Javier Vilcáez, Ph.D.
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My current research is on the Water-Energy-CO2 nexus. I conduct experimental and computational research on the hydrological, geochemical, and microbiological factors and interactions that control the multiphase bio-geochemical reactive transport of gas, aqueous, and hydrocarbon compounds in deep and shallow geological formations of complex heterogeneous porous media, at both the pore- and field-scale levels. The focus is on groundwater quality, petroleum produced water treatment and disposal, geological carbon storage and utilization, and enhanced oil recovery. The goal is to develop new environmental technologies and computational methodologies to minimize the environmental burden of and optimize the development of subsurface energy and groundwater resources. So far, my research has resulted in more than 40 peer-reviewed articles published in energy, mineral, and groundwater journals. I value independence, the majority of my publications are as first and/or corresponding author of research done by myself and with undergraduate and graduate students working under my supervision.

EDUCATION

Ph.D.	Environmental Studies (Geosystems and Energy Sciences), Tohoku University, Japan, 2009.
M.Eng.	Civil Engineering, Gunma University, Japan, 2006.
B.Eng.	Chemical Engineering, University of Saint Francis Xavier, Bolivia, 1998.

PROFESSIONAL EXPERIENCE

2020.8 – Present	Associate Professor of Geofluids & Hydrogeology, Boone Pickens School of Geology, Oklahoma State University, USA.
2014 – 2020	Assistant Professor of Geofluids & Hydrogeology, Boone Pickens School of Geology, Oklahoma State University, USA.
2011 – 2014	Assistant Professor of Energy Fluids, Frontier Research Center for Energy and Resources (FRCER), Graduate School of Engineering, The University of Tokyo, Japan.
2010 – 2011	Postdoctoral Scholar of Computational Modeling & Geosystems Production, Department of Energy and Mineral Engineering, The Pennsylvania State University, USA.

2009 – 2010	Postdoctoral Fellow of Energy Security, New Industry Creation Hatchery Center (NICHE), Tohoku University, Japan.
2000 – 2003	Production Chemicals and Drilling Fluids Engineer, MI-SWACO, Bolivia.
1998 – 2000	Computer Programmer, Center of Digital Computation, Bolivia.

RESEARCH EXPERIENCE

Mathematical modeling and simulation of multiphase reactive transport processes & Numerical optimization and uncertainty analysis

1. Groundwater flow
2. Enhanced oil recovery
3. Geological CO_2 storage
4. Heap and underground leaching of minerals
5. Transport and transformation of pollutants in underground water

Petroleum and mineral biotechnology

1. Microbial enhanced hydrocarbon recovery
2. Biogenic CO_2-recycling to CH_4
3. Bio & hydrometallurgy
4. Biological treatment of waters

Hydrothermal technology

1. Upgrading of heavy oil with supercritical fluids
2. Hydrothermal hydrogen generation

Water-Energy-CO_2 nexus

1. Beneficial use and safe disposal of CO_2 and petroleum produced water
2. Pore-scale modeling of petrophysical properties
3. Petroleum produced water management
4. Environmental data analysis

TEACHING EXPERIENCE

Oklahoma State University, USA (Faculty)

1. Applied Geostatistics (Spring 2020).
2. Exploring Earth: An Introduction to Geology (Fall 2018 (2 sections), Fall 2019, Fall 2020).
3. Groundwater Modeling (Spring 2015, Spring 2017, Spring 2019, Spring 2021).
4. Colloquium (Spring 2017).

5. Contaminant Transport (Spring 2016).
6. Geochemistry (Fall 2015, Fall 2016, Fall 2017).
7. Advanced Studies in Geology (Fall 2014 - present).
8. Special Problems in Earth Science (Fall 2014 - present).
9. Doctoral Dissertation Research (Fall 2014 - present).
10. Master's Thesis (Fall 2014 - present).

University of Tokyo, Japan (Faculty)

1. Advances in Simulation (Fall 2014, co-teaching).
2. Global Environment (Fall 2011, Fall 2013).
3. Environmental Petroleum and Mineral Engineering (Spring 2011, Spring 2012, co-teaching).

Pennsylvania State University, USA (TA)

1. Applied Reservoir Engineering (Spring 2010).

Univ. of St. Francis Xavier, Bolivia (TA)

1. Chemical Reactors Design (Spring 1998, Fall 1998).

AWARDS AND RECOGNITIONS

1. Top 5 most cited paper in the *International Journal of Mineral Processing* since 2007: "Bioleaching of chalcopyrite with thermophiles. Temperature-pH-ORP dependence" by Vilcáez, Suto, and Inoue.
2. Top 25 Hottest Article in *Minerals Engineering* (October to December 2008): "Response of thermophiles to the simultaneous addition of sulfur and ferric ion to enhance the bioleaching of chalcopyrite" by Vilcáez, Suto, and Inoue.
3. Top 25 Hottest Article in *Hydrometallurgy* (January to March 2009): "Effect of pH reduction and ferric ion addition on the leaching of chalcopyrite at thermophilic temperatures" by Vilcáez, Yamada, and Inoue.
4. Recognition for Outstanding Academic Accomplishment, Graduate School of Environmental Studies, Tohoku University, Japan, 2009.
5. Monbukagakusho Scholarship for Graduates (Doctor Course), Japanese Ministry of Education, Culture, Sports, Science and Technology, Japan, 2006 - 2009.
6. Monbukagakusho Scholarship for Graduates (Master course). Japanese Ministry of Education, Culture, Sports, Science and Technology, Japan, 2003 - 2009.
7. Recognition for Outstanding Undergraduate Thesis Dissertation, Faculty of Technology, University of Saint Francis Xavier, Bolivia, 1998.
8. Jaime Escalante Scholarship Award for Undergraduates, Jaime Escalante Foundation, Bolivia, 1993

AWARDED RESEARCH GRANTS

External (*Denotes principal investigator)

2021	1. ***J. Vilcáez**. "Pore-scale machine-learning modeling of flow and transport properties of carbonate rocks". National Science Foundation (NSF), EAR-Hydrologic Sciences program (Total award $282,444). Pending.
2020	2. ***J. Vilcáez.** "A new dolomite filtration technology to remove heavy metals and NORM from produced water". USGS 104(b) program (Total direct award $25,000). March 2020 - December 2021.
2019	3. * **J. Vilcáez**, B. Shabani, M. Elshahed. "Beneficial use of produced water to convert crude oil to methane gas in depleted oil reservoirs". Oklahoma Water Resources Center (Total direct award $5,000). February 2019 - January 2020.
2014	4. ***J. Vilcáez**. "Reactive transport modeling and simulation of microbial CH_4 generation in depleted oil reservoirs". Arai Science and Technology Foundation Research Grant (Total direct award 1,000,000 JY ($10,000)). April 2013 - March 2014.
2013	5. ***J. Vilcáez**. "Development of an organic matter-injection method for biogenic restoration of subsurface methane gas deposits". Japan Oil, Gas and Metals National Corporation (JOGMEC), Collaborative Research with the University of Tokyo (Total direct award 2,000,000 JY ($20,000)). April 2012 - March 2013.

Internal (*Denotes principal investigator)

2019	6. ***J. Vilcáez**. "Beneficial use of produced water: In-situ crude oil conversion to methane gas". Oklahoma State University-College of Arts & Sciences, FY 2020 Fall Travel Program ($1,000).
2017	7. ***J. Vilcáez**. "Risk assessment of groundwater pollution by hydraulic fracturing fluid migration". Oklahoma State University-College of Arts & Sciences, FY 2017 A&S Summer Research and +1 Supplement Program ($7,778 + $1,000).
2016	8. ***J. Vilcáez**. "Restoration of CH_4 deposits driven by the injection of CO_2 and stimulating nutrients". Oklahoma State University-College of Arts & Sciences, FY 2016 A&S Summer Research and +1 Supplement Program ($7,778 + $1,000).
2015	9. ***J. Vilcáez**. "Biogenic recycling of geologically stored CO_2 to CH_4". Oklahoma State University-College of Arts & Sciences, FY 2015 Spring Travel Program ($1,000).

PUBLICATIONS

Papers in peer-reviewed journals (*Denotes corresponding author, **Denotes student who I mentored)

2021

1. **O. Ishola, A. Alexander, ***J. Vilcáez***. Stochastic pore-scale modelling to predicting permeability and tortuosity of complex heterogeneous porous media. Advances in Water Resources, 2021, in review. (IF 4.0).

2020

2. ***J. Vilcáez.*** System and method of removing oil and heavy metals from petroleum produced water. U.S. Provisional Patent Application No 63/114,115.
3. ***J. Vilcáez.*** Reactive transport modeling of produced water disposal into dolomite aquifers: Controls of barium transport. Journal of Contaminant Hydrology, Vol. 233, 2020, Article 103600. doi.org/10.1016/j.jconhyd.2020.103600. (IF 2.650).
4. **B. Shabani, J. Pashin, ***J. Vilcáez***. TOUGHREACT-CO2Bio – A new module to simulate geological carbon storage under biotic conditions (Part 2): The bio-geochemical reactive transport of CO_2-CH_4-H_2-H_2S gas mixtures. Journal of Natural Gas Science and Engineering, Vol. 76, 2020, Article 103190. doi.org/10.1016/j.jngse.2020.103190. (IF 3.859).
5. A. Yadav, **J. Vilcáez**, I. F. Farag, B. Johnson, K. Mueller, N.H. Youssef, *M.S. Elshahed. Genomic characterization of a novel candidate phylum (ARYD3) from a high temperature, high salinity tertiary oil reservoir in north central Oklahoma, USA. Systematic and Applied Microbiology, Vol. 43, Issue 2, 2020, Article 126057. doi.org/10.1016/j.syapm.2020.126057. (IF 2.808).

2019

6. **B. Shabani, ***J. Vilcáez***. TOUGHREACT-CO2Bio – a new module to simulate GCS under biotic conditions (Part 1): the multiphase flow of CO_2-CH_4-H_2-H_2S gas mixtures. Journal of Natural Gas Science and Engineering, Vol. 63, 2019, pp. 85-94. doi.org/10.1016/j.jngse.2019.01.013. (IF 3.859).
7. **P. Ebrahimi, *** J. Vilcáez***. Transport of barium in fractured dolomite and sandstone saline aquifers. Science of the Total Environment, Vol. 647, 2019, pp. 323-333. doi.org/10.1016/j.scitotenv.2018.08.008. (IF 5.589).

2018

8. ***J. Vilcáez,*** **J. York, N. Youssef, M. Elshahed. Stimulation of crude oil biodegradation via methanogenesis in depleted oil reservoirs. Fuel, Vol. 232, 2018, pp. 581-590. doi.org/10.1016/j.fuel.2018.06.018. (5IF 5.128).

9. **P. Ebrahimi, *** J. Vilcáez**. Petroleum produced water disposal: Mobility and transport of barium in sandstone and dolomite rocks. Science of the Total Environment, Vol. 634, 2018, pp. 1054-1063. doi.org/10.1016/j.scitotenv.2018.04.067. (IF 5.128).

10. **P. Ebrahimi, ***J. Vilcáez**. Effect of brine salinity and guar gum on the transport of barium through dolomite rocks: implications for unconventional oil and gas wastewater disposal. Journal of Environmental Management, Vol. 214, 2018, pp. 370-378. doi.org/10.1016/j.jenvman.2018.03.008. (IF 4.865).

11. **B. Shabani, ***J. Vilcáez**. A fast and robust TOUGH2 module to simulate CO_2 storage in saline aquifers. Computers & Geosciences, Vol. 111, 2018, pp. 58-66. doi.org/10.1016/j.cageo.2017.10.012. (IF 2.721).

2017

12. ***J. Vilcáez**, S. Morad, N. Shikazono. Pore-scale simulation of transport properties of carbonate rocks using FIB-SEM 3D microstructure: implications for field scale solute transport simulations. Journal of Natural Gas Science and Engineering, Vol. 42, 2017, pp. 13-22. doi.org/10.1016/j.jngse.2017.02.044. (IF 3.859).

13. **B. Shabani, ***J. Vilcáez**. Prediction of CO_2-CH_4-H_2S-N_2 gas mixtures solubility in brine using a non-iterative fugacity-activity model relevant to CO_2-MEOR. Journal of Petroleum Science and Engineering, Vol. 150, 2017, pp. 162-179. doi.org/10.1016/j.petrol.2016.12.012. (IF 2.886).

2015

14. ***J. Vilcáez**. Numerical modeling and simulation of microbial methanogenesis in geological CO_2 storage sites. Journal of Petroleum Science and Engineering, Vol. 135, 2015, pp. 583-595. doi.org/10.1016/j.petrol.2015.10.015. (IF 2.886).

15. ***J. Vilcáez**. Stimulating effect of protein-rich matter on the biogenic conversion of CO_2 to CH_4. Journal of CO_2 Utilization, Vol. 10, 2015, pp. 60-66. doi.org/10.1016/j.jcou.2015.04.002. (5IF 5.489).

16. ***J. Vilcáez**. On the mechanism of chalcopyrite bioleaching with thermophiles. Austin J. Earth Sci. 2015; 2(2): id1014.

2013

17. V. Attavitkamthorn, ***J. Vilcáez**, K. Sato. Metamodeling of gas flooding EOR in Pattani Basin, Thailand. Journal of the Japanese Association for Petroleum Technology, Vol. 78, Issue 6, 2013, pp. 508-519. doi.org/10.3720/japt.78.508. (IF 0.83).

18. H. Kobayashi, N. Saito, K. Fu, H. Kawaguchi, **J. Vilcáez**, T. Wakayama, H. Maeda, *K. Sato. Bio-electrochemical property and phylogenetic diversity of

microbial communities associated with bioelectrodes of an electromethanogenic reactor. Journal of Bioscience and Bioengineering, Vol. 116, Issue 1, 2013, pp. 114-117. doi.org/10.1016/j.jbiosc.2013.01.001. (IF 2.032).

19. **J. Vilcáez**, *L. Li, S.S. Hubbard. A new model for the biodegradation kinetics of oil droplets: application to the Deepwater Horizon oil spill in the Gulf of Mexico. Geochemical Transactions, Vol. 14, Issue 4, 2013. doi.org/10.1186/1467-4866-14-4. (IF 2.615).

20. Q. Fu, H. Kobayashi, H. Kawaguchi, **J. Vilcáez**, H. Wakayama, H. Maeda, *K. Sato. Electrochemical and phylogenetic analyses of current-generating microorganisms in a thermophilic microbial fuel cell. Journal of Bioscience and Bioengineering, Vol. 115, Issue 3, 2013, pp. 268-271. doi.org/10.1016/j.jbiosc.2012.10.007. (IF 2.032).

21. *__J. Vilcáez__, L. Li, D. Wu, S.S. Hubbard. Reactive transport modeling of induced selective plugging by *Leuconostoc mesenteroides* in carbonate formations. Geomicrobiology Journal, Vol. 30, Issue 9, 2013, pp. 813-828. doi.org/10.1080/01490451.2013.774074. (IF 2.615).

2012

22. *__J. Vilcáez__, M. Watanabe, N, Watanabe, A. Kishita, T. Adschiri. Hydrothermal extractive upgrading of bitumen without coke formation. Fuel, Vol. 102, 2012, pp. 379-385. doi.org/10.1016/j.fuel.2012.07.024. (IF 5.128).

2011

23. P. Setiani, **J. Vilcáez**, N. Watanabe, A. Kishita, *N. Tsuchiya. Enhanced hydrogen production from biomass via the sulfur redox cycle under hydrothermal conditions. International Journal of Hydrogen Energy, Vol. 36, Issue 17, 2011, pp. 10674-10682. doi.org/10.1016/j.ijhydene.2011.06.012. (IF 4.084).

2009

24. *__J. Vilcáez__, T. Watanabe. Inhibitory effect of gamma-irradiated chitosan on the growth of denitrifying bacteria. International Journal of Microbiology, Vol. 2009, Article ID 418595. dx.doi.org/10.1155/2009/418595. (IF 1.670).

25. *__J. Vilcáez__, C. Inoue. Mathematical modeling of thermophilic bioleaching of chalcopyrite. Minerals Engineering, Vol. 22, Issue 11, 2009, pp. 951-960. doi.org/10.1016/j.mineng.2009.03.001. (IF 3.315).

26. *__J. Vilcáez__, R. Yamada, C. Inoue. Effect of pH reduction and ferric ion addition on the leaching of chalcopyrite at thermophilic temperatures. Hydrometallurgy, Vol. 96, Issues 1-2, 2009, pp. 62-71. doi.org/10.1016/j.hydromet.2008.08.003. (IF 3.465).

2008

27. *__J. Vilcáez__, K. Suto, C. Inoue. Response of thermophiles to the simultaneous addition of sulfur and ferric ion to enhance the bioleaching of chalcopyrite. Minerals Engineering, Vol. 21, Issue 15, 2008, pp. 1063-1074. doi.org/10.1016/j.mineng.2007.11.005. (IF 3.315).

28. *__J. Vilcáez__, K. Suto, C. Inoue. Modeling the auto-thermal performance of a thermophilic bioleaching heap employing mesophilic and thermophilic microbes. Hydrometallurgy, Vol. 94, Issues 1-4, 2008, pp. 82-92. doi.org/10.1016/j.hydromet.2008.05.007. (IF 3.465).

29. *__J. Vilcáez__, K. Suto, C. Inoue. Bioleaching of chalcopyrite with thermophiles. Temperature-pH-ORP dependence. International Journal of Mineral Processing, Vol. 88, Issues 1-2, 2008, pp. 37-44. doi.org/10.1016/j.minpro.2008.06.002. (IF 3.315).

2007

30. *__J. Vilcáez__, S. Miyazawa, K. Suto, C. Inoue. Numerical evaluation of biocide treatment against sulfate reducing bacteria in oilfield water pipelines. Journal of the Japan Petroleum Institute, Vol. 50, No.4, 2007, pp. 208-217. doi.org/10.1627/jpi.50.208. (IF 0.631).

Papers in peer-reviewed conference proceedings (*Denotes corresponding author, **Denotes student)

2013

31. **V. Attavitkamthorn, __J. Vilcáez__, *K. Sato. Integrated CCS aspect into CO_2 EOR project under wide range of reservoir properties and operating conditions. Energy Procedia, Vol. 37, 2013, pp. 6901-6908. GHGT-11. Kyoto-Japan. November 18-22, 2012. doi.org/10.1016/j.egypro.2013.06.622.

32. **K. Tanaka, __J. Vilcáez__, *K. Sato. Improvement of CO_2 geological storage efficiency by injection and production well design. Energy Procedia, Vol. 37, 2013, pp. 4591-4597. GHGT-11. Kyoto-Japan. November 18-22, 2012. doi.org/10.1016/j.egypro.2013.06.367.

33. **Y. Kuramochi, Q. Fu, H. Kobayashi, M. Ikarashi, T. Wakayama, H. Kawaguchi, __J. Vilcáez__, H. Maeda, *K. Sato. Electromethanogenic CO_2 conversion by subsurface-reservoir microorganisms. Energy Procedia, Vol. 37, 2013, pp. 7014-7020. GHGT-11. Kyoto-Japan. November 18-22, 2012. doi.org/10.1016/j.egypro.2013.06.636.

34. **M. Hara, H. Kobayashi, H. Kawaguchi, __J. Vilcáez__, *K. Sato. Mechanism of Electromethanogenic Reduction of CO_2 by a Thermophilic Methanogen. Energy

Procedia, Vol. 37, 2013, pp. 7006-7013. GHGT-11. Kyoto-Japan. November 18-22, 2012. doi.org/10.1016/j.egypro.2013.06.637.

35. **Q. Fu, Y. Onaka, H. Kobayashi, H. Kawaguchi**, J. Vilcáez**, *K. Sato. Identification of new microbial mediators for electromethanogenic reduction of geologically-stored carbon dioxide. Energy Procedia, Vol. 37, 2013, pp. 7021-7028. GHGT-11. Kyoto-Japan. November 18-22, 2012. doi.org/10.1016/j.egypro.2013.06.635.

2011

36. **P. Setiani, **J. Vilcáez**, N. Watanabe, A. Kishita, *N. Tsuchiya. Sustainable and enhanced hydrogen production from biomass through sulfur redox cycle using georeactor. Geothermal Resources Council Transaction, Vol. 35, 2011, pp. 135-138. Geothermal Resources Council 35th Annual Meeting. San Diego-USA, October 23-26, 2011.

37. **A. Nuryadi, *A. Kishita, N. Watanabe, **J. Vilcáez**, N. Kawai. EOR simulation by in situ nitrogen production via denitrifying bacteria and performance improvement by nitrogen alternating surfactant injection. SPE Asia Pacific Oil & Gas Conference and Exhibition 2011. Jakarta-Indonesia. September 20-22, 2011. doi.org/10.2118/147823-MS.

2010

38. ***J. Vilcáez**, T. Watanabe. Antibacterial activity of gamma-irradiated chitosan against denitrifying bacteria. AIP Conference Proceedings Vol. 1251, 2010, pp. 161-164. 2nd International Symposium on Aqua Science, Water Resource and Low Carbon Energy. Sanya-China. December 7-10, 2009. doi.org/10.1063/1.3529265.

2009

39. *A. Kishita, **J. Vilcáez**, N. Watanabe. Observation of the heavy crude oil dissolution behavior under supercritical condition of water. Proceedings of International Petroleum Technology Conference, CD-ROM, 2009. IPTC 13898. Doha-Qatar. December 7-9. doi.org/10.2523/IPTC-13891-MS.

40. ***J. Vilcáez**, K. Suto, C. Inoue. Studies on thermophilic bioleaching of chalcopyrite toward heap application. Advanced Materials Research, Vol. 71-73, 2009, pp. 357-360. 18th International Biohydrometallurgy Symposium. Bariloche-Argentine. September 13-17, 2009. doi.org/10.4028/www.scientific.net/AMR.71-73.357.

41. ***J. Vilcáez**, C. Inoue. Enhancement and inhibition of bioleaching chalcopyrite with thermophiles. Proceedings of the symposium of the Mining and Materials

Processing Institute of Japan, Spring-2009, pp. 215-216. Tokyo, Japan. March 26-28, 2009.

2008

42. *__J. Vilcáez__, C. Inoue. Mathematical modeling of the thermophilic bioleaching of chalcopyrite. Proceedings of Computational Modelling in Mineral processing, 2008, CD-ROM. Cape Town-South Africa. November 13-14.

43. *__J. Vilcáez__, K. Suto, C. Inoue. Bioleaching of chalcopyrite with thermophiles: temperature-pH-ORP dependence. In: Wang D.Z., et al. (Eds.) Proceedings of XXIV International Mineral Processing Congress, 2008, pp. 2779-2788. Beijing-China. September 23-28, 2008. ISBN: 9787030227119.

44. *__J. Vilcáez__, R. Yamada, C. Inoue. Effect of pH reduction and ferric ion addition on the leaching of chalcopyrite at high temperatures. In: Young C.A., et al. (Eds.), Hydrometallurgy 2008, Proceedings of the Sixth International Symposium Honoring Robert S. Shoemaker, 2008, pp. 980-988. Phoenix-USA. August 17-20, 2008. ISBN: 9780873352666.

45. *__J. Vilcáez__, K. Suto, C. Inoue. Chemical leaching of chalcopyrite at high temperatures and low pH. Proceedings of the symposium of the Mining and Materials Processing Institute of Japan, Spring-2008, pp. 185-186. Tokyo-Japan. March 27-29, 2008.

2007

46. *__J. Vilcáez__, K. Suto, C. Inoue. Modeling the auto-thermal performance of a thermophilic bioleaching heap employing mesophilic and thermophilic microbes. Advanced Materials Research Vol. 20-21, 2007, pp. 70-74. 17th International Biohydrometallurgy Symposium. Frankfurt am Main-Germany. September 2-5, 2007. doi.org/10.4028/www.scientific.net/AMR.20-21.70.

47. *__J. Vilcáez__, K. Suto, C. Inoue. Response of thermophiles to the simultaneous addition of sulfur and ferric ion. Proceedings of 3rd International Symposium on Bio & Hydrometallurgy, 2007, CD-ROM. Falmouth-UK. May 1-2, 2007.

48. *__J. Vilcáez__, K. Suto, C. Inoue. Effect of temperature on the bioleaching of chalcopyrite using thermophiles. Proceedings of the symposium of the Mining and Materials Processing Institute of Japan, Summer-2007, pp. 44. Nagoya-Japan. September 25-27, 2007.

2006

49. *__J. Vilcáez__, K. Suto, C. Inoue. A numerical evaluation on the viability of heap thermophilic bioleaching. AIP Conference Proceedings, Vol. 898, 2007, pp. 217-222. 4th International Workshop on Water Dynamics. Sendai-Japan. November 7-8, 2006. doi.org/10.1063/1.2721284.

Abstracts in conference proceedings (*Denotes corresponding author, **Denotes student who I mentored)

2020

1. ***J. Vilcáez**. Treatment of produced water for dissolved oil and heavy metals: Methanogenic degradation coupled to dolomite filtration. American Geophysical Union (AGU) Fall Meeting 2020. Online Everywhere, USA. December 1-17, 2020. Oral presentation.
2. **O. Ishola, ***J. Vilcáez**. A pore-scale numerical investigation on the impact of heterogeneity in predicting flow properties of carbonate rocks. American Geophysical Union (AGU) Fall Meeting 2020. Online Everywhere, USA. December 1-17, 2020. Poster presentation.
3. **K.H. Omar, ***J. Vilcáez**. A new dolomite filtration method to remove heavy metals from produced water. American Geophysical Union (AGU) Fall Meeting 2020. Online Everywhere, USA. December 1-17, 2020. Poster presentation.
4. **O. Ishola, ***J. Vilcáez**. A stochastic pore-scale numerical approach to permeability and tortuosity prediction in carbonate systems. Geological Society of America (GSA) Annual Meeting 2020. Connects Online, USA. October 26-30, 2020. Oral presentation.

2019

5. ***J. Vilcáez**. A new economic treatment method of produced water for dissolved oil and heavy metals. American Chemical Society (ACS) Midwest Regional Meeting (MWRM). Wichita, Kansas, USA. October 16-19, 2019. Oral presentation.
6. ***J. Vilcáez,** **B. Shabani. Beneficial use of produced water in depleted oil reservoirs: in situ crude oil conversion to methane gas. Geological Society of America (GSA) Annual Meeting 2019. Phoenix, Arizona, USA. September 22-25, 2019. Oral presentation.

2018

7. **B. Shabani, **J. Vilcáez**. A new TOUGHREACT module to simulate geological carbon storage under biotic conditions. Geological Society of America (GSA) Annual Meeting 2018. Indianapolis, Indiana, USA. November 4-7, 2018. Poster Presentation.
8. ***J. Vilcáez**. Field-scale simulation of barium transport in Class II wastewater disposal wells. Geological Society of America (GSA) Annual Meeting 2018. Indianapolis, Indiana, USA. November 4-7, 2018. Oral presentation.

9. A. Yadav, I. F. Farag, **J. Vilcáez**, N. H. Youssef, and M. S. Elshahed. Enrichment and genomic analysis of a novel bacterial phylum from formation waters in a tertiary oil reservoir in Cushing, OK. Annual Symposium of the Department of Microbiology and Molecular Genetics, Oklahoma State University. Stillwater, Oklahoma. April 27, 2018. Poster presentation.

10. ***J. Vilcáez,** **P. Ebrahimi, **B. Shabani. Coupling the disposal of CO_2 and petroleum produced water: A new MEOR method. Geological Society of America (GSA), South-Central Section - 52nd Annual meeting 2018. Little Rock, Arkansas, USA. March 12-13, 2018. Oral presentation.

2017

11. ***J. Vilcáez**. Disposal of produced water into depleted oil reservoirs: economic use and risk of USDW pollution. National Ground Water Association (NGWA) Summit 2017. Nashville, Tennessee, USA. December 4-7, 2017. Oral presentation.

12. **P. Ebrahimi, ***J. Vilcáez**. Transport of barium through dolomite rocks under the presence of guar gum and brine salinities of hydraulic fracturing wastewater. American Geophysical Union (AGU) Fall Meeting 2017. New Orleans, Florida, USA. December 11-15, 2017. Poster presentation.

13. **B. Shabani, ***J. Vilcáez**. An improved TOUGH2 module to simulate geological CO_2 storage in saline aquifers. Geological Society of America (GSA) Annual Meeting 2017. Seattle, Washington, USA. October 22-25, 2017. Poster presentation.

14. **P. Ebrahimi, ***J. Vilcáez**. Experimental and modeling results of barium transport through dolomite under the presence of high salinity and guar gum of fracturing wastewater. 2017 American association of petroleum geologist (AAPG) Mid-continent section meeting. Oklahoma City, Oklahoma, USA. October 2-3, 2017. Poster presentation.

15. ***J. Vilcáez**. Transport of heavy metals through shale rock fractures due to the injection of fracturing fluids: modeling and simulation. Geological Society of America (GSA), South-Central Section - 51st Annual meeting 2017. San Antonio, Texas, USA. March 12-14, 2017. Oral presentation.

2016

16. ***J. Vilcáez**, **J. York, **T. Seabeck. Stimulation of microbial methanogenesis from oil and CO_2 in the Cushing oil field. American Geophysical Union (AGU) Fall Meeting 2016. San Francisco, California, USA. December 12-16, 2016. Poster presentation.

17. **P. Ebrahimi, ***J. Vilcáez***. Effect of guar gum on the mobility of barium in disposal wells of the Arbuckle formation. Geological Society of America (GSA) Annual Meeting 2016. Denver, Colorado, USA. September 25-28, 2016. Oral presentation.

18. **B. Shabani, ***J. Vilcáez***. Prediction of CO_2-CH_4-H_2S-N_2 gas mixtures solubility in brine using a non-iterative fugacity-activity model relevant to MEOR. Geological Society of America (GSA) Annual Meeting 2016. Denver, Colorado, USA. September 25-28, 2016. Oral presentation.

19. ***J. Vilcáez***. Reactive transport modeling of biocide reagents in unconventional hydrocarbon reservoirs. 251st American Chemical Society (ACS) National Meeting & Exposition. San Diego, California, USA. March 14-17, 2016. Oral presentation.

2015

20. ***J. Vilcáez***. Microbial methanogenesis in oil reservoirs subjected to the injection of CO_2. Geological Society of America (GSA) Annual Meeting 2015. Baltimore, Maryland, USA. November 1-4, 2015. Oral presentation.

21. ***J. Vilcáez***. Pore-scale simulation of transport properties of carbonate rocks using nanoscale FIB-SEM 3D images. Geological Society of America (GSA) Annual Meeting 2015. Baltimore, Maryland, USA. November1-4, 2015. Oral presentation.

22. ***J. Vilcáez***. Stimulating effect of protein-rich matter on the biogenic conversion of CO_2 to CH_4. 249th American Chemical Society (ACS) National Meeting & Exposition. Denver, Colorado, USA. March 22-26, 2015. Oral presentation.

2014

23. ***J. Vilcáez***. Mathematical modeling as a tool to assess microbial community responses to CO_2 injection. American Geophysical Union (AGU) Fall Meeting 2014. San Francisco, California, USA, December 15-17, 2014. Poster presentation.

24. ***J. Vilcáez***, L. Li, K. Sato. Horizontal wells placement optimization for CO_2 geological storage in confined aquifers subjected to brine recycling. Japan Geosciences Union (JGU) Meeting 2014, Yokohama, Japan. April 28-May 2, 2014. Oral presentation.

2012

25. ***J. Vilcáez***. Restoration of methane gas deposits through stimulation of indigenous methanogens: modeling and simulation. JOGMEC-TRC Week 2012, toward actualization of a pilot project focused on the technology of

microbial methane generation. Tokyo, Japan. November 28, 2012. Oral presentation.

2010

26. ***J. Vilcáez**, L. Li, S. Hubbard, T. Hazen. Biodegradation of Deep-Sea Oil Spill at the Gulf of Mexico: An Estimate of Half Life Time. American Geophysical Union (AGU) Fall Meeting 2010. San Francisco, California, USA. December 13-17, 2010. Poster presentation.

INVITED SEMINARS AND PRESENTATIONS

2019

1. American Chemical Society (ACS) Midwest Regional Meeting (MWRM). Wichita, Kansas. October 17, 2019. "A new economic treatment method of produced water for dissolved oil and heavy metals". Invited speaker.
2. Department of Petroleum and Natural Gas Engineering, Bolivian Private University (UPB). Cochabamba, Bolivia. July 6, 2019. "Water-Energy-CO_2 Nexus". Seminar series.
3. Department of Petroleum and Natural Gas Engineering, University of Saint Francis Xavier. Monteagudo, Bolivia. July 1, 2019. "Water-Energy-CO_2 Nexus". Seminar series.

2018

4. Department of Geological Sciences, Texas Cristian University, Fort Worth, Texas. November 30, 2018. "Beneficial use and safe disposal of petroleum produced water in Oklahoma". Seminar Series.
5. Department of Geology, Kansas State University, Manhattan, Kansas. March 1, 2018. "Computational modeling of subsurface bio-hydro-geochemical processes". Seminar series.

2017

6. Department of Microbiology and Molecular Genetics, Oklahoma State University. Stillwater, Oklahoma. February 20, 2017. "Stimulation of microbial methanogenesis in depleted oil reservoirs". Seminar series.

2016

7. Department of Geosciences and Geological and Petroleum Engineering, Missouri University of Science and Technology. Rolla, Missouri. November 28, 2016. "Coupling geological carbon storage (GCS) and microbial enhanced hydrocarbon recovery (MEHR) in depleted oil reservoirs". Seminar series.
8. Department of Geography, Geology and Planning, Missouri State University. Springfield, Missouri. November 18, 2016. "Bio-geochemical reactive transport modeling of geological CO_2 storage in depleted oil reservoirs". Seminar Series.

9. U.S. Environmental Protection Agency (EPA) Seminar Series, R.S. Kerr Environmental Research Center. Ada, Oklahoma. May 11, 2016. "Reactive transport modeling of biocide treatments in unconventional hydrocarbon reservoirs". Seminar series.
10. The University of Texas Rio Grande Valley (UTRGV) Oil and Gas Conference. McAllen, Texas. March 23-25, 2016. "Restoration of depleted CH_4 gas deposits via microbial methanogenesis driven by the injection of CO_2 and stimulating nutrients". Invited speaker.

2015

11. Annual meeting of Geological Society of America 2015. Baltimore, Maryland. November 1-4, 2015. "Microbial methanogenesis in oil reservoirs subjected to the injection of CO_2". Invited speaker.

2014

12. Boon Pickens School of Geology Seminar Series, Oklahoma State University. Stillwater, Oklahoma. October 17, 2014. "Reactive transport modeling of CO_2 geological storage: methanogenesis from CO_2". Seminar series.

2012

13. Japan Oil, Gas and Metals National Corporation (JOGMEC)-TRC Week 2012, Tokyo-Japan. November 28, 2012. "Restoration of methane gas deposits through stimulation of indigenous methanogens: modeling and simulation". Invited speaker.

SERVICE TO THE DISCIPLINE AND PROFESSION

Chairing conference sessions

1. Co-chair of "Hydrogeology and Water Quality of the Mid-Continent U.S. and Mexico" at GSA South-Central Section – 52nd Annual meeting. Little Rock, Arkansas, USA. March 2018.
2. Chair of "Advances in Groundwater Modeling" at GSA 2015 Annual Meeting & Exposition. Baltimore, Maryland, USA. November 2015.
3. Co-chair of "Hydrology, Geochemistry, and Environment Geoscience" at GSA South-Central Section – 49th Annual meeting. Stillwater, Oklahoma, USA, March 2015.
4. Chair of "Mining of unconventional energy and mineral resources in Chile and Japan" at UTokyo Forum Global Emergence of Frontier Knowledge. Santiago, Chile, November 2013.

Invited research grant reviewer/panelist

1. National Science Foundation (NSF), Chemical, Bioengineering, Environmental and Transport Systems, Environmental Engineering (CBET-EE). March 1, 2019.
2. American Chemical Society (ACS), Petroleum Research Fund. February 22, 2018.

3. Geological Sciences & Engineering, Missouri University of Science & Technology. 2016, 2017.

Invited journal reviewer

1. Bioresources Technology (IF 5.8)
2. Journal of Hazardous Materials (IF 6.4)
3. Environmental Technology (IF 1.7)
4. Industrial and Engineering Chemistry Research (IF 3.1)
5. Hydrometallurgy (IF 3.3)
6. Fuel (IF 4.9)
7. Energy & Fuels (IF 3.0)
8. Journal of Petroleum Science and Engineering (IF 2.4)
9. Environmental Science & Technology (IF 6.4)
10. Geochemical Transactions (IF 1.7)
11. ACS Sustainable Chemistry & Engineering (IF 6.1)
12. Geochimica et Cosmochimica Acta (IF 4.7)
13. Scientific Reports (IF 4.6)
14. Advances in Water Resources (IF 3.5)
15. Water Resources Research (IF 4.4)
16. Frontiers in Microbiology (IF 4.0)
17. Catalysis Today (IF 4.9)
18. Euro-Mediterranean Journal for Environmental Integration (IF N/A)
19. Water Research (IF 9.13)
20. Journal of Natural Gas Science & Engineering (IF 3.84)
21. Science of the Total Environment (IF 6.55)
22. Hydrogeology Journal (IF 2.64)

Editorial board

2014 - Present Austin Journal of Earth Science

SERVICE TO THE SCHOOL AND COLLEGE

1. Hydro-geochemistry search committee (Fall 2018, Fall 2019)
2. Reviewer for the annual President's Cup (Fall 2018)
3. Paleontology search committee (Fall 2017)
4. Graduate committee (Fall 2016 - present)
5. Student enrichment fund committee (Fall 2014 - present)
6. A&S Faculty council college scholarship committee (Fall 2015 - Fall 2018)
7. Personnel committee (Fall 2017-Fall 2018)

8. Safety/ergonomics committee (Fall 2017-present)

PROFESSIONAL DEVELOPMENT

1. CAS General Education Teaching Workshop. Stillwater, Oklahoma, USA. August 12, 2019.
2. Alan Alda Science Communication Workshop for STEM scientists. Stillwater, Oklahoma, USA. January 9-10, 2018.
3. 2015 NSF CAREER Proposal Writing Workshop, National Science Foundation. Boston, Massachusetts, USA. April 27 - 28, 2015.
4. Early Career Geoscience Faculty Workshop Program, College of William and Mary. Williamsburg, Virginia, USA. July 26 - 31, 2015.
5. Scholarship of Teaching and Learning (SoTL), Institute for Teaching & Learning Excellence (ITLE), Oklahoma State University. Stillwater, Oklahoma, USA. Spring 2015.
6. Grant Writers' Seminar and Workshops, Oklahoma State University. Stillwater, Oklahoma, USA. October 14, 2015.

ADVISEES

University of Tokyo (co-advising)

Master Students

1. Vitsarut Attavitkamthorn. Thesis: Metamodeling of gas flooding EOR in Pattani Basin, Thailand.
   Spring 2011 - Spring 2013. Completed.
2. Hualong Li. Thesis: Global optimization of well placement for CO_2 injection and brine production based on an iterative Latin hypercube sampling method.
   Spring 2012 - Spring 2014. Completed.
3. Omer Ishag. Thesis: Uncertainty analysis of maximum sustainable injection rate in CO_2 geological storage.
   Spring 2012 - Spring 2014. Completed.

Oklahoma State University

Ph.D. Students

1. Abather Alhallaf. Thesis: Groundwater modeling of the Ogallala aquifer,
   Spring 2021 - Present.
2. Khalid Omar. Thesis: Treatment of produced water for heavy metals and NORM.
   Fall 2019 - present.
3. Olubukola Ishola. Thesis: Understanding the relationship between the microstructure and flow properties of carbonates.
   Fall 2019 - present.

4. Pouyan Ebrahimi. Thesis: Studies on the mobility and transport of barium present in unconventional petroleum produced water disposed into saline aquifers.
   Fall 2014 - Spring 2018. Completed.
   Postdoctoral Scholar at the Department of Geological and Petroleum Engineering, Missouri University of Science & Technology (June, 2018 ~).
5. Babak Shabani. Thesis: Beneficial use of produced water and CO_2 in depleted oil reservoirs: In-situ microbial conversion of crude oil to CH_4.
   Fall 2015 - Spring 2019. Completed.
   Research Scientist at Indiana Geological & Water Survey. Indiana University Bloomington (June, 2019 ~).

Master Students

6. Valentine Ezennubia. Research: Petroleum produced water remediation by the stimulation of indigenous methanogenic microbial communities.
   Spring 2021 - Present.
7. Joshua York. Research: Stimulation of microbial methanogenesis from CO_2 and oil in the Cushing oil field.
   Fall 2015 - Spring 2017.
8. Kyle Obenberger. Research: Impact of CO_2 injection on the petrophysical properties of clay bearing porous media.
   Fall 2014 - Fall 2015.
9. Jesse Blumenthal. Research: Fate and transport of biocide reagents (Glutaraldehyde) in tight porous media at deep geological formation conditions.
   Fall 2014 - Spring 2015.
10. Tristan Seabeck. Research: Reactive transport simulation of CO_2 injection into depleted carbonate oil reservoirs.
    Spring 2015 - Fall 2016.

Undergraduate Students

11. Daniela Ferguson. Research: Treatment of produced water for dissolved oil.
    Spring - 2021.
12. Toby Williams. Research: Reactive transport of biocide reagents through shale gas and dolomite rocks.
    Fall 2015 - Spring 2016. Completed.
13. Katie Spencer. Research: Mobility of glutaraldehyde in hydraulically fractured shale gas reservoirs.
    Fall 2017. Completed.

Accomplishments of advisees

1. American Geophysical Union (AGU) Virtual Student Travel Grant: 2020 (Olubukola Ishola).
2. General Scholarship sponsored by the Oklahoma City Section of Society of Petroleum Engineers (SPE): 2020 (Olubukola Ishola).
3. American Association of Petroleum Geologist Foundation (AAPG) Grants-in-Aid Program Research Grant: 2020 (Olubukola Ishola).
4. Third-place prize award for app idea FlowCalc 1.0, Oklahoma State University's annual app competition: 2019 (Olubukola Ishola).
5. Oklahoma State University Holistic Science Prize: 2019 (Babak Shabani).
6. Oklahoma Water Resources Center Research Grant: 2019 (Babak Shabani).
7. Best Presentation Award, 37th Annual Technical Conference, National Association of Black Geologists (NABG): 2018 (Pouyan Ebrahimi).
8. Geological Society of America (GSA) Graduate Student Research Grant: 2018 (Babak Shabani).
9. Recognized as the Outstanding Graduate Teaching Assistant, Oklahoma State University Graduate College: 2018 (Pouyan Ebrahimi).
10. Society of Petrophysics and Well Logging Analysts Research Grant (SPWLA): 2017 (Pouyan Ebrahimi).
11. Graduate Student Research Grant, Geological Society of America (GSA): 2017 (Pouyan Ebrahimi).
12. Robberson Summer Research Fellowships/Grants, Oklahoma State University Graduate College: 2016 (Pouyan Ebrahimi).
13. Unconventional Resources Special Interest Group Scholarship (UR-SIG): 2016 (Pouyan Ebrahimi).

THESIS COMMITTEE MEMBER

Oklahoma State University

Ph.D. Students

1. Ibukunoluwa, Bode-Omoleye (Geology). Thesis: An integrated characterization of micro- to nano-porosity in carbonate rocks. Spring 2015 - Summer 2019. Completed.
2. Liang Xu (Geology). Thesis: Morpho-tectonic analysis of the east African rift system. Spring 2017 - Summer 2018. Completed.
3. Rob Agnew (Environmental Sciences). Thesis: Degasification of groundwater. Fall 2016 - Spring 2019. Completed.
4. Nelly Ruiz (Biosystems and Agricultural Engineering). Thesis: Assessing potential links between hydrocarbon production and reported water pollution in Oklahoma. Fall 2016 - Spring 2019. Completed.
5. Md Ibrahim (Integrative Biology). Thesis: Interactions of chloride in the toxicity, accumulation, and bio-reactivity of copper and silver in fish.

Fall 2017 - present.

6. Sushobhan, Pradhan (Chemical Engineering). Thesis: Microfluidics based enhanced oil recovery (EOR).
   Fall 2017 - present.

Master Students

7. Jhon Hager (Geology). Thesis: Evaluating macropore flow with temporal ERI in riparian areas.
   Fall 2018 - Spring 2021.
8. Kyle Spears (Geology). Thesis: Evaluation of potential paleochannels in the Washita alluvium and terrace.
   Fall 2020. Completed
9. Braden Hrencher (Geology). Thesis: Hydrologic Processes at interfaces cause changes in geophysical signatures.
   Fall 2015 - Spring 2018. Completed.
10. Ines Barrios Galindez (Geology). Thesis: Evaluation of geomorphic proxies from high resolution topographic DEMs in oblique subduction zones: Western Puerto Rico.
    Fall 2015 - Spring 2018. Completed.
11. Charles Missi (Geology). Thesis: Physical, chemical and isotopic characteristics of groundwater and surface water in the lake Chilwa basin, Malawi.
    Fall 2015 - Spring 2018. Completed.
12. Cullen Pickens (Geology). Thesis: Field evaluation of diesel mass removal in dolomite karst.
    Spring 2015 - Fall 2016. Completed.
13. Jon Fields (Geology). Thesis: Hydrogeophysical characterization of swine effluent amend soils in mantled karst. Fall 2014 - Fall 2016. Completed.
14. Sundeep Sharma (Geology). Thesis: Seismic imaging of biofilm in porous media.
    Fall 2014 - Fall 2016. Completed.

MEMBERSHIPS

1. American Geophysical Union (AGU).
2. Society of Petroleum Engineers (SPE).
3. American Chemical Society (ACS).
4. Geological Society of America (GSA).
5. Geochemical Society (GS).