

Layla N. Izadi

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Professional Appointment

2023 – Present **Research Scientist**
Department of Sustainable Earth Systems Sciences, University of Texas at Dallas,
Richardson, TX, USA

Education

2016 – 2023 **Ph.D.**, Soil Sciences, University of Delaware, Newark, DE, USA
Thesis: Arsenic fate during sea-level rise hydrological disturbances

2019 – 2021 **M.CE.**, Civil and Environmental Engineering, University of Delaware, Newark, DE, USA

2010 – 2013 **M.Sc.**, Civil and Environmental Engineering, Kharazmi University, Tehran, Iran
Thesis: Prediction of toxic metals transport from mine processing plants to water resources.

2005 – 2010 **B.Sc.**, Civil Engineering, Shahroud University of Technology, Semnan, Iran

Honors and Awards

2023 **Convergence Research (CORE) Institute Fellowship**, San Diego, CA, USA.

2022–2024 **Engineering Postdoctoral Fellowship (eFellows)**, American Society for Engineering Education, Washington DC, USA.

2022 **SSSA and USNC/SS World Congress of Soil Science Travel Award**, Madison, WI, USA.

2022 **The David and Wells Willis Grant**, University of Delaware, Newark, DE, USA.

2022 **Student Travel Award for the Spring 2022 ACS National Meeting**, San Diego, CA, USA.

2021 **Donald L. and Joy G. Sparks Fellowship**, University of Delaware, Newark, DE, USA.

2020 – 2022 **DENIN Environmental Fellowship**, University of Delaware, Newark, DE, USA.

2020 **Sam and Wyn Wharry Grant**, University of Delaware, Newark, DE, USA.

2019 **Travel Grant for Early Career Scientist Interdisciplinary Workshop**, Ocean Observatories Initiative, Washington, DC, USA.

2018 **Environmental Biogeochemistry Grant**, University of Delaware, Newark, DE, USA.

2018 **Travel Grant for Early Career Interdisciplinary Workshop**, Ocean Observatories Initiative, Washington, DC, USA.

2018 **Travel Grant for Early Career Data Workshop**, Ocean Observatories Initiative, New Brunswick, NJ, USA.

2016 – 2022 **Doctoral Fellowship**, University of Delaware, Newark, DE, USA.

2016 – 2022 **Tuition Waiver Scholarship**, University of Delaware, Newark, DE, USA.

2013 **Ranked 1st among the graduates of Environmental Engineering**, Kharazmi University, Tehran, Iran.

2003 **Among top 100 in the Iranian National Chemistry Olympiad**, Tehran, Iran.

2003 **Kharazmi¹ Award** for designing and manufacturing an electronic counter, Tehran, Iran.

Research Interests

- Cycling and the fate of contaminants in dynamic environments.
- Environmental soil chemistry.
- Solute transport processes laboratory study, analysis, and modeling.

¹ A national competition for young inventors.

Research Experience

2023 – Present **Research Scientist/Director** of Environmental Soil Biogeochemistry (ESB) Laboratory
Department of Sustainable Earth Systems Sciences, University of Texas at Dallas,
Richardson, TX, USA

Climate change–contamination interaction processes

Overview: The ESB is an interdisciplinary research group dedicated to understanding the impacts of climate–change–induced stressors, such as sea–level rise (SLR), salt–water flooding/intrusion, and drought on the biogeochemical cycling and fate of contaminants and nutrients. We also focus on developing machine learning (ML) models for accurately predicting the fate and transport of different contaminants in contaminated soils and water resources under different environmental conditions.

2018 – 2023 **Research Assistant**, Advised by Prof. Donald Sparks
Department of Plant and Soil Sciences, University of Delaware, Newark, DE, USA

Impacts of sea–level–rise–induced flooding on coastal contaminants

The impact of sea–level–rise–induced flooding on the release and speciation of arsenic and selected hazardous chemicals from flood–prone contaminated coastal sediments were evaluated through advanced erosion experiments and synchrotron analysis.

2016 – 2018 **Research Assistant**, Mentored by Dr. Deb Jaisi
Department of Plant and Soil Sciences, University of Delaware, Newark, DE, USA

Dynamics and mechanisms of nutrient exchange at the sediment–water interface

The impact of flooding on the remobilization of various phosphorus pools from East Creek sediments in the Delmarva Peninsula, within the Chesapeake Bay watershed, was explored through laboratory erosion experiments and oxygen isotope ratios in phosphate.

2015 – 2016 **Researcher**, Mentored by Dr. Wen Deng
Department of Civil, Architectural and Environmental Engineering, Missouri University of
Science & Technology, Rolla, MO, USA

Numerical modeling of flow and transport through fractures

Developed an efficient quasi–3D random walk particle tracking algorithm based on a 2D flow field to simulate solute transport through natural fractures.

2011 – 2013 **Research Assistant**, Supervised by Dr. G. Assadollah Fardi
Department of Civil Engineering, Kharazmni University, Tehran, Iran

Simulation of toxic metals transport from tailings of mine processing plants to water resources

HP1 model and the PHREEQC database were used to investigate the reactive transport of heavy metals through mining soils under different environmental conditions.

Research Grant Support

1. **Constraining dynamic biogeochemical response to flooding in coastal urban and peri–urban soils**

Sponsor: Natural Resources Conservation Service – United States Department of Agriculture

Award #: NA/is selected for funding

PI/Co–PIs: PI: Szerlag, K., Co–PI: Aburto, F., Izaditame, L.

Duration: September 2024 – August 2027

Amount: **\$499,925.00**

Summary: With this project, we proposed a systematic, in–depth evaluation of changes in dynamic hydrological and biogeochemical soil properties at different spatial and temporal scales due to climate change. The proposed work seeks to create an index of susceptibility of dynamic soil properties to flooding for urban and peri–urban soil carbon, nutrients, and heavy metals.

2. **Effects of Saltwater Flooding on Arsenic Biogeochemical Cycling**
 Sponsor: National Science Foundation
 Award #: Pending
 PI/Co-PIs: PI: **Izaditame, F.**, Co-PI: Siebecker, M.G., Palmer, K.
 Duration: September 1, 2024 – September 1, 2026
 Amount: **\$411,915.00**
 Summary: The objective of this research is to identify at mechanistic and molecular levels the physical (bottom shear force), chemical (Eh and salinity), and biological (changes in biological community) factors that contribute to As mobilization from contaminated soils/sediments impacted by SLR.

3. **Impact of Sea-level Rise and Saltwater Flooding on Arsenic Stability and Soil Ecological Resilience**
 Sponsor: University of Texas at Dallas
 Award #: NA
 PI/Co-PIs: PI: **Izaditame, F.**, Co-PI: Palmer, K.
 Duration: June 2024 – May 2025
 Amount: **\$60,000**
 Summary: This project aims to evaluate the influence of environmental stressors associated with SLR on soil microbial community structure and activity and consequently on As fate.

4. **The impact of climate change on legacy contaminants**
 Sponsor: National Science Foundation, sub-awarded through American Society for Engineering Education
 Award #: 769-2098 / 2127509
 PI/Co-PIs: PI: **Izaditame, F.**, Co-PI: Hyndman, D. W.
 Duration: January 1, 2023 – December 31, 2024
 Amount: **\$259,200**
 Summary: This proposal is to enhance the current understanding of the effects of climate-change-induced perturbations, including SLR and corresponding saltwater flooding, on the mobilization of contaminants from contaminated coastal (Superfund) sites through the synthesis of novel experimental analysis and machine learning approaches.

5. **Environmental geochemistry laboratory establishment**
 Sponsor: University of Texas at Dallas
 Award #: 32355050
 PI/Co-PIs: PI: **Izaditame, F.**,
 Duration: January 2023 – December 2025
 Amount: **\$75,000**
 Summary: This proposal is to establish the physical infrastructure for a laboratory focused on environmental soil chemistry research, education, and technology development. By obtaining the necessary equipment for field/laboratory testing, the lab promotes collaboration among academia, industry, and civic leaders and facilitate the translation of advancements into real-world applications.

6. **Arsenic fate during sea-level rise hydrological disturbances**
 Sponsor: National Science Foundation, NSF, sub-awarded through Delaware EPSCoR's Project WiCCED
 Award #: 1757353
 PI/Co-PIs: PI: Sparks, D. L., Co-PI: **Izaditame, F.** (Fellow)
 Duration: August 2020 – December 2022
 Amount: **\$70,700**
 Summary: State-of-the-art erosion experiments mimicked several forcing conditions in the lab to explicitly examine the influence of turbulent flooding on As behavior. Arsenic concentration and speciation in the solution and direct As speciation of the sediments at different stress levels and time points were obtained through ICP-AES, bulk XANES, μ -XRF, and μ -XANES analysis. This work is performed as part of the DENIN Fellowship at the University of Delaware.

Publications¹

1. Szerlag, K. D., Siebecker, M. G., **Izaditame**, F., Northrup, P., Tappero, R., & Sparks, D. L., (2024). Multi-modal, micro-spectroscopic speciation of legacy phosphorus in two U.S. mid-Atlantic agricultural soils. *Soil Science Society of America Journal*. Accepted. **IF 2.93**
2. **Izaditame**, F., LeMonte, J., Siebecker, M., Yu, X., Fischel, M., Tappero, R., & Sparks, D. L., (2024). Sea-level rise and arsenic-rich Soils: a toxic relationship. *Journal of Hazardous Materials*. Volume 472. DOI: 10.1016/j.jhazmat.2024.134528. **IF 12.2**
3. **Izaditame**, F., Tamadoni^{*}, A., Siebecker, M. G., Sricharoenvech, P., Barreto, M., Fischel, M., Tappero, R., & Sparks, D. L., (2024). Hurricane and turbulent flooding impacts on arsenic release and speciation. *Environmental Science and Technology*. Submitted. **IF 11.6**
4. LeMonte, J. J., **Izaditame**, F., Tappero, R., Rinklebe, J., & Sparks, D. L., (2024). Potential impacts of sea level rise on arsenic mobility and speciation in an urban coastal soil. *ACS Earth and Space Chemistry*. Under Preparation.
5. **Izaditame**, F., Siebecker, M. G., & Sparks, D. L., (2022). Sea-level-rise-induced flooding drives arsenic release from coastal sediments. *Journal of Hazardous Materials*. Volume 423, Part B. DOI: 10.1016/j.jhazmat.2021.127161. **IF 12.2**
6. Abouzari, M., Pahlavani, P., **Izaditame**, F., & Bigdeli B., (2021). Estimating the chemical oxygen demand of petrochemical wastewater treatment plants using linear and nonlinear statistical models – A case study. *Chemosphere*, 270, 129465. DOI: 10.1016/j.chemosphere.2020.129465. **IF 8.1**
7. **Izadi Tame**, F., Fardi, G. A., & Khodadadi, A. (2017). Mathematical modeling of the reactive transport of heavy metals in soil column: Based on PHREEQC and HP1 simulators. *Advances in Environmental Research*, 6(1), 67–81. DOI: 10.12989/aer.2017.6.1.067.
8. Fardi, G. A., Zamanian, M., Mirmohammadi, M., & **Izadi Tame**, F. (2015). Air pollution study using factor analysis and univariate Box-Jenkins modeling for the northwest of Tehran. *Advances in Environmental Research*, 4(4), 233–246. DOI: 10.12989/aer.2015.4.4.233.
9. **Izadi Tame**, F., Damuchali, A. M., Fardi, G. A., and Khodadadi, A., Simulations of the impact of different rainfall intensities on reactive transport of metal contaminants from mine tailings, Proceedings of the 4th International Conference “Hydrus Software Applications to Subsurface Flow and Contaminant Transport Problems”, Prague, Czech Republic, March 2013, pp. 135–144. (ISBN: 978–80–213–2380–3).
10. **Izadi Tame**, F., Fardi, G. A., Khodadadi, A., and Faridzad, M., Investigating the effect of acidic rain on reactive transport of metal contaminants in groundwater, Proceedings of the 4th International Conference “Hydrus Software Applications to Subsurface Flow and Contaminant Transport Problems”, Prague, Czech Republic, March 2013, pp. 145–154. (ISBN: 978–80–213–2380–3).

Conference Presentations

Invited Talks

1. **Izaditame**, F., Climate Change Impacts on Soil and Water Resources, Department of Geosciences, University of Texas at Dallas, November 2023.
2. **Izaditame**, F., Climate Change Impacts on Soil and Water Resources, Department of Crop and Soil Sciences, Texas A&M University, April 2023.
3. **Izaditame**, F., Arsenic Fate During Sea-Level Rise Hydrological Disturbances, Department of Geosciences, Princeton University, December 2022.
4. **Izaditame**, F., Climate Change Impacts on Contaminated Coastal Sediments, *The 6th Seds Online Student Webinar*, April 2022.

Presentations

1. **Izaditame**, F., Siebecker, M. G., Sricharoenvech, P., and Sparks, D. L., Climate change and arsenic behavior in soils. *2023 ASA-CSSA-SSSA International Annual Meeting*, St. Louis, MO, November 2023.

¹ Underline^{*} indicates supervised graduate students.

2. **Izaditame, F.**, Siebecker, M. G., and Sparks, D. L., Rising Seas Bring Dead Contaminants Back to Life! *22nd World Congress of Soil Science*, Glasgow, Scotland, August 2022.
3. **Izaditame, F.**, Siebecker, M. G., and Sparks, D. L., Impacts of sea-level rise on the fate of arsenic in contaminated coasts, *ACS Spring 2022 Conference*, San Diego, CA, March 2022.
4. **Izaditame, F.**, Siebecker, M. G., and Sparks, D. L., How does Sea-level Rise Impact Pollution Release in Contaminated Coasts? *2021 ASA-CSSA-SSSA International Annual Meeting*, Salt Lake City, UT, November 2021.
5. **Izaditame, F.**, Siebecker, M. G., and Sparks, D. L., Elemental cycling from contaminated coastal sediments subjected to varying SLR-induced flooding intensities, *ACS Spring 2021 Conference*, April 2021.
6. **Izaditame, F.**, Siebecker, M. G., Tappero, R., Sricharoenvech, P., and Sparks, D. L., Arsenic fate under the shadow of sea-level rise, *ACS Spring 2020 National Meeting*, Philadelphia, PA, US, March 2020.
7. **Izaditame, F.**, Siebecker, M. G., Tappero, R., Sricharoenvech, P., and Sparks, D. L., How Does Sea-Level-Rise Affect the Release of Pollutants from Flood-Prone Contaminated Coastal Sediments? *AGU Fall Meeting*, San Francisco, CA, US, December 2019.
8. **Izaditame, F.**, Siebecker, M. G., and Sparks, D. L., Sea-Level-Rise-Induced Release of Heavy Metals from Flood-Prone Contaminated Coastal Sediments, *2019 ASA-CSSA-SSSA International Annual Meeting*, San Antonio, TX, US, November 2019.
9. **Izaditame, F.**, and Jaisi, D. P., Effect of sediment resuspension on nutrient concentrations in coastal waters, *Goldschmidt Conference*, Boston, US, August 2018.
10. **Izadi Tame, F.**, Damuchali, A. M., Fardi, G. A., and Khodadadi, A., Simulation of grain size distribution and pH effect on metals reactive transport, *International Conference on Environmental Crises and its Solutions*, Kish Island, Iran, February 2013.

Mentoring Experience

Graduate Students

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| 2023 – Present | Amin Tamadoni , Ph.D., Geosciences, University of Texas at Dallas
Project: Predicting arsenic levels in the U.S. Subwatersheds using explainable AI |
| 2023 – Present | Oluwaseun Adeyemi , Ph.D., Geosciences, University of Texas at Dallas
Project: Salinity impacts on arsenic release and speciation |
| 2024 | Giorgi Mindaishvili , Visiting Ph.D., Geosciences, University of Texas at Dallas
Project: Machine learning-based field geological mapping |
| 2023 | Irinka nikolaishvili , Visiting Ph.D., Geosciences, University of Texas at Dallas
Project: Climate change impacts on arsenic transport in soil and water quality |

Undergraduate & Highschool Students (selected)

Alyssa Denise Alberca Trasporto, *Enhance the role of microbes in biodegradation of PFAS-contaminated soils*, Biochemistry, University of Texas at Dallas, 2023.

Joanna Jia, Climate change impacts on phosphorus fate and cycling, Centennial High School, 2024.

Teaching Experience

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| 2024 | Instructor , University of Texas at Dallas, Dallas, TX, USA
Course: Environmental Aspects of Soil (GEOS 5V08)
Teaching the fundamentals of soils including origin, composition, classification, physical, chemical, and biological properties and processes. We will also study how elements and compounds, including plant nutrients, potentially toxic metals, metalloids, and organic compounds, react with the solid, aqueous, and gaseous compounds of soil. |
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- 2019 – 2021 **Teaching Assistant**, University of Delaware, Newark, DE, USA
 Course: Environmental Soil Chemistry (PLSC 608); Instructor: Dr. Donald Sparks
 Designing/grading exams, course project, and homework assignments, teaching course sessions, holding office hours
- 2013 – 2014 **Teaching Assistant**, Tarbiat Modarres University, Tehran, Iran
 Course: Quality Management of Water Resources; Instructor: Dr. Ahmad Khodadadi
 Teaching Hydrus 1D, and HP1 software to Master level students.

Professional and Public Services

Journal Reviewer

- Agrosystems, Geosciences & Environment
- Environmental Engineering Science
- Recent Advances in Food, Nutrition & Agriculture

Scholarly Services

- **Symposium Organizer**, Biogeochemical Dynamics Under Climate–Driven Hydrologic Regime Shifts Symposium, 2024 ASA, CSSA, SSA International Annual Meeting, San Antonio, TX, USA, November 2024: the symposium is dedicated to unraveling the complex interactions between soil processes, particularly biogeochemical cycling of contaminants and nutrients, and evolving hydrologic patterns influenced by climate change.
- **Session Organizer**, Nutrient and Trace Metal Cycling in a Changing Climate, 2024 ASA, CSSA, SSA International Annual Meeting, San Antonio, TX, USA, November 2024: This session is centered on research on the topics of macro and micronutrients in soils and fertilizers and how their chemical behaviors are affected by climate change.
- **Faculty Mentor/Host**, Training Programs for Georgian Scholars (TSU–UTD Program), University of Texas at Dallas, 2023 – Present: This eight–week program involves travel to Dallas, Texas, which begins with a two–week intensive English program, followed by training in academic and grant writing, dissertation preparation, presenting to academic audiences, and lessons on mentorship and student support while spending time each day in a UT Dallas laboratory, experiencing running a laboratory, interacting with students, and writing results.

Synergistic Activities

- **Delaware 4–H Youth Development Instructor**, Camp Barnes, DE, USA, June 2021, and 2022: Developed outreach and teaching materials on environmental– and ocean–related topics and gave lectures to K–12 campers through the University of Delaware Cooperative Extension program.
- **Greenest Blue Hens Competition Organizer**, University of Delaware, DE, USA, May 2021: Organized the [Greenest Blue Hen](#) challenge focused on restoring the earth through creative communications and actions.
- **PLSC EmPOWER Mentor**, University of Delaware, DE, USA, July 2021 – 2023: Supporting new local and international graduate students in the Plant and Soil Sciences Department during their transition to graduate school.
- **Pitch:90 Organizer**, Delaware Environmental Institute, Newark, DE, USA, 2019–2023: Pitch:90 is an elevator pitch competition in which researchers describe their work in 90 seconds to a panel of judges and an enthusiastic audience.
- **NOSB Question Writer**, The National Ocean Sciences Bowl, Washington, DC, USA, 2018–2019: The [NOSB](#) is an academic competition and program that addresses a national gap in environmental and earth sciences in public education by introducing high school students to and engaging them in ocean science, preparing them for STEM careers, and helping them become knowledgeable citizens and environmental stewards.
- **Member of PLSC JEDI Committee**, University of Delaware, DE, USA, July 2021 – December 2022: The justice, equity, diversity, and inclusion (JEDI) group provides recommendations for upper administrations and departmental faculty at the Department of Plant and Soil Sciences of the University of Delaware to facilitate changes that create a more inclusive community.

- **Interview Panelist**, Delaware Environmental Institute (DENIN), University of Delaware, DE, USA, June 2021 – August 2021: I served as a member of the interview panels to evaluate the applications and interview DENIN director candidates and DENIN environmental fellows.
- **American Society of Civil Engineers – Delaware Section Undergraduate Scholarship Judge**, DE, USA, 2021, Judged essays and application materials for the American society of civil engineers – Delaware section undergraduate scholarship application.
- **DENIN Symposium Organizer**, University of Delaware, DE, USA, March 2021 (and 2022): Organized 6th (and 7th) Annual DENIN Research Symposium for posters and paper presentations on diverse environmental research topics.
- **Greenest Blue Hen Event Organizer**, University of Delaware, DE, USA, June 2021: The Greenest Blue Hen Challenge 2021 aimed to recognize and celebrate University of Delaware students for their personal environmental actions and commitments. Spanning three weeks leading up to Earth Day, participants engaged in daily sustainability activities focused on Greener Energy, Waste, and Food.
- **Earth Week Celebration Organizer**, University of Delaware, DE, USA, 2021, a series of sustainability-focused events including the screening of Salted Earth, a documentary on seawater intrusion, a clothing swap, and regional clean-up efforts were organized.
- **Member of the OOI Early Career Scientist Community of Practice**, Ocean Observatories Initiative, Washington, DC, USA, 2018 – Present: Developed and fostered a community of practice around open science and ocean observatory data to tackle complex public and scientific challenges in marine science.

Work Experience

- 2011 – 2015 **Civil Engineer and EHS Manager, Sakoo Consulting Engineers**, Tehran, Iran
- Reviewed design documents, dam safety reports, and construction data.
 - Performed geotechnical, structural or hydrotechnical analyses.
 - Controlled feasibility and environmental impact studies.
 - Conducted dam structures inspections and participated in post-event inspections.

Professional Development

- Effective Teaching Practices: Cohort E, University of Texas at Dallas, Association of College and University Educators (ACUE), Fall 2024 – Spring 2025.
- Gentle Introduction to AI, University of Texas at Dallas, Dallas, TX, USA, February 2024.
- Summer Institute on Teaching, University of Delaware, Newark, DE, USA, June 2020.
- Summer Institute on Teaching, University of Delaware, Newark, DE, USA, June 2019.
- Early Career Scientist Interdisciplinary Workshop, Ocean Observatories Initiative, Washington, DC, USA, May 2019.
- Early Career Interdisciplinary Workshop, Ocean Observatories Initiative, Washington, DC, USA, September 2018.
- Early Career Data Workshop, Ocean Observatories Initiative, Rutgers University, New Brunswick, NJ, USA, July 2018.

Technical Skills

Computer Skills

- Proficient in: HYDRUS models, Microsoft Office Word, PowerPoint, and Excel.
- Skilled in: SAP, ETABS, SAFE, AutoCAD, C# Programming language, Mathcad.
- Familiar with: HYDROGEOCHEM models (PHREEQC2), Visual MINTEQ, MATLAB, EPANET.

Analytical Chemistry Skills

- Proficient in: Isotope Ratio Mass Spectrometry, X-ray absorption spectroscopy (XAS)
- Familiar with: HPLC, IC, XRD, NMR, SEM, XRF