sedimentary architecture data affect plume dispersion in multiscale and hierarchical systems?. *J. Hydrol*, 582, [DOI:10.1016/j.jhydrol.2019.124516](https://doi.org/10.1016/j.jhydrol.2019.124516).
47. **Soltanian, M.R.**, Hajirezaie, S., Hosseini, S.A., Dashtian, H., Amooie M.A., Meyal[†], A., Ershadnia^{*}, R., Ampomah, W., Islam, A., Zhang, X., 2019, Multicomponent reactive transport of carbon dioxide in fluvial heterogeneous aquifers. *J. Nat. Gas Eng.*, 65, [DOI:10.1016/j.jngse.2019.03.011](https://doi.org/10.1016/j.jngse.2019.03.011).
46. Ershadnia^{*}, R., Shams, R., Hajirezaie, S., Liu, Yuanhong[†], Jamshidi, S., **Soltanian, M.R.**, 2019, Non-newtonian fluid flow dynamics in rotating annular media: Physics-based and data-driven modeling. *Petrol. Science and Engineering*, 185, [DOI:10.1016/j.petrol.2019.106641](https://doi.org/10.1016/j.petrol.2019.106641).
45. Zhang, J., Zhang, X., Niu, J., Hu, B. X., **Soltanian, M.R.**, Qiu, H., Yang, L., 2019, Prediction of groundwater level in seashore reclaimed land using wavelet and artificial neural network-based hybrid model. *J. Hydrol*, 577, [DOI:10.1016/j.jhydrol.2019.123948](https://doi.org/10.1016/j.jhydrol.2019.123948).
44. Hoteit, H., Fahs M., **Soltanian, M.R.**, 2019, Assessment of CO₂ injectivity during sequestration in depleted gas reservoir. *Geosciences*, 9 (5), [DOI:10.3390/geosciences9050199](https://doi.org/10.3390/geosciences9050199).
43. Amooie, M.A., Hemmati-Sarapardeh, H., Karan, K., Husein, M.M., **Soltanian, M.R.**, Dabir, B., 2019, Data-driven modeling of interfacial tension in impure CO₂-brine systems with implications for geological carbon storage. *Int. J. Greenh. Gas Control.*, 90, [DOI:10.1016/j.ijggc.2019.102811](https://doi.org/10.1016/j.ijggc.2019.102811).
42. Pescimoro[£], E., Boano, F., Sawyer, A., **Soltanian, M.R.**, 2019, Modeling influence of sediment heterogeneity on nutrient cycling in streambeds. *Water Resour. Res.*, 55(5), [DOI:10.1029/2018WR024221](https://doi.org/10.1029/2018WR024221).

41. Mahmoodpour[£], S., Rostami, B., **Soltanian, M.R.**, Amooie M.A., 2019, Convective dissolution of carbon dioxide in deep saline aquifers: Insights from engineering a high-pressure porous Hele-Shaw cell. *Physical Review Applied*, 12, DOI:10.1103/PhysRevApplied.12.034016.
 40. Mahmoodpour[£], S., Rostami, B., **Soltanian, M.R.**, Amooie M.A., 2019, Effect of brine composition on onset of convection during dissolution of CO₂ in brine. *Comput Geosci*, 124, DOI: 10.1016/j.cageo.2018.12.002.
 39. Hajirezaei, S., Wu, X., **Soltanian, M.R.**, Sakha, S., 2019, Numerical simulation of mineral precipitation in hydrocarbon reservoirs and wellbores. *Fuel*, 238, DOI: 10.1016/j.fuel.2018.10.101.
 38. **Soltanian, M.R.**, Amooie, M.A., Cole, D.R., Graham, D., Pfiffner, S., Phelps, T., and Moortgat, J., 2018, Transport of perfluorocarbon tracers in the Cranfield geological carbon sequestration project. *Greenh. Gases: Sci. Technol.*, 8(4), DOI:10.1002/ghg.1786.
 37. Dai, Z., Zhan[£], C., **Soltanian, M.R.**, Ritzi, R.W. and Zhang, X., 2019. Identifying spatial correlation structure of multimodal permeability in hierarchical media with Markov Chain approach. *J. Hydrol*, 568, DOI:10.1016/j.jhydrol.2018.11.032.
 36. Zhang^{**}, Z., Wenxiang, Z., **Soltanian, M.R.**, Abdul. Olabi, 2018, Effectiveness of amino acid salt solutions in capturing CO₂: a review. *Renewable Sustainable Energy Rev.*, 98, DOI: 10.1016/j.rser.2018.09.019.
 35. Yu, Q., Dai, Z., Zhang^{**}, Z., **Soltanian, M.R.**, Yin, S., 2018, Estimation of sandstone permeability with SEM images based on Fractal theory. *Transp. Porous Media*, 126, DOI:10.1007/s11242-018-1167-2.
 34. Amooie, M.A., **Soltanian, M.R.**, and Moortgat, J., 2018, Solutal convection in porous media: Comparison between boundary conditions of constant concentration and constant flux. *Phys. Rev. E*, 98, DOI:10.1103/PhysRevE.98.033118.
 33. Dai, Z., Zhang, Y., Belicki, J.M., Zhang, M., Yang, C., Zhou, Y., Ampomah, W., Xiao, T., Middleton, R., Moortgat, J., **Soltanian, M.R.**, Stauffer, P., 2018, Heterogeneity-assisted carbon dioxide storage in marine sediments. *Appl. Energy*, 225, DOI:10.1016/j.apenergy.2018.05.038.
 32. **Soltanian, M.R.**, Amooie, M.A., Cole, D.R., Darrah, T., Graham, D., Pfiffner, S., Phelps, T., and Moortgat, J. 2018, Impact of methane on carbon dioxide storage in brine formations. *Groundwater*, 56(2), DOI:10.1111/gwat.12633.
 31. Q. Yu, X. Chen, Z. Dai, L. Nie, **Soltanian, M.R.**, 2018, Numerical investigation of stress distributions in slope backfills. *Periodica Polytechnica Civil Engineering*, DOI:10.3311/PPci.11295.
- Before joining University of Cincinnati*
30. Xiong, F. Wang, X., Jiang, Z., Amooie, M.A., **Soltanian, M.R.**, Moortgat, J., 2017, The shale gas sorption capacity of transitional shales in the Ordos basin, NW China. *Fuel*, 208 DOI:10.1016/j.fuel.2017.07.030.

29. Xiong, F., Jiang, Z., Li, P., Wang, X., Bi, H., Li, Y., Wang, Z., Amooie, M.A., **Soltanian, M.R.**, Moortgat, J., 2017, Pore structure of transitional shales in the Ordos basin, NW China: effects of composition on gas storage mechanism. *Fuel*, 206 DOI:10.1016/j.fuel.2017.05.083.
28. **Soltanian, M.R.**, Dai, Z., 2017, Geologic CO₂ sequestration: progress and challenges. *Geo-Energy and Geo-Resources is Geomech. Geophys.*, 3(3), DOI:10.1007/s40948-017-0066-2.
27. **Soltanian, M.R.**, Amooie, M.A., Gershenzon, N., Dai, Z., Ritzi, R., Xiong, F., Cole, D.R. and Moortgat, J., 2017, Dissolution trapping of carbon dioxide in heterogeneous aquifers. *Environ. Sci. Technol.*, 51(13), DOI:10.1021/acs.est.7b01540.
26. Amooie, M.A., **Soltanian, M.R.**, Dai, Z., Fengyang Xiong, and Moortgat, J., 2017, Mixing and spreading of multiphase fluids in heterogeneous bimodal porous media. *Geo-Energy and Geo-Resources is Geomech. Geophys.*, 3(3), DOI:10.1007/s40948-017-0060-8.
25. Yabusaki, S., Wilkins, M., Fang, Y., Williams, K. H., Arora, B., Bargar, J. R., Beller, H. R., Bouskill, N.J., Brodie, E. L., Christensen, J. N., Conrad, M.E., Danczak, R. E., King, E., **Soltanian, M.R.**, Spycher, N. F., Steefel, C. I., Tokunaga, T. K., Versteeg, R., Waichler, S., Wainwright, H., 2017, Water table dynamics and biogeochemical cycling in a shallow, variably-saturated floodplain. *Environ. Sci. Technol.*, 61(5), DOI:10.1021/acs.est.6b04873.
24. Amooie, M.A., **Soltanian, M.R.**, and Moortgat, J. 2017, Hydro-thermodynamic mixing of fluids across phases in porous media. *Geophys. Res. Lett.*, 44(8), DOI:10.1002/2016GL072491.
23. Ampomah, W., Balch, R. S., Rose-Coss, D., Will, R., Cather, M., Dai, Z., **Soltanian, M.R.**, 2017, Optimum design of CO₂ storage and oil recovery under geological uncertainty. *Appl. Energy*, 195(1), DOI:10.1016/j.apenergy.2017.03.017.
22. **Soltanian, M.R.**, Sun, A., Dai, Z., 2017. Reactive transport in a complex heterogeneous alluvial aquifer of Fortymile Wash, Nevada. *Chemosphere*, 179, DOI:10.1016/j.chemosphere.2017.03.136.
21. **Soltanian, M.R.**, Dai, Z., Yang, C., Amooie, M.A., and Moortgat, J., 2017. Multicomponent competitive monovalent cation exchange in hierarchical porous media with multimodal reactive mineral facies. *Stoch. Environ. Res. Risk Assess.*, 29(3), DOI:10.1007/s00477-017-1379-y.
20. Dai, Z., Zhang, Y., Staffer, P., Xiao, T., Zhang, M., Ampomah, W., Yang, C., Zhou, Y., Ding, M., Middleton, R. and **Soltanian, M.R.**, 2017. Injectivity evaluation for offshore CO₂ sequestration in marine sediments. *Energy Procedia*, 59, DOI:10.1016/j.egypro.2017.03.1420.
19. **Soltanian, M.R.**, Amooie, M.A., Cole, D.R., Graham, D.E., Hosseini, S.A., Hovorka, S., Pfiffner, S.M., Phelps, T.J. and Moortgat, J., 2016, Simulating the Cranfield geological carbon sequestration project with high-resolution static models and an accurate equation of state. *Int. J. Greenh. Gas Control.*, 54, DOI:10.1016/j.ijggc.2016.10.002.
18. **Soltanian, M.R.**, Amooie, M.A., Dai, Z., Cole, D., and Moortgat, J. 2016, Critical dynamics of gravito-convective mixing in geological carbon sequestration. *Sci. Rep.*, 6:35921, DOI:10.1038/srep35921.
17. Moortgat, J., Amooie, M.A., and **Soltanian, M.R.**, 2016. Implicit finite volume and discontinuous Galerkin methods for multicomponent flow in unstructured 3D fractured porous media. *Adv. Water Resour.*, 96, DOI:10.1016/j.advwatres.2016.08.007.

16. **Soltanian, M.R.**, Ritzi, R.W., Huang, C.C. and Dai, Z., 2015. Relating reactive solute transport to hierarchical and multiscale sedimentary architecture in a Lagrangian-based transport model: 1. Time-dependent effective retardation factor. *Water Resour. Res.*, 51(3), DOI: [10.1002/2014WR016354](https://doi.org/10.1002/2014WR016354).
15. **Soltanian, M.R.**, Ritzi, R.W., Huang, C.C. and Dai, Z., 2015. Relating reactive solute transport to hierarchical and multiscale sedimentary architecture in a Lagrangian-based transport model: 2. Particle displacement variance. *Water Resour. Res.*, 51(3), DOI: [10.1002/2014WR016354](https://doi.org/10.1002/2014WR016354).
14. Gershenzon, **Soltanian, M.R.**, Ritzi, R.W., Dominic, D.F., Keefer, D., Shaffer, E. and Storsved, B., 2015. How does the connectivity of open-framework conglomerates within multi-scale hierarchical fluvial architecture affect oil-sweep efficiency in waterflooding?. *Geosphere*, 11(6), DOI: [10.1130/GES01115.1](https://doi.org/10.1130/GES01115.1).
13. Ritzi, R.W., **Soltanian, M.R.**, 2015. What have we learned from deterministic geostatistics at highly resolved field sites, as relevant to mass transport processes in sedimentary aquifers?. *J. Hydrol.*, 122, DOI: [10.1016/j.jhydrol.2015.07.049](https://doi.org/10.1016/j.jhydrol.2015.07.049).
12. **Soltanian, M.R.**, Ritzi, R.W., Dai, Z., Huang, C.C., 2015. Reactive solute transport in physically and chemically heterogeneous porous media with multimodal reactive mineral facies: The Lagrangian approach. *Chemosphere*, 122, DOI: [10.1016/j.chemosphere.2014.11.064](https://doi.org/10.1016/j.chemosphere.2014.11.064).
11. Gershenzon, N.I., Ritzi, R.W., Dominic, D.F., **Soltanian, M.R.**, Mehnert, E. and Okwen, R.T., 2015. Influence of small-scale fluvial architecture on CO₂ trapping processes in deep brine reservoirs. *Water Resour. Res.*, 51(10), DOI: [10.1002/2015WR017638](https://doi.org/10.1002/2015WR017638).
10. Gershenzon, N.I., **Soltanian, M.R.**, Ritzi, R.W., Dominic, D.F., 2015. Understanding the impact of open-framework conglomerates on water–oil displacements: the Victor interval of the Ivishak Reservoir, Prudhoe Bay Field, Alaska. *Pet. Geosci.*, 11(1), DOI: [10.1144/petgeo2014-017](https://doi.org/10.1144/petgeo2014-017).
9. **Soltanian, M.R.**, Ritzi, R.W., Huang, C.C., Dai, Z., and Deng, H., 2015. A note on upscaling retardation factor in hierarchical porous media with multimodal reactive mineral facies. *Transp. Porous Media*, 108(2), DOI: [10.1007/s11242-015-0480-2](https://doi.org/10.1007/s11242-015-0480-2).
8. Pryshlak, T.T., Sawyer, A.H., Stonedahl, S.H., and **Soltanian, M.R.**, 2015. Multiscale hyporheic exchange through strongly heterogeneous sediments. *Water Resour. Res.*, 51(11), DOI: [10.1002/2015WR017293](https://doi.org/10.1002/2015WR017293).
7. **Soltanian, M.R.**, Ritzi, R.W., Dai, Z., Huang, C.C. and Dominic, D.F., 2015. Transport of kinetically sorbing solutes in heterogeneous sediments with multimodal conductivity and hierarchical organization across scales. *Stoch. Environ. Res. Risk Assess.*, 29(3), DOI: [10.1007/s00477-014-0922-3](https://doi.org/10.1007/s00477-014-0922-3).
6. Gershenzon, N.I., **Soltanian, M.R.**, Ritzi, R.W., Dominic, D.F., 2014. Influence of small scale heterogeneity on CO₂ trapping processes in deep saline aquifers. *Energy Procedia*, 59, DOI: [10.1016/j.egypro.2014.10.363](https://doi.org/10.1016/j.egypro.2014.10.363).

5. **Soltanian, M.R.**, and Ritzi, R.W., 2014. A new method for analysis of variance of the hydraulic and reactive attributes of aquifers as linked to hierarchical and multiscaled sedimentary architecture. *Water Resour. Res.*, 50(12), [DOI:10.1002/2014WR01546](https://doi.org/10.1002/2014WR01546).
4. Zhou, Y., Ritzi, R.W., **Soltanian, M.R.**, and Dominic, D.F., 2014. Influence of streambed heterogeneity on hyporheic exchange in gravelly rivers. *Groundwater*, 52(2), [DOI:10.1111/gwat.12048](https://doi.org/10.1111/gwat.12048).
3. Estabragh, A.R., **Pereshkafti, M.R.S.**, and Javadi, A.A., 2014. Numerical analysis of advection- dominated contaminant transport in saturated porous media. *Eur. J. Environ. Civ.*, 18(5), [DOI:10.1080/19648189.2014.889044](https://doi.org/10.1080/19648189.2014.889044).
2. Estabragh, A.R., **Pereshkafti, M.R.S.**, and Javadi, A.A., 2014. Comparison between analytical and numerical methods in evaluating the pollution transport in porous media. *Geotech. Geol. Eng.*, 31(1), [DOI:10.1007/s10706-012-9566-6](https://doi.org/10.1007/s10706-012-9566-6).
1. Estabragh, A.R., **Pereshkafti, M.R.S.**, Parsaei, B. and Javadi, A.A., 2014. Stabilised expansive soil behavior during wetting and drying. *Int. J. Pavement Eng.*, 14(4), [DOI:10.1080/10298436.2012.746688](https://doi.org/10.1080/10298436.2012.746688).

Dataset

1. Stegen, J C, Goldman, A, Blackburn, S., Chu, R. Danczak, R., Garayburu-Caruso, V., Graham, E., Grieshauber, C., Lin, X., Morad, J, Rn, H., Renteria, L., Resch, C., Tfaily, M., Tolic, N., Toyoda, J., Wells, J., Znotinas, K., Brooks, S., Bouskill, N., Newcomer, M., Rowe, A., Saify, A., Smith, G., **Soltanian, M.R.**, Trustschel, L., Turetaia, A., 2018. WHONDRS surface water sampling for metabolite biogeography. *Environmental System Science Data Infrastructure for a Virtual Ecosystem*, [DOI:10.15485/1484811](https://doi.org/10.15485/1484811).

Invited Presentations

- 2022 Los Alamos National Laboratory, Los Alamos, NM
- 2022 Pacific Northwest National Laboratory, Richland, WA
- 2022 College of Engineering, Jilin University, China
- 2021 Department of Geology, Kansas State University, KS
- 2021 University of Toledo, Department of Environmental Sciences
- 2020 OKI Regional Council of Governments, Cincinnati, OH
- 2019 University of Kentucky, Department of Earth and Environmental Sciences, KY
- 2019 Confluence Tech Showcase & Aqua Pitch, Cincinnati, OH
- 2019 Duke Energy Nature Grant Ceremony, Featured speaker, Cincinnati, OH
- 2019 Universal Technology Corporation, Dayton, OH
- 2018 College of Engineering, Jilin University, China
- 2018 Water Cluster Research Showcase, University of Cincinnati, OH

Professional Development Activities

- 2023 MODFLOW 6 and FloPy, Australian Water School
- 2022 Geochemical Modeling in Python

- 2022 Modeling Groundwater Chemistry, Ingeoexpert
- 2021 Short course on the Advanced Terrestrial Simulator (AMANZI-ATS), Oak Ridge National Laboratory, DOE
- 2020 Virtual Hand-Made Stream Sensor Networks Workshop: Build Your Own Smart Rock Sensor at Home, CUAHSI
- 2020 Multiscale Microbial Dynamics Modeling Summer School, Hosted online by DOE EMSL and PNNL
- 2020 Write Winning Grant Proposals, John Robertson from GWSW, University of Cincinnati, OH
- 2019 Advanced Aquifer Testing Techniques for Improved Hydrogeologic Site Characterization, thought by Jim Butler, Glenn Duffield, and Shlomo Neuman, West Chester University, PA
- 2019 STOMP Workshop by Mark White from DOE PNNL, OH
- 2019 DOD 101-How to Successfully Compete for DOD Funding, University of Cincinnati, OH
- 2018 National Science Foundation Cutting Edge Workshop: Early Career Geoscience Faculty Workshop, MD
- 2018 PHREEQC Workshop by Tony Appello, Amsterdam, Netherlands
- 2018 Groundwater Flow & Transport Modeling with GMS, Aquaveo, Provo, Utah
- 2018 Calibration and Uncertainty Analysis for Environmental Models: PEST thought by John Doherty, Bethesda, MD

Students and Visiting Scholars

Postdoctoral scholar:

- 2022-present Dr. Pei Li
- 2021-2022 Dr. Ali Yekta Meyal
- 2019-2021 Dr. Corey Wallace
- 2019-2021 Dr. Faranak Behzadi

Graduate students:

- 2022-present Farzad Moeini, PhD student
- 2021-present Tyler McGarr, PhD student
- 2021-2022 Reza Ershadnia, PhD student
- 2018-2021 Reza Ershadnia, MS student
- 2019-2021 Tyler McGarr, MS student

Undergraduate students:

- 2022-present Lydia Lupton, Research on an NSF supported project
- 2022-present Julie Hobbs, Research on an NSF supported project

2021-2022 Teagan Kleman, Research on an NSF supported project
 2021-2022 Colton Fields, Research on an NSF supported project
 2020-2021 Jared Crosby, Environmental engineering capstone project
 2020-2021 Matthew Marotta, Environmental engineering capstone project
 2020-2021 Megan Ginn, Environmental engineering capstone project
 2020-2021 Amy Cristiano, Environmental engineering capstone project
 2020-2021 Katie Straus, Environmental engineering capstone project
 2018-2019 Steven Ransom
 2018-2019 Jessica Bowling, UC McNair Scholar Program

Visiting scholars:

2022-present Dr. Zhien Zhang
 2018-2019 Dr. Ali Yekta Meyal
 2018-2019 Dr. Zhien Zhang

Visiting students:

2019-2021 Wanli Ren, PhD student, Jilin University
 2018 Yuanhong Liu, PhD student, Hohai University

Students' Committee Member

PhD:

Ayon Kumar Das, Petroleum Engineering Department, University of Calgary
 Fletcher, Aaron, Geosciences Department, University of Cincinnati
 Saman Ebrahimi, Department of Civil Engineering, University of Memphis
 Jacob Treacy, Environmental Engineering, University of Cincinnati
 Christopher Sheehan, Geosciences Department, University of Cincinnati
 Rachel Bosch, Geosciences Department, University of Cincinnati
 Sadegh Riasi, Environmental Engineering, University of Cincinnati

MS:

Gaurav Atreya, Environmental Engineering, University of Cincinnati
 Margaret Naber, Environmental Engineering, University of Cincinnati
 Scott Pantaleone, Geological Sciences, University of Alaska Anchorage
 Jacob Treacy, Environmental Engineering, University of Cincinnati

Teaching

University of
Cincinnati

Semester	Course #	Title	Enrollment
Spring 2024	GEOLXXXX	Applied Geochemistry	-
Spring 2024	GEOL4024/6024, EVST4024, ENVE5024/6024	Groundwater Modeling	-
Fall 2023	GEOL1027	Global water issues: wa- ter and human survival	-
Fall 2023	GEOL3005C/6005C, EVST3005C, ENVE3005C/6005C	Fundamentals of Groundwater	-
Fall 2023	GEOL4052/7025	Geosciences Colloquium Series	-
Spring 2023	GEOL4024/6024, EVST4024, ENVE5024/6024	Groundwater Modeling	24
Spring 2023	GEOL4052/7025	Geosciences Colloquium Series	24
Fall 2022	GEOL4052/7025	Geosciences Colloquium Series	29
Fall 2022	GEOL3005C/6005C, EVST3005C, ENVE3005C/6005C	Fundamentals of Groundwater	28
Spring 2022	GEOL4052/7025	Geosciences Colloquium Series	13
Spring 2022	GEOL4024/6024, EVST4024, ENVE5024/6024	Groundwater Modeling	17
Fall 2021	GEOL3005C/6005C, EVST3005C	Fundamentals of Groundwater	27
Spring 2021	GEOL4024/6024 EVST4024	,Groundwater Modeling	11
Fall 2020	GEOL3005C/6005C, EVST3005C	Fundamentals of Groundwater	39
Spring 2020	GEOL4024/6024, EVST4024	Groundwater Modeling	17
Fall 2019	GEOL3005C	Fundamentals of Groundwater	11
Spring 2019	GEOL4024/6024	Groundwater Modeling	8
Fall 2018	GEOL3005C	Fundamentals of Groundwater	24

Wright State
University

Semester	Course #	Title	Enrollment
Fall 2014	EES4540/6540	Subsurface Fluid Flow	8

Invited lectures

- 2019 Groundwater Short Course, Fundamentals of Engineering Exam, Environmental Engineering Department, University of Cincinnati

Service

Scientific community

Associate editor:

- 2018-present Advances in Geo-Energy Research
- 2019-2022 Frontiers in Water-Water and Critical Zone
- 2017-2021 Hydrogeology Journal

Editorial board member:

- 2020-2023 Energies

Committee member:

- 2022-present Founding member of the Interpore Midwest and Northeast US Chapter
- 2020-2022 Member of Interpore event committee

Session convener and chair:

- 2022 Geosciences for a sustainable future, GSA Joint North-Central/Southeastern Meeting, Cincinnati, Ohio, US.
- 2022 Buried-valley aquifers and the Theis Environmental Monitoring and Modeling Site, Field trip for GSA Joint North-Central/Southeastern Meeting, Cincinnati, Ohio, US.
- 2022 Advances in understanding processes at or near the groundwater – surface water interface, GSA Joint North-Central/Southeastern Meeting, Cincinnati, Ohio, US.
- 2020 Advances in understanding processes at or near the groundwater-surface water interface, GSA Annual Meeting Connects Online, US. Sponsored by GSA Hydrogeology Division, GSA Quaternary Geology & Geomorphology Division, and GSA Karst Division.
- 2019 Advances in understanding processes at or near the groundwater-surface water interface, GSA Annual Meeting, Phoenix, Arizona, US. Sponsored by GSA Hydrogeology Division and GSA Soils and Soil Processes Division.
- 2018 Groundwater-surface water interactions: identifying and integrating physical, biological, and chemical patterns and processes across systems and scales, Fall Meeting, Washington DC
- 2018 Complexities of subsurface fluid emplacement for energy storage in porous formations, Fall Meeting, Washington DC

- 2017 Persistent problems in multiphase flow and transport in porous media: from pore- to continuum-scale, Fall Meeting, San Francisco, CA

Guest editor:

- 2021 Special issue on *CO₂ geologic storage and utilization: Recent advances and future perspectives*, Interpretation, SEG and AAPG Journal.
- 2020 Special issue on *Modeling the impacts of climate change on water resources security*, Atmosphere.
- 2020 Special issue on *Modeling Multiphase Flow and Reactive Transport in Porous Media*, Energies.
- 2019 Special issue on *Enhanced Oil Recovery in Conventional and Unconventional Oil and Gas Reservoirs*, Advances in Geo-Energy Research.
- 2018-2019 Special issue on *Reactive transport modeling and risk assessment for geologic CO₂ sequestration*, Computers & Geosciences.
- 2018-2019 Special issue on *Geologic CO₂ Sequestration: Progress and Challenges*, Geomechanics and Geophysics for Geo-Energy and Geo-Resources.

Reviewer for:

Geophysical Research Letters, Scientific Reports, Environmental Science and Technology, Water Resources Research, Hydrogeology Journal, Journal of Hydrology, Energy & Fuel, Greenhouse Gases: Science and Technology, Geotechnical and Geological Engineering, Hydrological Processes, Natural Resource Modeling, Stochastic Environmental Research and Risk Assessment, Groundwater for Sustainable Development, Iranian Journal of Science and Technology Transactions of Civil Engineering, Geomechanics and Geophysics for Geo-Energy and Geo-Resources, International Journal of Greenhouse Gas Control, Fuel, The Canadian Journal of Chemical Engineering, Environmental and Engineering Geoscience, Acta Geophysica, Journal of Petroleum Exploration and Production Technology, Energies

Proposal reviewer for:

National Science Foundation
Ohio Water Resources Center
American Chemical Society (ACE) Petroleum Research Fund
P30-Texas A&M Center for Environmental Health

Panelist for:

National Science Foundation, Hydrologic Sciences Program

University of Cincinnati

- 2022-present Board member, Confluence Water Technology Innovation Cluster
- 2018-present Director, Theis Environmental Monitoring & Modeling Site.

- 2018-present Member of the steering committee for UC Center for Field Studies.
- 2021 Search committee member for faculty positions in Environmental Engineering.

UC Geosciences

- 2022-present Geosciences Department Colloquium Series.
- 2022-present Geosciences Department industry partnership committee member.
- 2021-present Graduate policy committee member.
- 2019-present Managing and maintaining ICP-OES laboratory.
- 2018-present Director, Theis Environmental Monitoring & Modeling Site.
- 2020 Invited and hosted Henry Darcy Distinguish Lecture by Prof. Reed Maxwell.
- 2019 Invited and hosted Henry Darcy Distinguish Lecture by Dr. John Doherty.
- 2019 Organized and hosted STOMP Simulator workshop by Dr. Mark White from Pacific Northwest National Laboratory.

Local community

- 2021-present Develop a groundwater education program for Cincinnati Museum Center.
- 2018-2021 Display cores from Theis Environmental Monitoring & Modeling Site at Cincinnati Museum Center.

Conference Abstracts

† denotes undergraduate students, graduate students, postdoctoral researchers, and visiting scholars.

32. **Soltanian, M.R.**, Ershadnia[†], R., Moeini[†], Rubinstein, R., Versteeg, R., Investigating applications of cDC-GANs for diverse subsurface problems: Multiphase flow and enhanced reaction rates, HydroML 2023 symposium, Berkeley, CA on May 21-24 2023.
31. Li[†], P., McGarr[†], J., Ford, R., Wallace[†], C.D., Kleman[†], T., Fields[†], C., Trutschel, L., Ward, D., Rowe, A., Fritz, K., **Soltanian, M.R.**, Characterizing hyporheic zone processes controlled by sedimentary architecture within compound bar deposits using field data and a numerical modeling, GSA NC section meeting in Grand Rapids, MI on May 4-6 2023.
30. McGarr[†], J., Li[†], P., Meyal[†], A., Rubinstein, R., Versteeg, R., McAvoy, D., **Soltanian, M.R.**, Understanding fate and transport of perfluorooctane sulfonic acid (PFOS) within riparian floodplains GSA NC section meeting in Grand Rapids, MI on May 4-6 2023.
29. Ershadnia[†], R., Hajirezaie, S., Hosseini, S.A., **Soltanian, M.R.**, Effect of thermal-hydrological-mechanical-chemical mechanisms on CO_2 distribution within aquifers, Carbon Capture, Utilisation and Storage (CCUS), Houston, Texas, 2023.
28. **Soltanian, M.R.**, Ershadnia[†], R., Moeini[†], F., Predicting the effect of capillary heterogeneity on methane plume migration in shallow unconfined aquifers: Physics-based and surrogate modeling, Interpore 15th Annual Meeting, Edinburgh, Scotland, 2023.
27. Li[†], P., **Soltanian, M.R.**, Understanding the impact of small-scale topographies on multi-component reactive transport processes within the groundwater and surface water mixing

zone using a fully-coupled modeling framework, Interpore 15th Annual Meeting, Edinburgh, Scotland, 2023.

26. Versteeg, R., Rubinstein, R. L., Meyal[†], A., **Soltanian, M.R.**, Johnson, D., Turner, T., Turnkey cloud based modeling using containerized components, American Geophysical Union, Fall Meeting 2022
25. Lulu[†], X., Dai, Z., **Soltanian, M.R.**, Physicochemical processes of geological carbon sequestration in partially depleted oil reservoirs, American Geophysical Union, Fall Meeting 2022
24. Wallace[†], C.D., **Soltanian, M.R.**, High-resolution redox monitoring to evaluate and optimize the remediation of redox-sensitive solutes in dynamic hydrogeologic environments, Battelle's Twelfth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, California, 2022, May.
23. McGarr[†], J., Wallace[†], C.D., Ntarlagiannis, D., Sturmer, D., **Soltanian, M.R.**, Geophysical mapping of hyporheic processes controlled by sedimentary architecture within compound bar deposits, GSA Joint North-Central/Southeastern Meeting, Cincinnati, Ohio, US, 2022, April.
22. Ward, D., Booth, M., Matter, S., **Soltanian, M.R.**, Sturmer, D., Grap, P., Walson, J., Brown, J., Boylson, P., Ongoing research in geomorphology and hydrogeology at the Cooper Creek collaborative experimental watershed, GSA Joint North-Central/Southeastern Meeting, Cincinnati, Ohio, US, 2022, April.
21. Ershadnia[†], R., **Soltanian, M.R.**, Hydro-thermo-chemo-mechanical modeling of carbon dioxide injection in fluvial heterogeneous aquifers, GSA Joint North-Central/Southeastern Meeting, Cincinnati, Ohio, US, 2022, April.
20. **Soltanian, M.R.**, Wallace[†], C.D., Spatiotemporal dynamics of solute mixing and redox dynamics in riparian floodplains, AGU Fall Meeting, New Orleans, LA, 13-17 December 2021.
19. Versteeg, R., Rubinstein, R., Meyal[†], A., Zhou, H., **Soltanian, M.R.**, Peacock, A., Integration of measurements, modeling, and parameter estimation for a predictive site understanding, RemPlex Summit, Center for the Remediation of Complex Sites, Pacific Northwest National Laboratory, Nov 8-12, 2021.
18. Boano, F., Pescimoro, E., Sawyer, A. and **Soltanian, M.R.** Modeling effects of physical and chemical heterogeneity of alluvial sediments on hyporheic exchange. In EGU General Assembly Conference Abstracts (p. 10086), 2020, May.
17. Versteeg, R., Alper, E., Aufdenkampe, A.K., Johnson, D.V., Karra, S., Rodzianko, A., Rubinstein, R. L., **Soltanian, M.R.**, Partridge, G., Wainwright, H.M., Turner, T., Zhou, H., Watershed process understanding through automated multi source data ingestion and model-data coupling, American Geophysical Union, Fall Meeting 2019
16. Wallace[†], C.D., Sawyer, A.H., **Soltanian, M.R.**, Barnes, R., Nitrate removal within heterogeneous fluvial sediments under tidal influence, American Geophysical Union, Fall Meeting 2019
15. Zhan[†], C., Dai, Z., Zhang, X., **Soltanian, M.R.**, How does resolution of sedimentary architecture data affect plume dispersion in multiscale and hierarchical systems? GSA Annual Meeting in Phoenix, AZ, USA, 2019

14. Ershadnia[†], R. Hajirezaie, S., Gershenzon, N. I., **Soltanian, M.R.**, Impact of methane on carbon dioxide sequestration within multiscale and hierarchical fluvial architecture, GSA Annual Meeting in Phoenix, AZ, USA, 2019
13. Wallace[†], C.D., Sawyer, A.H., **Soltanian, M.R.**, Barnes, R., Nitrate removal within heterogeneous fluvial sediments under tidal influence, GSA Annual Meeting in Phoenix, AZ, USA, 2019
12. Dai, Z., **Soltanian, M.R.**, Neural network based fractal models for predicting petrophysical properties of the sandstone in northern coal mines of China, EGU General Assembly, Vienna, Austria, 2019
11. **Soltanian, M.R.**, Versteeg, R., Liu[†], Y., Bowling[†], J., Ransom[†], S., Nash, D., Rowe, A., Trutschel, L., Ward, D., Townsend-small, A.V, Sturmer, D., Lowell, T., Ekberg, M., Ritzi, R.W., Dominic, D., Dwivedi, D., Toward Real Time Monitoring and Predicting Hydrobiogeochemical Impacts of Groundwater-Surface Water Interactions: Applications to CV Theis Groundwater Observatory, American Geophysical Union, Fall Meeting 2018
10. **Soltanian, M.R.**, Amooie, M.A., Cole, D., Darrah, T., Graham, D., Pfiffner, S., Phelps, T., Moortgat, J., Impacts of methane on carbon dioxide storage in brine formations, Interpore 10th Annual Meeting, New Orleans, USA, 2018
9. Liu[†], Y., **Soltanian, M.R.**, Zhou, Y., Xue, L., Dwivedi, D., Influence of Streambed Heterogeneity on Reactive Solute Transport in Gravelly Rivers, American Geophysical Union, Fall Meeting 2018
8. Meyal[†], A., **Soltanian, M.R.**, Salinas, P., An Advanced Multiphase Flow and Reactive transport Code for Simulating CO₂ Geological Sequestration, American Geophysical Union, Fall Meeting 2018
7. Versteeg, R., Alper, E., Dafflon, B., Falco, N., Johnson, D., Karra, S., Lichtner, P., Rodzianko, A., **Soltanian, M.R.**, Wainwright, H.M., van der Werf, M., Zhang, Y., Multi-site critical zone process understanding through standardized and automated data ingestion and model-data coupling, American Geophysical Union, Fall Meeting 2018
6. Dong, Sh., Dai, Z., Xu, B., Wang, H., **Soltanian, M.R.**, Experimental investigation of cement based slurry transport processes in fractured limestone, GSA Annual Meeting in Indianapolis, Indiana, USA, 2018
5. Ma[†], F., Dai, Z., Wang, C., **Soltanian, M.R.**, Experimental and simulation investigation of radionuclide migration in fractured granite, GSA Annual Meeting in Indianapolis, Indiana, USA, 2018
4. Zhan[†], C., Dai, Z., Ritzi, R.W., **Soltanian, M.R.**, Spatial correlation structures of multi-modal permeability in hierarchical media with markov chain approach, GSA Annual Meeting in Indianapolis, Indiana, USA, 2018
3. Wanli[†], R., Dai, Z., Cao, Y., **Soltanian, M.R.**, Upscaling solute transport in saturated porous media from experiment scale to field scale, GSA Annual Meeting in Indianapolis, Indiana, USA, 2018

2. Dai, Z., Ma, Z., Wanli[†], R., Yang, C., **Soltanian, M.R.**, Scale dependent dispersion of solute transport in multiscale media, GSA Annual Meeting in Indianapolis, Indiana, USA, 2018
1. Zhan, J., Dai, Z., Qin, S., Liu, X., Li, G., **Soltanian, M.R.**, Potential volcanic earthquake induced landslide assessment in Changbai mountain, Northeast China, GSA Annual Meeting in Indianapolis, Indiana, USA, 2018

Media Attention

My work on groundwater and surface water interaction at the Theis Environmental Monitoring and Modeling Site at the University of Cincinnati has received attention in the following media outlets:

○ UC news

- Miller, M., 2019, UC Groundwater Project Goes International, The University of Cincinnati's groundwater observatory, the only one of its kind east of the Mississippi River, is helping scientists understand how to protect drinking water around the world, <https://www.uc.edu/news/articles/2019/05/n20835936.html>
- Miller, M., 2020, UC unleashes new tools to track water pollution; University is leading global effort to understand how rivers influence drinking water, <https://www.uc.edu/news/articles/2020/11/uc-unleashes-new-tools-to-track-water-pollution-at-groundwater-observatory.html>

○ Public radio

- Thompson, A., 2020, UC observatory could help protect drinking water, <https://www.wvxu.org/post/crosby-township-water-sensors-could-be-copied-nationwidestream/0>

○ 2021 Research Spotlight Interpore

- <https://www.interpore.org/research-spotlight-introduction-to-the-theis-environmental-monitoring-and-modeling-site-at-the-university-of-cincinnati/>

Associated visualizations of redox dynamics and time-lapse geophysics at the Theis Environmental Monitoring and Modeling Site (TEMMS) are available at the Interpore's YouTube channel:

<https://www.youtube.com/watch?v=SpjeZR8WqgA>

<https://www.youtube.com/watch?v=41_{25cW}pdw>